



# Friends & Partners in Aviation Weather

## Fall 2022 Planning Meeting



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*26 October 2022 Hybrid Meeting*

# Spring 2023 FPAW Meeting

## Dates – April/May 2023

- Potential conflicts – Holidays, Festivals/Events, Major Meetings, etc.
  - Easter – April 9, Tax Day – April 18, Mother’s Day – May 14, Memorial Day – May 29
  - ATCA Tech Symposium in Atlantic City, NJ – April 25-27
  - AUVSI XPONENTIAL in Denver, CO – May 8-11
  - EBACE in Geneva, Switzerland – May 23-25
- Suggested FPAW meeting dates
  - 18 – 20 April 2023, 2 – 4 May 2023, 15 – 18 May 2023

## Location

- Other location (move non-Washington, DC area meeting to Spring, for Federal budget planning purposes)?
- Washington, DC area?

# Fall 2023 FPAW Meeting

## Dates – October/November 2023

- Potential conflicts – Holidays, Festivals/Events, Major Meetings, etc.
  - Columbus/Indigenous Peoples' Day – October 9, Halloween – October 31, Election Day – November 7, Veterans Day – November 10, Thanksgiving – November 23
  - NBAA-BACE in Las Vegas, NV – October 17-19
  - ATCA Global – Washington, DC – November 1-3
- Suggested FPAW meeting dates
  - 3 – 5 October 2023, 24 – 26 October 2023, 14 – 16 November 2023

## Location

- Washington, DC area (move Washington, DC area meeting to Fall, for Federal budget planning purposes)?
- Other location?

# General Meeting Outline

## Format

- Hybrid (both in person & virtual)
- Virtual only (travel or onsite restrictions)
- In person only (no internet access)

## Structure

- Hybrid – two or three days
  - Approximately four to six hours of meeting time per day, including Planning Meeting
- Virtual – three or four days
  - Approximately four hours of meeting time per day
  - Plenary Sessions on sequential days, Planning Meeting on later day
- In person – two days
  - 8 am to 5 pm local time, one hour lunch break

# Suggested Topics for Discussion

## Ian Johnson

- Review current gaps in weather products and training
  - Gain input from the user community about how these gaps affect their operations
  - Work with the research community to address and resolve gaps identified
- Review of current MET products
  - Current weather products are designed for meteorologists and not pilots; we need to be cognizant that pilots are not meteorologists
- Review current MET training
  - WTIC research has found that pilots have difficulty interpreting many aviation weather products (Blickensderfer et al., (2019)
  - “A pilot who does not understand aviation weather products may be at higher risk of encountering hazardous weather.” (Blickensderfer et., al., 2019)
- Propose developing a standalone weather knowledge written exam
  - WTIC research has shown that a pilot could miss all the weather questions on the FAA written examination and still pass.

## Rex Alexander

- High-density urban area sensing and observation
- UAS/Drone/eVTOL Icing standards and avoidance
- UAS/Drone Lightning avoidance criteria and standards

## Matt Strahan

- The Role of WMO in Aviation Weather
- What does WMO do for Aviation Weather. Who can participate?
- ICAO's Hazardous Weather Information Service (HWIS), which is a gridded service meant to replace SIGMETs. Trials will be started around 2026, with operations beginning in 2029
- Sharing of automated turbulence and icing observations

## Elizabeth Wilson

- Improved weather data for rural/smaller airports without TDWRs
- Improved low-altitude radar data for UAS/AAM and helicopters
- Certification and/or approval of third-party weather data (PWS data) and/or third-party providers (NWP output)
- More collaboration with aviation data providers (industry, public sector) --> AMDAR program (how to help it grow)

## Marilyn Pearson

- AAM proposed landings on buildings, in city centers and other non-traditional landing sites and operating areas. The task of wx information and reporting goes beyond drone weather as these AAM will carry passengers and cargo and medical supplies and patients.

## Heather Reeves

- The use of probabilistic forecasts in aviation

## Matthias Steiner

- Weather for Upper Class E Airspace operations (i.e., upper troposphere/lower stratosphere). Case in point, the recent accident of the Airbus Zephyr on 19 August 2022 may have been caused by hazardous weather resulting in a breakup of this delicate solar-powered high-altitude solar-powered uncrewed aircraft. It might be nice to bring relevant industry and agency partners together to discuss types of operations, weather sensitivities of those aerial vehicles, and available vs. needed weather guidance. This could easily fill a half day if not a full day.
- Research to Operations (R2O): Discussion of potential outlets for aviation weather guidance products (government and/or private sector) and implications for aviation industry. The discussion may include characterizing the economic landscape for either approach, oversight and quality assurance of guidance products, etc.

## Chris Johnson

- Weather simulation via [www.ClimaDrive.com](http://www.ClimaDrive.com), a new standard in simulation by means of accurately replicating weather tied to the 4th dimension, time

## Ethan Krimins

- Low Altitude Weather Network (LAWN) – Is a technology program being funded by the State of Ohio and launched at the Springfield, Ohio Airport
- Quantum Computing – Quantum Research Sciences has a Quantum Computing project that involves atmospheric weather for aviation applications

## Joe Vickers

- Recent ASTM Standards published pertaining to using aircraft data to measure braking action (ABAR):
  - E3188 – 19 Standard Terminology for Aircraft Braking Performance
  - E3266 – 20 Standard Guide for Friction-Limited Aircraft Braking Measurements and Reporting: Aircraft data derived braking performance that complies to a uniform standard that can be transmitted in line with the RCAM/GRF
- These standards are in response to NTSB recommendations:
  - A-16-23: "... develop the technology to ... category airplanes with equipment and procedures to ... state, record, and convey the airplane braking ability ... available to slow or stop the airplane during the landing roll."
  - A-16-24: "... w ... operators and the system manufacturers to develop procedures that ensure that airplane-based braking ability results can be readily conveyed to, and easily interpreted by, arriving flight crews, airport operators, air traffic control personnel, and others with a safety need for this information."
- Canada is the first to introduce these concepts as regulatory guidance for operators during recent presentations to Canadian operators, FAA, EASA, ICAO and IATA during a recent Transport Canada Advisory Circular presentation.

## Joel Siegel

- Translating weather information for both crewed and uncrewed ... s. We continue to see issues and accidents relating to ... operators not understanding the weather impacts ... This is going to be even more true as we get into ... since part 107 literature does not focus heavily on v ... like the Part 61 requirements for crewed pilot certifications.



## Wayne Fry

- In rural areas of Mississippi there are few FAA approved weather sources. This lack of weather reporting prevents helicopter air ambulance operators from making 100s of life-saving flights each year. These Part 135 operators cannot file instrument flight plans without approved weather services. Installation and upkeep of approved weather sources is prohibitively expensive so we need either cheaper weather sources or find some way to use the many weather sources that already exist. Rural populations deserve the same level of medical attention as their urban counterparts.

## Ismail Gultepe

- Low visibility condition in Arctic
- UAV applications for cold climates

## Randy Bass

- Federal Agency Aviation Weather Technical Exchange Meeting - the primary, in person workshop consisting of federal agencies across the country that conduct research and/or operations directly or potentially indirectly related to aviation weather, assisting or supporting aviation. I can present more thoughts on this topic during the planning session.

Topic of discussion @ FPAW Fall 2021 Meeting

## Marilyn Pearson

- UAS operations need weather at low altitude and in areas not covered by improved weather forecasting, but we need to think beyond the small drone market. Consider the needs of the emerging eVTOL/AAM/SVO market. The operations in this market will encompass operations in congested airspace, near airports, dealing with urban microclimates. These vehicles are being tested, first manually piloted at first, then remotely piloted, then autonomously operated. They will operate in Class B and all other classes of airspace. How will these vehicles navigate the environment? What are the weather needs to ensure safe operation?

Topic of discussion @ FPAW Spring 2022 Meeting

## Thomas Fahy

- For FPAW Planning Meeting -- Request for an expanded session of Spectrum and 5G Interference for Aviation Safety.

Topic of discussion @ FPAW Spring 2022 Meeting

## Claudia McKnight

- I haven't attended FPAW recently, so this may have been covered. If not, I would love to see a discussion on earth boundary layer weather (particularly below 1000 ft AGL) as it applies to small unmanned aerial systems (sUAS). As operators are requesting more and more operations beyond visual line of sight (BVLOS) weather information and forecasts for rural (and even urban)/ off-airport areas are becoming more important. Tools like HEMS may be applicable but there remains a gap in weather information as well as defined standards.

## Bryce Ford

- Improvements in Forecast models due to Aircraft Based Observations (aka MDCRS/AMDAR & Water Vapor Measurement) and the direct use of ABO in Aviation Operations Wx support. I believe we should have better coverage of the data aviation can contribute to help improve Forecasts that support operations. We seem to always focus on what the Wx forecasts should do for aviation.

## Matthias Steiner

- Weather concerns for space launch: Today's space launch weather criteria are conservative (e.g., cloud electrification & lightning) and pressure is increasing from the private sector to modify them. It would be beneficial to have a session to capture weather criteria supporting space launch from various agencies (e.g., NASA, USAF, FAA, Army) & the private sector. The discussion would try to document current requirements & practices, plus emerging needs from the industry. *Topic of discussion @ FPAW Fall 2021 Meeting*
- On behalf of the FAA, Scott Landolt has investigated issues with the automated measurement of mixed-phase precipitation. These issues may have holdover time application concerns. It would be beneficial to bring the FPAW community an update on these matters. *Topic of discussion @ FPAW Fall 2022 Meeting*

## John Walker

- Vertical Profiling of the Lower Atmosphere with Small UAS – In recent years, many engineering and integration efforts in the lab, followed by extensive field studies and arduous calibration / validation demonstrations have shown the value of small UAS for collecting accurate, repeatable measurements within and above the planetary boundary layer (up to at least 3km AGL). With a proven concept in hand, many have envisioned a 3-dimensional observation network with a footprint similar to ASOS/AWOS and existing statewide mesonets, featuring combination of fixed and mobile surface stations. Although there are many concepts of operation, one of the simplest and, perhaps, the one that yields the best opportunity for future automation is that which involves vertical profiling from a sheltered base station (i.e., "drone in a box"). While this vision holds great value, many challenges remain, including but not limited to: 1) ruggedization of platforms with operational envelopes that enable platforms to routinely operate in strong winds and icing, 2) ability to operate at sufficiently high altitudes to collect meaningful data, 3) (eventually) multi-platform, automated deployment with a human in the loop from a remote location, 4) routine maintenance and calibration to ensure fidelity of data. These, alone, imply a combined need for enhanced platform engineering and sensor integration, reliable detect and avoid (DAA) for vertical BVLOS operations, fail-safe communications with redundant safety/emergency protocols, and a vision for a sustainability path among multiple stakeholders. Despite these challenges, the potential benefits to daily operations in the near-term, as well as to long-term research, for a broad swath of Federal, state, and local stakeholders is massive. However, it will take a broad community of stakeholders to transition such a vision into reality, and to do so, we must begin tackling these issues at the inter-agency level and on such a broad scale now.

## Jason Baker

- Not sure if this will be covered in the second session or not, but if not I think at a future FPAW meeting spending time discussing an aviation weather strategy for the future would be beneficial. Lots of different users mentioned: Mets, ATC, pilots, dispatchers, etc. Some concepts recommend TFM strategies (more machine to machine) others keep a layer or layers of human decision makers in the process. Likewise, as more information becomes available the role of legacy products and personnel should evolve accordingly. We could identify an end state then move collectively towards that goal. Without that we risk going in circles.

# List of General FPAW Topics

## Emerging modes of transportation

- Unmanned aerial systems, urban air mobility
- Supersonic flight, commercial space launch (space weather)

## Weather forecasts

- Trajectory-based operation, flight planning, optimization, etc.
- Uncertainty characterization of weather, traffic, etc.

## Weather information integration

- Decision-making under uncertainty
- Weather, human factors, automation
- Data standardization (see notes)

## Weather observations

- PIREPs, ADS-B, webcam (VWOS)
- Augmentation of surface observations
- Mandate to equip aircraft & share weather observations
- Visualization & use of data & information

## Weather in cockpit

- CDM in cockpit
- Bring in pilots to solicit their concerns & what they would benefit from

## Climate change impacts on infrastructure

- Increased temperatures, sea level rise, etc.
- Changing storms, more turbulence, lightning, etc.

## General updates

- Research & development from labs, industry, etc.
- Policy, procedures, Weather Community of Interest/Practice, gathering of requirements
- Funding challenges

## Science of Weather & Climate

- Tutorials of specific topics
  - boundary layer meteorology
  - thunderstorms & associated hazards

# Spring 2023 FPAW Meeting

## Topic #1

- Overarching theme
- Approximate duration (1, 2 or 4 hours)
- Session lead(s)

## Topic #2

- Overarching theme
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- Session lead(s)

## Topic #3

- Overarching theme
- Approximate duration (1, 2 or 4 hours)
- Session lead(s)

## Updates

- Topics
- Session lead

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