00:00:00.000 --> 00:00:01.730
Jeff Weinrich (Guest)
Hello this is Jeff can you hear me OK?

00:00:06.280 --> 00:00:10.780
Matt Fronzak
Little little weak Jeff I don't know if you were whispering or.

00:00:06.870 --> 00:00:07.240
Jeff Weinrich (Guest)
Or.

00:00:10.730 --> 00:00:11.360
Jeff Weinrich (Guest)
Wow.

00:00:12.460 --> 00:00:13.550
Jeff Weinrich (Guest)
Uh how about now.

00:00:14.250 --> 00:00:15.180
Matt Fronzak
Little better, yeah.

00:00:15.390 --> 00:00:16.630
Jeff Weinrich (Guest)
OK great thanks.

00:00:18.980 --> 00:00:45.810
Matt Fronzak
And Uh Jeff to your your question earlier, I can see where on the the the detailed agenda. There was an item in there about reviewing yesterday. It it will be it will be not at all extensive and and just kind of and in passing mention so. So you're likely to be handed the ball prior to the time listed on the detailed agenda.

00:00:46.530 --> 00:00:54.370
Jeff Weinrich (Guest)
No problem and I will we'll just get started will have a longer time for discussion and it ends early will will just like garlic.

00:00:54.690 --> 00:00:55.260
Matt Fronzak
Bigger.

00:01:48.110 --> 00:01:48.660
Matt Fronzak
Plus.

00:03:09.420 --> 00:03:10.750
Matthias Steiner (Guest)
Good morning, everyone.

00:03:13.290 --> 00:03:14.060
Ryan, Thomas E-CTR (FAA)
Audi Sir.

00:03:19.150 --> 00:03:25.570
Matt Fronzak
You know, Matthias when you when you say it that way. I flashback to doctor Carl has?

00:03:26.500 --> 00:03:37.220
Matt Fronzak
Do you ever listen to national public radio and and his show he would he would always start out with this wonderfully mellifluous.

00:03:38.320 --> 00:03:40.080
Matt Fronzak
Hello everybody.

00:03:43.040 --> 00:03:44.720
Matthias Steiner (Guest)
We have a nice accent, you mean.

00:03:45.470 --> 00:03:50.680
Matt Fronzak
With a little bit of an accent in there just a wee wee bit of an accent in this.

00:04:02.230 --> 00:04:03.920
Matt Fronzak
Dave strand won't do a sound check.

00:04:05.280 --> 00:04:05.940
David A Strand
No.

00:04:06.510 --> 00:04:08.020
Matt Fronzak
OK, good you sound great.

00:04:08.260 --> 00:04:09.720
David A Strand
Good is this at all right.

00:04:09.970 --> 00:04:10.410
Matt Fronzak
Yes.

00:04:10.830 --> 00:04:11.480
David A Strand
Alright.

00:04:12.870 --> 00:04:15.980
Matthias Steiner (Guest)
Is Dave doing that chat room again today?

00:04:16.230 --> 00:04:27.880
Matt Fronzak
Dave is the the chat Meister today and uh and Jeff come. You know you. You you can use and abuse. Dave any way you'd like.

00:04:27.930 --> 00:04:46.640
Matt Fronzak
Come Randy on Day One basically handed the ball over to Dave at the end of each of the sessions and he kind of went through the questions yesterday. Nancy preferred to to run that herself or to let her presenters. You know, do double duty. So, your call on that.

00:04:47.370 --> 00:04:52.080
Jeff Weinrich (Guest)
No uh that's fine for Dave to answer the question and answer session.

00:04:47.580 --> 00:04:48.120
David A Strand
What would

00:04:53.040 --> 00:04:53.400
Matt Fronzak
K.

00:04:54.390 --> 00:05:01.140
David A Strand
or if you need whatever you need for me just let me know Jeff but otherwise I'll I'll just watch.

00:05:01.540 --> 00:05:04.720
Jeff Weinrich (Guest)
Thank you, yeah, I'm I'll plan on you know.

00:05:05.920 --> 00:05:11.580
Jeff Weinrich (Guest)
Introducing each speaker with the bio and then sharing the presentation.

00:05:12.910 --> 00:05:21.500
David A Strand
OK and and if you change your mind just just let me know it. You know it kind of depends on the flavor of the presentation sometimes it's.

00:05:22.780 --> 00:05:35.920
David A Strand
You know hard keeping track of the chat. It's a little easier. I think in teams. But when we've done it in zoom in the past. Sometimes it was, it was a little bit overwhelming to try to be watching too many things at once.

00:05:27.300 --> 00:05:27.770
Jeff Weinrich (Guest)
Yeah.

00:05:34.160 --> 00:05:39.170
Jeff Weinrich (Guest)
Yeah, yeah, yeah, I think that's probably too much for one person. So, yeah, I'd be happy to take the help.

00:07:05.380 --> 00:07:10.560
Jeff Weinrich (Guest)
Good morning, everyone this is Jeff Leonard just want to take a roll call for speakers.

00:07:11.150 --> 00:07:12.640
Jeff Weinrich (Guest)
Uh Coral Garman.

00:07:18.510 --> 00:07:19.830
Jeff Weinrich (Guest)
Uh is ordained.

00:07:25.890 --> 00:07:26.800
Jeff Weinrich (Guest)
Kathy rice?

00:07:29.510 --> 00:07:30.620
Jeff Weinrich (Guest)
Even more lava.

00:07:30.430 --> 00:07:37.720
Smith, Kristin A (KSC-SII10)
Hey, sorry, it's Christmas Smith. I'm going to be filling in for Kathie Rice today. She had an emergency that she had to take care of it.

00:07:37.960 --> 00:07:39.030
Jeff Weinrich (Guest)
OK, no problem.

00:07:42.960 --> 00:07:44.510
Lt Col Omar Nava (Guest)
Open this is a Omar Nova.

00:07:45.060 --> 00:07:45.540
Jeff Weinrich (Guest)
Great.

00:07:45.290 --> 00:07:45.590
Lt Col Omar Nava (Guest)
Over.

00:07:52.720 --> 00:07:53.490
Matt Fronzak
That was a good move.

00:07:53.540 --> 00:07:57.770
Matt Fronzak
Move on, UM Jeff now you know how much dancing you're going to have to do.

00:08:00.670 --> 00:08:02.270
Jeff Weinrich (Guest)
I'm not the best dancer but I can try.

00:08:04.470 --> 00:08:07.460
Bass, Randy (FAA)
Hey Jeff I just sent you all the BIOS I have.

00:08:08.130 --> 00:08:09.760
Jeff Weinrich (Guest)
Thank you I I printed them all out.

00:08:09.820 --> 00:08:14.190
Jeff Weinrich (Guest)
Uh so I I have them here on paper. Thank you and I'll use that as a backup.

00:08:21.190 --> 00:08:27.390
Jeff Weinrich (Guest)
So we'll just wait another moment or 2 for our other speakers to join then we'll we'll get started.

00:08:28.040 --> 00:08:34.770
Matt Fronzak
Yeah, and I see Carl is here, Jeff so who was who was the second one on your list.

00:08:30.700 --> 00:08:31.050
Jeff Weinrich (Guest)
Right.

00:08:34.950 --> 00:08:36.080
Jeff Weinrich (Guest)
Uh he's well being.

00:08:42.310 --> 00:08:45.460
Matt Fronzak
Uh and I don't see Hazel at this time.

00:08:45.790 --> 00:08:46.230
Jeff Weinrich (Guest)
OK.

00:08:46.850 --> 00:08:47.520
Jeff Weinrich (Guest)
Well, uh.

00:08:49.360 --> 00:08:51.360
Jeff Weinrich (Guest)
So my keeping Hazel.

00:08:52.870 --> 00:08:55.890
Jeff Weinrich (Guest)
Well, you know, we will get started and she can join.

00:08:57.030 --> 00:08:57.570
Jeff Weinrich (Guest)
At the end.

00:08:59.330 --> 00:08:59.630
Jeff Weinrich (Guest)
Both.

00:09:01.560 --> 00:09:04.200
Matt Fronzak
Randy is that something you can do reach out to Hazel.

00:09:06.730 --> 00:09:13.640
Bass, Randy (FAA)
Yeah, I'll see if I can track her down. I heard from her last night or this morning. So hopefully, she's just running a little bit late.

00:09:14.050 --> 00:09:14.230
Matt Fronzak
Yeah.

00:09:14.840 --> 00:09:41.680
Matt Fronzak
Cool, alright. Well, it's uh it's 1132 coming up on 33 on my watch so good morning. Everybody and welcome to day. 3 of the friends and partners in aviation weather special aviation. Federal Aviation weather. Technical exchange meeting, which is a mouthful and a half, especially if you haven't had quite enough coffee yet, this morning.

00:09:43.010 --> 00:10:04.330
Matt Fronzak
I I I I must say days one and 2 have at least from my perspective. I'm not disappointed and dumb and I looking at today's agenda. The lineup of speakers and topics. It seems to me that that day, 3, will not will not disappoint either.

00:10:04.740 --> 00:10:05.570
Matt Fronzak
Uhm.

00:10:06.180 --> 00:10:36.150
Matt Fronzak
A day 3, will be led by Mister Jeff Wine Rich and Jeff is if I can get to the right page. Here he is supports the National Weather Service Office of Science and technology integration and works for the science and Technology Corporation. Before we hand it off to Jeff. However, I intern and going to hand it off to the the.

00:10:36.200 --> 00:10:51.010
Matt Fronzak
Don't let the much more sophisticated and Erudite Matthias Steiner, who will go over our administrative items and then after he's done will give the ball to Jeff and let him start running Matthias.

00:10:55.380 --> 00:11:01.640
Matthias Steiner (Guest)
Well, thank you for getting us started here mapped and can you take the next slide please?

00:11:02.290 --> 00:11:26.540
Matthias Steiner (Guest)
Uh welcome from my side as well here for the 3rd day of this year 's fall. F per meeting and as you can see today. We will talk about commercial space and multi use weather and future weather. So it's quite an interesting mix of aspects that we will be discussing today.

00:11:27.550 --> 00:11:33.530
Matthias Steiner (Guest)
A planning meeting will be then. On October 20 that is kind of a look beyond.

00:11:33.580 --> 00:12:00.340
Matthias Steiner (Guest)
Uh this meeting, but looking ahead of topics that we may be discussing in the spring meeting, or next fall meeting a year from now, so if you're interested in helping shape the future of F per meeting. Please join us on the planning meeting will be a same time frame 11:30 AM to about 4:00 PM eastern on that day.

00:11:43.450 --> 00:11:43.760
+16*******38
My God,

00:11:58.280 --> 00:11:58.540
+16*******38
like.

00:11:59.640 --> 00:12:00.030
+16*******38
So yeah,

00:12:00.640 --> 00:12:01.020
+16*******38
cool.

00:12:00.970 --> 00:12:11.700
Matthias Steiner (Guest)
Uh information is also on the F power website where you could submit potential topics that you may wanna have considered for future discussions.

00:12:02.010 --> 00:12:02.300
+16*******38
Yeah.

00:12:07.320 --> 00:12:07.750
+16*******38
Yeah, yeah.

00:12:10.060 --> 00:12:10.580
+16*******38
I agree.

00:12:13.090 --> 00:12:13.490
+16*******38
Yes.

00:12:13.270 --> 00:12:42.040
Matthias Steiner (Guest)
In terms of today's meeting, please, mute your microphone 's. If you're not talking that really helps minimizing background noise and we're using the chat room as in the past couple of days where you can submit questions and comments and David Strand is monitoring the chat room and he will assist Jeff with the discussion let that way.

00:12:16.050 --> 00:12:16.890
+16*******38
Yeah, yeah.

00:12:42.870 --> 00:12:48.440
Matthias Steiner (Guest)
So without further ado, I will hand it over to Jeff to take it from here, thank you.

00:12:49.360 --> 00:12:51.320
Jeff Weinrich (Guest)
Thank you and welcome everyone.

00:12:52.070 --> 00:12:52.660
Jeff Weinrich (Guest)
Uh.

00:12:54.440 --> 00:13:02.460
Jeff Weinrich (Guest)
You have any exciting day planned so our first session will be weather support to commercial space.

00:13:03.490 --> 00:13:13.050
Jeff Weinrich (Guest)
How will the boom and commercial space affect aviation weather operations? What are the requirements with the roles will government agencies playing weather support for these up?

00:13:17.850 --> 00:13:24.970
Jeff Weinrich (Guest)
It would be talking about strategic pillows orbital flights launch and reentry at the planetary travel our first speaker.

00:13:25.440 --> 00:13:27.640
Jeff Weinrich (Guest)
Uh and so or format if you haven't.

00:13:27.690 --> 00:13:34.880
Jeff Weinrich (Guest)
Uh joined us this week will be a short presentation by each of the.

00:13:35.650 --> 00:13:36.650
Jeff Weinrich (Guest)
Uh panelists.

00:13:37.740 --> 00:13:48.610
Jeff Weinrich (Guest)
And then we'll get into discussion modes with the panel. So we're not going to be death by PowerPoint today. Just a lot of engaging discussion so our first.

00:13:49.580 --> 00:13:50.080
Jeff Weinrich (Guest)
Uhm.

00:13:50.650 --> 00:14:19.940
Jeff Weinrich (Guest)
Panelist is Karl Harmon and he is an aerospace engineer at the FAA 's Office of commercial space. Transportation he collaborates collaboratively and assists. The office to encourage fertility so Sillett 8 and promote commercial space launches and Reentries by the private sector, with particular emphasis

on ensuring public safety privacy. It is Ms in aerospace engineering and pH D and earth and Emma Spheric Sciences from Purdue University at Purdue he also.

00:14:21.430 --> 00:14:50.450
Jeff Weinrich (Guest)
Was a research pilot for the NSF funded airborne laboratory for Atmospheric Research Haylor. He also earned an MBA in ESO security answer staging studies from the US War College. He associate fellow of the American Institute of aeronautics and astronautics AIA and is a former chair of its flight testing technical committee. He's the technical chair for AA ascend 2021 space conference taking place this November.

00:14:51.430 --> 00:14:52.440
Jeff Weinrich (Guest)
Welcome.

00:14:53.700 --> 00:14:54.520
Jeff Weinrich (Guest)
Carl.

00:14:56.240 --> 00:14:58.010
Garman, Karl E (FAA)
Greetings Jeff Greetings everybody.

00:14:59.500 --> 00:15:03.880
Garman, Karl E (FAA)
Uhm queue up the slides uh are you driving or do you prefer that I just?

00:15:03.940 --> 00:15:06.740
Garman, Karl E (FAA)
Uh uh like drive from my computer.

00:15:07.050 --> 00:15:13.860
Jeff Weinrich (Guest)
Well, whatever you prefer, if it's easier for you, you can you can share your your screen, but I I have yours ready as well?

00:15:14.370 --> 00:15:17.560
Garman, Karl E (FAA)
OK let's let's move to share that.

00:15:18.720 --> 00:15:20.080
Garman, Karl E (FAA)
I'll give that a shot here.

00:15:20.330 --> 00:15:20.780
Jeff Weinrich (Guest)
Alright.

00:15:27.450 --> 00:15:29.320
Garman, Karl E (FAA)
Alright can you see this?

00:15:29.610 --> 00:15:30.470
Matt Fronzak
We got it girl.

00:15:31.740 --> 00:15:34.630
Garman, Karl E (FAA)
OK uh greens everyone UM.

00:15:35.560 --> 00:15:49.160
Garman, Karl E (FAA)
Carl Garmin Office FA office commercial space. Transportation and my thanks to the panel chair. Jeff wine racks for introducing this topic in the following slides, I frame some thoughts for our conversation.

00:15:51.000 --> 00:16:05.620
Garman, Karl E (FAA)
So these images depict the variety of operational concepts of modern commercial space launches. Let's talk about what that involves tourist of all commercial space is definitely not a new entrant.

00:16:06.820 --> 00:16:10.650
Garman, Karl E (FAA)
The FAA has licensed launches since the 1980s.

00:16:11.360 --> 00:16:30.070
Garman, Karl E (FAA)
And they've done so through our authorities in title 51, US code, which essentially is to regulate the safety of commercial space launches and Reentries and we also have another mandate, which is to encourage facilitate and promote commercial space launches and reentries specifically by the private private sector.

00:16:31.270 --> 00:16:38.140
Garman, Karl E (FAA)
What you see from these slides and these were all light FAA licensed activities here?

00:16:38.870 --> 00:17:02.880
Garman, Karl E (FAA)
Ah, the diversity of operating concepts is increasing, so you see both suborbital and orbital vehicles disposable and also reusable capture. Kerry, like you see under the belly of a of an airborne mother ship in the upper left and the center center bottom pics and also the traditional rocket stack like you see in the lower right hand.

00:17:03.690 --> 00:17:15.930
Garman, Karl E (FAA)
Uhm you see also returned to to site and also typical splashdown activities. So the the variety of those operating concepts is increasing, and we license. These all of them.

00:17:16.890 --> 00:17:17.740
Garman, Karl E (FAA)
So next one.

00:17:19.550 --> 00:17:25.600
Garman, Karl E (FAA)
When do you add end up talking to FAA commercial space? Why not space horse? Why not NASA well?

00:17:26.360 --> 00:17:59.020
Garman, Karl E (FAA)
The analogy I use here is it's like the Capital Beltway. If you were going to take a trip around the Capital Beltway. You're dealing with an on ramp and you're dealing with an off ramp and the office of commercial space. Transportation the FA is really are very similar by analogy to that on ramp and that off ramp. If you are a US person to include Corporation or you're launching from the United States or a place subject to US jurisdiction. You have to get a launch license. If you're re entering a spacecraft you need to get a reentry license.

00:17:59.940 --> 00:18:06.300
Garman, Karl E (FAA)
So for you as commercial space activity that's really us where the on ramp and the off ramp.

00:18:08.580 --> 00:18:17.400
Garman, Karl E (FAA)
So that that's kind of like the tie in between aviation or aerospace weather and commercial space is really focused on these on ramps and off ramps.

00:18:17.690 --> 00:18:24.030
Garman, Karl E (FAA)
Uhm weather of course affects the day of of of operations activities considerably.

00:18:24.400 --> 00:18:38.180
Garman, Karl E (FAA)
Uh in commercial space launches and Reentries just like they do in aviation weather so that's a commonality here of those those day of operations activities end up influencing us profoundly.

00:18:39.330 --> 00:18:49.900
Garman, Karl E (FAA)
Well let me talk about just one example just to highlight not the only example. Of course, but just kind of one example of some ways that traditional aviation weather may not.

00:18:49.970 --> 00:19:21.700
Garman, Karl E (FAA)
Ah, Oh might not completely transfer over to to uh space launches and Reentries. If Ramiro logical example. There's something called triggered lightning and rockets primarily like vertical launches. It's a different type. Yet the the physics are the same of course, but the realm of the atmospheric physics that you're dealing with can can differ quite significantly hand have a very profound impacts. Upon your operations So what does weather have to do with commercial space operations?

00:19:21.960 --> 00:19:45.670
Garman, Karl E (FAA)
Beyond the beyond those things like OK, one of those wins or hurricane or rain or something that affects aviation and space launches and Reentries. Let me kind of just tease out one example here of of lightning and in cases where it launch lightning almost changed history. And I want to caveat. This none of the examples that I'm going to show here we're FAA licensed commercial launches.

00:19:46.250 --> 00:19:59.770
Garman, Karl E (FAA)
But we seek to learn the applicable light lessons from each of these experiences take the one on the left and uh my regrets for the for the fuzzy images, a lot of these were very, very short exposure.

00:20:00.180 --> 00:20:01.250
Garman, Karl E (FAA)
Uh uh.

00:20:02.240 --> 00:20:07.920
Garman, Karl E (FAA)
Uh footages on wet film back in the day to capture the phenomena, but on the left.

00:20:08.530 --> 00:20:17.480
Garman, Karl E (FAA)
Apollo 121969 triggered lightning led to near mission failure, so it led to an era board of the second crewed lunar landing mission.

00:20:18.090 --> 00:20:41.660
Garman, Karl E (FAA)
But quick intervention by that crew enabled continued flight that lightning incident almost changed history. 'cause remember Apollo 12 remember what happened just before that was Apollo 11 the first landing on the moon to the lunar surface and back and the following mission. Apollo 13 was itself cut short due to some issues that were already baked into.

00:20:41.930 --> 00:20:44.820
Garman, Karl E (FAA)
Uh to the spacecraft hardware itself.

00:20:45.520 --> 00:21:07.090
Garman, Karl E (FAA)
2 consecutive failures on 13 and if 12, had failed would likely offended the Apollo Lunar program, resulting in only one crewed lunar landing instead of 6. This event spurred considerable research into triggered lightning. Fast forward almost 2 decades. This is an Atlas Sentara launch at the Cape in 1987.

00:21:07.720 --> 00:21:36.460
Garman, Karl E (FAA)
Lightning strike which hit the vehicle and then came down the the the connectivity path was down the vehicles exhaust path? Which of course was was ionized and then to the launch gantry set off a chain of events that resulted in loss of the launch vehicle and the payload. Fast forward another 3 decades from

that there was some very compelling footage that appeared on You Tube of what appeared to be a Russian Soyuz Soyuz launch out of out of Central Asia.

00:21:36.510 --> 00:21:54.820
Garman, Karl E (FAA)
But other than some videos that are available online verifiable. Data is not forthcoming on this so if you have a link to publishable. Verifiable peer reviewed data on this either, I or some colleagues of mine would be very interested in talking to you about that.

00:21:55.520 --> 00:22:01.510
Garman, Karl E (FAA)
So the perennial challenges here to protect the public and enable launch operations.

00:22:02.880 --> 00:22:24.200
Garman, Karl E (FAA)
So some likely challenges and opportunities that you have arising from this and this transcends aviation weather. These are more general net challenges. You have more diverse capable infrequent operations and weather and airspace constraints are are among them You are always dealing with constraints due to airspace and and whether opportunities.

00:22:25.290 --> 00:22:55.320
Garman, Karl E (FAA)
I would say increasing the Fidelity and the integration of day-to-day operations data so like me or logical entire traffic data. I can identify that as an opportunity and the challenge and an opportunity, which is kind of combined as the FAA issued performance based licensing regulations back earlier this year and their performance based on that they specify a performance outcome and it is up to industry to innovate in order to meet the end goal of that, so they are less prescriptive more performance based.

00:22:55.660 --> 00:23:07.970
Garman, Karl E (FAA)
But though to make the system work those do require a industry actively engaging in helping produce standards and also knowledgeable practitioners. To actually do the licensing work.

00:23:10.630 --> 00:23:29.190
Garman, Karl E (FAA)
So I'll close with these these words aerospace safety regulations, which is what we deal in there are rules made with rocket science and you have a trade off here. It's because the thoroughness speed and flexibility often emerge as as triple constraints. It's not it's not.

00:23:29.720 --> 00:23:59.570
Garman, Karl E (FAA)
So it's not a a very it's not a one dimensional type of Field is that there's you have tradeoffs. But one thing that we do not trade off on is the public safety peace everyone here. Of course, is interested in Mission assurance, but primarily my office is real or I shouldn't say primary our offices focus is the safety of the uninvolved public so even if you get a launch, which doesn't succeed to its stated objectives as long as that debris.

00:24:00.140 --> 00:24:18.960
Garman, Karl E (FAA)
Does not go outside of the designated hazard area for which we've controlled the the public safety risk criteria? We consider that launch for public safety purposes. A success, so there's a little bit difference in success criteria. We're focused on the safety of the uninvolved public.

00:24:19.820 --> 00:24:22.810
Garman, Karl E (FAA)
Uh Jeff I'll hand it back to you, that that concludes my intro.

00:24:27.070 --> 00:24:28.650
Jeff Weinrich (Guest)
Alright thank you so much Carol.

00:24:29.490 --> 00:24:30.130
Jeff Weinrich (Guest)
Uhm.

00:24:31.900 --> 00:24:33.210
Jeff Weinrich (Guest)
Next we have.

00:24:34.340 --> 00:24:37.270
Jeff Weinrich (Guest)
Hazel vein or can you hear me alright Hazel?

00:24:38.180 --> 00:24:39.470
Hazel Bain
Yep can you hear me?

00:24:39.190 --> 00:25:08.360
Jeff Weinrich (Guest)
Great again, I can't so I don't reduce you quickly and Hazel main is a research scientist at the Cooperative Institute for research in Environmental Science at the University of Colorado Boulder and Noah's space weather prediction center. Currently, specializing and development of tools for operational space weather forecasting in particular, her work focused on solo solar radiation summer forecasting support of SWPC.

00:24:41.260 --> 00:24:41.800
Hazel Bain
Taylor.

00:25:09.220 --> 00:25:14.420
Jeff Weinrich (Guest)
Customers in the aviation and human space exploration industries.

00:25:16.140 --> 00:25:17.640
Jeff Weinrich (Guest)
So welcomed Hazel.

00:25:16.460 --> 00:25:16.880
Hazel Bain
Hey.

00:25:18.260 --> 00:25:19.470
Hazel Bain
And can you see my slides?

00:25:18.360 --> 00:25:18.910
Jeff Weinrich (Guest)
And.

00:25:20.840 --> 00:25:22.120
Jeff Weinrich (Guest)
No no.

00:25:22.740 --> 00:25:23.550
Hazel Bain
Oh, OK.

00:25:23.610 --> 00:25:23.860
Hazel Bain
Right.

00:25:24.830 --> 00:25:29.100
Hazel Bain
Let me see I think you have a copy of them, too. If you want to share them from your end.

00:25:28.340 --> 00:25:30.550
Jeff Weinrich (Guest)
I do, I do? Yeah. Absolutely. I can OK?

00:25:31.630 --> 00:25:32.260
Jeff Weinrich (Guest)
See.

00:25:37.020 --> 00:25:37.810
Jeff Weinrich (Guest)
Mute.

00:25:40.280 --> 00:25:45.170
Matt Fronzak
You got backups and backups to the backups and backup the backups at the back.

00:25:44.650 --> 00:25:45.620
Jeff Weinrich (Guest)
We do, we do?

00:25:46.910 --> 00:25:50.140
Jeff Weinrich (Guest)
Alright can you see that uh so your presentation?

00:25:50.460 --> 00:25:51.600
Hazel Bain
Yep, perfect.

00:25:52.090 --> 00:25:52.520
Jeff Weinrich (Guest)
Alright.

00:25:52.340 --> 00:26:09.390
Hazel Bain
Great, thanks very much OK, so thanks for the invite to speak today. Randy had asked me to cover some of the products and services that we offer at Noah Space Weather Prediction Center and so this is an overview of some of that, so if you could switch to the next slide, please.

00:25:53.740 --> 00:25:54.210
Jeff Weinrich (Guest)
You're welcome.

00:26:14.450 --> 00:26:31.930
Hazel Bain
Jeff can you switch to the next slide please. Thank you perfect OK so at the newer space weather prediction center based here in Boulder. We are the nation 's official source so space weather alerts watches and warnings and also other services, and situational awareness and information and and to the general public.

00:26:32.540 --> 00:27:00.720
Hazel Bain
Uh and so as a sort of very quick overview that that covers things from geomagnetic storms from coronal mass ejections occurring on the sun that can cause impacts to you know the electric grid and all sorts of things like that, and redo blackouts, which are of course, are important for communications and then the big one here for what we're talking about today is the solar radiation storms, so these are energetic charged particles are coming from irruptive events on the sun and and if you go to the next slide.

00:27:05.200 --> 00:27:35.150
Hazel Bain
So this is our solar storm at Solar Radiation Storm S scale. This is uh so our way of communicating to our customers and to users how intense the storm is and what those effects, maybe to those users so you can start down from an S. One skirt storm, which is just something relatively minor and then all the way up to an S 5 storm. And so each of these levels goes up in an order of magnitude in terms of the intensity and so that you can see, there that if you can you can find this on our website?

00:27:35.210 --> 00:28:05.560
Hazel Bain

That this sort of it communicates those impacts to systems like satellite operator satellite systems, too, so the biological impacts to astronauts or who are on eBay or who up ISS or who are traveling elsewhere and then also down to sort of aviation levels and whether or not. We expect to see elevated radiation levels on sort of of commercial flight levels. And so we have customers that use these users scale all the way across you know from HF comms.

00:28:05.720 --> 00:28:21.530
Hazel Bain
Navigation with people at NASA looking at the the biological impacts to crew and we have you know users across all of the major airlines etc? Across the US so these are all public things so anyone can get to these alerts and warnings next slide, please.

00:28:28.960 --> 00:29:02.260
Hazel Bain
K so in terms of the radiations forecast. We have 2 different approaches to this we tried to have our 12 and 3 days long term. Probabilistic forecasts and these come out every day at at 22:00 UT and they will give you a probability of an event occurring in the next day One Day 2 or day, 3 and so this is very much used for for longer term, planning and certainly from an asset perspective like thinking about whether you'd want to do any VA and those couple of days. Or maybe whether you'd want to schedule a lunch or perhaps postponing launch in those next couple of days so this is specifically based on.

00:29:02.770 --> 00:29:33.110
Hazel Bain
The threshold of 10, Med Protons at the goes spacecraft noise goes spacecraft exceeding a particular threshold of 10 pfu and so that's pretty minor. That's still a pretty minor storm and so as the event progresses, you would see it go up through the different skill levels and on the other hand, because we're not the signs and understanding is not quite there yet to have really accurate predictions out as far as Day One Day 2 Day 3 and we also support this with much shorter term warning and alert products so these were the 3 days is kind of on the.

00:29:33.170 --> 00:30:00.760
Hazel Bain
They timescale we had these short warning products which are on the minutes to errors sort of time frame and this is specifically a warning here. You can see on the right hand side is when that red line. There will cross the that the blue dashed line that would be the S one and scale and so we'd have a warning, which would hope would go out before that threshold is crossed telling users hey. We looked we think there's going to be an event coming. We think it's going to cross the threshold, and hopefully here's an idea of when.

00:30:01.440 --> 00:30:31.460
Hazel Bain
Uh and then an alert follows up and that is showing you that the conditions have been met for that event so you would have the warning to say something is coming and they alert follows up to say that the threshold has been crossed and so we have warnings and alerts for 10 M eaves at 10:00 PFU but then also a higher energy particles, which is kind of a more of interest for for people who are going into space because the higher energies are more likely to penetrate through any VA suit or or something like that. And so we have warning and alerts for 10 movies crossing one pfu and so that's

00:30:31.680 --> 00:30:38.370
Hazel Bain
the kind of thing that NASA would be looking for? Is is those higher energies, although they certainly want situational awareness of if anything is going on.

00:30:38.920 --> 00:30:48.010
Matt Fronzak
Hazel Hazel before you go off of that slide would you be for this space whether ignoramus so kind as to decode me V&PFU?

00:30:38.970 --> 00:30:39.780
Hazel Bain
Uh next like.

00:30:47.890 --> 00:31:02.450
Hazel Bain
Sure, sure so let me be is a Mega Electron Volts. So it's just an energy measure, so it's telling you how energy the how energetic the protons are and this is specifically protons that we're looking at so 10 MV is kind of.

00:31:03.360 --> 00:31:34.260
Hazel Bain
Some people would consider that pretty low and certainly from a from a let's talk about NASA and talk about EBS. So eBay suits are you should start to get worried about the radiation from them round. About 30 to 50 MB and certainly from a kind of a spacecraft perspective. Once things get up to 100. So 10 MV is something that we have traditionally given warnings and alerts for from a forecast perspective because we have people in the satellite industry and things that people who care about that. But in terms of sort of.

00:31:34.550 --> 00:31:45.490
Hazel Bain
Please vote for sort of space travel and things that you want to start thinking in the 30 to 50 MV and then certainly the 100 movies and then if we were getting events that give you an idea of a really big event.

00:31:46.140 --> 00:32:02.480
Hazel Bain
And aviation level industry would feel things when you start getting 500 embs being you know above the background at 1:00 of these spacecraft. The goes spacecraft. So so that kind of gives you an idea of where the scale is so to feel something aviation, you'd be seeing particles at 5:00, 100, maybe.

00:32:03.520 --> 00:32:12.070
Hazel Bain
There obviously NASA cares about 100 and above and then they also care about 1350 if particular occasions, where the astronauts would be outside of of a of a vehicle.

00:32:12.850 --> 00:32:28.770
Hazel Bain

Come on the As for the PSU that's particle flux units and so that's telling you just about like the amount of particles. You're seeing in a unit volume in a in a particular time periods in in any area. So it's just kind of giving you a yeah, just an intensity level for the event.

00:32:29.500 --> 00:32:30.140
Hazel Bain
Does that help?

00:32:32.180 --> 00:32:33.150
Matt Fronzak
Perfect thank you.

00:32:33.480 --> 00:32:35.570
Hazel Bain
Great OK next slide, please.

00:32:42.880 --> 00:33:07.200
Hazel Bain
OK, so I I threw this in here because it's something that's new but it's it's still bullets. You know what this is pretty low levels in terms of space travel, but but maybe this, the IKEA will eventually you know exceed or higher. Altitudes so this is something we started doing in 2019 and international Civil Aviation organization asked well, 3 global space weather centers. There's not going to be 4 but at the time, 3 global space weather center is to provide.

00:33:07.470 --> 00:33:19.010
Hazel Bain
Uh advisory space when advisories on things that could impact aviation radiation communications and navigation and so in terms of the radiation we now have.

00:33:19.070 --> 00:33:49.560
Hazel Bain
From the advisories that go out that show whether we expect to see elevated radiation at flight levels between 20 5060, 1000 feet at 1000 feet increments and that's when the radiation would pass. These what we call moderate and severe thresholds, which are 30 microsieverts per hour. On 80 microsieverts per hour. So I'll not go spend any more time on this because it's a lot lower than in altitude and what we're talking about, but it's just to show that in terms of radiations hopes he has products that are very much for my in space perspective, but then also add through.

00:33:49.680 --> 00:34:03.200
Hazel Bain
A commercial aircraft flight levels 2 and perhaps we were working on that part in the middle where where we could sort of fill in the middle in terms of what's happening in the radiation belts. Those are models that were also sort of looking at next slide, please.

00:34:07.460 --> 00:34:37.270
Hazel Bain
So for the most part astronauts that are sitting in the like the equivalent of the International Space Station, where you're in low earth orbit. They're largely protected from the effects of solar energetic

particles by the Earth 's magnetic field. I think there's maybe I think on and in terms of a 90 minute order orbit. You maybe have 10 minutes. Whether you're a little bit more exposed and what you are for the rest of the time, but you know for the most part, you are very well protected from the earth magnetic field, however, as we start thinking about going beyond low. Earth orbit and we're thinking about going back to the moon and Mars astronauts are going to be.

00:34:37.330 --> 00:34:48.980
Hazel Bain
Much more exposed to all aspects of the storm and this. This is going to require much more enhanced forecasting from our perspective we're going to have to talk about all clear forecasting particularly so the idea that if you were.

00:34:49.050 --> 00:35:17.440
Hazel Bain
And you were traveling or something and you wanted to do any VA whether or not you would expect there to be a storm in the next few days. Whether that would be smart to go across ahead with the EB aorta, perhaps postpone we need to be looking at trying to forecast. These things before they happen on the sun like at the moment. We're very much in a reactive mode that when we see something erupted on the sun. We can give a forecast but we want to try and extend that sort of back in time to be able to predict before the eruption occurs whether we expect to radiation store.

00:35:18.060 --> 00:35:48.180
Hazel Bain
And then we it's really difficult at the moment to determine what the peak of the event is going to be just from these remote observations that we have so that's something that needs a lot more work. There, too, and then also to really understand the duration and evolution of these storms and particularly from a human space exploration perspective. If you wanna have astronauts sheltering from a storm and it really is felt like the the the sort of the solar component of the radiation that you could mitigate that from a radiation shelter. But you don't you don't want to have an astronaut in there for days.

00:35:48.480 --> 00:36:01.560
Hazel Bain
And you wanna know when the worst part is going to be. And when they cannot get out to move around at around the capsule with relative safety and so that's kind of where we're going in the future is to understand these aspects so next slide, please.

00:36:06.740 --> 00:36:37.150
Hazel Bain
So, in terms of support for for crewed missions subsea has supported a NASA space radiation analysis group, so NASA. Schrag we have supported band 24, 7. For many years way back to the Gemini and Apollo missions right through to the International Space Station and that involves daily briefings to Schrag involves sort of every day is getting a situational awareness of what's happening on the sun and whether anything is anticipated, obviously during active periods. Those Commission communications ramp up and especially during special activities such as.

00:36:37.200 --> 00:37:00.870
Hazel Bain
One season deviates and especially during this. This particular and very active period. In 2003 called Halloween. Storms subsidy issued 140 alerts warning and watch used to. NASA Johnson during that time period, so it's a very active communication and I very successful partnership that has exactly which has lasted many decades at this point, so next slide, please.

00:37:05.660 --> 00:37:36.410
Hazel Bain
And so this is where we are in the process of signing an interagency agreement to continue that support for the radiation environment to NASA for the conduct of all human spaceflight, so this is going to be the extension of all our observations and briefings are 24 or forecasts warnings alerts really, for all aspects of space weather. You know like they they're most interested in the radiation. But they certainly are very well. Spaceweather educated users. So we can certainly talk to them about whether we expect there to be a geomagnetic storms coming or what other kinds of accelerated.

00:37:36.760 --> 00:37:53.380
Hazel Bain
Anyone for their own situation awareness and they will then inform the flight surgeon if whether or not. They think there's any reasons for the shell for the astronauts to shelter or whatever or if there's a no go on the mission. And so I've talked a lot about here, but it's sort of NASA and sort of government human spaceflight opportunities but.

00:37:53.990 --> 00:38:23.940
Hazel Bain
I think all of these products are publicly available and so certainly this will be something that is accessible to commercial to the commercial sector and as we make advancements in our understanding and our forecasting for requirements for NASA certainly that is going to be available for the commercial industry to to contact 2 and certainly that's something that you know. SpaceX has occasionally called the forecast office and just asked for an update on whether or not. They expect to radiation storm coming up in the next few days before I launch or something so that certainly that communication is there.

00:38:24.190 --> 00:38:33.790
Hazel Bain
And these forecasts are public so anyone can use them and in future. We hope to be able to give a much more fine grained forecast as we start to understand more about these events.

00:38:34.710 --> 00:38:35.970
Hazel Bain
So I will leave it there.

00:38:41.000 --> 00:38:42.210
Jeff Weinrich (Guest)
Thank you so much.

00:38:46.250 --> 00:38:50.280
Jeff Weinrich (Guest)
And the next is Kristen Smith on.

00:38:53.130 --> 00:38:54.320
Smith, Kristin A (KSC-SII10)
I am here.

00:38:57.100 --> 00:38:57.640
Jeff Weinrich (Guest)
Welcome.

00:38:58.840 --> 00:39:02.260
Smith, Kristin A (KSC-SII10)
Thank you filling in for Kathie Rice today.

00:39:02.800 --> 00:39:03.260
Jeff Weinrich (Guest)
Sure.

00:39:04.630 --> 00:39:06.510
Jeff Weinrich (Guest)
So did you want to introduce yourself?

00:39:07.060 --> 00:39:08.220
Smith, Kristin A (KSC-SII10)
Sure, so.

00:39:08.270 --> 00:39:39.140
Smith, Kristin A (KSC-SII10)
Uh like we just mentioned my name is Kristen Smith. I work in the KC weather office with my other colleague Kathy Rice. I've been with KFC for about 9 years now. I spent some time previously at NASA. Marshall Space Flight center as well as a contractor and have been involved with whether both at NASA and net. KFC my background is in atmospheric science. I have my Bachelors Science Masters.

00:39:39.190 --> 00:40:01.560
Smith, Kristin A (KSC-SII10)
Then PhD all in Atmospheric Science and then the KFC weather office. One of the primary things that I do is focus on the Lightning launch commit criteria, which I'll get into in our slides when we get into the presentation. So Jeff if you're able to bring those slides up. I don't have a final copy.

00:40:01.480 --> 00:40:02.850
Jeff Weinrich (Guest)
Sure, sure no problem.

00:40:27.070 --> 00:40:28.600
Jeff Weinrich (Guest)
Be able to let's see this OK.

00:40:27.110 --> 00:40:27.550
Smith, Kristin A (KSC-SII10)
Sorry.

00:40:29.050 --> 00:40:30.140
Smith, Kristin A (KSC-SII10)
Yep, I can see it.

00:40:34.070 --> 00:40:34.510
Jeff Weinrich (Guest)
Mute.

00:40:42.630 --> 00:40:43.900
Smith, Kristin A (KSC-SII10)
OK, perfect.

00:40:44.690 --> 00:40:47.700
Smith, Kristin A (KSC-SII10)
Alright so we'll go on to the next slide.

00:40:48.510 --> 00:40:52.420
Smith, Kristin A (KSC-SII10)
Get into some of the background on Kennedy Space Center.

00:40:53.200 --> 00:41:24.090
Smith, Kristin A (KSC-SII10)
Translate into so Kennedy Space Center as most of you know the the shuttle program ended back around 2011 and we've been going through this transition period where Kennedy Space Center was focused on the spatial program and we've transitioned into a multi user spaceport. So it's not just about NASA vehicles. NASA missions we have transitioned our Space Center.

00:41:24.140 --> 00:41:54.210
Smith, Kristin A (KSC-SII10)
Into accommodating the commercial launch entities as well. In some of those groups are displayed on the screen here from your SpaceX to your blue. Origin and United Launch Alliance to Boeing as well. So it's not just about NASA anymore. We are evolving and opening up to others outside of the government agency as well so going on to the next slide just getting into a little bit about what KFC weather.

00:41:54.480 --> 00:41:55.140
Smith, Kristin A (KSC-SII10)
Does

00:41:56.730 --> 00:42:01.980
Smith, Kristin A (KSC-SII10)
at NASA in our weather office so we do a variety of things?

00:42:02.040 --> 00:42:32.300
Smith, Kristin A (KSC-SII10)
Uh we do a little bit of operational weather support the majority of the forecasting is done by our

counterparts at the 45th weather squadron, which is just across the River at Cape Canaveral space where station but Kathy and I have supported in the past. Some weather operations that have been at Stennis Space Center. At least when it comes to some of the tropical weather support and other support that they needed that they couldn't get elsewhere. KFC whether we're also.

00:42:32.820 --> 00:42:49.050
Smith, Kristin A (KSC-SII10)
Seeing the weather instrumentation and also the weather data that is collected out at KFC the instrumentation is helped is maintained by our counterparts at the 45th weather squadron.

00:42:49.470 --> 00:43:09.050
Smith, Kristin A (KSC-SII10)
Uh but in addition to that instrumentation. KFC also has what we call a trap troposphere, Doppler radar wind profiler, which is that center picture there. It's a an array of about 640 and tennis and it was updated over the the last 5 years or so from A.

00:43:09.900 --> 00:43:17.490
Smith, Kristin A (KSC-SII10)
50 Megahertz Doppler radar wind profiler to a profiler that is at a slightly.

00:43:22.790 --> 00:43:43.420
Smith, Kristin A (KSC-SII10)
Just the same profiles of the winds at upper levels are weather data. We also make sure that it is archive and it's also publicly accessible on our website, which I'll just show on one of the later slides as well. So you can go and visit that and we're always looking for ways to improve.

00:43:43.990 --> 00:43:49.630
Smith, Kristin A (KSC-SII10)
Uhm our interactions with others. The research that we do services we provide.

00:43:49.700 --> 00:44:17.900
Smith, Kristin A (KSC-SII10)
I'd uh we do have a local meso scale model, which is depicted in the lower left hand corner of the slide. This was created by our applied meteorology unit few years back. And this is used by the weather forecast source at the 45th weather. Squadron not just for day-to-day operations but also for day of launch as well. It's a great way to incorporate.

00:44:18.490 --> 00:44:34.270
Smith, Kristin A (KSC-SII10)
Uhm or look at the The weather at more local scale than working then looking at some of the larger global models. So it's terrific model that was tailored for Kennedy Space Center or the the eastern range.

00:44:35.210 --> 00:44:36.890
Smith, Kristin A (KSC-SII10)
A man is used daily.

00:44:38.180 --> 00:44:40.610
Smith, Kristin A (KSC-SII10)
And we can go on to the next slide.

00:44:47.690 --> 00:45:17.470
Smith, Kristin A (KSC-SII10)
OK, just another look at what we're doing. That's more centered around NASA. So the big focus right focus right now is the Artemis, one mission, and what we've shown here on the screen or the various stages of the development of Artemis, so in the upper left hand corner. This is from the green run test that was conducted out at Stennis Space Center and this was one of the things that Kathy and myself were keeping a close eye on.

00:45:18.110 --> 00:45:29.050
Smith, Kristin A (KSC-SII10)
Really last year during our busy tropical season. I mentioned before that, Kathy and I did provide a little tropical forecast for them, while they were getting ready to do.

00:45:29.840 --> 00:45:32.330
Smith, Kristin A (KSC-SII10)
There uh green run tests so.

00:45:33.710 --> 00:45:50.460
Smith, Kristin A (KSC-SII10)
Uh we were very involved with that when it's needed as some of the other pictures on here just displays like the lower left hand corner. It's the barge that carried the core stage from Stennis to KFC and then the other images just show the.

00:45:51.360 --> 00:46:03.010
Smith, Kristin A (KSC-SII10)
How the Artemis Rocket has grown and is slowly being put together and we're very looking forward to that launched in the very near future.

00:46:03.820 --> 00:46:05.490
Smith, Kristin A (KSC-SII10)
We will go on to the next slide.

00:46:05.860 --> 00:46:06.150
+16*******38
Right.

00:46:13.890 --> 00:46:43.740
Smith, Kristin A (KSC-SII10)
OK so Carl did a nice segue for me into this slide. One of the the big focus is like I mentioned before was the Lightning launch commit criteria and we've highlighted the same missions that Carl provided some great background on in the past and it was the Atlas Centaur, 67 mission back in 1987 that really led to the development of the Lightning advisory panel which is the group of experts that.

00:46:30.860 --> 00:46:32.150
+16*******38
Right now.

00:46:43.820 --> 00:46:56.820
Smith, Kristin A (KSC-SII10)
We rely on to further develop or lightning launch commit criteria. There were earlier versions of these rules that were used before at Atlas Centaur 67.

00:46:57.110 --> 00:47:26.940
Smith, Kristin A (KSC-SII10)
Uh maybe even back into the Apollo days, but they slowly transformed over time from being something very generic like avoiding lightning to something where we're really trying to find ways where we can increase launch availability while still maintaining safety and keeping the crew payloads missions. All safe so this is something that we're very dedicated to these.

00:47:00.060 --> 00:47:00.770
+16*******38
3 quarters.

00:47:26.990 --> 00:47:27.830
Smith, Kristin A (KSC-SII10)
Criteria.

00:47:29.000 --> 00:47:31.200
Smith, Kristin A (KSC-SII10)
While they are updated.

00:47:31.270 --> 00:47:49.850
Smith, Kristin A (KSC-SII10)
Uh we also update the rationale behind those rules as well, and both the rules and the rationale are publicly available as well. And I'll show you on our website where you can access those but this area it. It's something that right now.

00:47:51.020 --> 00:48:08.510
Smith, Kristin A (KSC-SII10)
I suppose you could say it's a little bit of a challenge where it comes to questions from the the larger audience where you know, everybody is trying to push the envelope trying to you know increase this launch availability while we have to.

00:48:09.170 --> 00:48:16.000
Smith, Kristin A (KSC-SII10)
Still think about the the safety behind it, so we try to do research where we can.

00:48:16.260 --> 00:48:46.380
Smith, Kristin A (KSC-SII10)
Uh we were trying to find ways to collaborate with those in the larger scientific community. So we can be more aware of certain lightning physics information something that we may not know right now, but

could be very useful. If we did have a better understanding of that. We could pass along to our lightning advisory panel for them to review and consider and hopefully use towards further modifying those.

00:48:46.430 --> 00:48:56.180
Smith, Kristin A (KSC-SII10)
Rules so we greatly appreciate any kind of collaboration, we can do with researchers in that topic will go on to the next slide.

00:48:59.680 --> 00:49:31.250
Smith, Kristin A (KSC-SII10)
So this is just a little overview of how we develop the Lightning launch commit criteria right now. KFC weather works as the liaison between the subject matter experts who are are lightning advisory panel and the larger community. KFC will talk with the technical users who we considered to be the launch weather. Officers and these could be those at the 45th weather squadron out at Vandenberg even at NASA Wallops.

00:49:31.580 --> 00:50:01.800
Smith, Kristin A (KSC-SII10)
And we also interact with the FAA as well. So we greatly appreciate our relationship with the FAA and the office of commercial space. Transportation especially when it comes to these difficult topics of lightning launch commit criteria and keeping safety at the forefront. One of the other things that we do as well. When there are updates with lightning launch commit criteria. We want to make the larger community.

00:50:01.850 --> 00:50:31.400
Smith, Kristin A (KSC-SII10)
Aware of those changes, so some things that we do are highlighted below here in the lower right hand corner. We update the OR our colleagues at the day of launch working group and that includes not just government agency, but it also includes the commercial entities as well? Who are able to attend. We also give updates biannually at the range commanders council.

00:50:32.310 --> 00:51:01.010
Smith, Kristin A (KSC-SII10)
And more recently, we've been involved with the Air Force or spaceforce meetings called range activity customer exchange, which is more geared towards the commercial entities as well so any kind of forum that were able to attend and provide updates to whether or not. It's on our lightning launch commit criteria or statuses at KFC in regards to whether we're more than happy to do and and work with those groups.

00:51:01.730 --> 00:51:03.350
Smith, Kristin A (KSC-SII10)
It's going on to the next slide.

00:51:11.970 --> 00:51:42.740
Smith, Kristin A (KSC-SII10)
OK and I think this is my last slide, so this is just a snippet of the homepage. To our KFC weather. Home page and it's something that we just released earlier this year and it has a lot of great information and in

the drop down So what we've highlighted here is where you can find the latest updates for lightning launch commit criteria so you can click on the first document, which we call.

00:51:42.800 --> 00:52:13.190
Smith, Kristin A (KSC-SII10)
Are NASA standard 4010 and that is where the lightning launch commit criteria. The rules themselves are in the document and then the next document called rationales. That's where you can find all the scientific justification for how the rules were developed and then we also have a history document, which is also a nice recap of the evolution of the Lightning launch commit criteria and the Lightning advisory panel as well. So these are some great documents that you can access on the website.

00:52:13.670 --> 00:52:43.360
Smith, Kristin A (KSC-SII10)
In some of the other dropdowns. We also have under the KFC weather data archive a link where you can access that publicly available weather data that is collected out at KFC so it includes not only lightning data that is cloud to ground and lightning aloft but we have surface electric field. Mill data that covers the eastern range as well as about 31 weather towers at various Heights ranging from about 54 to 500 feet.

00:52:43.840 --> 00:52:52.030
Smith, Kristin A (KSC-SII10)
And we collect temperature relative humidity and wind data at those Heights so a lot of great information.

00:52:52.090 --> 00:53:09.750
Smith, Kristin A (KSC-SII10)
Uhm one other thing I'd point out is well under research and operations. We highlight some of those research areas like are applied meteorology unit. There's a link to their website as well as some other interesting links in regards to projects in the past.

00:53:09.800 --> 00:53:13.530
Smith, Kristin A (KSC-SII10)
So I think that is my last slide.

00:53:14.240 --> 00:53:15.570
Smith, Kristin A (KSC-SII10)
And I'll wrap up there.

00:53:17.120 --> 00:53:18.220
Jeff Weinrich (Guest)
Thank you so much.

00:53:20.450 --> 00:53:20.930
Jeff Weinrich (Guest)
Right.

00:53:22.120 --> 00:53:23.540
Jeff Weinrich (Guest)
So aurum.

00:53:24.920 --> 00:53:25.790
Jeff Weinrich (Guest)
Soon.

00:53:29.240 --> 00:53:30.740
Jeff Weinrich (Guest)
So our last summer.

00:53:31.740 --> 00:53:33.400
Jeff Weinrich (Guest)
Uh panelists is.

00:53:34.580 --> 00:54:05.970
Jeff Weinrich (Guest)
Lieutenant Colonel Omar Nava and he is the chief of space weather and electromagnetic effects where their strategic plans and Integration Division Directorate of whether headquarters United States Air Force in Washington DC. He serves as the lead for space weather environmental alignment issues with the services joint staff office of the Secretary of Defense Intelligence Community Federal agencies and international partners. In addition, Lieutenant Colonel now but provides scientific perspective for developing.

00:54:06.510 --> 00:54:14.630
Jeff Weinrich (Guest)
Interagency and International Space weather analysis and forecasting capabilities, he's also responsible for evaluating national and Department of Defense.

00:54:15.600 --> 00:54:34.950
Jeff Weinrich (Guest)
Uhm spaceweather strategic plans and programs to access their technical feasibility and operational implementation. Lieutenant Colonel novel received his Commission from the United States Air Force Academy in 2005 and earned his doctorate in atmospheric and Oceanic Sciences from the University of California, Los Angeles in 2016.

00:54:36.790 --> 00:54:38.570
Jeff Weinrich (Guest)
Welcome Lieutenant Colonel.

00:54:41.090 --> 00:54:44.040
Jeff Weinrich (Guest)
He doesn't have any slides, but will speak for a few minutes.

00:54:42.680 --> 00:54:43.100
Lt Col Omar Nava (Guest)
Said.

00:54:45.910 --> 00:55:14.800
Lt Col Omar Nava (Guest)
I think for should have sent you a shorter bio sorry but you know other than Hazel. I'm you know looking through the list of names not too familiar with this particular community. But I am excited to be here and thank you to the meeting organizers for reaching out and inviting me to speak today and so I can probably tell a lot of diversity in the topics in this session and you know, I'm glad that Hazel talked about the solar radiation aspect. But I'm going to you know talk about a little bit different aspect of the space environment.

00:55:15.280 --> 00:55:45.470
Lt Col Omar Nava (Guest)
Uh so to set the stage, according to the 2018 National Defense strategy. One of our current and future challenges in the in Department of Defense is operating in a space domain that is increasingly contested and congested so you know it should be no surprise to to us here that frequency of launches has significantly increased in recent years, a lot of commercial companies getting into the business and now recently over the last few months. You know space. Tourism has a you know has more data points now, too.

00:55:46.030 --> 00:56:15.740
Lt Col Omar Nava (Guest)
And so all of these aspects, you know, these tie into basically this difficult mission of achieving what's called a space domain awareness in such a way it's the ability to be able to detect track identify and characterize space objects. So satellites debris meteors, etc and even the space environment, so that basically spaceweather aspects and all of this is aimed at supporting space activities in terms of you know safety security.

00:56:16.090 --> 00:56:40.840
Lt Col Omar Nava (Guest)
Uh in sustainability and so for this talk. I'll provide a little more perspective on that tracking aspects of a space domain awareness and especially from the lens of safety, so one example. SpaceX is pretty well known now that they're in process of building a satellite mega constellations in order to provide global broadband Internet service and you know, no of course I don't work for them.

00:56:41.350 --> 00:57:00.890
Lt Col Omar Nava (Guest)
Ummm, but no recently they've got approved you know permissions from the FCC fly 12,000. Starlink satellites and least from latest I saw they've also filed paperwork to throw up another 30,000. So you're now you're looking at about 42,000 satellites in space and really to put this into you know, some perspective.

00:57:01.240 --> 00:57:04.580
Lt Col Omar Nava (Guest)
Uh I think currently there's about maybe 4300.

00:57:05.010 --> 00:57:23.840
Lt Col Omar Nava (Guest)
Uh active artificial satellites and really about 11,600 or so have been launched in all of history, so you

know they're they're putting a lot of stuff up in the in orbit and of course, that's going to be concerning you know at the moment they're about round 1700, so far, but you know they're they're making headway.

00:57:24.720 --> 00:57:30.370
Lt Col Omar Nava (Guest)
And and and they know that they're putting these satellites and very low orbit, which is going to come into play.

00:57:30.630 --> 00:58:00.450
Lt Col Omar Nava (Guest)
Come later on this talk, but of course, it's not just the US and it's not just SpaceX. That's doing this and also recently in the news that China is also in the process of putting up a national satellite. Internet mega constellation. And I definitely don't work for them and they're looking to put up about 30, 13,000 satellites in low Earth orbit there and so you know in terms of space domain awareness and that is a tremendous number of objects to to track and.

00:58:00.500 --> 00:58:11.900
Lt Col Omar Nava (Guest)
Course you know when immediate thoughts that goes in your head is just want to make sure you know when they don't collide into each other not only just the commercial to commercial assets, but you know commercial too. In my case you know national security assets.

00:58:12.340 --> 00:58:25.220
Lt Col Omar Nava (Guest)
And also you can sort of think about in international incidences US commercial asset running into some other countries asset, and and then amongst all of these that satellites also the space debris.

00:58:26.120 --> 00:58:31.310
Lt Col Omar Nava (Guest)
And so you know where does the you know space weather come in and and sort of why are we at least the space by the community?

00:58:31.770 --> 00:59:01.710
Lt Col Omar Nava (Guest)
I am very concerned, especially over the next few years, so we've already started. This new 11 year solar cycle and basically defined as an increase in activity from the sun basically increase heating of Earth 's upper atmosphere and when you have when you hit our atmosphere, you get expansion and now you get densities from the lower altitudes raised up to the higher altitudes, resulting in increased satellite drag and so with that increase satellite drag essentially what happens is while your objects now.

00:59:02.040 --> 00:59:08.390
Lt Col Omar Nava (Guest)
Course they decrease in altitude and then they traveled faster so in other words, they're probably not going to be.

00:59:09.380 --> 00:59:39.470
Lt Col Omar Nava (Guest)

Where you know where you think they originally were you know similar when I leave my wife and like a Harry Potter store and just in turn around for a second. She's gone. So you know that's a That's a big concern with the with the significant satellite drag and of course, it's not a local affect its global so you know imagine applying that to 40,000. Starlink satellites 13,000 of China 's satellites and then of course. Other objects that already up there and now you sorta had this nightmare scenario for you know space domain awareness where?

00:59:39.970 --> 00:59:52.430
Lt Col Omar Nava (Guest)
You have thousands 10s of thousands of objects that aren't necessarily you know where you think they're going to be. And so trying to figure out if there's going to be any collisions and trying to make sure that you send out notifications in time.

00:59:52.760 --> 00:59:56.850
Lt Col Omar Nava (Guest)
And this is a yeah, it's pretty much a nightmare scenario.

00:59:57.560 --> 01:00:27.820
Lt Col Omar Nava (Guest)
And so that's just the satellites in cells. You know, bringing up the space debris. That's already up there. At least according to the latest numbers. I had so last solar. Max was in 2012 and around that time, there were about 11,000 pieces of space debris. About 10 centimeters or more. I think that's about the size of a softball and latest estimates as of this year, you looking about you know 27,000. So definitely more than double of that just space debris 10 centimeters or more right now as we're heading into the next.

01:00:28.390 --> 01:00:29.540
Lt Col Omar Nava (Guest)
Next solar cycle.

01:00:30.860 --> 01:01:00.200
Lt Col Omar Nava (Guest)
And so you know son has an 11 year solar cycles. I mentioned so we expect the steady increase in just you know satellite drag effects over the next few years, but of course. We just don't worry about the activity on this you know just the the increase, the energy coming out of the sun. There's also you know sporadic events of increased solar activity such as you know, Corona, mass ejections. Some that last a few days and and these types of events inject huge amounts of energy into Earth 's upper atmosphere and it's if you can imagine a lot of heating.

01:01:00.430 --> 01:01:06.770
Lt Col Omar Nava (Guest)
Lot of expansion of the atmosphere a lot of drag and been uh. You know well known cases over the last few years where?

01:01:07.100 --> 01:01:37.930
Lt Col Omar Nava (Guest)
Uh you know it's just that folks have had a difficult time, trying to track all these objects for these

significant storms. So you know sort of a 12 punch with increased solar activity and now you know the increased frequency of these events and you know sort of the glada. Carl had mentioned you know, there's the the on ramp off ramp analogy you know increase all like drag also affects reentries as you imagine if you're not project. You know, projecting whatever object you're looking at so vehicle to enter.

01:01:39.120 --> 01:01:53.610
Lt Col Omar Nava (Guest)
You know enter sooner because of an increased out of like drug that can cause a problem safety problems as well. You know trying to make sure that the objects coming back in don't land where you don't want him to land so just another aspect there that I'm glad he he mentioned.

01:01:54.480 --> 01:02:15.540
Lt Col Omar Nava (Guest)
Uhm so overall you know you could say that really this, you know, even though I'm talking from space. Weather aspect really space object tracking this issue really inherently is a trust roll weather problem with the neutral atmosphere. Basically extending out of course into space. But it is influenced by a solar activity, so at least you know, I'm uh basically homegrown.

01:02:15.600 --> 01:02:32.290
Lt Col Omar Nava (Guest)
In a weather officer meteorologists, but I spent a lot of time on the on the space weather side. And so at least for me my perspective. It's it's been beneficial to have you know experience in those 2 regimes and and and I think that's you know at least whenever I see normal trust role whether officers.

01:02:32.780 --> 01:03:04.330
Lt Col Omar Nava (Guest)
Uh you know it doesn't hurt to to have that space experience or knowledge as well. 'cause I mean, it's all it's all mixed together. It's intertwined and of course, you know. DoD is constantly working to improve its modeling capabilities, especially for a space object. Tracking and even in the recent news last few months. Space weather prediction center where Hazel is recently released their whole atmosphere. I'm sphere. Plasmasphere electrodynamics model. So basically the whole atmosphere model takes GFS and extends it slid all the way up to 400 to 600 kilometres so you're capturing.

01:03:04.710 --> 01:03:11.350
Lt Col Omar Nava (Guest)
You know that low and that low or earth orbits regime and specially for you know, these this satellite drag effects.

01:03:12.500 --> 01:03:42.150
Lt Col Omar Nava (Guest)
And so you know in conclusion, you know. Of course, the DoD is A is a is a strong proponent of commercial space capabilities. That shouldn't be a surprise interesting thing recent development in the last few years. You know since 2015. Within the combined space operations center at now. Vandenberg space for space there's a new commercial integration cell and person. I think that's a great thing where they they found in previous exercises that having you know that access to to real time in near real time information.

01:03:42.210 --> 01:04:12.480
Lt Col Omar Nava (Guest)
From a commercial satellite owner operators really improved that that that space domain awareness aspect and so you know it's in so I mentioned all of this and you know, even Starlink and and and and other companies are putting up satellites in space even though you know, we have to deal with with sort of that debt crowding issue really from the DoD perspective where more relying more and more relying on commercial space. And we're really concerned about this satellite drag aspect is because we want to make sure that you know the capabilities.

01:04:12.720 --> 01:04:28.530
Lt Col Omar Nava (Guest)
That the commercial side provides and want to make sure that they're going to be available when we really need them, and so of course, you know as we ramp up through this. This upcoming solar cycle over next few years. It's going to be definitely quite challenging and so that concludes my talk, for now.

01:04:29.310 --> 01:04:29.720
Lt Col Omar Nava (Guest)
Thank you.

01:04:35.000 --> 01:04:36.700
Jeff Weinrich (Guest)
Alright thanks, so much.

01:04:39.010 --> 01:04:43.840
Jeff Weinrich (Guest)
So that's all the panelists we have for this session, so we have.

01:04:43.900 --> 01:04:45.050
Jeff Weinrich (Guest)
Come up.

01:04:46.150 --> 01:04:49.070
Jeff Weinrich (Guest)
Going to our panel discussion right now.

01:04:49.960 --> 01:04:50.680
Jeff Weinrich (Guest)
And.

01:04:53.910 --> 01:04:59.800
Jeff Weinrich (Guest)
Our second moderator is going to take over with the questions.

01:05:03.320 --> 01:05:04.460
Jeff Weinrich (Guest)
For the panel.

01:05:10.070 --> 01:05:10.720
Jeff Weinrich (Guest)
Let's

01:05:10.080 --> 01:05:14.730
David A Strand
So Jeff did you wanna go through some of the questions here to to kick off the?

01:05:14.310 --> 01:05:16.860
Jeff Weinrich (Guest)
sure sure sure Yep.

01:05:16.450 --> 01:05:19.310
David A Strand
OK, we have a we have a few that have come in and I'll.

01:05:19.930 --> 01:05:34.980
David A Strand
Uh hit a couple of easy ones first for Hazel because she was so proactive made my job easy. In she jumped in and answered them on the chat room, but I wanted to highlight them because there's some good links in there.

01:05:35.030 --> 01:05:35.740
David A Strand
Uhm.

01:05:36.980 --> 01:05:38.160
David A Strand
Earlier.

01:05:38.900 --> 01:05:39.660
David A Strand
Matt.

01:05:40.670 --> 01:06:00.140
David A Strand
And Mattias had asked questions. Matias his question was that Hazel had mentioned SWPC forecast whether they were publicly available or mentioned. They were publicly available and whether or not. They included gridded data that could be integrated into a decision support tools.

01:06:00.780 --> 01:06:12.990
David A Strand
And then just tagging onto that Matt said he thought that the look ahead was very limited for SWPC. And so it was interesting to see that uh 3 thing 3 day forecast was issued.

01:06:13.790 --> 01:06:19.860
David A Strand
And is this for all space weather impacts or just a subset of them and Hazel put into the.

01:06:20.600 --> 01:06:29.370
David A Strand
Uh chat some links and some answers that Hazel did you want to expand on what you have in the chat any in response to?

01:06:28.060 --> 01:06:28.630
Hazel Bain
Ash.

01:06:29.290 --> 01:06:55.630
Hazel Bain
Sure, sure, yeah, I guess that those I forget about the IQ forecast not necessarily being fully public. Yet yes, so the all of our proton forecasts. As part of the Noah S scale and all that that is all publicly available and I put some links in the chat box there for where people can subscribe or find those forecasts and linked to a paper that just shows a recent verification study of those products to show you what our current skill.

01:06:56.780 --> 01:06:58.680
Hazel Bain
I'm just not sure really the lamp never mind.

01:06:59.670 --> 01:07:19.900
Hazel Bain
Uh yes, so the link to the uh to a paper that looks at recent forecast verification study that tells us what our recent performance skill and metrics and all that are for that, so if people are interested. They can go and look there that I care forecasts are not the the gridded data is is not available just yet. That's something that the the.

01:07:20.300 --> 01:07:45.360
Hazel Bain
And the 3 or 4 forecast centers are working on and and I think part of that is because some of it is at the moment. We're kind of in this year, 2 year we're just getting going and seeing how this works and some of it is related to their sort of private industry and there are 2 so at some point. There may be cost recovery for some of these forecasts at some point in the future in in for different parts of you know the Globe and where people decide to subscribe to that, but

01:07:46.010 --> 01:08:16.890
Hazel Bain
hopefully that will be something that we can share in the future. Certainly the the forecast that goes to IQ is takes that gritty data and sort of distills it down to a text based advisory and that was something that we saw coming from the aviation industry through our customer requirements. Every was that people wanted that information in a way that was sort of understood by the aviation community and these these goodies and text based forecasts were modeled from the volcanic ash advisories and so it just is a very quick snapshot of that information. But certainly we hear that we're hearing that there are people would be.

01:08:16.950 --> 01:08:47.890
Hazel Bain
Interested in being able to see the map and being able to see her that globally distributes and in terms of the the the 3 day products. Yes, so there's we have our 3 day probabilistic forecasts for the radiation storms. We also have 3 day probabilities for the big solar flares and the X class solar flares and then also for some geomagnetic activity and so that's available on the website and I can. I'll stick link in there that shows you our archive that people can go back and look and see what the the different forecast products look like so.

01:08:48.150 --> 01:08:59.840
Hazel Bain
We come out through our report on solar and Geophysical activities that are SGA and then also our 3 day product, which gives you finally off 3 days worth the forecast so those are all available on the city website.

01:09:00.930 --> 01:09:31.120
David A Strand
And and and for everyone on the call. If you're at least using the teams app. I'm not sure about if you use it through a browser, but the chat room is archived for the all the way back to the beginning of the meeting on Monday, so you. You can go back and refer to that anytime and sometimes because of that. It's a little hard to find so hazels links are at the time stamps of 1216 and 1223. Today, so you can go right to that and I think she said that.

01:09:31.410 --> 01:09:42.150
David A Strand
Choose adding one more there about now so anyway that that's a fine, though, so thank Hazel and there was a couple that came in for Carl UM.

01:09:43.140 --> 01:10:10.570
David A Strand
And it was also from one was from Randy Bass and moments from Matthias from Randy pass are there any gaps for Carl are there any gaps in the weather support commercials too? I'm sorry are there any gaps in weather support to commercial space. Either terrestrial or spaceweather launch orbital reentry that you believe needs particular attention. So I'll leave that one to you first there Carl.

01:10:11.600 --> 01:10:14.610
Garman, Karl E (FAA)
Thanks, Dave and and thanks Randy UM.

01:10:15.360 --> 01:10:20.830
Garman, Karl E (FAA)
I'm going to stay pretty to answer that I'll stay pretty close to the scope of the mandate for my office.

01:10:21.460 --> 01:10:32.070
Garman, Karl E (FAA)
Uh so the operator the actual licensee that holds the commercial space launch or reentry license the operator is responsible for controlling their trajectory.

01:10:32.830 --> 01:10:47.670
Garman, Karl E (FAA)
So if there are weather issues that would affect that trajectory really that responsibility is on the operator to understand and an account for that to make sure that their their trajectory is kept within the scope of that license.

01:10:48.250 --> 01:11:00.040
Garman, Karl E (FAA)
Uh so one of those look like those are typically what I mean day of launch right wins synoptic massive scale local meteorology.

01:11:00.090 --> 01:11:29.320
Garman, Karl E (FAA)
Hey uh if you look in our our regulations ones at the performance based rags is there very outcome. Oriented you will only see the word weather quote unquote. The word weather actual text mentioned once you will see it exactly once and you will only see that word weather when it comes down to the list of items that an operator has to provide if there is a mishap they have to provide a report on the weather conditions at the time the mishap.

01:11:30.010 --> 01:11:30.640
Garman, Karl E (FAA)
So.

01:11:31.550 --> 01:11:33.440
Garman, Karl E (FAA)
When you when you talk about gaps.

01:11:34.650 --> 01:11:37.050
Garman, Karl E (FAA)
I kind of tie that back to 2.

01:11:37.760 --> 01:11:42.680
Garman, Karl E (FAA)
There's a differentiation between the public safety piece and the the.

01:11:42.740 --> 01:11:51.860
Garman, Karl E (FAA)
Come on Mission Assurance Peace Alright everyones typically interested in in Mission Assurance, but my office is really interested in the public safety piece.

01:11:52.640 --> 01:11:53.230
Garman, Karl E (FAA)
Uhm.

01:11:54.610 --> 01:12:25.740
Garman, Karl E (FAA)
I doubt if not if an operator would want to launch when there is a high probability of them losing their payload operators tend not to make money when they lose payloads due to things that they could

prevent but realize our main focus is the public safety piece and it's the operators responsibility for controlling their trajectory and if they go outside the bounds of what's authorized the license. It's considered a mishap and that which part of the reporting of that as far as like space weather like an orbit type of stuff in my office does not have an orbit authority.

01:12:26.260 --> 01:12:48.330
Garman, Karl E (FAA)
And also Interestingly we're actually constrained by the commercial space. Launch Amendments Act of 2004. We have a very tight scope of things that we can regulate especially when it comes to the newest one. You may see in in media reports is commercial spaceflight participants space tourists for for for normal people.

01:12:48.970 --> 01:13:00.260
Garman, Karl E (FAA)
Uhm we're very constrained by statute as to what we can regulate regarding regarding design or regarding crew up until a sunset date of 2023.

01:13:00.830 --> 01:13:24.650
Garman, Karl E (FAA)
Uhm Congress has twice extended to the the length that moratorium and the current date goes through 2023. I'm not going to vent mention I'm not going to venture a prediction of what our friends just up the street on the Hill may choose to do what that moratorium that is in the legislative sphere and not in the regulatory sphere because interacts to our authorizations under title 51, US code.

01:13:25.880 --> 01:13:42.220
Garman, Karl E (FAA)
That gives a little bit of a of a of a 360 round about that. But in bottom line. Randy is really it's the operator making sure that that they can control their trajectory based on what's in the license and so they're primarily interested in what the weather pieces?

01:13:43.770 --> 01:14:04.670
David A Strand
Uh you know, I have a question kind of Tide to a couple of comments. You've made about the uh the illustration of that. You deal with the on ramps and the owner off ramps and you don't your office does not have the on orbit authority what? What is the vertical extent of the end of the off on ramp or the beginning of the on ramp?

01:14:05.870 --> 01:14:29.510
Garman, Karl E (FAA)
It's determined by what's considered end of launch so redefined as the last control of the vehicle or the last control of the launch vehicle upon the launch? Which of course since you're dealing with with launch vehicles that are very different that that depends for of exactly physically what that means varies from one launch application to another launch application.

01:14:30.130 --> 01:14:35.490
Garman, Karl E (FAA)
And a lot of that is, is A is hammered out through the process of the of the licensing.

01:14:36.840 --> 01:14:49.170
Garman, Karl E (FAA)
The licensing process pre application. We actually grant the launch license and then that'll be in there and then we'll read from a regulatory span standpoint, Dave administer to what's considered end of launch.

01:14:49.990 --> 01:14:53.320
Garman, Karl E (FAA)
Wet but essentially it's the last control of the launch vehicle.

01:14:53.620 --> 01:15:05.300
David A Strand
OK, yeah, and Uh Matthias asked for you, Carl if you could elaborate a little bit more on whether constraints besides lightning for a space launch and reentry.

01:15:11.400 --> 01:15:15.390
Garman, Karl E (FAA)
Not sure what's meant what you mean by constraints, they mean legal constraints.

01:15:11.600 --> 01:15:11.990
David A Strand
Any.

01:15:13.960 --> 01:15:18.040
David A Strand
Matthias do you wanna elaborate on your question about elaboration there?

01:15:23.360 --> 01:15:24.240
Matthias Steiner (Guest)
Sure.

01:15:25.450 --> 01:15:54.310
Matthias Steiner (Guest)
I mean, there are certain weather conditions. Lightning is one of them. Where you wouldn't launch because you have impacts on that there may be there question to a certain degree could also be answered by Kristen, who you know provides weather support for these space launches and reentries. I would assume as well. In terms of what weather aspects are you looking for to avoid. Let's say if the winds are too strong or in a certain way that may affect how your you know.

01:15:54.360 --> 01:16:24.640
Matthias Steiner (Guest)
Or physical is launching or or gets drifted off its path in certain ways or if there is a failure of the launch, whereas the debris going etc. So there's certainly different weather aspects. That play into the thinking as you plan and execute these launches. That's what I was wondering what aspects of where they go into that thinking if you could elaborate either. You call or or Kristen or or maybe Omar?

01:16:24.680 --> 01:16:25.950
Matthias Steiner (Guest)
As well, I don't know.

01:16:28.410 --> 01:16:29.950
Smith, Kristin A (KSC-SII10)
Karl do you want me to take this one?

01:16:33.620 --> 01:16:34.270
Garman, Karl E (FAA)
Sure.

01:16:35.530 --> 01:16:46.980
Smith, Kristin A (KSC-SII10)
Alright so there are different types of constraints that are looked at some are more user constraints that like Matias, you had mentioned.

01:16:48.190 --> 01:16:58.050
Smith, Kristin A (KSC-SII10)
Upper level winds and that comes into play when it comes to loads and vehicle trajectories things like that, so that's user defined.

01:16:59.920 --> 01:17:30.270
Smith, Kristin A (KSC-SII10)
At least work goes into consideration when you talk about probability of violation when the 45th weather squadron or vanderburg and and Wallops do this as well. They're probability of violation or POV that takes into consideration the lightning LCC lightning much commit criteria and then some of the missions specific user constraints, which could include surface winds.

01:17:30.500 --> 01:17:43.740
Smith, Kristin A (KSC-SII10)
Temperature and if the vehicle can or can't fly through Precip, but the POV wouldn't include certain user constraints like upper level wind shear, solar activity or recovery conditions so.

01:17:44.930 --> 01:17:52.250
Smith, Kristin A (KSC-SII10)
Maybe like the wave height or wind speeds over the ocean so from that perspective that's.

01:17:52.930 --> 01:18:06.240
Smith, Kristin A (KSC-SII10)
What does and doesn't go into a probability of violation when it comes to those values that are put out by the launch weather officers so summer. Lightning launch commit criteria other constraints are are defined by the user.

01:18:08.400 --> 01:18:09.340
Matthias Steiner (Guest)
Great thank you.

01:18:10.720 --> 01:18:14.730
Garman, Karl E (FAA)
And then Carl here, I could add on to what Chris mentioned.

01:18:15.360 --> 01:18:16.010
Garman, Karl E (FAA)
Is?

01:18:17.400 --> 01:18:17.960
Garman, Karl E (FAA)
Ah.

01:18:19.180 --> 01:18:31.580
Garman, Karl E (FAA)
A lot of the weather items are as Chris and use the term user defined from a licensing perspective we would look at right? What the A lot of things, including the even the trajectory, including the size of the hazard zone.

01:18:31.960 --> 01:18:40.060
Garman, Karl E (FAA)
Uh to make sure that the public risk right here in the expected casualty numbers don't exceed an acceptable threshold and.

01:18:41.490 --> 01:18:44.340
Garman, Karl E (FAA)
And so a lot of so some of those things like.

01:18:44.990 --> 01:19:16.070
Garman, Karl E (FAA)
Would proud depend launch to launch because a lot of it's based upon your trajectory characterises a launch vehicle. You're expected debris cat or your debris catalog for that particular launch or re-entry vehicle so a lot of these things are performance based specifically because they're the field is very, very diverse and you'd have to look at what is the expected outcome and then backtrack from that to get clear defined risk criteria so it's I I hesitate I I should say I caution against drawing.

01:19:16.410 --> 01:19:30.760
Garman, Karl E (FAA)
2 close of an analogy with our with our friends in the aviation world. I I would not like in it to saying. Hey, you know the cross. Max cross wind component is such and such it. Therefore you shall not take off I would.

01:19:31.650 --> 01:19:55.450
Garman, Karl E (FAA)
This is it it's so dependent upon upon the characteristics of of particular launches and reentries vehicle and faults. Rejector either debris catalog. A lot of things. Even the even the payload. Also, the reason why lightning gets such specific special attention. And why you'll see soul sections on lightning, but very little little mention of whether as a bigger field.

01:19:56.420 --> 01:20:00.940
Garman, Karl E (FAA)
Has to do with this? The main driver and this is not not?

01:20:01.000 --> 01:20:31.320
Garman, Karl E (FAA)
The The The second obvious if you just look at the Rag from a just from a plain text. But the background. Big reason why lightning gets a lot of very close attention is not because we're trying to protect the payload. It's not because we're trying to necessarily protect any human participants that are on board. It's to protect the flight safety system. The flight safety system or flight termination system, which essentially blows up the vehicle. The proverbial range controller to hit the button and blow the vehicle up if it goes.

01:20:31.670 --> 01:20:33.440
Garman, Karl E (FAA)
Too much you know cross range.

01:20:34.120 --> 01:21:04.250
Garman, Karl E (FAA)
Uh is there to protect the uninvolved public if you had a lightning strike and it took out the the ability for that flight safety system to activate or or for the range control to send a signal to Orient. It compromised the integrity of that flight safety system. Now you do have an uncontrolled hazard to the public so the reason why lightning gets such attention is not so much to protect mission assurance.

01:21:04.680 --> 01:21:16.160
Garman, Karl E (FAA)
It's to protect the flight safety system because that is how you you large to a large extent can guarantee that the uninvolved public isn't put at risk due to an errant launch vehicle.

01:21:17.740 --> 01:21:25.460
Garman, Karl E (FAA)
But Well, you wouldn't get that just by a clearly a crisp literal reading of of the rag. There's a lot of background packed into that.

01:21:27.280 --> 01:21:28.300
Matthias Steiner (Guest)
Great thank you.

01:21:27.430 --> 01:21:27.820
David A Strand
Uh.

01:21:28.500 --> 01:21:42.950
David A Strand
You you guys are great because Kristen 's already put into the chat a link for FAQ on the criteria as well. So check out that link there. I'm wondering and and Kristen you mentioned wave Heights and it made me think.

01:21:43.440 --> 01:22:06.750
David A Strand
Uh with the space X it's one thing for water landing. You have to be looking at certain criteria. But for the space X where there have a couple of times landed on a platform out in the ocean in the open ocean does that has that presented any unique challenges from from just a normal water landing or other reentries you.

01:22:07.440 --> 01:22:09.540
David A Strand
Y'all dealt with or for anybody there.

01:22:10.570 --> 01:22:19.630
Smith, Kristin A (KSC-SII10)
So that's like in the the guy that I just put in the link and what I was describing earlier those recovery conditions that's

01:22:20.880 --> 01:22:24.150
Smith, Kristin A (KSC-SII10)
that's with also looked at by the.

01:22:24.780 --> 01:22:32.660
Smith, Kristin A (KSC-SII10)
This specific launch weather officer. That's assigned to that particular mission, so they take all of that into consideration and.

01:22:34.320 --> 01:22:39.040
Smith, Kristin A (KSC-SII10)
Would brief the the user whether it's space X or whomever?

01:22:39.610 --> 01:22:43.060
Smith, Kristin A (KSC-SII10)
At at what they're anticipating those conditions to be.

01:22:43.840 --> 01:22:45.130
Smith, Kristin A (KSC-SII10)
So they can make the call.

01:22:46.750 --> 01:22:48.960
David A Strand
OK thanks.

01:22:48.070 --> 01:22:48.360
Garman, Karl E (FAA)
Right.

01:22:49.790 --> 01:22:53.100
Garman, Karl E (FAA)
Hey Dave, Carl here? Can I just amend one quick thing I just mentioned?

01:22:53.460 --> 01:22:54.240
David A Strand
Yeah, please.

01:22:54.170 --> 01:23:25.900
Garman, Karl E (FAA)
Alright so in in addition, I when I said to protect the flight termination system. Let me uh. Let me qualify. What I said earlier that also also covers any any safety critical systems, so any systems that are considered for the launch that are considered safety critical. I just mentioned the flights flight termination system or flight safety system as an example by I don't want to mislead the audience to think that's the only thing I care about it really. It's it's safety critical systems again for the for the intent of protecting the uninvolved public.

01:23:29.810 --> 01:23:30.320
David A Strand
OK.

01:23:30.650 --> 01:23:32.640
Garman, Karl E (FAA)
Just 'cause that's a distinction with a difference.

01:23:36.100 --> 01:23:36.780
David A Strand
Uhm.

01:23:37.830 --> 01:23:43.030
David A Strand
Uh another a couple of questions came in from Gordon Brooks for Kristen.

01:23:43.840 --> 01:23:47.750
David A Strand
Uh he said he missed the names of the local models that you're using?

01:23:48.900 --> 01:23:53.270
David A Strand
Do use measure scale ensemble data from the Air Force.

01:23:53.320 --> 01:23:54.790
David A Strand
This weather.

01:23:55.420 --> 01:23:59.130
David A Strand
Uh and he mentions that they have 20.

01:23:59.720 --> 01:24:06.280
David A Strand
4 in one kilometre ensemble coverage for Cape Canaveral and then work with the 45th weather group.

01:24:07.380 --> 01:24:27.850
Smith, Kristin A (KSC-SII10)
So I'm not sure all the different types of models that the 45th has available. I know they do use what they call the gallon model so it's more of a global model. But the one that I had mentioned the meso scale model earlier. That's a a Wharf based model that's localized for our area.

01:24:29.740 --> 01:24:30.350
David A Strand
OK.

01:24:31.570 --> 01:24:32.360
David A Strand
Uhm.

01:24:33.620 --> 01:24:46.380
David A Strand
Eric asked come and this may have already been covered here did weather criteria required for launch in terms of lightning strikes and ceilings change from space shuttle program to the current private ventures.

01:24:51.390 --> 01:24:56.980
Smith, Kristin A (KSC-SII10)
So the criteria are are still essentially the same from.

01:24:57.690 --> 01:25:09.770
Smith, Kristin A (KSC-SII10)
With some slight modifications since the the shuttle program ended but that's it's not based on necessarily commercial entities, joining the mixed. It's just based on?

01:25:10.360 --> 01:25:40.170
Smith, Kristin A (KSC-SII10)
Add new information that the Lightning advisory panel may have new questions that come up on whether it's Day of launch or non day of launch that the weather. Officers may relay back to my office and then we bring to the Lightning advisory panel for them to think about and discuss and then either modify or or keep the the rules as is, but we are getting a lot of questions from the larger.

01:25:40.530 --> 01:25:54.070
Smith, Kristin A (KSC-SII10)
Commercial group about can you tailor the lightning launch commit criteria for a specific vehicle or can the Lightning launch commit criteria be tailored or?

01:25:54.530 --> 01:26:24.710
Smith, Kristin A (KSC-SII10)
Uhm modified to be applicable to certain size vehicles can you have different lightning LCC for small vehicles like sounding rockets and then vehicles that are more midsize and larger than large size or can the criteria be altered based on like the propellant types, so these are a lot of questions that we're trying to handle some research has been done by more graduate level students.

01:26:24.790 --> 01:26:43.220
Smith, Kristin A (KSC-SII10)
Uhm thanks to our counterparts at the 45th Weather Squadron, who've been working with some students coming up with theses topics for them to look into we also work with local high schools that are interested in looking at ways that they can.

01:26:44.450 --> 01:27:00.190
Smith, Kristin A (KSC-SII10)
Get involved with research and we're looking for topics to to explore so all of this information is just a great way of trying to address those questions that that come to us about the lightning LCC and how they can be modified and improved.

01:27:02.230 --> 01:27:03.720
David A Strand
Alright UM.

01:27:04.600 --> 01:27:29.070
David A Strand
And one last one for Kristen here from Matt looking for his identifying gaps. You suggested you try to do. Lightning research and development to the extent you can to refine and improve your lightning launch commit criteria and he says to him. It sounded like that. You were identified in R&D&R&D Gap in this area would you care to comment on his?

01:27:29.730 --> 01:27:30.200
David A Strand
Comment.

01:27:29.950 --> 01:27:30.190
Smith, Kristin A (KSC-SII10)
Sure.

01:27:30.250 --> 01:27:42.470
Smith, Kristin A (KSC-SII10)
Great yeah, so we've been identifying for you know the last couple of years now and and by me, I mean, myself and and the Lightning advisory panel and others topics that.

01:27:43.210 --> 01:28:13.130
Smith, Kristin A (KSC-SII10)
Would be very helpful if we knew more information about and we've been working together. Along with Carl as well. Carl and I talk very often about lightning launch commit criteria and other weather related topics and what we're looking, and hoping to do is create some type of document. We're thinking right now, a Journal article. Maybe through the the AMS where we can discuss more of the Lightning launch commit criteria.

01:28:13.250 --> 01:28:43.580
Smith, Kristin A (KSC-SII10)
If some of the background is applications when it comes to operations and to highlight the areas in research where it we would we find it would be very beneficial. If we knew more knew more about and

our hope is that these topics. Once we make the researchers aware of areas where we think we're lacking that whether it's students or other researchers who are more established within their career.

01:28:44.040 --> 01:28:46.960
Smith, Kristin A (KSC-SII10)
Would be made aware of it and could.

01:28:48.050 --> 01:28:49.810
Smith, Kristin A (KSC-SII10)
Research it or you know.

01:28:50.410 --> 01:29:01.040
Smith, Kristin A (KSC-SII10)
Look at it as from whether it campaign or anything else. Some type of topic. They could tack on to maybe their current work or or new work that they may be interested in looking into.

01:29:02.600 --> 01:29:16.160
David A Strand
And we have a couple of questions for the panel in general, but then Brian Paddick. You grew just asked a question you're just a moment ago. I believe is for you Kristen? How much support since it's I assume it's lightning.

01:29:16.530 --> 01:29:20.920
David A Strand
Uh how much support do you get from the Marshall Space Flight group in Huntsville?

01:29:22.580 --> 01:29:52.260
Smith, Kristin A (KSC-SII10)
So we uh I should have brought this up before when I was talking in my slides, but at KFC. We interact with all of our counterparts at all. The different NASA centers on a frequent basis. We also collaborate and interact with the space force at both the eastern range and Western Range. We talked with our counterparts at the National Weather Service as well. So we'd like to talk with everybody in it.

01:29:52.320 --> 01:30:17.490
Smith, Kristin A (KSC-SII10)
Frequent basis, so we reach aware of what kind of struggles were going through individually how we can help each other so Marshall is is one of the groups that we interact with very, very frequently and they're the group. We turn to as our upper level. Wind experts so they do a lot. If not all of our analysis from an asset perspective when it comes to upper level winds.

01:30:21.170 --> 01:30:22.790
David A Strand
Alrighty UM.

01:30:23.680 --> 01:30:26.670
David A Strand
Omar I have to ask and maybe I just missed this but.

01:30:27.790 --> 01:30:33.600
David A Strand
When there is a strictly a DoD mission how much.

01:30:34.480 --> 01:30:36.800
David A Strand
Interaction I guess do you have with?

01:30:38.210 --> 01:30:48.530
David A Strand
Kind of what is the civilian side or are y'all pretty segregated in that manner or is there a lot of collaboration or how? How does your interaction into?

01:30:49.480 --> 01:30:52.860
David A Strand
Dealing with the groups at the at Kennedy there.

01:30:53.790 --> 01:31:24.140
Lt Col Omar Nava (Guest)
So the thumb at least from what I understand I'm sort of familiar with the the office at the at the 45th. But you know nowadays you know pick. Whatever community like no one really works on their their own anymore. There's been a you know over the last few years. You know this big push to you know really have that interagency collaboration are really trying to share you know from a resource perspective from an auto perspective from a you know procedures perspective really trying to share what we can across.

01:31:24.200 --> 01:31:54.990
Lt Col Omar Nava (Guest)
You know across the different agencies that way you know in general, the community will then be re stronger so seeing that. A lot on the on the space weather side and I'm sure I'm not too familiar on the on the launch side, but you know it's it's a It's a nice thing seeing over the last few years. Just this you know military is not acting alone. We really do rely on interagency partners and as I mentioned with the commercial integration sell commercial partners as well. Also, you know bolsters mission, and really seeing as some good improvements so.

01:31:55.390 --> 01:31:57.900
Lt Col Omar Nava (Guest)
I'm looking forward to see what the future holds though.

01:31:59.590 --> 01:32:00.170
David A Strand
Great thank you.

01:32:00.500 --> 01:32:17.470
David A Strand
Uhm a question, but he has had for all the panelists so whoever wants to chime in first from all of your perspectives? How will changing climate conditions affect low orbit and Space Flight operations.

01:32:18.480 --> 01:32:20.430
David A Strand
So anybody want to go first on that.

01:32:24.590 --> 01:32:25.840
David A Strand
And not everyone at once.

01:32:29.210 --> 01:32:32.660
David A Strand
Matthias do you want elaborate any on the on what you're looking for there.

01:32:37.210 --> 01:32:37.530
Matthias Steiner (Guest)
How?

01:32:37.580 --> 01:33:08.590
Matthias Steiner (Guest)
Ah, well, I I was trying to pick their brain in terms of understanding what they are concerned about. I mean, they're all the current concerns may still be day, about may be amplified in certain ways. We may see more convective storm. Therefore, more lightning activity, which may limit you know launch windows, etc. I mean, there is a full spectrum to it. How our conditions. The atmospheric conditions may change in the future and how that may affect.

01:33:08.650 --> 01:33:34.980
Matthias Steiner (Guest)
Operations or how it may affect also infrastructure. I mean, if we have significant sea level rise suddenly. KFC maybe on the water and and this launchpad may no longer be there as an option or stuff like this, I mean, I. I was really trying to see where where what people are thinking about and getting concerned in terms of how our climate conditions may change.

01:33:43.010 --> 01:33:46.770
David A Strand
Sounds like there's more concerned about the the launch this month.

01:33:48.430 --> 01:33:49.240
David A Strand
But.

01:33:51.490 --> 01:33:52.860
David A Strand
Anyone care to comment on that.

01:33:56.630 --> 01:33:57.160
David A Strand
Ah.

01:33:59.440 --> 01:34:16.920
Lt Col Omar Nava (Guest)

This I know I don't necessary have that expertise, but I think a new tenant. Colonel Rob Randoms in the in the in the chat and I know he's very familiar with the climate aspects. So maybe you can chime in or put something in there, but at least that's my response phone different.

01:34:23.560 --> 01:34:26.140
Lt Col Branham (HAF/A3OW) (Guest)
Yeah, this is a this is a tenant Colonel Branum.

01:34:23.570 --> 01:34:24.260
David A Strand
Well, Jeff.

01:34:26.190 --> 01:34:26.700
Lt Col Branham (HAF/A3OW) (Guest)
Uh.

01:34:27.910 --> 01:34:29.820
Lt Col Branham (HAF/A3OW) (Guest)
Thanks Omar for that.

01:34:30.070 --> 01:34:38.080
Lt Col Branham (HAF/A3OW) (Guest)
Uh you know, and I'm gonna talk about this, this afternoon. A little bit, but you know the DAF right now is really looking at at.

01:34:38.710 --> 01:34:48.020
Lt Col Branham (HAF/A3OW) (Guest)
Uh 22 areas when it comes to climate change and I think you know this group would do well to do the same is really taking a look at.

01:34:48.730 --> 01:35:19.600
Lt Col Branham (HAF/A3OW) (Guest)
Ah, you know you know from an operations perspective, particularly with fuel consumption, particularly with you know support to aviation operations right from the flying aspect. Then there's the infrastructure piece and we talked about that. You know before a little bit that that the you know the DAF itself is looking at. You know how do we develop you know installation resiliency plans for our infrastructure out there to support?

01:35:19.650 --> 01:35:20.240
Lt Col Branham (HAF/A3OW) (Guest)
Readiness.

01:35:20.900 --> 01:35:29.500
Lt Col Branham (HAF/A3OW) (Guest)
Which you know that feeds into the flying operations piece so I think that's that's something that we had to talk about you know going forth.

01:35:33.140 --> 01:35:35.260
David A Strand
Uh Jeff were were up to about.

01:35:35.310 --> 01:35:42.650
David A Strand
Not 3 minutes before one or 2 minutes before one now, so that was the extent of the questions but.

01:35:42.710 --> 01:35:44.270
David A Strand
So I'll

01:35:43.640 --> 01:35:44.260
Garman, Karl E (FAA)
Hey Dave,

01:35:45.490 --> 01:35:46.970
David A Strand
Yes, Sir who's.

01:35:46.420 --> 01:36:05.520
Garman, Karl E (FAA)
I can get this car all I can on that it's I'm kind of struggling with Matthias is question excellent question fair question. I'm kind of struggling with how to answer it from my agencies perspective because the scope of the of the climate change challenge is is it? It's a very long term challenge.

01:36:06.340 --> 01:36:13.380
Garman, Karl E (FAA)
The scope of my agencies licensing authority really is, is far far shorter than that.

01:36:14.030 --> 01:36:18.880
Garman, Karl E (FAA)
Uh like I described earlier you know launch and then re-enter the on ramp and the off ramp.

01:36:19.500 --> 01:36:36.000
Garman, Karl E (FAA)
So the the amount of time that one spends on that proverbial onramp and offramp are orders of magnitude shorter than than than the challenges that he described so that that that's kind of explains my reticence for a minute because I I I.

01:36:38.040 --> 01:36:47.310
Garman, Karl E (FAA)
There's just a huge difference in time scales, so I'm I'm just trying to articulate and impacts to to the scope my agencies licensing authority when it comes to that issue.

01:36:48.290 --> 01:36:56.260
David A Strand
Yeah, I was guessing it tongue in cheek away, but uh or little facetiously, but I think it's true that probably it sounds like from most of the.

01:36:57.910 --> 01:37:02.220
David A Strand
Issues that are being chased by this immediate panel are are much more.

01:37:02.520 --> 01:37:16.400
David A Strand
Uhm near term so I'm not that there's not the issues for the longer term, there, but anyway, we're coming up on 1:00 o'clock. So I wanted to give it back to to Jim. Thank you for all that interaction there.

01:37:19.020 --> 01:37:20.620
David A Strand
Or Jeff I'm sorry do you have?

01:37:21.520 --> 01:37:22.790
David A Strand
Sorry one of the JS.

01:37:22.250 --> 01:37:25.860
Jeff Weinrich (Guest)
That no worries. Thank you David I appreciate you.

01:37:25.910 --> 01:37:31.610
Jeff Weinrich (Guest)
You are handling all the questions and thank you to all the panelists a great discussion.

01:37:32.210 --> 01:37:47.190
Jeff Weinrich (Guest)
Uh I knew there would be no lacking of questions. So we're going to take a scheduled 30 minute break and return at 1:30 Eastern Time, and talk about multi use weather, which will last.

01:37:48.260 --> 01:37:52.210
Jeff Weinrich (Guest)
An hour and 10 minutes, so I'll I'll see you at 1:30 Eastern Time, thanks so much.

01:59:15.380 --> 01:59:22.440
Matt Fronzak
For Uh Dan and Heather and Sally any of y'all wanted to a sound check or a video check feel free.

01:59:25.210 --> 01:59:26.790
Dan Lindsey (Guest)
Hey this is Dan can you guys hear me?

01:59:28.520 --> 01:59:32.940
Matt Fronzak
5. By 5, I was going to say no but then that would be a really smart alecky answer.

01:59:34.420 --> 01:59:36.630
Reeves, Heather D.
This is Heather can see me and hear me.

01:59:37.810 --> 01:59:39.550
Matt Fronzak
No for you, Heather I'm gonna say no.

01:59:41.510 --> 01:59:41.930
Reeves, Heather D.
Hey.

01:59:43.410 --> 01:59:44.980
Reeves, Heather D.
Will be a sticker to me.

01:59:48.480 --> 01:59:50.870
Matt Fronzak
Well, I know you better I know you could take it.

01:59:58.370 --> 01:59:59.980
McFarlane, Sally
And this is Sally can you hear me?

02:00:00.910 --> 02:00:03.110
Matt Fronzak
5. By 5, Sally and see you too.

02:00:02.580 --> 02:00:03.020
McFarlane, Sally
Great.

02:00:03.710 --> 02:00:04.380
McFarlane, Sally
Great, thanks.

02:06:51.890 --> 02:06:52.410
Johnston, Kevin L (FAA)
Monitors.

02:06:53.030 --> 02:06:55.600
Johnston, Kevin L (FAA)
So tell us about the process right now.

02:07:11.640 --> 02:07:17.550
Matt Fronzak
Alright Jeff my uh my sandil, she's 130 exactly.

02:07:14.610 --> 02:07:14.890
Flynn, Diane CTR (FAA)
Like.

02:07:18.600 --> 02:07:25.410
Matt Fronzak
And all 3 of your speakers who aren't named TBDR on and have all done some checks.

02:07:25.350 --> 02:07:26.080
Flynn, Diane CTR (FAA)
Oh, OK.

02:07:26.430 --> 02:07:27.180
Jeff Weinrich (Guest)
Wonderful.

02:07:28.230 --> 02:07:30.430
Jeff Weinrich (Guest)
Uh so welcome back everyone.

02:07:32.400 --> 02:07:42.260
Jeff Weinrich (Guest)
Our session now is going to be multi use weather capabilities that agencies are working on that could be leveraged for evening weather.

02:07:35.640 --> 02:07:36.050
Flynn, Diane CTR (FAA)
Period.

02:07:37.490 --> 02:07:39.380
Flynn, Diane CTR (FAA)
Right well well good.

02:07:40.760 --> 02:07:42.800
Flynn, Diane CTR (FAA)
Well, good, hey will it be remote?

02:07:44.640 --> 02:07:47.510
Jeff Weinrich (Guest)
And if you're if you're not speaking for you go on mute please.

02:07:47.280 --> 02:07:48.130
Flynn, Diane CTR (FAA)
Right right.

02:07:51.630 --> 02:08:01.140
Jeff Weinrich (Guest)
Thank you capabilities that agencies are working on could be leveraged for aviation weather or hasn't aviation weather component. We have MRMS satellite and.

02:08:02.480 --> 02:08:06.250
Jeff Weinrich (Guest)
Do you eat your free panelists for this session?

02:08:06.860 --> 02:08:07.500
Jeff Weinrich (Guest)
Uhm.

02:08:08.480 --> 02:08:14.720
Jeff Weinrich (Guest)
And we'll start with Doctor Dan Lindsay and he is the.

02:08:15.720 --> 02:08:33.870
Jeff Weinrich (Guest)
Then no and as this goes or program scientists. He has been with Noah since 2004 in Fort Collins, Colorado and specializes in satellite remote, sensing a message scale phenomena from the geostationary platform, including thunderstorms tropical cyclones and aerosols.

02:08:35.180 --> 02:08:40.570
Jeff Weinrich (Guest)
So so smoke and blowing dust so welcome Dan.

02:08:41.410 --> 02:08:44.340
Jeff Weinrich (Guest)
And I know you're going to share your presentation.

02:08:45.530 --> 02:08:48.270
Dan Lindsey (Guest)
Yeah, thanks Jeff just double checking you can hear me OK.

02:08:48.570 --> 02:08:49.060
Jeff Weinrich (Guest)
Again.

02:08:49.500 --> 02:08:58.200
Dan Lindsey (Guest)
Great so while I'm sharing I will just say oops. You want to see my email thanks to Randy for the invitation to participate today.

02:08:59.080 --> 02:09:02.220
Dan Lindsey (Guest)
And I will also say can you guys see my screen?

02:09:05.170 --> 02:09:05.730
Matt Fronzak
Yes.

02:09:05.860 --> 02:09:06.390
Dan Lindsey (Guest)
OK great.

02:09:05.930 --> 02:09:06.340
Prott, Frances M (FAA)
Yes.

02:09:07.440 --> 02:09:35.970
Dan Lindsey (Guest)
I should also say that what I'm presenting today is largely the work of others. Most specifically and in this case. Tony Wimmers and usng know. Tony winners from Sims and young know from Sarah and then lots of others who just generally work on on goes R so I worked for knowing Desdas That's I think you probably all know this. But just to make sure NASDAQ is the satellite arm of Noah and my role is goes our program scientist so I I I I would say that I probably work most with the imagery itself.

02:09:36.510 --> 02:10:06.880
Dan Lindsey (Guest)
But I'm also pretty familiar with most of the products but the operational products in the experimental products that we're working on so I thought I would spend this 5 minutes just giving you a highlight of a couple of different products that we have to maybe whet your appetite and see. And then during the discussion. We could talk about if there's interest in these among the folks who run look on the meeting here so first just an example. This is one of my favorite volcano examples. This is actually the Himawari 8 satellite back in.

02:10:07.040 --> 02:10:38.590
Dan Lindsey (Guest)
2017 we had an eruption on South, the South end of kamchatka of the called ball. Comboni volcano may not be saying that right. This is the so called ash.org and you can see if you can see my mouse. The ash is very evident right here is trimming to the South. But, perhaps my favorite part of this is you can actually see contrails of the aircraft that are flying on the typical from East Asia to North America route through this area and you start to see as they get notifications or the volcano.

02:10:38.650 --> 02:10:56.120
Dan Lindsey (Guest)
They start to deviate their flight paths and that's shown by these sort of Kinks and the controls that show up right there. I just thought. This was a really neat example. And it highlights the the use or the utility of satellite data is particularly geostationary data for volcanic eruptions.

02:10:57.090 --> 02:11:27.190
Dan Lindsey (Guest)
Here's another eruption same area a little bit further. South couple years later. This is Reiko Key. This is a true color image, which shows the volcano spewing. It's ash up over the top of the low clouds and the Ashes up really well and the the Brown color that it actually is thanks to the true color imagery from Himawari 8 and then a few days later. This volcano was active for days and it spewed lots of things into the atmosphere, including lots of sulfate aerosols and this is a.

02:11:27.330 --> 02:11:50.960
Dan Lindsey (Guest)
The so called so 2 RGB from ghost 17 way to the East of the volcano. The yellows indicate these aerosols and probably some ash mixed in as well, and it really circulated up here among this low pressure system

North of the illusions for days and so again any routes going from North America over to East Asia probably had to keep an eye out for this plume because of the the dangers involved.

02:11:51.990 --> 02:12:21.530
Dan Lindsey (Guest)
OK, so I'm gonna say a couple words about some experimental products. We have working right now. The first is automated turbulence detection. This is led by Tony Wimmers at Sims, So what we're looking at here. This is actually another himawari example. But we have this running from goes 16 and go 17 as well on the left and middle panels is just a water vapor band. This is the 6.2 band 8 by itself, and on the right is a high pass filter of that product you can think of that is basically calculating gradients of the brightness.

02:12:21.740 --> 02:12:49.230
Dan Lindsey (Guest)
Teachers themselves and what it does is it really enhances the gradients in this case showing these gravity wave features as a very subtle gravity wave feature that shows up as these ripples. It shows up better in the high pass filter and then you can see as the aircraft passes through they did have some reports of severe turbulence and this area, corresponding with those ripples so this is just to kind of give you an idea of how we can use satellite data to help find the turbulence and in clear Sky regions.

02:12:50.460 --> 02:13:20.090
Dan Lindsey (Guest)
So this is the way that this is what the product looked like itself. Looks like and this is actually from yesterday. Interestingly, so we have a very recent example and what's plotted is the probability of moderate or greater turbulence. That's the contours. So you can see yellow contour represents 50% probability and the the other contours or just lower percentage of probability and then plotted on top of that are the Pirates showing quite a few moderate or moderate turbulence. There's even a a couple of.

02:13:20.530 --> 02:13:50.730
Dan Lindsey (Guest)
Extreme turbulence cases there in Kentucky corresponding with this uh this system that was over the the southeast United States yesterday so there's a lot more info about this product at this website. If you you could probably just find it by Googling turbulence in Sims, but it does run in real time and I encourage you to take a look at it if you think it might be of interest. So I should also say this is specifically in the 36 to 37,000 flight level, so it is vertically dependent on or.

02:13:50.780 --> 02:14:21.810
Dan Lindsey (Guest)
The product does have different vertical levels and then the final experimental product. I wanted to highlight is vertical. Cross sections across flight paths so this is an example from Atlanta to Chicago and on the on the X axis. You see Atlanta over here. We see O'Hare on the far right and then on the vertical axis is height in thousands of feet and the main thing that we wanted to highlight here or clouds. Because this is not something that you can normally get easily since satellite normally gives you 2 dimensional info. This is actually given us.

02:14:22.090 --> 02:14:52.760
Dan Lindsey (Guest)

3. Dimensional info where the clouds are so you can see on the first half of the flight path. We had high clouds indicated in the white and the blue hatching represents possibly mixed phase. So I sing could be a potential issue, there down here is blue showing some low clouds in the area. This is hard to do because we really can't see through the clouds with goes 16 and goes 17 only in some cases so we may be missing some some lower clouds down here below the high clouds. But they do a pretty good job of making that estimate, especially when the top layer is semi transparent.

02:14:52.920 --> 02:15:02.270
Dan Lindsey (Guest)
Also plotted on here are the turbulence reports from yesterday probably in that same area that I highlighted on the on the last case, they're over Kentucky, Indiana etc.

02:15:03.260 --> 02:15:35.640
Dan Lindsey (Guest)
So I'll finish by just providing some resources on the web if you're just looking for imagery and products itself, the slider side is nice, so if you just Google. Rambai slider or you can copy this URL and other imagery site viewer is from the star group and Desdas That's this would load faster. If you have low bandwidth. I I didn't say much about volcanoes. But certainly you are probably familiar with valk at from Mike Pence bonuses team up at Sims website there and here again are the links to the 2 examples that I showed you the automated turbulence detection from Sims.

02:15:35.880 --> 02:15:53.690
Dan Lindsey (Guest)
And the vertical cross section page, which is very experimental very early at this point. If anybody has any positive or negative feedback on any of these products really. I I'd love to hear it. You can, we can talk about it later during the discussion or you can shoot me. An email there at that address so I'll stop there and pass it to the next panelist.

02:15:58.600 --> 02:15:59.480
Jeff Weinrich (Guest)
Thanks so much.

02:15:59.540 --> 02:16:00.010
Jeff Weinrich (Guest)
Yeah.

02:16:01.860 --> 02:16:02.460
Jeff Weinrich (Guest)
Then.

02:16:04.080 --> 02:16:07.540
Jeff Weinrich (Guest)
I mean, just think stuff, so next we have.

02:16:07.600 --> 02:16:08.020
Jeff Weinrich (Guest)
From.

02:16:08.980 --> 02:16:22.320
Jeff Weinrich (Guest)
Doctor Heather Reeves and she is the assistant director for the Collective Institute for severe and high impact weather research and operations in Norman, Oklahoma within.

02:16:23.150 --> 02:16:32.320
Jeff Weinrich (Guest)
SCIWR Oh, she leads a team of scientists who are developing new decision support tools for surface transportation and aviation.

02:16:33.760 --> 02:16:34.520
Jeff Weinrich (Guest)
So welcome.

02:16:34.900 --> 02:16:38.640
Reeves, Heather D.
Great thank you am I supposed to share my screen or as somebody else going to.

02:16:38.260 --> 02:16:42.020
Jeff Weinrich (Guest)
Uh me either. Either way, I can do it or you can show it, what would you prefer?

02:16:41.360 --> 02:16:42.160
Reeves, Heather D.
OK.

02:16:46.560 --> 02:16:48.050
Reeves, Heather D.
I'm not sure how to do it.

02:16:47.980 --> 02:16:50.900
Jeff Weinrich (Guest)
OK, I'll take care of it for you, yeah, no no worries.

02:16:48.670 --> 02:16:50.030
Reeves, Heather D.
Yeah, I'm sorry, yeah.

02:16:51.010 --> 02:16:52.680
Reeves, Heather D.
It's not giving me the option.

02:16:52.960 --> 02:16:53.530
Jeff Weinrich (Guest)
She.

02:16:54.890 --> 02:16:59.040
Matt Fronzak
Heather that's the first time I've ever heard you say, I don't know how to do something.

02:16:58.660 --> 02:16:59.310
Reeves, Heather D.
Translation.

02:16:59.860 --> 02:17:02.600
Reeves, Heather D.
He's never been around me very much obviously.

02:17:04.110 --> 02:17:08.820
Reeves, Heather D.
I'm so comfortable with that phrase that doesn't embarrass me a bit to admit it.

02:17:11.070 --> 02:17:11.780
Jeff Weinrich (Guest)
And you have the?

02:17:11.830 --> 02:17:15.900
Jeff Weinrich (Guest)
Uh MRMS slide is that correct OK.

02:17:14.850 --> 02:17:15.420
Reeves, Heather D.
Yeah.

02:17:18.560 --> 02:17:48.350
Reeves, Heather D.
Yeah, so while that's coming up. Uh must tell you that one of the things that we work on in my team is this thing called MRMS. It's a data Fusion system that integrates together radar satellite data lightning etc. ET cetera to create decision support tools for weather among the things that we create are the usual cast of suspects that you're all familiar with things like composite reflectivity echo tap and Bill but in actuality, we have over 100 products and derivatives.

02:17:48.400 --> 02:17:54.550
Reeves, Heather D.
Being produced by Ms Operationally, and then even more in our experimental system next slide, please.

02:17:59.290 --> 02:18:00.540
Reeves, Heather D.
Next slide please.

02:18:05.000 --> 02:18:07.970
Jeff Weinrich (Guest)
It takes a few seconds for it to come in the delay.

02:18:06.410 --> 02:18:09.090
Reeves, Heather D.
OK, well, it's not then it's given, but that's OK.

02:18:09.360 --> 02:18:30.970
Reeves, Heather D.
Uh we have yeah, we have 3 different teams working on MRMS. There's a team focused on severe weather applications. One focused on hydrologic applications and then there's my team, which does transportation and the transport team were divided into 2 different on line items. One is on surface. Transportation and the other focuses on aviation and so today. What I'm going to talk to you is how we can.

02:18:09.410 --> 02:18:10.440
Jeff Weinrich (Guest)
OK. Sorry.

02:18:32.800 --> 02:18:33.390
Reeves, Heather D.
Uh.

02:18:34.510 --> 02:19:06.340
Reeves, Heather D.
Meld together these different lines of research so this one is a mashup between aviation and rode whether the 2 things that I lead. We have a project with the weather prediction center out of N set to develop a suite of road hazards tools and this includes things like surface precipitation diagnostics. The probability of weather roads are sub freezing things like the snow rate at the surface and you get above one inch an hour duties can't keep up anymore. The snow plows. Just can't keep up with it and these are all being mashed together into one product road hazards.

02:19:06.390 --> 02:19:37.260
Reeves, Heather D.
Product this is still highly under development but you see the point here is that we're diagnosing what the road conditions are like whether there's snowy weather. It's rapidly accumulating snow icy or just wet roads and this is one thing I've often thought could be useful for aviation applications, not just for general maintenance and making sure you have the right number of crude available to keep the property cleared but also for safety. This, as this picture suggests it can sometimes be a problem next slide please.

02:19:43.430 --> 02:19:47.640
Reeves, Heather D.
The next match I I'm I'm still not seeing it. I don't know if anybody else is.

02:19:52.890 --> 02:19:54.460
David A Strand
Now, for me, there, we go.

02:19:54.230 --> 02:20:21.950
Reeves, Heather D.
There we go OK, the next one is with hydrometeorology soumm. There's this algorithm that was developed for the WSR 88 design. It's called the harder media classification algorithm and that was developed to improve our quantitative precipitation estimation by the 88 D 's Well. We took that

algorithm because it does diagnose hail and graupel. We took it and modified it to work with our 3. D mosaics for reflectivity and the dual pole moments to see if we could diagnose hail.

02:20:22.000 --> 02:20:37.890
Reeves, Heather D.
That flight level and if there's anybody here from American Airlines. I'm sorry. I know you must be about sick of people bringing up this. This particular case. But it is the one Institute observation. I have that I know where it happened, and, when it happened, and at what else it, dude.

02:20:38.350 --> 02:20:42.390
Reeves, Heather D.
Uhm the first image on the from the left of the of the.

02:20:43.100 --> 02:21:10.700
Reeves, Heather D.
Ms output shows reflectivity in the diagnosis of graupel and hail from that algorithm and we did have hail at flight level right where the plane plowed into that storm and it wasn't just there like in the minutes before it didn't just appear it was there 10 minutes prior and if you go one more over for me. It was there, even 20 minutes prior so the next slide shows it at 20:00 minutes prior. So we think there's an application here. For now, casting that could be really helpful and useful.

02:21:10.760 --> 02:21:12.980
Reeves, Heather D.
From going forward.

02:21:13.990 --> 02:21:15.430
Reeves, Heather D.
Next slide please.

02:21:16.240 --> 02:21:20.370
Reeves, Heather D.
Yeah, there. It is at 20:00 minutes prior that Black Blob, I'm next slide after that, please.

02:21:27.640 --> 02:21:47.660
Reeves, Heather D.
So this isn't as severe weather mashup with aviation this is something that we were inspired to work on with the aviation weather center, so we all know about convective sigmets and what they look like the the whole design of M and everything I did some research on? When were the first convective sigmets.

02:21:47.710 --> 02:22:18.440
Reeves, Heather D.
Uhm made or what? What inspired them in the accident that caused the convective sigmets happened in 1977. So I don't know for sure. When Sigma it's actually started after that, but we'll just assume shortly after that, so if you go to the next slide. Please we are now closing in on the 50th anniversary of the first Sigma sounds very exciting news. But this is the big question look at the Sigma. It's there's still handdrawn vertex by vertex by human one by one updating sometimes.

02:22:18.490 --> 02:22:34.580
Reeves, Heather D.
20 an hour, they still are disseminated using the same kind of formatting that we would use if we were using a dye fax machine and so I have to ask the question that that just went away from the previous slide, which is this when sigmets can, we go back a slide please.

02:22:37.120 --> 02:22:45.300
Reeves, Heather D.
When segments turn 50 in a few years from now is this what we still want them to look like do we still want to have?

02:22:45.940 --> 02:23:08.440
Reeves, Heather D.
Some human being may actually sweating away, drawing these things and do we still want to disseminate them as they were still using defects machines or do we want? Some kind of innovation. I think you know that's a big question for me. We're coming up on 50 years would be nice. If something some new technology and capabilities were folded in and so now we can move to the next slide, please.

02:23:13.040 --> 02:23:42.970
Reeves, Heather D.
So we've developed software to automatically detect convective Sigma and so on the left is what the human forecasters from the AWC produced and on the right is what we've produced with our software. It's not a one to one agreement. We've got assigment off the coast of South Carolina and they don't and they have one over South Georgia and we don't. But having some software like this can help relieve the workload on the human forecast or they can pay more attention to these marginal type situations where it's sort of is it or isn't it type of a Sigma.

02:23:43.150 --> 02:23:55.000
Reeves, Heather D.
While letting the easy wins just passed through and be automatically produced and just sort of rubber stamp them once you get the computer is involved. You can do a lot more can you please move on to the next slide?

02:23:59.150 --> 02:24:27.060
Reeves, Heather D.
So this is one thing that we've been playing with is just grading. The Sigmets, according to coverage. So I've just put different coverage thresholds in here when we do this. Now we have a product. That's in lockstep with what the TCF does and this gives us a great and new way to validate something like the TCF we no longer need to invalidate the TCF using the point observations from the radar to the objects produced by the people we can actually do object based verification and this would allow us.

02:24:27.110 --> 02:24:46.420
Reeves, Heather D.
To uncover whether or not there's certain pathological problems with the tasks, such as its size, the size of the polygons. Or maybe their position might be. You know skewed at certain times of day relative to where the convection actually happened. So I think there's a lot to be done here. I think I might have one more slide after this.

02:24:52.080 --> 02:25:19.140
Reeves, Heather D.
Ah this is it yeah, and that is too. There's no reason why we have to limit ourselves to just a 2 D depiction convection does tend to a taper off. As you go up and so it may not penetrate to the level where you wanna fly. It may not be as much of a problem up there and so we thought. Why not grade it and then have it be height, dependent that grading of coverage, so here from 25 to 30,000 feet. The coverage is not nearly so bad as it is in the worst part of the atmosphere.

02:25:19.380 --> 02:25:34.530
Reeves, Heather D.
So these are just I'll just some different ideas that I have for what we could do to mash up. These different areas of expertise that we have at NSSL with something that might be useful for aviation and I hope it was interesting for you and thanks so much for the opportunity to share.

02:25:41.660 --> 02:25:42.860
Jeff Weinrich (Guest)
Alright thanks, so much.

02:25:47.720 --> 02:26:14.230
Jeff Weinrich (Guest)
And our final panelist is doctor, Sally MacFarlane and she has to program manager in the biological and Environmental Research program office within the Department of Energy Office of Science Doctor Refinement manages the atmospheric radiation. Measurements research facility. A scientific user facility that provides the climate resource community with the observations from fixed.

02:26:14.290 --> 02:26:23.000
Jeff Weinrich (Guest)
In mobile atmospheric observatories to improve understanding of the fundamental processes governing the interactions among aerosols clouds.

02:26:23.760 --> 02:26:40.460
Jeff Weinrich (Guest)
Precipitation and radiation doesn't Marlene is actively involved in interagency efforts focused on observations. She is currently due to chairs of the interagency Arctic Research Policy Committee sub team on Arctic observations and is a member of the US global change research program.

02:26:41.240 --> 02:27:11.910
Jeff Weinrich (Guest)
Interagency working group on observations the Interagency Coordinating Committee for airborne geoscience research and applications and the Internet agency counsel for advancing Meteorological Services Committee on observation. Ull symptoms Prior to joining Dewey headquarters doctor. MacFarlane was an active resource scientists with over 50 peer reviewed publications focusing on the use of remote, sensing observations, and radiative transfer models to improve understanding. Other radiative effect of clouds and aerosols on the Earth 's atmosphere and to evaluate cloud.

02:27:11.960 --> 02:27:15.230
Jeff Weinrich (Guest)
The climate models that are MacFarlane is to follow the.

02:27:16.310 --> 02:27:20.230
Jeff Weinrich (Guest)
American Association for the advancement of science, so welcome.

02:27:21.020 --> 02:27:23.860
McFarlane, Sally
Thank you. Sorry I didn't realize you're gonna have to read all of those.

02:27:24.470 --> 02:27:56.420
McFarlane, Sally
Acronyms out, I I haven't shared in teams before so I want to set presentation look right OK looks a little weird on my screen OK? Well, thank you. I'm so Randy asked me to present just kind of I think because Department of Energy is sort of a maybe a non traditionally non aviation agency so folks might not. Be aware of some of the activities. We do that make use of aviation weather or or might be relevant for aviation weather so I'm just going to give a brief introduction.

02:27:25.190 --> 02:27:25.700
Jeff Weinrich (Guest)
So yeah,

02:27:29.250 --> 02:27:29.700
Jeff Weinrich (Guest)
Yep.

02:27:30.770 --> 02:27:31.230
Jeff Weinrich (Guest)
Yes.

02:27:56.790 --> 02:28:07.740
McFarlane, Sally
Primarily to my program, which is the atmospheric radiation measurement or arm user facility and then our sister research program, which is the atmospheric system research program.

02:28:08.970 --> 02:28:09.790
McFarlane, Sally
So.

02:28:11.320 --> 02:28:18.530
McFarlane, Sally
Arm is a well, we call user facility within the DMV Office of Science and that means it's.

02:28:18.970 --> 02:28:49.700
McFarlane, Sally
A facility that's really available to the community for scientific research and the goal of the arm facility is to provide the research community with long term Institute in remote, sensing observations of aerosols.

Clouds precipitation and radiation and the goal is to provide data that can improve the understanding and representation of aerosol and cloud impacts on the radiation budget and climate models. And so our office is focused primarily on understanding and processes that are relevant to climate, but of course, many Atmospheric.

02:28:49.750 --> 02:29:15.080
McFarlane, Sally
Processes that are of interest to climb matter of are also of interest to weather so there's a lot of connections. There so arm has 33 fixed observatories and different climate regimes. We also have 3 mobile facilities or 6 months to 5 year deployments and we have an aerial facility. That includes that the manned aircraft and unmanned aerial system and tethered balloon systems.

02:29:15.770 --> 02:29:18.200
McFarlane, Sally
All of our data is freely available to the community.

02:29:18.250 --> 02:29:40.920
McFarlane, Sally
Be a man and then I did want to mention and I'll talk a little bit more about it later. There's a sister research program, which funds scientists from the academic community and the national GOP national laboratories to use arm data to study aerosol cloud and radiation processes and they do have a funding opportunity announcement. Currently, open so if you are in the academic community. You might want to check that out.

02:29:43.060 --> 02:30:01.020
McFarlane, Sally
This map just shows all of the locations that arm has done observations over the past 25 years, so the red dots are there are places where we did either immobile facility campaign or an aircraft campaign and the green dots are where we are currently doing observations.

02:30:02.360 --> 02:30:12.850
McFarlane, Sally
So each of our ground based facilities has over 50 instruments that range from surface meteorology radiosondes.

02:30:13.400 --> 02:30:14.020
McFarlane, Sally
Uh.

02:30:14.650 --> 02:30:35.710
McFarlane, Sally
Broadband or spectral radiometers to active remote, sensing instruments, including Salaam iters, Micropulse Lidar 's Doppler Lidars. We have vertically pointing K band radars at all of our sites and scanning radars at some of our sites. We also do aerosol Institute measurements and some surface.

02:30:36.320 --> 02:30:38.500
McFarlane, Sally
And precipitation measurements as well.

02:30:40.530 --> 02:31:10.860
McFarlane, Sally
And then regarding our aerial observations, we have and as I mentioned it manned research aircraft, so for many years we operated a G one turboprop aircraft for atmospheric research. We retired that in 2019 and procured a Bombardier Challenger 850 jet, which we're currently modifying for research and we hope to begin deploying for field campaigns in 2023. We have over 60 research instruments that we can fly on the aircraft including.

02:31:10.920 --> 02:31:13.850
McFarlane, Sally
Meteorology aerosol probes and cloud probes.

02:31:14.460 --> 02:31:31.870
McFarlane, Sally
And we also are doing some work in unmanned systems. So we did some work early on with small uas. Now we're focusing on this Group 3 uas which is a modified Tiger shark. I will say we have had some challenges with this, but we we think from making progress now.

02:31:32.500 --> 02:31:56.450
McFarlane, Sally
Uh we have integrated a lot of atmospheric instruments on the aircraft and we are hoping to do research flights with our aircraft next year. But this fall. We have been collaborating with Mississippi State University. They also have several Tiger sharks and we've integrated some of our instruments on their aircraft and we hope to do flights at our Oklahoma site this fall.

02:31:57.520 --> 02:32:14.030
McFarlane, Sally
Only for the aerial observations, we have several tethered balloon systems and again. We've flown a variety of instruments on those systems to look at aerosol and cloud properties. We've actually flown them in cloud at our site and Oliktok Point, Alaska.

02:32:15.710 --> 02:32:34.910
McFarlane, Sally
And finally I'll just mention some of the types of research activities that we do. That might be relevant to aviation weather. So we have a very strong research activity in cloud microphysics. In all types of clouds. But we have done a lot of work on mixed phase clouds using both radar and aircraft data.

02:32:36.300 --> 02:32:53.590
McFarlane, Sally
Well, this isn't really focused on an aircraft. I seen you know it's focused on understanding cloud processes and what keeps clouds active for very long time and and how they impact their how the phase impacts. The radiation budget, they could presumably relevant for pricing research.

02:32:54.770 --> 02:33:07.290
McFarlane, Sally
With our tethered balloon, I mentioned our site and Elect Point, Alaska. We actually recently did a study

there on ice fog and so this picture up here shows the balloon actually operating in the ice fog conditions in Alaska.

02:33:08.070 --> 02:33:32.840
McFarlane, Sally
Uh we have a lot of research that we fund on convection oven. You know convection initiation information. We've done a lot in the Oklahoma region or one of our fixed sights is we also did a significant campaign in coordination with NSF in Argentina, a few years ago. We had both one of our mobile facilities and our aircraft, there and looking at the initiation of our graphic convection.

02:33:33.790 --> 02:33:38.120
McFarlane, Sally
And this region has some of the most severe thunderstorms in the world and a lot of hail.

02:33:39.010 --> 02:33:46.740
McFarlane, Sally
And then currently one of our mobile facilities is in the Houston area where the focus for that campaign is an aerosol deep convection interactions.

02:33:47.700 --> 02:33:53.980
McFarlane, Sally
And then finally we do a bundle of boundary layer of research as well again. This is mostly focused on aerosol.

02:33:54.030 --> 02:34:03.350
McFarlane, Sally
So understand aerosols in the boundary layer and cloud formation. However, there is some work on turbulence and some work associated with the low level jet specially in in Oklahoma.

02:34:04.580 --> 02:34:08.720
McFarlane, Sally
So that's all I have just a really quick overview of.

02:34:09.310 --> 02:34:10.940
McFarlane, Sally
Armandina weeks activities.

02:34:14.860 --> 02:34:16.210
Jeff Weinrich (Guest)
Alright, thank you so much.

02:34:15.250 --> 02:34:16.510
McFarlane, Sally
How do I stop sharing?

02:34:20.640 --> 02:34:27.990
Jeff Weinrich (Guest)
So that's our 3 panelists for this session and David is going to take over.

02:34:28.600 --> 02:34:29.280
Jeff Weinrich (Guest)
Uhm.

02:34:30.630 --> 02:34:33.750
Jeff Weinrich (Guest)
Monitoring the questions and facilitating the discussion.

02:34:34.730 --> 02:34:36.730
McFarlane, Sally
Alright can anyone tell me how to stop sharing.

02:34:37.120 --> 02:34:39.990
Jeff Weinrich (Guest)
Uh I got, I think I got it.

02:34:39.490 --> 02:34:39.960
McFarlane, Sally
OK.

02:34:41.410 --> 02:34:42.730
David A Strand
We can take it away from you.

02:34:42.880 --> 02:34:44.150
McFarlane, Sally
Excellent thanks.

02:34:45.080 --> 02:34:48.070
David A Strand
Uh and Sally but while you're there.

02:34:48.120 --> 02:34:59.710
David A Strand
Here, I'll just kind of go in reverse order here Randy Bass, just ask the question can the jet be used for other flight campaigns. There is a reserved purely for DoD purposes.

02:35:00.640 --> 02:35:27.990
McFarlane, Sally
So we do our aircraft are mobile cities and our aircraft campaigns are proposal based so anyone from the scientific community can submit a proposal for those aircraft, not yet 'cause. It's it's not ready, but that is the way that we operate it. So we have had folks not funded you know funded by other agencies definitely that's submit campaign proposals to us.

02:35:30.540 --> 02:35:38.070
David A Strand
All righty and Matt was asking yeah does the arm disarm share its observations in real time with National Weather Service.

02:35:39.170 --> 02:35:59.900
McFarlane, Sally
So we have a few different, UM collaborations. We've done with some folks at Noah. We do share all of our son. Data goes into GTS and I think we've done some work with various groups and Noah on some of our data in real time, we don't.

02:36:00.660 --> 02:36:01.290
McFarlane, Sally
Uhm.

02:36:02.620 --> 02:36:11.850
McFarlane, Sally
We don't produce all of our data in real time since it's more research oriented, but we can produce specific products and collaboration with folks.

02:36:15.200 --> 02:36:16.530
David A Strand
Great, thanks.

02:36:17.880 --> 02:36:18.670
David A Strand
Uhm.

02:36:20.010 --> 02:36:20.940
David A Strand
And a

02:36:21.920 --> 02:36:32.320
David A Strand
This is for Heather, who's had several questions and she's answered most of them online. But one here from Randy bass, UM.

02:36:33.920 --> 02:36:39.820
David A Strand
That came in, not to put you on the spot, but if you could talk a little bit about facets.

02:36:40.630 --> 02:36:41.970
David A Strand
And dumb.

02:36:42.830 --> 02:36:55.990
David A Strand
Warn on forecast initiatives in the Weather Service and he's going to give you bonus points. If you can talk a little bit about those how those initiatives might translate into aviation support for tracking convection, etc.

02:36:55.600 --> 02:36:58.850
Reeves, Heather D.
Yeah, well, I want those bonus points, you know, I do.

02:36:59.030 --> 02:37:01.450
David A Strand
You know it's gonna try to find those for you, but yeah.

02:37:01.720 --> 02:37:31.830
Reeves, Heather D.
Yeah, I don't know what I can use him for but I want him OK, so facets is an acronym that stands for forecasting a continuum of environmental threats and if you're still just as clueless as before, I spelled it out that it's welcome to my world. I doesn't mean a lot to me either. It's one of those where somebody is trying. Too hard to make an acronym that spelled a word. But what it is, is it's this initiative within the National Weather Service and NOAA across the board to transition, the National Weather Service over to probabilistic.

02:37:31.870 --> 02:38:02.840
Reeves, Heather D.
Forecasting and it includes several components. It's this iterative process that starts with observations and modeling data circles on through to the forecaster interpretation of that the creation of products for an end user measures. The response of the end user whether it's effective or not gets into validation and verification and then the process starts back over so this is like this endless loop of of work available. I think we're just all about job security more than anything else but it is important because.

02:38:03.060 --> 02:38:09.130
Reeves, Heather D.
Probabilistic forecasting provides a more robust solution than a deterministic forecast does.

02:38:10.170 --> 02:38:40.840
Reeves, Heather D.
And I know that folks in the aviation community tend to bristle a bit when we start talking about probabilities. But the reality is, and I hope I don't get myself into too much trouble, saying this. But the reality is I've seen some of you do it. When I've been to the command center and you look at the Taft from the AWC and then you say, Well, let's look at united staff. That's probabilistic forecasting you're trying to get a sense of? What is the range of possible solutions and that's what this can give you weren't on forecast as a subset of facets.

02:38:23.530 --> 02:38:24.070
David A Strand
Reference.

02:38:24.640 --> 02:38:24.920
David A Strand
And.

02:38:41.020 --> 02:39:06.860
Reeves, Heather D.
It's an ensemble system. It's an on demand, regional forecast very short range of areas targeted for certain kinds of weather right now. The emphasis for the team working on warn on forecast is improving

the lead time for a tornado warnings, but this concept could be applied to more than just that it could be applied to getting a more precise forecast of fog at SF or better forecasts of.

02:39:07.690 --> 02:39:26.860
Reeves, Heather D.
Uh I Fr types of conditions at airports or maybe just wind shifts. When is a wind gust front from a vicinity thunderstorm going to pass through and change the direction across the runway and maybe have to result in turning the airport around or do I need to turn the airport around because it'll only be for so for so long.

02:39:27.820 --> 02:39:28.510
Reeves, Heather D.
Uhm.

02:39:30.130 --> 02:39:38.280
Reeves, Heather D.
OK, so I think I think I've covered this. I do, I get the bonus points. Randy does that cover? What she wanted or do I need to talk more to get the points.

02:39:40.560 --> 02:39:45.580
Bass, Randy (FAA)
No as I said that's a That was a much better explanation than I could have given so I appreciate it.

02:39:45.940 --> 02:39:51.410
Reeves, Heather D.
OK Alright well, I'll look for UM cashing in those points at some point in the future.

02:39:51.020 --> 02:39:53.470
David A Strand
It'll be a little extra in your paycheck just watch for it.

02:39:53.870 --> 02:39:55.240
Reeves, Heather D.
Only if only.

02:39:56.140 --> 02:40:09.280
David A Strand
Thank you Heather and Dan had a few questions. I think you answered them all on the chat then I have to say. I was very intrigued with especially the volcanic ash product.

02:40:09.830 --> 02:40:33.330
David A Strand
Uh having flown several 1000 hours as an airline pilot between North America and Asia and one of the events that you showed there. I actually didn't fly over the region when it it dropped it. So they had already taken into account. But that's really intriguing stuff and Sally have to say also as an airline pilot. I'm really intrigued to hear about the airplane coming online in 23, but

02:40:33.880 --> 02:40:35.910
David A Strand
uh anyway.

02:40:37.270 --> 02:40:40.470
David A Strand
I think we have one question here that is aimed.

02:40:41.320 --> 02:40:43.200
David A Strand
Towards all the panelists.

02:40:44.100 --> 02:40:53.220
David A Strand
Uh from Matt struck with how relevant your non aviation R&D is or could be to aviation.

02:40:53.790 --> 02:41:10.580
David A Strand
Uh how do we foster necessary collaboration and funding to really supercharge. Some of the aviation related efforts. Aside from having Timbs like this uh and what role might I cams and Imco play.

02:41:11.940 --> 02:41:13.920
David A Strand
So just open up to all the panelists there.

02:41:17.240 --> 02:41:47.880
Dan Lindsey (Guest)
This is Dan so first of all I I can't speak to Icms and Imco 'cause. I don't know what those are but I will say that Nez Dis, who I worked for in general is currently really interested in just the very general goal of user engagement and and I guess what they mean is going out and talking to users or end users of our products or our data and finding out from them. What their problems are that we could potentially help with.

02:41:48.200 --> 02:42:17.850
Dan Lindsey (Guest)
A lot of times, researchers for Nessus researchers in the past have tended to focus on what they want to work on and what they think may be useful or may be important, and the idea is maybe we don't really know like what I to be honest. I don't really know what FAA does exactly so some sort of meetings where you guys or the folks on the call and and it it probably is beyond FAA who's on the call now could tell us you know what do you do on a daily basis what? What are the problems that you encounter now?

02:42:18.190 --> 02:42:34.760
Dan Lindsey (Guest)
That perhaps satellite products could help with that kind of stuff is really useful for us. So I don't know. Maybe having scheduling meetings. One on one meetings with fairly small groups and talking through these types of things would be helpful. I don't know Matt if that's really getting at your question or not, but that at least what I said, is a true statement.

02:42:37.740 --> 02:42:47.650
McFarlane, Sally
Yeah, maybe I could add so I am on the Icams Observation Committee. I I'm basically the Department of Energy route to any observational related Interagency Committee.

02:42:48.840 --> 02:42:52.540
McFarlane, Sally
And so I do think that's a good a good question. I don't really know.

02:42:52.590 --> 02:43:11.090
McFarlane, Sally
So how or where aviation weather falls within the activities within I cams. I don't know whether it falls more in the services committee or observations committee. We are spinning up our subcommittees within observations. One of which is going to be.

02:43:11.880 --> 02:43:23.510
McFarlane, Sally
Uh I think focused on aircraft related observations and so maybe that's a place to make that connection also with the the aviation weather services.

02:43:27.020 --> 02:43:30.130
Reeves, Heather D.
Well, I'll say something it seems like UM.

02:43:31.040 --> 02:44:01.120
Reeves, Heather D.
It seems like it's not so difficult to get funding to work on death legislation types of research projects and somebody died and so now we need to fix this problem, but I'm leaning forward into novel types of projects that somebody didn't die. It's just maybe a new innovation that might streamline things might add benefit. That's kind of kind of hard to.

02:44:01.410 --> 02:44:30.200
Reeves, Heather D.
Funding for that in the aviation sector, so it'd be nice. If there was some way to advance those other interests and not be so morbid in our in our priorities. Not that it isn't worthwhile to fix a problem that causes somebody to die. I'm not really definitely is but it would be nice to think what do I want this product to look like? In 10 years? Do I want it to still be the same or are there new is the new technology that could be folded in and make it better.

02:44:34.000 --> 02:44:35.290
David A Strand
Matt is that dumb.

02:44:36.660 --> 02:44:37.720
David A Strand
Respond to your

02:44:39.390 --> 02:45:00.660
Matt Fronzak
Well, I I I heard I heard kind of 33 different sort of angles being being taken and and you know, I I guess maybe when Bill and I are having our? What did we hear? What are the gaps water? The collaboration opportunities you know what? Are, the are the?

02:45:00.710 --> 02:45:19.660
Matt Fronzak
Yeah, I'm I'm I'm overlaps. Uh my I. I sense collaboration opportunities of Plenty in in in this space right here. If we say the right magic words to the right people and by the way Dan for you, there are there are are?

02:45:20.890 --> 02:45:51.460
Matt Fronzak
People I admire they may even be on the line. So I better not say anything bad about them out at at Nola is you know global systems. The lab the the the stand. Benjamin Steve Weigand. Curtis Alexanders of the world who do such marvelous marvelous work on the on the high resolution. Numerical weather prediction models that they do, and and you know much of that was assisted by not insignificant.

02:45:51.510 --> 02:46:21.330
Matt Fronzak
Amounts of funding from the FAA to help advance the aviation arena. And yet, there have been several times where we have gone and talked with them and said did you know that X and such is of interest to us because of this reason, and that reason and and and often they know, but sometimes they don't know and they go wow. That's really good information. If I we didn't know that we had done this thing differently here what I'm hearing from you is hey.

02:46:22.040 --> 02:46:33.800
Matt Fronzak
We here at nest has got a lot of cool stuff, but we don't exactly know what your problems are and we don't want to just throw solutions over the fence that are chasing the problem. We'd rather have a problem. We're working on and producing a solution for?

02:46:34.690 --> 02:47:05.140
Dan Lindsey (Guest)
Yeah, you nailed it exactly. That's exactly the situation. I mean, I. I think some of our folks certainly know some of the problems. It's not like we're completely ignorant, but I mean, it's good to keep up with the way. Things change 'cause a lot of times. We're working on products that were requested 10 or 15 years ago and then we'll say here you go and they say, Oh, wait that's not a problem anymore because of such and such so I I think it's good to do this regularly. I don't know yearly meetings or something, but I don't know we should we should talk later and schedule. Some sort of a meeting to get through and figure out a plan.

02:47:05.690 --> 02:47:35.390
Matt Fronzak
Well and and as sorry I I did not did not follow my own words and turn my camera on when I was talking. I apologize for that. I you know, one of the things that Bill and I are going to be talking about

tomorrow. Is is kind of a next steps or what? What what tangible outcomes. Do we want to come from these 4 days and maybe? What you just said Dan is is one of those tangible outcomes. Whether it's hosted by through F paw and you know, we have a budget of zero so sometimes doing this.

02:47:35.430 --> 02:48:08.680
Matt Fronzak
Can be a little bit challenging for us but but you know? Maybe it's maybe it's I cams or aurinko? Which Dan is the replacement for the office of federal coordinator of Meteorology. The The Old OFCCM office, so that's here again. So we've not had a conversation you know a new acronym. So it's all good. So so you know, maybe that's how it needs to happen going forward is to have a Federal Aviation weather Tim because I'm an aviation guy you know on an annual basis and just let let's exchange information back and forth and see where we are with him.

02:48:09.570 --> 02:48:29.540
Dan Lindsey (Guest)
Yeah, real real quick to follow up. I would say we should share information. First worry about funding later. You know if we go in with worried about funding. Then it, you know wait sometimes things will just stop. But yeah, I think that's a great plan. And I think we probably can find funding it. If we need to so I'm not that worried on on that side of things.

02:48:31.160 --> 02:48:34.330
Matt Fronzak
I like you, you're not worried about funding that's cool beans.

02:48:37.790 --> 02:48:38.580
David A Strand
Uhm.

02:48:39.510 --> 02:48:42.460
David A Strand
Above average and I kind of on the same subject.

02:48:43.590 --> 02:48:45.890
David A Strand
Put something in the chat just now.

02:48:46.790 --> 02:48:47.690
David A Strand
Uhm.

02:48:49.140 --> 02:49:04.730
David A Strand
And Barb I tell you what, if you're OK it. It's a rather lengthy, but if their teens to the conversation here, so Bob would you mind uh capsuling? What it is that you are articulating without my clumsy reading and then you haven't explained what I just read.

02:49:05.650 --> 02:49:08.600
Bob Avjian
Oh sure I was hoping you'd do so. Everybody would jump on you date.

02:49:08.050 --> 02:49:08.370
David A Strand
Oh.

02:49:12.630 --> 02:49:21.280
Bob Avjian
Hey Dan, You said something earlier and it it popped into my head because the work that you know, Matt and myself, You know, Mike Robinson. Others have worked.

02:49:21.670 --> 02:49:29.870
Bob Avjian
Uh you know with enhancements to come and support services whether understand whether prop process or you know, and.

02:49:30.560 --> 02:49:50.190
Bob Avjian
Uh defining what what is already in the plan to provide various Nessus products goes products. Emma Rory etc or other you know remote sensing products, you know for the FAA to kind of. As yet to be determined how exactly they're going to be use you know, and and potentially integrated.

02:49:50.900 --> 02:50:06.020
Bob Avjian
Uhm, however, in that work and I I'm so I'm sure there's others. You know out there in the world that have had a found hey. We have other goes products out there. You know, improving you know what the ABI and and and the capabilities that that that sensor provides.

02:50:06.540 --> 02:50:13.480
Bob Avjian
Uhm future stuff that's coming on you know for the space weather program that I know about separately, but things like that.

02:50:14.970 --> 02:50:39.110
Bob Avjian
And it goes to mass point about having a you know a coordination cycle. You know, and is that coordination cycle solely remaining within the FAA and then action weather program office to to to talk to him. WS slash no and slash nez about stuff. They want right and you know how to you know how the needs to get.

02:50:39.490 --> 02:51:03.960
Bob Avjian
Uh exposed you know is it a process that OK. We got to put all the all the requests into the next and where the program and then they go and deal with it with the no or you know are there. Other means right for us, too, and others that have interest in India and recommendations for use of innovation where the products whether they're nez Oranmore mess for example.

02:51:04.290 --> 02:51:24.890
Bob Avjian
Uh that we'd like to be able to access you know, so I think I think it. I'm just pointing out one sort of aspect of that coordination that that I've seen so far, but also acknowledging what Matt was saying about hey. They probably wouldn't make sense to have you know sort of a a more integrative?

02:51:25.520 --> 02:51:30.750
Bob Avjian
Uh you know it's changed to just to discuss the satellite product needs.

02:51:32.750 --> 02:51:33.710
Dan Lindsey (Guest)
Yeah, yeah.

02:51:34.530 --> 02:52:01.610
Dan Lindsey (Guest)
I I I think there's probably multiple avenues out there to collect you know to share information and collect needs and things like that. You know, not all of us are tide into things that you're already doing some some we are somewhere not. I think so. I don't know I I just think, more more communication. In general is good and you know if if you have to talk to 4 different groups and say the same thing. Maybe that's what's needed in order to make sure that everybody gets the message.

02:52:02.680 --> 02:52:05.650
Dan Lindsey (Guest)
I don't know I'm I'm not sure if I'm really answering what you were getting at or not.

02:52:06.100 --> 02:52:16.800
Bob Avjian
No, it's alright it's just I think just just information you know, we're just just talking here. But I I figured I can at least you know put that out, there, so, so that you'll know.

02:52:17.240 --> 02:52:41.780
Bob Avjian
On that you know, there had there has been some coordination point. But you know, I I think there's more recommendations for additional cell like products that are probably not already in the plan for or FAA already has in their plan, you know, and that their way. There's various ways to kind of explore. Those products and you know put up a test bed and pilots to to use them You know, or evaluate them.

02:52:43.780 --> 02:52:44.160
Bob Avjian
So.

02:52:44.520 --> 02:52:56.500
Dan Lindsey (Guest)
Yeah, I I should also say I'm just one little piece of no of course, and you know, there's a lot of people that probably are talking to you guys already that I'm not aware of so it's just you know it's more of ignorance on my part in some cases.

02:52:58.550 --> 02:52:59.450
Bob Avjian
Thank you.

02:53:02.060 --> 02:53:03.550
David A Strand
Alright UM.

02:53:04.740 --> 02:53:11.600
David A Strand
Yeah, this one comment here and in the chat. I just can't let go by David McCarron.

02:53:13.890 --> 02:53:27.510
David A Strand
Every forecast is probabilistic it's just if you tell people that are not no such thing as the terministic forecast and and I. I I have to chuckle, which I'm sure Matt is to our our first boss many years ago.

02:53:28.060 --> 02:53:57.770
David A Strand
Uh would be rolling over in his grave right now over probabilistic because he wanted us to either say it's gonna rain or not, and but he was also very good at forecasting what it's gonna was so he could come along after the fact and tell us what we should have forecasted but but there. There's a lot of truth in that that you know how often can you say that there there is 100% one way or the other but anyway, it was a it was a comment that I.

02:53:59.110 --> 02:54:00.240
David A Strand
I had to.

02:54:01.550 --> 02:54:02.680
David A Strand
Look at so.

02:54:03.860 --> 02:54:11.380
David A Strand
And Matt just put a uh. I'm sorry, Sally just put a link in to the DOE wind energy technologies office.

02:54:12.010 --> 02:54:14.680
McFarlane, Sally
Yeah, Matt had made a comment about.

02:54:12.120 --> 02:54:12.780
David A Strand
Ah.

02:54:13.590 --> 02:54:14.320
David A Strand
You must speak to that.

02:54:15.600 --> 02:54:18.030
McFarlane, Sally
Matt had made a comment that there might be some.

02:54:20.610 --> 02:54:41.100
McFarlane, Sally
The renewable energy sector might be doing information in cloud forecasting and wind forecasting that might be relevant. So I put in a link to the wind energy is technology office. Some semi familiar with some of their work. Obviously we have a solar energy technologies office as well. Unless you up to date on what they're doing with cloud forecasting right now.

02:54:41.970 --> 02:54:45.650
Matt Fronzak
And I think that was my brother, Matt also known as Matthias, who put that comment.

02:54:43.040 --> 02:54:43.450
David A Strand
Yes.

02:54:45.080 --> 02:55:02.590
David A Strand
Yeah, I was actually Matthias, who had a comedy, but it seems that it was a renewable energy sector was developing capabilities such as wind and cloud coverage predictions that could benefit low altitude flight. OPS so you know it. It looks like that that that's a good response, Matthias did you have?

02:54:46.250 --> 02:54:47.100
McFarlane, Sally
No, I'm sorry.

02:54:47.790 --> 02:54:48.490
McFarlane, Sally
From Matt.

02:54:50.930 --> 02:54:52.590
McFarlane, Sally
Oops yeah fragment.

02:55:03.240 --> 02:55:07.470
David A Strand
Uh in anything to respond to the response there from Sally.

02:55:10.560 --> 02:55:40.220
Matthias Steiner (Guest)
Not particularly no, I mean, it's it's where I'm coming from is that they clearly do forecast for low altitude. Wind turbine farms or solar panel and in order to manage their grades. They need to understand what is the power production that they can achieve at a certain location such that they can balance the grade in in Smart Ways and so there is essentially forecasting capabilities for low altitude.

02:55:40.270 --> 02:56:11.020
Matthias Steiner (Guest)
Related to cloud coverage or wins and this may be very location specific to that. They are doing for their purpose would they be willing to share that for free probably now because it's mostly commercial how they are using that but maybe there will be a way to collaborate and opportunities to to share at some minimum fee. I don't know, but there's clearly information they had that is relevant.

02:56:11.120 --> 02:56:14.990
Matthias Steiner (Guest)
For low altitude flight operations that that's kind of where I'm coming from.

02:56:16.190 --> 02:56:27.360
McFarlane, Sally
Yeah, and I think that the wind energy providers themselves as you say would probably not share for free. But some of the work that labs like?

02:56:28.000 --> 02:56:36.880
McFarlane, Sally
The National Renewable Energy lab are doing to improve when forecast to help characterize wind resources. You know, those are research efforts so they might be.

02:56:37.470 --> 02:56:40.130
McFarlane, Sally
More willing to share and more relevant and also relevant.

02:56:40.680 --> 02:56:41.540
Matthias Steiner (Guest)
Absolutely.

02:56:46.900 --> 02:56:47.530
David A Strand
OK.

02:56:46.900 --> 02:56:57.090
Dan Lindsey (Guest)
So if you'd like I can respond to Brians comment about Syrah and a WC yeah, so you're absolutely right. I mean, there's a Brian as you know, I think there's a number of Syrah.

02:56:57.700 --> 02:57:17.550
Dan Lindsey (Guest)
Employees who actually sit at a WC there in Kansas City. The one thing that I don't have a clear idea of just me personally is the I guess the connection and relative role of a WC versus what FA FA? Does so it's probably a simple thing. I just that's something I've never you never quite understood.

02:57:18.610 --> 02:57:20.070
Dr. Brian Pettegrew
Yeah, hey, Dan owner.

02:57:22.180 --> 02:57:37.310
Dr. Brian Pettegrew
I was formerly one of those Syrah professionals that they WC and it was a complicated relationship. But we we ran a lot of the R 2 oh from the FAA into the National Weather Service, especially for a grated modeling fields.

02:57:38.500 --> 02:57:51.990
Dr. Brian Pettegrew
But one of the things we were slowly working towards is you know, Steve Miller or some of the other scientists. There they would reach out to us and we would do a lot of internal demos just within our our own forecasting realm.

02:57:52.790 --> 02:57:56.790
Dr. Brian Pettegrew
Uh how much that got out to other users.

02:57:58.040 --> 02:58:26.930
Dr. Brian Pettegrew
Is probably limited but we were just really starting to try to take advantage of that? Of course it's also resource dependent. You know a WC has a very limited resource in their scientists and supports death. So we were always kind of battling the pushed operations versus? What do we have time to really demo scientifically to allow the users but it is an existing resource and I? I think Randy as well aware of it and we've done.

02:58:27.650 --> 02:58:38.420
Dr. Brian Pettegrew
Part of the PM hours in the past, we would have days where you know, Steve Miller would come down from CSU and gave demos of all the products to people in the FAA.

02:58:38.470 --> 02:58:38.720
Dr. Brian Pettegrew
Yep.

02:58:39.830 --> 02:58:46.320
Dr. Brian Pettegrew
So I I think that it's there, I think we're just still seeking kind of the hook to make it more tangible.

02:58:52.750 --> 02:59:24.180
Dan Lindsey (Guest)
See I have one more go back if that's OK. There was a question early on in the chat to me asking about the UM the turbulence product if it was available in gridded datasets. And while we were working here. I shot an email over to Tony and he said. The answer is yes, it's available in net. CDF format net. CDF 4, I guess and it's mapped onto the goes the geostationary projection. The same as our as our imager. So it's goes 16 and 17 units sort of a unique projection.

02:59:24.230 --> 02:59:36.450
Dan Lindsey (Guest)
You can always re map that onto something more convenient for you so whoever was the task that if

you want. More details about that projection in those files shoot me an email dan.lindsey@noaa.gov and I can put you in touch with Tony.

02:59:37.120 --> 02:59:45.480
Bob Avjian
Indian that's me that's Bob and I I'll do that. I think you have your email from from other venues. So I'm going to send you that separately so thank you.

02:59:48.220 --> 02:59:49.190
David A Strand
Alright Thanks Dan.

02:59:50.660 --> 02:59:51.350
David A Strand
Uhm.

02:59:52.630 --> 02:59:56.010
David A Strand
OK, all the good discussion. Jeff we're running about.

02:59:56.880 --> 03:00:14.770
David A Strand
Uh looks like about 1015 minutes ahead. That's the extent of what's been submitted at least so far for questions or discussion items, so unless unless somebody has something else, there, I'll turn it back over to you.

03:00:16.530 --> 03:00:24.870
Jeff Weinrich (Guest)
Thank you so much David and thank you panelist does anyone have any other discussion items before we haven't or afternoon break.

03:00:25.550 --> 03:00:31.070
David A Strand
I I did see a comment comment from Steve on guard for Matt and Dan.

03:00:26.130 --> 03:00:26.840
Jeff Weinrich (Guest)
We wanna break.

03:00:31.700 --> 03:00:39.280
David A Strand
Uh wanted to concur on the great utility of the goes satellite observation products, both for directly use and the observations.

03:00:39.870 --> 03:00:59.920
David A Strand
Uh for model simulation GSL coordinating with Dan and colleagues on the model simulation effort and there are many promising goes products, including of course, GLM that will definitely help short range forecasts and somebody just put a hand up and I love that about teams. I have a little circle with plus 78.

03:00:51.240 --> 03:00:56.730
Jeff Weinrich (Guest)
I think it was Randy.

03:01:00.530 --> 03:01:02.110
David A Strand
It's one of those, 78 people.

03:01:02.630 --> 03:01:05.440
Jeff Weinrich (Guest)
I think Randy has his hand raised and did you have something?

03:01:04.140 --> 03:01:05.290
David A Strand
Adds Randy OK.

03:01:05.880 --> 03:01:06.600
David A Strand
Yes, or Randy.

03:01:06.100 --> 03:01:06.960
Bass, Randy (FAA)
Yeah, UM.

03:01:07.540 --> 03:01:08.170
Bass, Randy (FAA)
So.

03:01:08.870 --> 03:01:21.280
Bass, Randy (FAA)
We wanted to kind of expand a little bit on what Dan was asking about regarding that relationship between a WC and FAA and under this actually kind of goes both ways.

03:01:21.950 --> 03:01:28.810
Bass, Randy (FAA)
Come from a research standpoint the the aviation weather research program that that falls under me.

03:01:29.210 --> 03:01:38.930
Bass, Randy (FAA)
Uh we do that applied research, to you know come up with these new you know capabilities and things a lot of those go to the National Weather Service.

03:01:39.180 --> 03:01:50.160
Bass, Randy (FAA)
Uh we used to go directly to a WC now they go more towards EMC. But a WC still has a a big role to play in that if nothing else, they test a lot of that.

03:01:51.510 --> 03:01:52.800
Bass, Randy (FAA)
Or it's for them.

03:01:53.830 --> 03:02:17.620
Bass, Randy (FAA)
Uhm going back you know the FAA then takes that you know weather data and pulls it into into our different systems and I know you weren't on here Monday. But Doug Murphy talked about the next. Gen weather pro processor and common support systems weather, which is the comp system that moves that data around or we'll move it.

03:02:19.540 --> 03:02:27.690
Bass, Randy (FAA)
One of the limiting factors that we have, though, is data comes up. You know satellite data is is a is a monster.

03:02:28.380 --> 03:02:31.810
Bass, Randy (FAA)
Come and getting that to us in the FAA.

03:02:31.860 --> 03:02:45.690
Bass, Randy (FAA)
Maybe it is a problem where we're fairly limited and and what we can accept and in reality. We don't have all the you know requirements for a lot of the new capabilities just because they're new capabilities.

03:02:46.310 --> 03:02:51.970
Bass, Randy (FAA)
And dumb so we're we're working with the the program management office on that, but

03:02:52.620 --> 03:02:58.160
Bass, Randy (FAA)
uhm what one thing you, you may not know about the FAA is we are very slow.

03:02:58.690 --> 03:03:12.280
Bass, Randy (FAA)
Now, some of that is just process a lot of it is, you know, we can't accept anything that if 98% of the time. It's the greatest product in the world, but 2% of the time it causes catastrophic failures, yeah, we can't do that.

03:03:12.900 --> 03:03:17.920
Bass, Randy (FAA)
Uh because of the safety aspect, so we've gotta check everything and and that just takes awhile so.

03:03:19.840 --> 03:03:36.350
Dan Lindsey (Guest)
Well, you guys may be slow but I think we might be slower. We are like for example, the the products that we're putting into operations. Now were conceived in the in the late 90s and we had to wait to

build the instruments and build the satellites and get him launched and etc etc. So anyway, we understand slow.

03:03:37.430 --> 03:04:09.670
Dan Lindsey (Guest)
And and just a quick uh replying to Steve wagons comment. Steve I I didn't look at the guest list. Even see that you were on so I'm glad to see that you're here. And yes, Steve is right, we work closely with GSL and actually he reminded me. I I failed to mention GLM at all. When I was speaking earlier. GLM is the Geostationary Lightning Mapper. You know relatively new instrument in Geo orbit were able to monitor a lightning activity over a large area from goes East and goes West constantly. And this is I mean, I suspect this information might be useful for pilots who were flying out.

03:04:09.720 --> 03:04:18.150
Dan Lindsey (Guest)
Especially over the ocean where you may not have other lightning information. You know to avoid convection and things like that, but anyway. That's something that we should probably look into some more.

03:04:24.090 --> 03:04:48.380
Steve Weygandt (Guest)
It's like taking management say again thanks Dan for all the great products you produce. I think there are a lot of great aviation applications. You know as I said in there, both direct use and then in the models and and it dovetails well with the with the high refresh rate. Because of you know the the way that goes is so we think there's a lot there and and again. We're already you know, we've already used cloud products for a long time and the GLM.

03:04:49.350 --> 03:04:53.930
Steve Weygandt (Guest)
Will be in with the rapid refresh and there's lots of other things you all are.

03:04:54.470 --> 03:04:58.250
Steve Weygandt (Guest)
I'm putting together that we think have a lot of potential for aviation applications.

03:05:05.600 --> 03:05:11.510
Matt Fronzak
Are they strand this? Is this is Matt? Can I ask a question of Sally if she's still with us?

03:05:12.370 --> 03:05:13.100
David A Strand
Uh.

03:05:14.610 --> 03:05:16.110
David A Strand
I see Sally still there.

03:05:16.410 --> 03:05:32.590
Matt Fronzak

OK, Hi Sally, I'm I I probably was not paying attention, you probably stated it very explicitly and I was multitasking and doing stuff like that. But how many of those uas is and how many of those fixed wings ET cetera ET cetera do you guys have?

03:05:34.040 --> 03:05:44.380
McFarlane, Sally
Technically, just wanna beach, although we did recently actually get an interagency transfer from DoD of some additional Tiger shark.

03:05:45.050 --> 03:05:45.780
McFarlane, Sally
Uhm.

03:05:47.430 --> 03:05:56.020
McFarlane, Sally
I don't wanna say pieces 'cause I think actually some of them are complete aircraft. But we only have one that that we will kind of.

03:05:56.790 --> 03:06:02.750
McFarlane, Sally
Instrument for for atmospheric research and the others will be for training or parts.

03:06:03.240 --> 03:06:33.630
Matt Fronzak
OK and and the reason that I was asking about that actually refers back to a question that that I put in there about sharing data in real time with no National Weather Service and what I was thinking was. She maybe deal, he's got a whole fleet of these things flying around and you know if they're if they're out outfitted with sensors and and and you you're doing real time, observing you know that this is kind of a Nirvana end state right for for those in the modeling industry to get crowdsourced you know near continuous weather observations.

03:06:33.710 --> 03:06:43.220
Matt Fronzak
From various levels of the atmosphere, so I thought that the Steve why gantz and Curtis Alexanders of the world might want it. But if it's one maybe that's not quite as important.

03:06:44.870 --> 03:06:47.720
McFarlane, Sally
Yeah, probably a little less critical.

03:06:45.810 --> 03:06:46.470
David A Strand
8 months.

03:06:47.120 --> 03:06:51.030
David A Strand
Sadly, though based on what you just said, you had mentioned earlier that you had.

03:06:51.830 --> 03:06:54.710
David A Strand
Some work with the the the drones at.

03:06:55.930 --> 03:07:24.040
David A Strand
And I apologize if anybody from either one either Mississippi State or University. Mississippi or Southern Miss. One of those. Mississippi schools that that you were doing some some work with their drones is so is that just kind of on a one off or is that supporting them and something or it's not really used in in feeding information back to you all in the same way that you're one or you know in the way that mass describing there that that might provide more data.

03:07:22.770 --> 03:07:23.280
McFarlane, Sally
Right.

03:07:24.430 --> 03:07:34.570
McFarlane, Sally
So it's sort of a a. A relationship that we developed on an interim basis. I mentioned we were having some issues with our aircrafts that we had actually modified.

03:07:35.320 --> 03:07:58.490
McFarlane, Sally
Our aircraft up a bit from the original Tiger Shark Standard and we ended up having some issues with the landings based on some of those modifications and so we've been working with the manufacturer to address that but meantime while we were sort of grounded because of that our aerial group developed this collaboration with Mississippi State Who.

03:07:59.160 --> 03:08:14.630
McFarlane, Sally
We're flying Tiger sharks as part of their and I I won't remember the the right name of the program. But they had a an effort in doing that and so they were doing as part of their aeronautics program. I believe, and so we brought in the atmospheric instrumentation and have been working with them on.

03:08:15.220 --> 03:08:16.380
McFarlane, Sally
Integrating some of our.

03:08:16.430 --> 03:08:19.700
McFarlane, Sally
Or equipment onto their aircraft and.

03:08:20.390 --> 03:08:33.040
McFarlane, Sally
Testing out some of the ways that we hope to do research flights with like staggered visual observers and and how that will work and so that's kind of what we're hoping to test this fall in Oklahoma.

03:08:34.290 --> 03:08:38.620
David A Strand
Good I hope Mister Pilot Landings is not something you want to have trouble with so.

03:08:38.580 --> 03:08:43.740
McFarlane, Sally
No no even with an unmanned aircraft. It's still not not something yeah.

03:08:41.440 --> 03:08:49.500
David A Strand
That's right uh Jeff If I may there was one or maybe 2 additional came in since we're running a couple minutes ahead.

03:08:50.150 --> 03:08:50.840
Jeff Weinrich (Guest)
Yeah, go ahead.

03:08:52.210 --> 03:08:55.150
David A Strand
And I'm sorry I'm gonna mispronounce his name terribly.

03:08:56.160 --> 03:08:57.110
David A Strand
Apoorva.

03:08:58.290 --> 03:08:59.130
David A Strand
Bajaj.

03:08:59.860 --> 03:09:07.100
David A Strand
It's for Heather? What are the different federal agencies that are currently using the merge products?

03:09:08.520 --> 03:09:16.600
Reeves, Heather D.
Yeah, MRMS is used by the National Weather Service for decision support by all of the unsub service centers and within all of the?

03:09:17.690 --> 03:09:24.840
Reeves, Heather D.
Weather forecast office is its streamed many of the products by satellite all of the products by LDM.

03:09:25.730 --> 03:09:55.380
Reeves, Heather D.
Come out that way it's also used for data assimilation and the ramp and her model. So it's the the data source of record for their it's used for model validation within EMC for post analysis outside of the National Weather Service. FEMA uses it for disaster response and planning. It's also been used by the Department of interior for some of their management types of things we know there's some local water resource management.

03:09:56.000 --> 03:10:05.450
Reeves, Heather D.
Use of Ms it's a one of our mosaics is in the Frisby stream for radar. So it's used for that as well.

03:10:06.290 --> 03:10:15.100
Reeves, Heather D.
It it is publicly available, so I know there's quite a few agencies outside of the federal government that use it some.

03:10:16.400 --> 03:10:35.670
Reeves, Heather D.
Private sector entities are downloading the data and using and I think Delta Airlines is started using it. So there's quite a few we I. I don't know offhand. The full list of everybody. That's using it. We have some applications being used by the Department defense. the Air Force in particular, has some some.

03:10:36.690 --> 03:10:43.160
Reeves, Heather D.
Uh some of our stuff is being used for that, particularly our domains outside of the cone as like Korea, Guam.

03:10:44.440 --> 03:10:47.210
Reeves, Heather D.
Uh Hawaii and the Caribbean.

03:10:52.430 --> 03:10:53.270
David A Strand
All right very good.

03:10:53.620 --> 03:10:54.490
David A Strand
Uhm.

03:10:58.030 --> 03:11:08.460
David A Strand
Let's see and Sally put a link into the Mississippi State activities there so everyone can check that out.

03:11:09.730 --> 03:11:15.340
David A Strand
And dumb anyway. Jeff I'll give it back to you here. We're down to about 5 minutes and uh.

03:11:16.000 --> 03:11:18.000
David A Strand
And it looks like that that's a.

03:11:19.060 --> 03:11:20.260
David A Strand
The last of the questions.

03:11:20.610 --> 03:11:20.880
Jeff Weinrich (Guest)
Alright.

03:11:21.380 --> 03:11:39.120
Jeff Weinrich (Guest)
Great great panel great questions great discussion, so thank you. Everyone we're going to reconvene at 2:50. Eastern Time, and have our final session on aviation weather in the future so I'll see everyone in about 15 minutes.

03:28:06.920 --> 03:28:07.830
Jeff Weinrich (Guest)
Hello everyone,

03:28:08.960 --> 03:28:09.610
Jeff Weinrich (Guest)
it's

03:28:10.740 --> 03:28:14.450
Jeff Weinrich (Guest)
250 Eastern Time will get started in our last session.

03:28:15.190 --> 03:28:19.570
Jeff Weinrich (Guest)
It's like we have all of our panelists online.

03:28:23.280 --> 03:28:25.460
Jeff Weinrich (Guest)
And we're going to start off with.

03:28:25.520 --> 03:28:26.230
Jeff Weinrich (Guest)
It's a

03:28:27.540 --> 03:28:28.050
Jeff Weinrich (Guest)
come.

03:28:29.570 --> 03:28:30.550
Jeff Weinrich (Guest)
Mike Emanuel.

03:28:31.360 --> 03:28:51.630
Jeff Weinrich (Guest)
Mister Emanuel has been supporting the enactment of principle systems for the FAA for over 23 years in the areas of engineering acquisition and project management. He currently leads the terminal precipitation on the last project. The cloud services for aviation weather project. Co chairs with the National Weather Service and United States Air Force.

03:28:52.830 --> 03:29:03.420
Jeff Weinrich (Guest)
International agency for advancing made logical services future weather radar. Working Group and it's across agency system engineering lead for the spectrum.

03:29:04.070 --> 03:29:26.670
Jeff Weinrich (Guest)
Efficient national surveillance radar program during his tenure with the FAA Mister Emanuel supported the solution of implementation of multiple elements of the national airspace, including whether it capabilities, such as the level. Windshear alert system. Runway visual range and the asaase controller equipment interface. Display system and the Eddy dissipation rate performance standards.

03:29:28.120 --> 03:29:45.650
Jeff Weinrich (Guest)
He's the Federal Acquisition Institute in Project Management Level 3 certified and hold a BS in information and computer science from Stockton and and and he in systems engineering from Stevens Institute of Technology. Welcome Mike to the panel and the floor is yours.

03:29:46.780 --> 03:29:48.620
Emanuel, Michael (FAA)
Thank you Jeffrey that was poetry.

03:29:49.730 --> 03:30:02.390
Emanuel, Michael (FAA)
Thank you all for allowing me to share some time with you to speak about some of the emerging concepts that we're starting to explore within the FAA.

03:30:02.440 --> 03:30:12.720
Emanuel, Michael (FAA)
A uh in particular, one that is exciting is our initiative. We've dubbed the cloud services for aviation weather or season.

03:30:12.780 --> 03:30:36.910
Emanuel, Michael (FAA)
Uh uh what we are starting to explore is is the opportunities that the cloud environment offers in terms of delivering new weather information to various users of the national airspace system so the thought here is right, we can.

03:30:36.960 --> 03:30:43.170
Emanuel, Michael (FAA)
Uhm provide for the dissemination of data the processing of data.

03:30:43.620 --> 03:30:52.400
Emanuel, Michael (FAA)
Uh without necessarily provisioning new hardware and so that we believe will be advantageous.

03:30:53.000 --> 03:31:21.310
Emanuel, Michael (FAA)

Uh in terms of rolling out new capabilities right. We don't necessarily need a monolithic system acquisition effort to deployed new capabilities. Or maybe we leverage existing infrastructure that provides for some degree of service and product delivery, but maybe not. The totality of all that is needed so instead of.

03:31:23.100 --> 03:31:28.370
Emanuel, Michael (FAA)
Taking advantage or or manipulating those configurations deploying new hardware.

03:31:28.760 --> 03:31:41.030
Emanuel, Michael (FAA)
Uh we can utilize the cloud as a means for service delivery so you know the The The Advantages You know include.

03:31:41.080 --> 03:31:41.760
Emanuel, Michael (FAA)
Uhm.

03:31:42.440 --> 03:31:55.770
Emanuel, Michael (FAA)
Uh sort of the scalability right then the the the cloud environment itself is extensible and scalable and and there are recurring costs advantages in terms of.

03:31:56.840 --> 03:32:03.940
Emanuel, Michael (FAA)
Paying for what you utilize right, though there are certainly other considerations around.

03:32:03.990 --> 03:32:06.910
Emanuel, Michael (FAA)
Uhm security obviously.

03:32:07.740 --> 03:32:29.070
Emanuel, Michael (FAA)
That that that need to be taken into account. But what I'm really excited about and why I reached out to Randy Bass. Around this particular topic is you know the the enterprise for weather dissemination. Obviously is not exclusive to the FAA aviation whether or not exclusive to the FAA.

03:32:29.130 --> 03:32:41.080
Emanuel, Michael (FAA)
OK, there's a whole host of not only federal but but commercial entities that that have a requirement right to to utilize this data.

03:32:41.590 --> 03:33:11.440
Emanuel, Michael (FAA)
Uhm we are all starting to explore the cloud. We are all utilizing very similar observation systems right via the ADHD network or the different modeling capabilities that the Weather Service has or the the terminal. Doppler weather radars that we have in situ. Type data that the aircraft platforms might be providing all this data is is kind of shared and we're all similarly starting to explore.

03:33:11.720 --> 03:33:14.250
Emanuel, Michael (FAA)
The cloud environment and and wouldn't it be.

03:33:14.930 --> 03:33:18.800
Emanuel, Michael (FAA)
Desirable for a federal enterprise approach.

03:33:19.250 --> 03:33:37.270
Emanuel, Michael (FAA)
Uh to utilizing this platform wherein we all kind of have the same inputs or similar inputs, but we all maybe have different processing requirements, where we then kind of do our own specific.

03:33:37.330 --> 03:33:39.950
Emanuel, Michael (FAA)
Come yeah, manipulation of the data.

03:33:40.520 --> 03:33:49.550
Emanuel, Michael (FAA)
Uh so uhm again, I wanted to just kind of thank the the form here for allowing me to kind of share some of my thoughts. Hopefully we have some good discussion.

03:33:49.980 --> 03:33:51.560
Emanuel, Michael (FAA)
Uh yeah.

03:33:51.650 --> 03:34:21.540
Emanuel, Michael (FAA)
I am having coordinated any of this with any of my leadership, so anything. I have to say is, is purely my opinion in my my desire, but you know when you think about what I cams is doing and and sort of the they have a a cloud computing subcommittee within that structure right again. Air Force Weather Service. FAA is starting to explore the cloud. As others you know can, we approach this as a federal enterprise and and maximize the?

03:34:21.630 --> 03:34:31.230
Emanuel, Michael (FAA)
The opportunity that this, this technology has to offer so Jeff. Those were my opening remarks. I guess I'll yield back for the other panelists introductions.

03:34:33.150 --> 03:34:34.080
Jeff Weinrich (Guest)
Thank you Michael.

03:34:34.560 --> 03:34:36.790
Jeff Weinrich (Guest)
Up next we have.

03:34:36.850 --> 03:34:41.180
Jeff Weinrich (Guest)
The Lieutenant Colonel Robert Brandom.

03:34:43.220 --> 03:34:43.860
Jeff Weinrich (Guest)
And.

03:34:43.350 --> 03:34:43.950
Lt Col Branham (HAF/A3OW) (Guest)
I think.

03:34:44.980 --> 03:34:45.480
Jeff Weinrich (Guest)
Go ahead.

03:34:45.150 --> 03:34:45.440
Lt Col Branham (HAF/A3OW) (Guest)
Yeah.

03:34:46.590 --> 03:34:48.840
Lt Col Branham (HAF/A3OW) (Guest)
Do you have something else to say I'm sorry?

03:34:48.230 --> 03:34:55.780
Jeff Weinrich (Guest)
So I'm just going to introduce your bio. I'll just read the first paragraph, but you have quite an extensive background.

03:34:51.260 --> 03:34:51.490
Lt Col Branham (HAF/A3OW) (Guest)
OK.

03:34:53.740 --> 03:34:54.040
Lt Col Branham (HAF/A3OW) (Guest)
But.

03:34:56.880 --> 03:35:07.220
Jeff Weinrich (Guest)
Uh Lieutenant Colonel Robert Brannum is the Chief Weather Branch Air Force Operations Group Director of current operations deputy chief of staff.

03:35:08.070 --> 03:35:38.960
Jeff Weinrich (Guest)
DCH operations Hafs Pentagon, Washington DC, he leaves the annual production of over 2500 staff weather product supporting the secretary of the Air Force and army chief of staff of the Air Force and army and other DoD senior leaders. Further, he leaves the integration of climate and weather intelligence to inform strategic planning and mission readiness courses of action for senior. DoD leaders

and he leads the integration of weather and environmental assessments, supporting the joint staff national military command center.

03:35:39.220 --> 03:35:46.940
Jeff Weinrich (Guest)
Air Force and army crisis action teams finally Lieutenant Colonel random leads the assessment of weather and environment at impacts.

03:35:47.350 --> 03:35:51.810
Jeff Weinrich (Guest)
Uh 2 global rule Terry operations and.

03:35:53.200 --> 03:35:53.860
Jeff Weinrich (Guest)
Another.

03:35:54.070 --> 03:35:56.760
Jeff Weinrich (Guest)
A couple decades of service.

03:35:57.660 --> 03:35:59.960
Jeff Weinrich (Guest)
So welcome to the panel and the floor is yours.

03:36:00.890 --> 03:36:12.900
Lt Col Branham (HAF/A3OW) (Guest)
Uh Jeff. Thank you so much for that introduction and I want to thank the team for for you know, providing this opportunity for me to participate in this panel this week. It's been a lot of great discussions.

03:36:13.370 --> 03:36:43.400
Lt Col Branham (HAF/A3OW) (Guest)
Uh and for this particular panel here. I know Mike is yeah. I mean touched on a good bit of it already ah as I was walking through this and and kind of talking through a I really surmised. You know 3 questions. I mean here today and you know really kind of focusing on you know what future data sources and communication methods as a federal weather enterprise should we be really looking at it and we talk about future data sources.

03:36:43.450 --> 03:37:13.300
Lt Col Branham (HAF/A3OW) (Guest)
I mean, there's a lot of information out there today, particularly here in the cone is in the DoD. Obviously we're focused on a global perspective weird. You know just not concerned about what's going on here in the states were even more concerned about what's going overseas, and I think that's that's a challenge in itself right. I mean, we're talking about you know, interagency perspectives and kind of talking through that and I'll get to a little bit of that.

03:37:13.980 --> 03:37:24.690
Lt Col Branham (HAF/A3OW) (Guest)

I'm here in a couple minutes, but you know, we talk about you know really optimizing a sensing grid, integration process and when we're really looking at you know data sources we?

03:37:25.460 --> 03:37:56.540
Lt Col Branham (HAF/A3OW) (Guest)
Near force right, I mean right now, we're really trying to take uh annalistic look at terrestrial you know capabilities, coupled with S Pen capabilities together to meet the full package. You know you can't just look at you know, one entity and and forget about the other. You know when you're trying to you know fill the gaps providing support as an example for us. We're trying to plug into a program called Chad C 2, which is a joint you know integrated you know platform to where we can.

03:37:56.590 --> 03:38:04.430
Lt Col Branham (HAF/A3OW) (Guest)
Look at you know integrating our data and and really. That's where it's at today, it's about getting data integration.

03:38:04.620 --> 03:38:11.280
Lt Col Branham (HAF/A3OW) (Guest)
Uhm on common operating platforms to support the war fighter from a DoD perspective.

03:38:11.780 --> 03:38:16.720
Lt Col Branham (HAF/A3OW) (Guest)
Ah and I think you know a question that I'll posed to the team here.

03:38:17.650 --> 03:38:46.840
Lt Col Branham (HAF/A3OW) (Guest)
I mean, obviously we have a lot of questions. I think but you know is there a point where there's a degree of oversaturation of data OK and how do we develop a long term management practice to ensure that we have the most timely act. You know timely actionable and relevant data for a given operation or you know mission that we're supporting I. I think going forward and looking at different data types whether it be terrestrial space.

03:38:47.140 --> 03:39:14.730
Lt Col Branham (HAF/A3OW) (Guest)
Uh you know, so once in AI and machine learning there, which is the Air Force is getting into today quite a bit. Quite frankly as a matter of fact I think we've talked about that. Some in the last few days with in the office or precipitation capability with the FAA and of course, the Air Force has been working very closely with MIT. Lincoln labs with a global synthetic weather radar capability, particularly for our okona 's support missions.

03:39:15.800 --> 03:39:38.660
Lt Col Branham (HAF/A3OW) (Guest)
And you know uh Mike had mentioned previously talking about the cloud. Yes, absolutely on the Air Force side where you're looking at that right now. Obviously, the focus. I had mentioned previously talking about the optimization of that sensor at sensing grid, integration even more importantly to is the efficiencies with data centers.

03:39:39.320 --> 03:40:09.500
Lt Col Branham (HAF/A3OW) (Guest)
Uh as an example in the Air Force. You know, we got 6. Operational weather squadrons and we have a a unique weather squadron in the in the 14th down at Asheville that has a lot of data on the historical side for climatology and then we've got our really well, but call the engine room second weather group out at Offit Air Force Base, there at the 557th weather wing and we're we've got a plan in place to to start that you know that migration.

03:40:09.790 --> 03:40:21.490
Lt Col Branham (HAF/A3OW) (Guest)
You know process of going to the cloud from you know calendar year 22 through 24 kind of taken taken an enterprise perspective at doing this.

03:40:22.540 --> 03:40:52.310
Lt Col Branham (HAF/A3OW) (Guest)
And you know something that's very important to us on the DoD side and I think it's worth noting here. Certainly is you know, we have to be able to operate on different security enclaves you know, we can't just just operate on our standard. Internet you know niprnet capability. We have in our home here or you know in our office back at you know wherever we're sitting that we have to be able to you know operate on that you know secret and top secret levels so that's a.

03:40:52.600 --> 03:40:55.340
Lt Col Branham (HAF/A3OW) (Guest)
Important consideration for the DoD going forward.

03:40:56.240 --> 03:41:25.640
Lt Col Branham (HAF/A3OW) (Guest)
Uh we talk a little bit about cloud computing computing. I think that's an important area that we're looking at right now, particularly as it aligns with the National Defense strategy and you know that's our backbone, and really are when we look at requirements. We've talked and I think I mentioned this a couple days ago, actually and you know one of the forms but you know, we talk about you know building requirements. Well, you know for the Air Force and you know for the DoD at large. It's got to be tide.

03:41:25.690 --> 03:41:57.200
Lt Col Branham (HAF/A3OW) (Guest)
Back to National Defense strategy if it's not you know a good luck getting funding for it. Pretty much is what we're saying here and I? I think that's an important thing to look at obviously we want to really work on those partnerships to you know, we're looking to engage Noah through the icam structure. Currently, you know formally you know thick measure, which you know they had. They had the cops eat network. You know located underneath that cop sees transferred over to Icam 's now that's a.

03:41:57.260 --> 03:42:19.070
Lt Col Branham (HAF/A3OW) (Guest)
Enterprise wide data sharing community that's still intact under the icons network as Mike mentioned previously the clouds going to enable that rapid scalable solution space for us to engage emerging

requirements and challenges. So I think that's that's a focus for us, where we're really trying to push to get into the cloud.

03:42:19.600 --> 03:42:39.950
Lt Col Branham (HAF/A3OW) (Guest)
Ah, one of our big challenges that we have with data processing, particularly in a cyber contested environment includes that edge computing and edge data fields, particularly with these 5 G. Local networks that are out there. Now we are certainly open to discussion for a federal weather cloud solution.

03:42:41.140 --> 03:42:43.330
Lt Col Branham (HAF/A3OW) (Guest)
Some challenges with the head as you might expect.

03:42:43.380 --> 03:42:52.430
Lt Col Branham (HAF/A3OW) (Guest)
It's uh you know defensibility, obviously in a cyber contested environment is something for us to think about a little bit and you know, we also.

03:42:53.250 --> 03:43:22.310
Lt Col Branham (HAF/A3OW) (Guest)
You know we're taking a look at it, I mean, obviously you know when it comes to paying the bills. I mean, it with anything else. You know in a case like that? How does that look in a programmatic environment and you know from a palm perspective going forward something that I would suggest to the group here going forth and you know relay fry cams. Quite frankly I. I think uh you know a perspective that I thought about is the next Gen numerical weather prediction and data assimilation.

03:43:23.270 --> 03:43:28.460
Lt Col Branham (HAF/A3OW) (Guest)
Data analytic algorithms kind of focusing on that big data AI machine learning.

03:43:29.220 --> 03:43:33.660
Lt Col Branham (HAF/A3OW) (Guest)
Seasonal sub seasonal forecasting a I'm going to talk a little bit about that now.

03:43:34.250 --> 03:43:45.150
Lt Col Branham (HAF/A3OW) (Guest)
Uh in my former job before I came over to the beta branch chief for the a fog weather team. I spent a lot of time with climate change and I'm still plugged into it, I I can't leave it.

03:43:45.640 --> 03:43:51.990
Lt Col Branham (HAF/A3OW) (Guest)
So I've been really kind of you know, I mean, really kind of staying plugged into the groups here or but but it you know.

03:43:52.350 --> 03:44:00.170
Lt Col Branham (HAF/A3OW) (Guest)

Uh in the DAF or installations were critical to what we do when it comes to the National Defense strategy. I mean, there's no doubt about it.

03:44:00.780 --> 03:44:02.410
Lt Col Branham (HAF/A3OW) (Guest)
Uh you know, and

03:44:03.320 --> 03:44:33.610
Lt Col Branham (HAF/A3OW) (Guest)
the DAF and really DoD. Now, they, I mean, they've taken a priority look at this climate change issue and there's 2 areas that we're looking at focused on climate change mitigation and adaptation and I think for us here. And when we're talking about climate change and its impact on aviation operations. I suggest we think of climate change from those concepts as we apply it to support to aviation OPS and we talk about mitigation. We're talking about you know.

03:44:34.230 --> 03:44:36.320
Lt Col Branham (HAF/A3OW) (Guest)
Fuel emissions things of that nature.

03:44:36.830 --> 03:44:49.730
Lt Col Branham (HAF/A3OW) (Guest)
Uh adaptation we're talking about policies were talking about practice is what do we do at the local level to to help provide better weather support to help better integrate that weather data right?

03:44:50.340 --> 03:45:01.080
Lt Col Branham (HAF/A3OW) (Guest)
Amay and I'll give an example. You know it's like go through some of this real quick here. You know like it. You know the aviation community. the Air Force uses 80 / 80% of the energy budget.

03:45:01.640 --> 03:45:03.170
Lt Col Branham (HAF/A3OW) (Guest)
Uh you know.

03:45:03.710 --> 03:45:14.570
Lt Col Branham (HAF/A3OW) (Guest)
Uh on fuel expenditures and and it's 45% of the DoD when it comes to energy use that's a big, big you know number there so.

03:45:15.420 --> 03:45:42.350
Lt Col Branham (HAF/A3OW) (Guest)
Think about what the Air Force was looking at when it comes to climate change fuel savings right when I mean, we can. And then we can probably you know think about that, so from a weather perspective we're looking at on the Air Force Side? How do we get our data better integrated in mission planning right? It's about getting that that that and not just data. I I mean, I think in my case. My opinion Rob Randoms Opinion. But I think it's it's more about S 2 S data.

03:45:43.210 --> 03:46:05.070
Lt Col Branham (HAF/A3OW) (Guest)

You know 4 casting out and into you know, I mean into you know several weeks. If not seasonal patterns for Mission Planning Mission Planning Software. You know for tankers refuel orders and things of that nature. We can earn our money and really make a positive impact there and then that turns into optimizing those operations.

03:46:05.660 --> 03:46:17.330
Lt Col Branham (HAF/A3OW) (Guest)
For the deaf and that and that's our focus right now that the daff is working on as a matter of fact. I just found out that they're looking at developing it. Daft climate strategy in which I think is wonderful going forth.

03:46:19.020 --> 03:46:19.970
Lt Col Branham (HAF/A3OW) (Guest)
Last but not least.

03:46:20.280 --> 03:46:30.180
Lt Col Branham (HAF/A3OW) (Guest)
Uh my installation readiness, I mean, we gotta have our our infrastructure at the installation to support flying operations and climate change is heavily being looked at there.

03:46:30.640 --> 03:46:37.350
Lt Col Branham (HAF/A3OW) (Guest)
Uh over the last several years we've been updating policies playbooks you had seized for our buildings.

03:46:37.770 --> 03:47:08.110
Lt Col Branham (HAF/A3OW) (Guest)
Uh and it's not a cookie cutter. You know a process here. This is an installation by installation approach and we've got to use a number of tools defense climate assessment tool 14th weather squadron. You know CPC at Noah. You know you know different things to help us integrate data into these processes as it as an example of that tend to Layer 4 space is currently in the rebuild process we've used climate data.

03:47:08.630 --> 03:47:28.960
Lt Col Branham (HAF/A3OW) (Guest)
To establish a more restrictive building design and wind speeds and flood elevation for that particular air filled there, so these are things that I think we should you know, we talk about these I hope we have some great discussion here on that, once again. Thank you for this time to participate in this panel this afternoon. I'm excited for our discussion.

03:47:36.170 --> 03:47:37.190
Jeff Weinrich (Guest)
Thank you so much.

03:47:38.450 --> 03:48:06.400
Jeff Weinrich (Guest)
Next we have Mark Zettlemoyer and he works for an NGO 's National Weather Service in the aviation is space. Weather services branch serving as a liaison to the FAA office of next. Gen then next. Gen air transportation system. Mark has a bachelors and Masters degree in Meteorology from Penn State and

Florida State and joined in NWS after 27 years in the Air Force where he supported everything from low and slow army helicopter training to fighters and air mobility.

03:48:07.030 --> 03:48:26.800
Jeff Weinrich (Guest)
Operations across the Pacific as one of 5 next. Gen part partner agency liaisons to the FAA NextGen office of collaboration in messaging. He's engaged in various cross agency issues such as new entrants to the national airspace system cyber security and data exchange welcome mark to the panel and you have the floor.

03:48:27.550 --> 03:48:33.480
Mark Zettlemoyer (NWS) (Guest)
Thanks, Jeff Hello to my compatriots on the panel good to see your faces again. It's been awhile.

03:48:34.270 --> 03:48:47.500
Mark Zettlemoyer (NWS) (Guest)
Well, one day I hope we can all get back together again, and talk about some of these issues face to face like Mike mentioned? What I'm going to say is, is my opinion, not necessarily sanctioned by Weather Service and NOAA.

03:48:48.700 --> 03:48:53.330
Mark Zettlemoyer (NWS) (Guest)
But I'll draw on elements of what? What both of both of them have talked about.

03:48:54.000 --> 03:49:02.850
Mark Zettlemoyer (NWS) (Guest)
Uh yeah, I worked for Bruce Entwistle in the requirements and policy side of the National Weather Service, the AFS analyzed forecast support.

03:49:03.600 --> 03:49:14.250
Mark Zettlemoyer (NWS) (Guest)
But I'm heavily engaged with our office of dissemination as we try to evolve our data sharing and data dissemination capabilities, particularly.

03:49:15.680 --> 03:49:19.750
Mark Zettlemoyer (NWS) (Guest)
Visa vie the FAA and the data sharing with the DoD.

03:49:20.710 --> 03:49:31.740
Mark Zettlemoyer (NWS) (Guest)
So future of Aviation I'm going to emphasize data and Steve Bradford brought this out yesterday when he said that the future really is a in info centric mass.

03:49:32.530 --> 03:49:33.270
Mark Zettlemoyer (NWS) (Guest)
Uhm.

03:49:34.490 --> 03:49:55.750
Mark Zettlemoyer (NWS) (Guest)

So when it comes to weather data are we ever really gonna have enough. No, you know, particularly the government can't do everything when it comes to operations and vision for the future like advanced their mobility or uas traffic management. Now the chief scientist Steve Bradford. You know spent a lot of time on Pireps yesterday.

03:49:56.320 --> 03:49:56.990
Mark Zettlemoyer (NWS) (Guest)
Uhm.

03:49:57.810 --> 03:50:21.060
Mark Zettlemoyer (NWS) (Guest)
But Interestingly I mean in my mind, he he's on the right track. Pirates did they are very manual. But they've coach of ours. Questions afterward kind of led to the path where if we automated a lot of that process where it wasn't a pilot report. It was an aircraft report and you know what happens if the aircraft.

03:50:21.670 --> 03:50:23.480
Mark Zettlemoyer (NWS) (Guest)
Is actually a weather sensor?

03:50:24.400 --> 03:50:43.210
Mark Zettlemoyer (NWS) (Guest)
When you look at the uh am concepts. Uas traffic will particularly advanced air mobility operating concept your talmbout. These aircraft and very close score quarters in a in a in a narrow corridor going back and forth say from the the downtown area out to an airport.

03:50:44.040 --> 03:51:08.750
Mark Zettlemoyer (NWS) (Guest)
Uhm you gotta need pretty rapid communications rapid day-to-day ups updates. It you know, not only between the aircraft and their PSU their provider services for for Umm Urban Air Mobility. But you're probably going to need the aircraft aircraft communications, too, so if we do things like that where the aircraft is taking data disseminating that data.

03:51:09.500 --> 03:51:19.440
Mark Zettlemoyer (NWS) (Guest)
Instantaneously to the aircraft behind them. I think we have measurably improve our margin for safety, which is something NASA is exploring through there.

03:51:20.330 --> 03:51:28.620
Mark Zettlemoyer (NWS) (Guest)
Uh systemwide what's it called sift systemwide safety assurance as a research effort that they've got underway so.

03:51:29.750 --> 03:51:52.820
Mark Zettlemoyer (NWS) (Guest)
Frankly, my opinion again, I think the ATSB, a mandate for equip page for the carriers. You know in GA as much as they could might have been a first step. I I do think the my opinion again that when it comes to

AM and and UTM operations. I think we're going to need to have every aircraft. The sensor to fill those data gaps.

03:51:53.400 --> 03:52:11.070
Mark Zettlemoyer (NWS) (Guest)
Uh I think the business case will be there, particularly from a safety perspective to make that attractive for businesses to equipped aircraft. But that might be the primary way to make sure we have enough density of information to support those types of operations in the future.

03:52:12.650 --> 03:52:15.890
Mark Zettlemoyer (NWS) (Guest)
So as I was saying that all has to be machine to machine.

03:52:16.670 --> 03:52:33.150
Mark Zettlemoyer (NWS) (Guest)
The first step in that process is I kayos migration for the International Aviation community. To I Wixom. That's the I Ko Meteorological. Information exchange data standard. It's an XML extensible markup language format.

03:52:33.750 --> 03:52:49.400
Mark Zettlemoyer (NWS) (Guest)
It's designed for machine to machine communications web service just went live on September 29th. With that, so people that access the Weather Service in gateway will find Staffs and observations there in the new XML formats.

03:52:50.170 --> 03:52:51.720
Mark Zettlemoyer (NWS) (Guest)
Uh yeah.

03:52:52.500 --> 03:53:01.260
Mark Zettlemoyer (NWS) (Guest)
Advantages in the future. I don't think the fact that it's you know XML or or Grib 2 or net. CDF model data is going to matter a whole lot.

03:53:02.590 --> 03:53:31.880
Mark Zettlemoyer (NWS) (Guest)
The open geospatial consortium has an effort underway. It's called the environmental date of Retrieval. API application programming interface and that capability that they're coming up with a standard for will essentially homogenized data a user will be able to come into an API and Weather Service offers a lot of our data now on. API is accessible by the public. But they can come in and they can get grid 2 data and they'll be able to get.

03:53:31.950 --> 03:53:59.950
Mark Zettlemoyer (NWS) (Guest)
XML data and and net CDF data and actually they'll be able to overlay. All these different data types and use the information as they wish. So while we're moving machine to machine. I think we'll also see standards and capabilities evolved that will allow a lot of interoperability of different data types, which will certainly facilitate you know, some of this close in sensing that, I've been talking about.

03:54:00.710 --> 03:54:10.160
Mark Zettlemoyer (NWS) (Guest)
And Uh Rob touched on it briefly all this information. I have uh. I pay attention to aviation cybersecurity also we're gonna have to.

03:54:10.860 --> 03:54:21.090
Mark Zettlemoyer (NWS) (Guest)
Bake this into everything we do cyber security. I ko is developing a cyber security framework. It'll probably be out in a in a couple years.

03:54:21.730 --> 03:54:35.420
Mark Zettlemoyer (NWS) (Guest)
Yeah, but we you know, I don't know what approach it will take well. We all need PIV cards will biometrics come into play. You know for users and then ask you know, I don't know what it will take to count that we have to protect the information.

03:54:36.690 --> 03:55:01.280
Mark Zettlemoyer (NWS) (Guest)
There has to be free exchange, but it has to be protected, so a lot of work to be done in the future. But like I said, I think if if we open up the data sharing the hopefully, the business case is there hope the safety case will certainly be there. I think we can make a lot of advances increased capacity and safety and then ask for all types of vehicles no matter who's flying.

03:55:02.030 --> 03:55:08.300
Mark Zettlemoyer (NWS) (Guest)
So that's my thoughts on on aviation future from a data view. Jeff I'll turn it back over to you.

03:55:14.100 --> 03:55:14.830
Jeff Weinrich (Guest)
Thank you.

03:55:15.730 --> 03:55:18.530
Jeff Weinrich (Guest)
And finally we have.

03:55:19.970 --> 03:55:20.500
Jeff Weinrich (Guest)
Uh.

03:55:21.210 --> 03:55:23.720
Jeff Weinrich (Guest)
Donald Nick and

03:55:24.850 --> 03:55:54.340
Jeff Weinrich (Guest)
From the National Transportation Safety Board Don is a senior meteorologist for the NTSB and the operations. Operational factors group. He's been with the NTSB since 1998. We provides technical weather analysis and documentation for accident investigations in all modes of Transportation has been

involved in over 1200 accident cases and hundreds of general aviation accidents. He he has degrees in aeronautics from Embry Riddle.

03:55:54.700 --> 03:55:58.260
Jeff Weinrich (Guest)
And in Meteorology from Florida State holds a private pilot and aircraft.

03:55:58.540 --> 03:55:58.980
Jeff Weinrich (Guest)
Uh.

03:55:59.720 --> 03:56:27.670
Jeff Weinrich (Guest)
Uh dispatcher certificate and NWS certificate prior Prior to joining the NTSB has a Transworld Airlines. He worked at transport. Airlines is instructor. Teaching Meteorology Federal Aviation regulations of flight procedures and head of meteorology for the air carrier for 14 years. He also taught pilot and dispatch initial training courses at Pan Am training Institute flight safety international and other Corporate Seminars. Welcome to the panel Donald.

03:56:29.190 --> 03:56:52.950
Eick Donald
Well to to make a summary basically we've been looking at accident trends. We have seen some improvements, especially in general deviation with glass. Cockpits and monetization is some aircraft air careerwise. We've been doing a tremendous amount of reducing 121 air carrier accidents to where.

03:56:53.340 --> 03:56:59.350
Eick Donald
Uh we're we're rarely seeing the fatal accidents, I mean for our last.

03:56:59.410 --> 03:57:28.890
Eick Donald
A major detail was 2018. We only had 4 fatalities for a part 121 carriers in the United States. But we do see whether it's being significant impact in all phases of aviation in general aviation accidents, which can extend from flight instruction personal business corporate aircraft. We still see about 23 to 22% of those accidents.

03:57:29.530 --> 03:57:37.170
Eick Donald
Uh being weather related or whether it's a cause or a factor for air carrier accents believe it or not the.

03:57:37.230 --> 03:58:08.190
Eick Donald
The UM the weather involvement is actually higher at about 38% so even though we're seeing lower. Fatal accidents for the airlines. We do see whether it's being a significant impact airline operations with turbulence being the number one cause of accidents where we've cause a serious injury to the passenger or flight attendant and it's most often the flight attendant and we just recently finished a.

03:58:08.700 --> 03:58:25.850
Eick Donald
A safety study on turbulence, which we looked at all the air carriers and all the government services provided seeing what we can do to improve that record, but turbulence is still a big impact with their carriers then adverse win wins.

03:58:26.380 --> 03:58:32.580
Eick Donald
Uh and and even in the few rare cases loss of control in flight.

03:58:33.390 --> 03:58:47.270
Eick Donald
Beautiful app is for disturbances, UM, we're looking at Part 135, which also extends to a large area where it's scheduled small commuter aircraft as well as on demand.

03:58:47.700 --> 03:59:12.960
Eick Donald
Uhm aircraft and we have seen a little bit slight increase in trends there to where we have been seeing some accidents weather related VFR in IMC conditions controlled flight into terrain icing and we're still. We're still back meeting. Some of the basic hazards being an impact of 135 operations.

03:58:58.590 --> 03:58:59.010
Matt Fronzak
OK.

03:59:14.050 --> 03:59:27.320
Eick Donald
But overall we, we have been seeing some improvements, but whether it's still a significant impact to air transportation as well as ground highway and so forth and swells Marine.

03:59:28.620 --> 03:59:41.150
Eick Donald
Basically, I'll just fill it in a way for any questions. I don't know where you want to go with this we, we don't see any climate change impacts and so forth. We just see some long, long.

03:59:42.590 --> 03:59:48.700
Eick Donald
Long road uh trends with equipment and training as being the most significant features.

03:59:58.980 --> 03:59:59.900
Jeff Weinrich (Guest)
Thanks so much.

04:00:00.210 --> 04:00:02.280
Jeff Weinrich (Guest)
Uh so.

04:00:01.710 --> 04:00:05.290
Matt Fronzak
Jeff Jeff Excuse me for butting in this is Matt.

04:00:03.210 --> 04:00:03.610
Jeff Weinrich (Guest)
Good.

04:00:05.350 --> 04:00:07.170
Matt Fronzak
Uhm uhm.

04:00:05.690 --> 04:00:06.330
Jeff Weinrich (Guest)
Yeah, go ahead.

04:00:07.760 --> 04:00:10.200
Matt Fronzak
Jim Evans can you turn your camera off please?

04:00:14.100 --> 04:00:19.420
Matt Fronzak
It's not that I don't like looking at you, but since you're not on this panel. We want to leave that bandwidth for the panelists.

04:00:24.340 --> 04:00:25.190
Matt Fronzak
Thank you Sir.

04:00:28.750 --> 04:00:35.830
Jeff Weinrich (Guest)
Thank you and thank you. All all the panelists that so that's our 4 panelists so that's open the discussion and.

04:00:37.190 --> 04:00:37.900
Jeff Weinrich (Guest)
David.

04:00:40.000 --> 04:00:41.650
Jeff Weinrich (Guest)
Go ahead and coordinate the.

04:00:42.600 --> 04:00:43.980
Jeff Weinrich (Guest)
Discussion, please thanks.

04:00:44.390 --> 04:00:44.940
David A Strand
Thank you Sir.

04:00:44.990 --> 04:00:55.360
David A Strand
Here come Matthias has a question 2 or all the hand list if you could have a new sensing capability, what would it be.

04:00:59.860 --> 04:01:03.360
Emanuel, Michael (FAA)
This is my command, you I'll I'll jump in first up you know.

04:01:03.420 --> 04:01:03.640
Emanuel, Michael (FAA)
So.

04:01:05.490 --> 04:01:22.890
Emanuel, Michael (FAA)
No, that's certainly dependent on on sort of the gap and and shortfall that you're looking to address you know, I think one of the things that some of our analysis have shown is is. Maybe not so much performance gaps. But sort of spatial gaps right you know, not necessarily having the observations in the sensing where you need them.

04:01:23.610 --> 04:01:28.440
Emanuel, Michael (FAA)
Uh you know, so I think that that that's a harder challenge.

04:01:28.790 --> 04:01:29.670
Emanuel, Michael (FAA)
Uhm.

04:01:30.300 --> 04:01:56.600
Emanuel, Michael (FAA)
You know, but with respect to maybe Asian weather right. You know, obviously you know, hazardous weather alerting whether it be convective or wind based or you know, I sing right. You know, having greater awareness in that regard, obviously is is always at the a desire, but you know if there was a if there was a way to proliferate.

04:01:57.260 --> 04:02:18.550
Emanuel, Michael (FAA)
The sensing spatial, resolution without you know the costs associated with a fleet of sensors. You know at every grid point you know that that would be the utility right, but but uh you know that that that's certainly you know a bigger challenge. You know, maybe one where you know sort of the.

04:02:19.240 --> 04:02:44.160
Emanuel, Michael (FAA)
Yeah, you know derived capability right you know, thinking of a air forces. Global synthetic weather radar right. We don't necessarily have an observation sensor in the middle of the ocean or the middle of the Rockies or in theater in in in the Middle East right. But we're able to derive per precipitation information. So I'll I'll I'll I'll start the discussion with that over.

04:02:47.000 --> 04:03:01.810
Lt Col Branham (HAF/A3OW) (Guest)
Yeah, and this is other tenant Colonel. Brandon you know. Of course I. I'll I'll I'll kind of chime on to what Mike said. Here I I think you know for us in in the Air Force and the DoD certainly having sensing capabilities.

04:03:02.390 --> 04:03:03.000
Lt Col Branham (HAF/A3OW) (Guest)
Ah.

04:03:03.680 --> 04:03:11.720
Lt Col Branham (HAF/A3OW) (Guest)
That you know, we can keep I mean, obviously protected from a from a cyber security and it from an object perspective.

04:03:13.670 --> 04:03:44.890
Lt Col Branham (HAF/A3OW) (Guest)
In other theaters to support the war fighter is more important to us and obviously global synthetic rather radar was an example of that, but also like having a a. A capability of understanding. Obviously, you've got you know tactical weather sensors that you can use like micro weather sensor for a terrestrial observation at given location, but having the ability to sense the vertical right and to be able to effectively characterize the atmosphere.

04:03:45.450 --> 04:03:52.050
Lt Col Branham (HAF/A3OW) (Guest)
At a given location, you know, we've had numerous discussions in the past about hey do, we need to get you know?

04:03:52.590 --> 04:03:56.280
Lt Col Branham (HAF/A3OW) (Guest)
Uh you know tactical you know.

04:03:57.190 --> 04:04:10.960
Lt Col Branham (HAF/A3OW) (Guest)
Tactical you know radio signs and things like that that gets very difficult. You know from a Nocona 's perspective on on you know where do you place those you always want stuff that's upstream to give you a the ability to forecast the weather right so I.

04:04:11.830 --> 04:04:18.650
Lt Col Branham (HAF/A3OW) (Guest)
I think for us certainly that Uh Okona 's perspective, is is is you know where the gaps are going to be there.

04:04:21.960 --> 04:04:50.870
Eick Donald
Regards to aircraft I would we'd love to see in situ are reporting edr on all aircraft that could all automatically detect pireps get it into the system and be able to display it in. In improved in cockpit

weather displays so that would be the alternate goal to have aircraft doing the sensing not, relying on a pilot to to call ATC to put it in as a pirate.

04:04:22.840 --> 04:04:23.370
David A Strand
And done.

04:04:51.170 --> 04:04:58.960
Eick Donald
So will the Weather Service can get the forecast and issued the advisory have that readily available to everybody.

04:04:59.700 --> 04:05:00.330
Mark Zettlemoyer (NWS) (Guest)
Here here.

04:05:02.000 --> 04:05:04.430
Mark Zettlemoyer (NWS) (Guest)
That's what I was saying just different words.

04:05:04.810 --> 04:05:05.270
Eick Donald
Yep.

04:05:05.080 --> 04:05:10.880
Mark Zettlemoyer (NWS) (Guest)
So yeah, and and going back to my discussion about Advanced Air Mobility Urban Air Mobility.

04:05:11.510 --> 04:05:24.370
Mark Zettlemoyer (NWS) (Guest)
You know if there were a capability to blanket a city you know, and and detect the winds and in the ER the turbulence. You know which will be the major impacts to air taxi services in the future.

04:05:24.940 --> 04:05:36.060
Mark Zettlemoyer (NWS) (Guest)
So that would be extremely beneficial to ensure safety for those you know first folks taken off on those first flights battling the the turbulence in the urban canyons.

04:05:37.960 --> 04:05:46.360
Eick Donald
Well, just even uh I'll just say just being able to to see this from the cockpit side and so forth too. We had a close encounter.

04:05:46.410 --> 04:06:16.380
Eick Donald
Uhm this more last night, I should say in Phoenix, where we had an aircraft taking off in a uh a very significant underneath the significant thunderstorm cell encountered a microburst and hail was damaged in aborted the takeoff and came back and it was from looking at it from ground based weather radar clearcut depiction of this, but again air traffic controllers in the tower.

04:06:16.480 --> 04:06:46.490
Eick Donald
Don't have weather display like what we see on National Weather Service radars. The pilot could not rely on as airborne radar because he wasn't in the air yet and then even then limitations and the system basically failed them that he high based thunderstorm in Phoenix and he had the minimums that take off and Luckily. It was the changing winds that he recognized and stopped to major accident from occurring and that happened last night or.

04:06:46.550 --> 04:06:50.120
Eick Donald
Early this morning at about one Z in Phoenix.

04:06:51.040 --> 04:06:52.520
Eick Donald
So all these things still occur.

04:06:51.280 --> 04:06:51.710
Emanuel, Michael (FAA)
Doesn't?

04:06:53.060 --> 04:06:57.400
Emanuel, Michael (FAA)
Doesn't Phoenix have a terminal Doppler weather radar? They they should have been always it's awesome.

04:06:56.030 --> 04:07:09.890
Eick Donald
Yeah, and I I think I think he got the alert on takeoff and that's one of the reasons why he aborted. But he didn't counter the he didn't counter the microburst and also the hail so it was a close call.

04:07:03.340 --> 04:07:03.710
Mark Zettlemoyer (NWS) (Guest)
Wow.

04:07:15.880 --> 04:07:20.700
David A Strand
Speaking of sensors from or or or new ways to since weather.

04:07:21.110 --> 04:07:23.430
David A Strand
Uh there was a comment that.

04:07:23.480 --> 04:07:39.410
David A Strand
The Steve dark foot in the chat that I don't know if you want to comment on Don or not, but the NTSB recently recommended that 121 operators equipped with a radius be required equipment.

04:07:40.060 --> 04:07:58.510
David A Strand

Uh to broadcast a DSB weather data in Rule airspace and he did put a link to that recommendation 20 dash 30 related to it, and to the ER parameter. But I don't know if you want to add anything to that that link is in the chat.

04:08:00.000 --> 04:08:08.740
Eick Donald
Uhm I don't know how much I can add to that right now, but I know we that was coming. One of the things that came about with the R turbulence study.

04:08:09.180 --> 04:08:16.290
Eick Donald
I'm just trying to to to get that information and make it available, so we can improve the system.

04:08:21.060 --> 04:08:22.670
David A Strand
And there was a

04:08:23.960 --> 04:08:24.950
David A Strand
Let me see.

04:08:25.910 --> 04:08:50.290
David A Strand
Sometimes the questions get answered after somebody asks a different question see if I can head straight here. Donald Eric are the results from the NTSB study that was completed. To understand the current impact with turbulence to airlines published in any form or the results from the NTSB study that was completed. To understand the current impact of turbulence to airlines published in any form.

04:08:50.820 --> 04:09:02.040
Eick Donald
It it is officially published now it is on our NTSB web page. We have made formal recommendations to the FAA as well as the National Weather Service.

04:09:02.630 --> 04:09:33.680
Eick Donald
Uhm several of them are like the Dr was one of them also we fully support from our study of our over the last several years as well as the accidents. We did base it base. Our current information on that products like the dog now cast be pushed up more for operation as we saw in several or accident cases that were tide to convection that it.

04:09:33.730 --> 04:09:47.360
Eick Donald
Provided advance warning to the flight crew that if they had it from the dispatch and powered perspective. It would have made a difference in the turbulence event so we could have prevented some accidents there.

04:09:47.930 --> 04:10:06.890
Eick Donald

Uhm also to improve the kinda like what Heather was talking about with the the and I feel old now convective sigmets being almost 50 years old boy was around with southern Airways and so forth, but we want some improvements and the Airmets.

04:10:07.620 --> 04:10:19.420
Eick Donald
Uh with regards to turbulence to and the fact that most people don't use them because they're too big so we need to see some improvements and how we're dealing with turbulence forecasts and warnings.

04:10:19.940 --> 04:10:20.850
Eick Donald
Uhm.

04:10:21.630 --> 04:10:51.480
Eick Donald
And just even you know, everyone is using their own type of forecast beta. TP there sigmets. The National Weather Service Sigmets. Everyone is using different products and we're not talking to each other. Just like the probabilistic forecasts that we used the National Weather Service Staff. Let's see what United 's doing. We're seeing the same thing with Sigmets and Airmets from the air carriers so we need to unify and start.

04:10:51.530 --> 04:11:00.680
Eick Donald
Looking at the products and I was even aware of the UM the one turbulence product that was talked about today with the satellite.

04:11:01.170 --> 04:11:09.720
Eick Donald
Uhm until just shortly before so I mean, I that that was not even one of my typical products that.

04:11:10.730 --> 04:11:22.290
Eick Donald
We used in the past and that was from uh Dan Lindsay 's presentation from nez does come with regards to the satellite based turbulence.

04:11:22.680 --> 04:11:35.650
Eick Donald
Uh so all those things were kind of useful and we even had a turbulence accident. Just yesterday with the 3 flight attendants injured going into Houston so these things are occurring daily.

04:11:37.560 --> 04:11:50.570
David A Strand
Uh and Joe Bracken just put on the chat the link to ntsb.gov. I assume that's the document in question there that we were just talking about so.

04:11:51.170 --> 04:12:05.670
Eick Donald
You'll have to look this to see if that's correct. But if not, I'll make sure it. It's it's out there. It is officially

out now published in the National Weather Service and FA have been have received some of the recommendations that we made on it.

04:11:51.230 --> 04:11:51.690
David A Strand
Uh.

04:12:06.540 --> 04:12:19.500
David A Strand
And I'm sorry Joe if I just read the the print underneath your link NTSB safety research report referenced turbulence. So yeah, that is what it the The One supposed to be pointing to there so thanks for that. Joe.

04:12:20.250 --> 04:12:21.050
David A Strand
Uhm.

04:12:21.770 --> 04:12:43.860
Mark Zettlemoyer (NWS) (Guest)
Hey before we move on if I could reference a couple small points that Don just made talking about sigmets with the move. To I Wixom. We have an opportunity to reshape how we disseminate data so but there's a lot in the art at least my my part of the community looking forward to doing away with bullets.

04:12:44.940 --> 04:13:14.110
Mark Zettlemoyer (NWS) (Guest)
The advantage of I Wixom is you're not going to need WMO IDs you'll be able to search on the metadata associated with say an observation or assigment and so uh a data consumer will be able to say. I'm flying point. A to point B and then he can. Subscribe to information that applies along his poop using this Cdr. I was talking about and what the communication system. The Web service should provide is you know a sigmet.

04:13:14.550 --> 04:13:45.540
Mark Zettlemoyer (NWS) (Guest)
One Polygon one message, He gets just what he needs for obs. Sigmets anything he needs along his route of flight, so he doesn't get overwhelmed. You know looking at this volume of data, he should still has a should still have something in his flight management system that can process that when you look at capabilities like NASA has built like DWR the dynamic weather roots. Not you know, not just convection expand that. The icing and turbulence. You know where an aircraft can re route re route around these hazards.

04:13:46.130 --> 04:13:52.760
Mark Zettlemoyer (NWS) (Guest)
So I think using information in the future getting tailored what you need will be a lot easier in the future.

04:13:54.380 --> 04:14:23.960
Lt Col Branham (HAF/A3OW) (Guest)
Yeah, and something that I'll bring up here, too, and it kind of goes back to to your point mark a little bit ago and then somebody mentioned here briefly on actually Matt talking about the use of of sensor data

from aircraft that that I was part of a study on some of that in my former job kind of digging in a little bit to see you know you know where we're at with that debt that is an area that that we certainly want to dig deeper.

04:14:24.020 --> 04:14:32.060
Lt Col Branham (HAF/A3OW) (Guest)
Into on the Air Force side of utilizing sensors that are on aircraft. Obviously, I think that's.

04:14:32.760 --> 04:14:49.360
Lt Col Branham (HAF/A3OW) (Guest)
I think that's a data area not only from the DoD perspective. But even from the airlines and everywhere else to where we can actually have a lot more real time data. I mean in the vertical right and how do we? How do we get that shared across the agencies?

04:14:49.980 --> 04:14:52.190
Lt Col Branham (HAF/A3OW) (Guest)
May I mean that's a That's a great question.

04:14:52.480 --> 04:15:00.270
Lt Col Branham (HAF/A3OW) (Guest)
Uh uh but uh it's it's definitely something that in my opinion right now, we have a lack of.

04:15:05.970 --> 04:15:10.190
David A Strand
Yeah, there was a paper from the AMS conference last year that.

04:15:10.250 --> 04:15:15.440
David A Strand
Uh coincidentally Matt and Matthias our fearless Co chairs here.

04:15:15.890 --> 04:15:21.740
David A Strand
Uh presented along with some others and there's a link to that in the chat as well.

04:15:26.250 --> 04:15:30.640
David A Strand
OK UM any other questions or discussion for our panel.

04:15:39.280 --> 04:15:40.870
David A Strand
You mentioned Southern Airlines.

04:15:41.740 --> 04:15:46.720
David A Strand
Don was that the one that had the hail storm hit the hail outside of Atlanta back in.

04:15:46.570 --> 04:16:16.470
Eick Donald
Yeah, in the windshield and that that's the one that basically really we found that they didn't have the

convective sigmet well. They didn't have convective segments. I just had him cigarettes. Back then, but we wanted to enhance that hazard to have a separate report so the FAA and the Weather Service came up with the convective sigmet and then the sender. Weather Service unit from those accidents. In 8 just as a point you look at the major improvements we've had in the?

04:15:48.660 --> 04:15:49.040
David A Strand
Yep.

04:16:16.580 --> 04:16:28.280
Eick Donald
In weather sensors and so forth a lot of them came from major accidents, so we have the Doppler from Microburst Vance we have.

04:16:29.490 --> 04:16:34.960
Eick Donald
Uh the Alois and their their TDWR from the microburst events.

04:16:35.440 --> 04:16:36.940
Eick Donald
Uh and uh.

04:16:38.070 --> 04:17:09.280
Eick Donald
All these events that tend to to make some improvements and getting groups together and how long did it take to get FAA to get the weather displays on the controller screen that took a Nexus of 10 years, so it wasn't until the 80s that they had it on their scope and then it took several accidents such as the Scott Crossfield accident to where we, we basically put their procedure in that you just don't look it up in your scope. You tell the pilot that he's about ready to fly into.

04:17:09.700 --> 04:17:12.010
Eick Donald
Uh the activity and that that.

04:17:12.790 --> 04:17:16.710
Eick Donald
In itself has reduced convective accidents dramatically.

04:17:17.190 --> 04:17:30.690
Eick Donald
Uh just being able to provide that information on the scope tell the controller to use it advise the flight crew in case he's not aware of it because there are limitations on airborne weather radar.

04:17:31.390 --> 04:17:39.650
Eick Donald
And to prevent the the incidents and make sure everyone is on the same page. We just hoped with turbulence because.

04:17:40.840 --> 04:18:10.960
Eick Donald
You know controllers don't have turbulence on their screen unless it's Conductive Related and they have to rely on paper to to get the advisories to let him know. Hey, there's a a sigmet for turbulence. Orenair met for turbulence. We need to start soliciting pireps in when we're getting rid of air at the text format. We don't have any way to communicate that data to the controller. So we're looking at improvements and even could controller display just for turbulence so they can.

04:18:11.000 --> 04:18:15.710
Eick Donald
Be aware of what's out there and it starts listening and providing that information.

04:18:17.560 --> 04:18:28.030
Eick Donald
And it goes back to even this. I remember working the United Airlines turbulence case out of off the Pacific, where they encountered the turbulence.

04:18:28.730 --> 04:18:41.830
Eick Donald
And killed the one passenger and seriously injured 37. There was an aircraft ahead of him who encountered the turbulence first and didn't tell anybody.

04:18:39.980 --> 04:18:40.800
Lt Col Branham (HAF/A3OW) (Guest)
Ouch.

04:18:42.610 --> 04:19:12.790
Eick Donald
They sent it back to the airline as their proprietary turbulence report but they didn't tell the aircraft behind them. United encountered it. And when they encountered it, they reported it on frequency and there was another airplane directly behind them. That attributed United Pirette that prevented their aircraft from encountering the same type of turbulence and injuries.

04:19:12.920 --> 04:19:22.000
Eick Donald
So it's a matter of getting this information out to everyone not keeping it proprietary and increasing that situational awareness.

04:19:23.230 --> 04:19:25.660
David A Strand
That's like shared information uh.

04:19:25.240 --> 04:19:25.880
Eick Donald
That's it.

04:19:26.860 --> 04:19:45.060
David A Strand

Yeah, I I remember the southern airlines well 'cause that was my very first day on the job at Delta going into the Meteorology Department. Fresh out of grad school and I thought why this is an exciting industry, but and it was literally just a stones throw from where mats houses so.

04:19:45.630 --> 04:19:50.150
David A Strand
Uh he wasn't quite down to the Met Department Yeah, but we remember that, well.

04:19:50.740 --> 04:19:54.080
David A Strand
Uhm Jim Evans I asked a question about.

04:19:54.130 --> 04:20:07.680
David A Strand
The fact that Phoenix has a TWR and it was that would display the microburst shapes on the tower situation. Display was the TDWR and operational October 6th do, we know?

04:20:09.570 --> 04:20:14.420
Eick Donald
I believe it is, is we're just we're just looking at the we got the event this morning.

04:20:15.080 --> 04:20:30.080
Eick Donald
Uh it was just an incident so far. We don't know if it's brought up to an accident. One of the frustrations. I have is I don't have access to that information. So I'll have to reach out to the FAA in.

04:20:30.140 --> 04:20:53.360
Eick Donald
Uh and MIT and say, Hey, you know can I get a uh? Add an image of the IT was display at the time because we don't have live access to it or archive. So we've got to get it from the FAA but I believe it was and until they get reached up into an accident and it's just another daily incident that's occurred.

04:20:54.770 --> 04:21:00.700
David A Strand
In one of those reasons, is what Matthias is just asked to all the panelists.

04:21:00.770 --> 04:21:09.800
David A Strand
Uh as it as it comes down, too many times. Lots of things that we talked about today that need to get done? Do we have enough money?

04:21:10.560 --> 04:21:21.050
David A Strand
Or do those things uh or how we can improve leveraging and achieving more through collaboration any visionary suggestions.

04:21:28.580 --> 04:21:39.310
David A Strand

I guess if it didn't come down to money that maybe some of these things would have occurred way earlier, but like I said sometimes it takes events, unfortunately to make things happen.

04:21:38.720 --> 04:21:38.970
Lt Col Branham (HAF/A3OW) (Guest)
No.

04:21:39.890 --> 04:21:40.510
Ian Johnson (FAA) (Guest)
They have this.

04:21:40.110 --> 04:21:40.630
Lt Col Branham (HAF/A3OW) (Guest)
Well, I.

04:21:41.430 --> 04:21:42.240
Ian Johnson (FAA) (Guest)
He had fun with it.

04:21:43.060 --> 04:21:51.300
Ian Johnson (FAA) (Guest)
I I actually I actually think that there could be some form of collaboration. We just need to start talking to each other.

04:21:43.390 --> 04:21:44.230
Emanuel, Michael (FAA)
Stop.

04:21:52.000 --> 04:21:54.590
Ian Johnson (FAA) (Guest)
Because UM sometimes.

04:21:55.310 --> 04:22:08.420
Ian Johnson (FAA) (Guest)
Another agency or even within the FAA maybe doing something similar to what we're doing, but we're not talking to each other so I think if we start talking to each other. We working towards the same goal. I I'm hoping that's what we're doing.

04:22:09.860 --> 04:22:22.340
Ian Johnson (FAA) (Guest)
Then we can pull our resources together and money would not be an option or problem because you know the more people put money in the pot. Then the less one agency or one program has to spend.

04:22:23.260 --> 04:22:29.630
Ian Johnson (FAA) (Guest)
So I think that's something and Wittich program has been doing trying to do that a lot working across the board.

04:22:30.280 --> 04:22:37.690
Ian Johnson (FAA) (Guest)
So I think if we were able to do that. I think we'll be able to get where you need to be that's just my talks in suggestion.

04:22:40.310 --> 04:22:49.300
Emanuel, Michael (FAA)
So this is like a manual right again. This is aviation weather for the future right. So we might have an opportunity here right to kind of rethink.

04:22:49.930 --> 04:22:57.710
Emanuel, Michael (FAA)
Uh our collaboration or obviously there's some degree of collaboration in amongst the entities again government and and and commercial.

04:22:58.160 --> 04:23:06.660
Emanuel, Michael (FAA)
Uh, which may or may not have been sufficient. So so there's an opportunity here. You know, I think funding is always challenged right. We all know that.

04:23:07.990 --> 04:23:38.040
Emanuel, Michael (FAA)
And and there's always competing priorities, not just within the weather community right. You know uh new weather observation system or fuel for aircraft right or a fighter versus a tanker right. You know there's there's always, there's always budgets that that you know have competing priorities, but where we have an opportunity right is to not stovepipe to identify where we have a mutual shared interest where we have mutual shared capabilities and needs.

04:23:38.340 --> 04:23:55.680
Emanuel, Michael (FAA)
And then socialise those right not only through forums like this, but but also in in other entities whether it's icams or or some other multi agency collaborative entity and you know, staying unified right staying consistent.

04:23:56.010 --> 04:24:03.240
Emanuel, Michael (FAA)
Uh identifying the benefits right both operationally and monetarily right and you know it's not always the the.

04:24:04.170 --> 04:24:13.870
Emanuel, Michael (FAA)
Did they they the thing to kind of dwell on particularly when we're talking about safety of life type missions. But you know at the end of the day so often decisions come down to the bottom line.

04:24:14.440 --> 04:24:44.190
Emanuel, Michael (FAA)
Uh so you know, there there needs to be a commitment right at at at all levels of our our organizations to to be willing to to collaborate and share and and and and and that's not easy right. You know coming

up with a governance structure, where one organizations mission is competing against. Another 's is is is is gonna create you know controversy and conflict but you know at the end of the day if we all kind of keep that mentality.

04:24:27.020 --> 04:24:27.350
Lt Col Branham (HAF/A3OW) (Guest)
Right.

04:24:44.240 --> 04:24:56.250
Emanuel, Michael (FAA)
Right uh of the greater good and and leveraging where we all can provide benefit and value there. There there might be an opportunity there for for success as we rethink right aviation weather for the future over.

04:24:57.650 --> 04:25:11.360
Mark Zettlemoyer (NWS) (Guest)
Yeah, I'll chime in a little bit there and absolutely agree with Mike 's. What Mike said. But particularly where we can leverage across the board freely is is open standards.

04:25:11.970 --> 04:25:21.170
Mark Zettlemoyer (NWS) (Guest)
You know, I uh I wakes him as an open standard, that I ko has developed in conjunction with wmo who has done the the technical development.

04:25:21.840 --> 04:25:52.640
Mark Zettlemoyer (NWS) (Guest)
Uh my my my larger point is I mentioned Open Geospatial Consortium. They they've come up with standards. Don Birch off group is developing the standards for Utmb and Advanced Air Mobility. So those are open forum, where people can participate participate. You get your input in and then I hopefully what emerges from all these activities is a standard that will facilitate interoperability across industry and across government agencies.

04:25:53.110 --> 04:26:14.780
Mark Zettlemoyer (NWS) (Guest)
And that way you can leverage work of others and so I would encourage participation in forums like like Dons a STM group F 38. You know, or or stay abreast of what's happening in a ogc with open standards and open source software. That's being developed that you can use to facilitate that that interoperability and leveraging the work of others.

04:26:21.160 --> 04:26:21.990
David A Strand
Uhm.

04:26:22.700 --> 04:26:28.540
David A Strand
We've got about 5 minutes left here, we did have one more question come in. I assume this is a.

04:26:29.280 --> 04:26:37.360
David A Strand
Uh for Don it's from Gabriel Hendrick. You said that the weather is involved in a lot.

04:26:38.080 --> 04:26:56.820
David A Strand
Of accidents, but how much is it responsible for the accident versus something else like pilot error or defective material or is it possible to say, and I don't know if you have any off the top of your head statistics on that. I'm sure it varies greatly, according to the type of flight, and adding.

04:26:55.820 --> 04:26:56.460
Eick Donald
Yeah.

04:26:56.520 --> 04:27:27.400
Eick Donald
It it, it, it does vary, UM, yeah again. We see again. We have the man. The machine and the environment interaction. So you don't see too many whether whether it's coming out as the the cause of the accident was whether it's usually a combination of the the man equipment operating in the environment. So it's the pilot flying the aircraft too close to convection or in the clouds and into icing conditions.

04:27:27.800 --> 04:27:33.200
Eick Donald
And not making the appropriate actions and to get pre flight briefing.

04:27:33.530 --> 04:27:42.220
Eick Donald
Uh we, we, we, we talked a little bit. Even yesterday or the beginning of the week on Monday and Tuesday talking about how we've enhanced.

04:27:42.650 --> 04:28:12.430
Eick Donald
Uhm the preflight planning with the advisory circular. We still see 40% of our pilots, not getting an adequate briefing and contributing into them flying VFR in IMC or into icing conditions or into forecasted conditions. So it all depends on the on the the area and the impact. But it's a matter of knowing your environment and taking appropriate plans when you interact with it.

04:28:13.870 --> 04:28:17.990
Eick Donald
But again, it's like all aircraft or having issues so it's.

04:28:18.450 --> 04:28:19.170
Eick Donald
Uhm.

04:28:19.820 --> 04:28:36.160
Eick Donald
You know all the pens on this situation that at their flying into but whether it's still a significant factor in

like I said it accounts for 22% of generally the Asian accidents in the air carrier world that's as high as 38%.

04:28:36.740 --> 04:28:43.820
Eick Donald
Why you don't see the fatal of accidents occurring with the air carriers but that turbulence is an invisible?

04:28:43.910 --> 04:29:14.650
Eick Donald
Uh uh contribution adverse winds taking off and landing with Crosswinds and Tailwinds and causing overruns that those can be significant impacts. We just had an accident up in Provincetown Cape Cod, Massachusetts with the uh 135 operation landing in heavy rain associated behind a line of strong thunderstorms with a tailwind contaminated.

04:29:14.700 --> 04:29:38.170
Eick Donald
Runway uh in that tailwind did basically helped didn't help him stop and overran the airport and injured 6 people seriously. So it's impacting dated day, depending on the operation in at about 1300 accidents a year weather is a big factor in those events.

04:29:40.260 --> 04:29:41.860
David A Strand
You know you mentioned preflight.

04:29:42.010 --> 04:29:52.960
David A Strand
Uh me and my roots were part 91 GA. But I I was in the 121 world for so long now that I'm a little removed from the 91 current.

04:29:53.600 --> 04:29:55.320
David A Strand
Way they the things are done but.

04:29:56.160 --> 04:30:06.250
David A Strand
Back in the day they used to have a weather briefing and it was through flight service and and it was easy to see. Yes, they've got one now with so many.

04:30:07.890 --> 04:30:18.870
David A Strand
Uh cloud sources of weather information whether it's packaged through something like a 4 flight or something or uh or just looking@weather.gov or the AWT site.

04:30:19.460 --> 04:30:24.480
David A Strand
Uhm I I would argue that it, it's it's easier and there's probably more.

04:30:24.530 --> 04:30:40.140
David A Strand
Or uh volume of weather information available and maybe even assessed then there was back, you know when I was first starting to fly in the well along time ago and I'm I'm wondering if that is something that is easily.

04:30:40.810 --> 04:30:55.720
David A Strand
Ascertain in in an incident or accident by the NTSB because it's not just like well. They logged the phone call with the flight services. Now it's like well. We don't really do. We really know what they looked at or how well police they might have been?

04:30:54.200 --> 04:30:54.640
Eick Donald
Well.

04:30:56.020 --> 04:31:26.590
Eick Donald
That's that's the hard part of our investigation is there's only several of those sites that record any contact a contract flight service station lydos does record any contact flight. Foreflight does record. Some there's flight plan.com does record some but we'll roll reach out to those users but we don't know if it's you know, we see a lot of cases, the guy who looks at my radar and his telephone and.

04:31:26.640 --> 04:31:56.750
Eick Donald
That's that's his briefing and off, he goes well, he didn't get any inflate advisors. You didn't get the meat. Tarzan tabs other times, it may look at his tablet and get me Tarzan. Taffin think that's it. And then he runs into LGS over happens to be an airmet for IFR conditions and he wasn't certified for it or icing conditions. So it gets into we have a hard time documenting that and to kind of say. Hey was, it properly was it did, he receive a briefing.

04:31:57.030 --> 04:32:20.900
Eick Donald
And then was it properly forecasted UM. We're getting better and better. But even our weather elements. We still have a problem when you start talking about severe storms forecasting of meso scale convective complexes to rate shows even some supercells. We're not there yet and talk about ceilings of visibility.

04:32:21.290 --> 04:32:40.000
Eick Donald
Uhm all Weather Service still has a problem forecasting the onset of of fog and deteriorating visibility. A lot of the low ceilings invisibility encounters accidents. We see the Weather Service didn't have an advisory out or it didn't cover the route.

04:32:40.410 --> 04:32:41.300
Eick Donald
Uhm.

04:32:41.930 --> 04:32:55.990
Eick Donald
Or it's like. Hey, you got the whole southeast covered by the advisory but only few stations reporting so they don't pay attention to it. So we've got an issue on properly forecasting getting a briefing using their tools and.

04:32:56.340 --> 04:33:01.790
Eick Donald
Uhm inflight getting updates, so it it. It's a big it's a big issue.

04:33:02.810 --> 04:33:17.340
Eick Donald
And it's something that we have to look at and try to determine the to say. Hey, the the guy did his best to to preflight and unanticipated flew into the activity. We do see those every now and then.

04:33:18.130 --> 04:33:37.990
Eick Donald
In Scott Crossfield lose a case like that, he got multiple briefings took off and it was a rapidly developing severe weather situation and he was relying on his storm scope and his briefing that has roots should be safe and eventually flew into a severe thunderstorm.

04:33:39.760 --> 04:33:41.860
Eick Donald
ATC watched it right in front of them.

04:33:42.840 --> 04:33:43.330
Eick Donald
So.

04:33:44.950 --> 04:33:46.550
David A Strand
Well thanks Don UM.

04:33:47.180 --> 04:33:55.340
David A Strand
And and thanks to all the panelists there were up to 4 minutes till so I I tell you Jeff I'll turn it back to you too.

04:33:55.400 --> 04:34:00.990
David A Strand
Love to close it out or having any more questions for the panelists there.

04:34:01.420 --> 04:34:04.290
Jeff Weinrich (Guest)
Yeah, thank you for a great panel and a great discussion.

04:34:04.750 --> 04:34:05.490
Jeff Weinrich (Guest)
Uhm.

04:34:06.690 --> 04:34:12.430
Jeff Weinrich (Guest)
If there's no other questions for the panelists. I'll turn it over to anyone from the organizing.

04:34:13.020 --> 04:34:16.600
Jeff Weinrich (Guest)
Committee for any final comments before we call it a day.

04:34:17.860 --> 04:34:47.220
Matt Fronzak
Well, this is math and of course, I always have a comment about everything but I've been pretty good today about keeping my mouth shut. So so here we go? I'm gonna I'm gonna I'm gonna I'm gonna point out that at last Springs. F pawn meeting, Janet Ford and Jim Haseman from the Capital Group spent a full day talking about the pilot briefing process. The improvements that are being that are being introduced into that and that that notion that Don is talking about about concerning you know.

04:34:47.440 --> 04:35:05.120
Matt Fronzak
Not not being able to fully understand what a pilot looked at prior to their briefing was among the many topics that were covered so very timely for that to be brought up again, especially given what we talked about last year, Mike Rob Mark.

04:35:05.170 --> 04:35:06.920
Matt Fronzak
Uhm uhm.

04:35:07.510 --> 04:35:11.370
Matt Fronzak
Gosh, I've forgotten who the 4th wasn't already how do you like that see?

04:35:12.710 --> 04:35:14.330
Matt Fronzak
Don right in front of me.

04:35:15.160 --> 04:35:44.870
Matt Fronzak
Thank you for for for you know for taking us into the future, a little bit tougher for looking out ahead. You know you got done with your prepared remarks early enough that I was concerned that we were going to be out early. But here we are basically run on time and and certainly there is a lot of interest in this in the chat room, there's some interesting sidebars going on to while they're not quite as good as the in person sidebars will be are still pretty good of.

04:35:44.920 --> 04:36:04.640
Matt Fronzak
Of people making connections, saying we need to talk to one another. We need to get together that more than anything else. You know makes the cockles of my heart heart warm up so I really like that. Rob you and Steve Dar need to have that conversation. Steve nosey a DSB weather stuff inside out upside down and and he'll he'll get you all squared away on that.

04:36:05.030 --> 04:36:36.220
Matt Fronzak
Uh so one last comment from me and then I'll hand it over to Matthias Tomorrow is kind of a recap day? Which maybe some of you go Oh my God. I would rather put myself in the eye with a sharp stick then recap what we've talked about the last 3 days. But this isn't actually an opportunity, I think, to shape some future work to shape some future problem areas because one of the things we're going to talk about is you know what do we want to come out of this 4 day Tim what? What sort of A is it a statement? Is it uh.

04:36:36.510 --> 04:37:06.440
Matt Fronzak
Paper is at a position you know what? What exactly is it and and so, if you're not there to participate tomorrow. You can't help steer that discussion if you are. You certainly can't help through that discussion bill. Bowman, who is the the the manager of the aviation weather division at the FAA and and I will be leading the those conversations tomorrow. I hope you will join us and and help us to to shape this. This this very important topic going forward.

04:37:06.910 --> 04:37:09.500
Matt Fronzak
On that note Matias I'll turn it over to you to close this up.

04:37:12.470 --> 04:37:42.860
Matthias Steiner (Guest)
Well, well, I'm with the broom behind and get us all out of here. Uh another great day lot of good information and discussions and so I don't wanna use up more time here and just look forward to tomorrow discussions and I'm not envying Matt and Bill as to what they are pondering this evening and overnight in terms of how to shape the discussion tomorrow.

04:37:43.010 --> 04:38:13.950
Matthias Steiner (Guest)
There was so much uh topics that we touch base on in the last 3 days. But as Matt said it. It is an opportunity tomorrow to help shape where this is going? What are we wanna take what? What do we want to take out from this Tim and how do we follow up on this? Where is the future going to be so please join us tomorrow again at 11:30 eastern on the same?

04:38:13.990 --> 04:38:18.660
Matthias Steiner (Guest)
Uh teams meeting so thank you all and goodbye.

04:38:21.390 --> 04:38:21.970
Eick Donald
Thank you.

04:38:24.870 --> 04:38:27.440
Ian Johnson (FAA) (Guest)
Thanks guys read discussion we save by.

04:38:27.540 --> 04:38:29.130
Lt Col Branham (HAF/A3OW) (Guest)
Yep, buddy take care.