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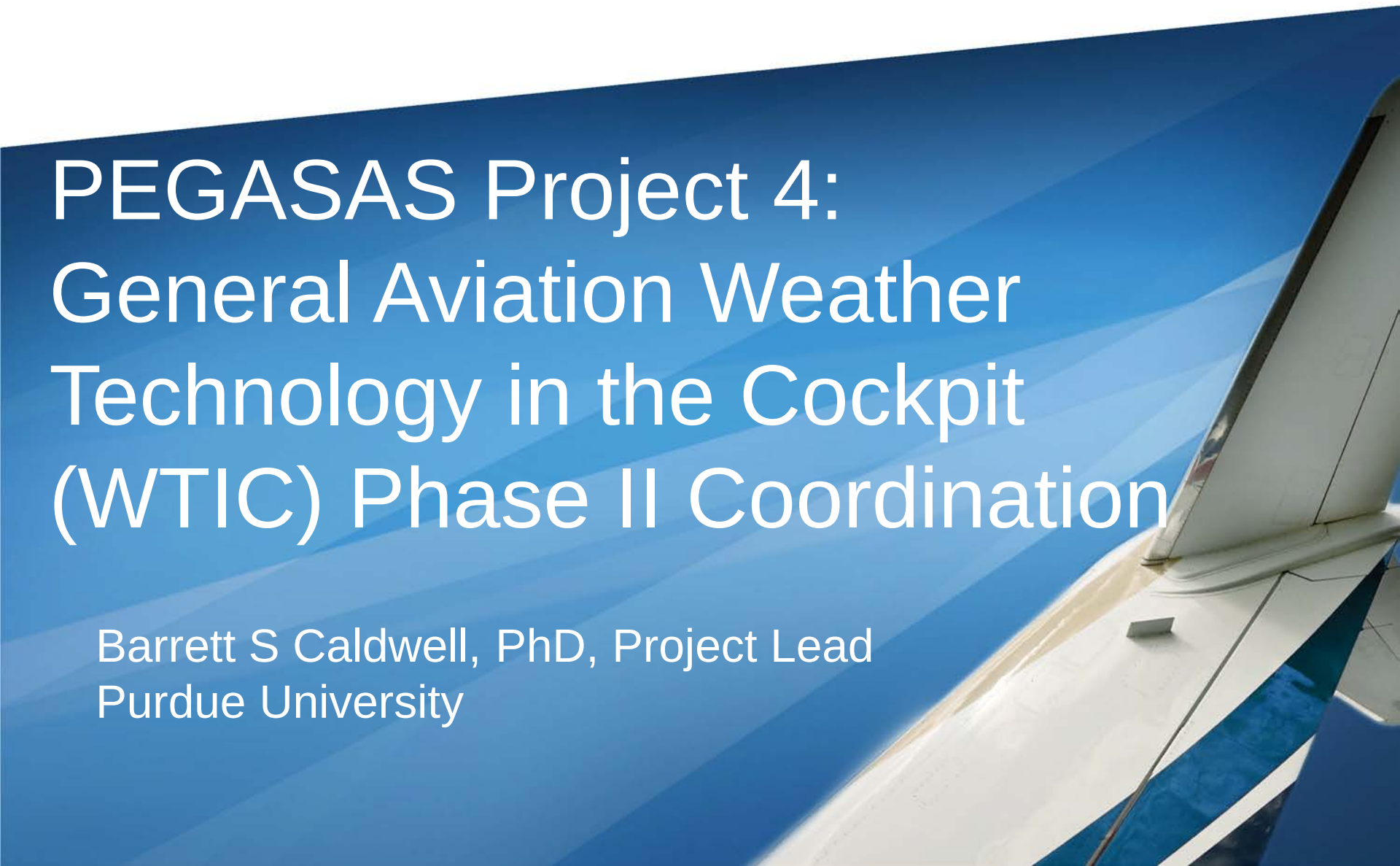
NBAA

PEGASAS Project 4: General Aviation Weather Technology in the Cockpit (WTIC) Phase II Coordination

Barrett S Caldwell, PhD, Project Lead
Purdue University



PEGASAS WTIC Structure, Phase I (2014)

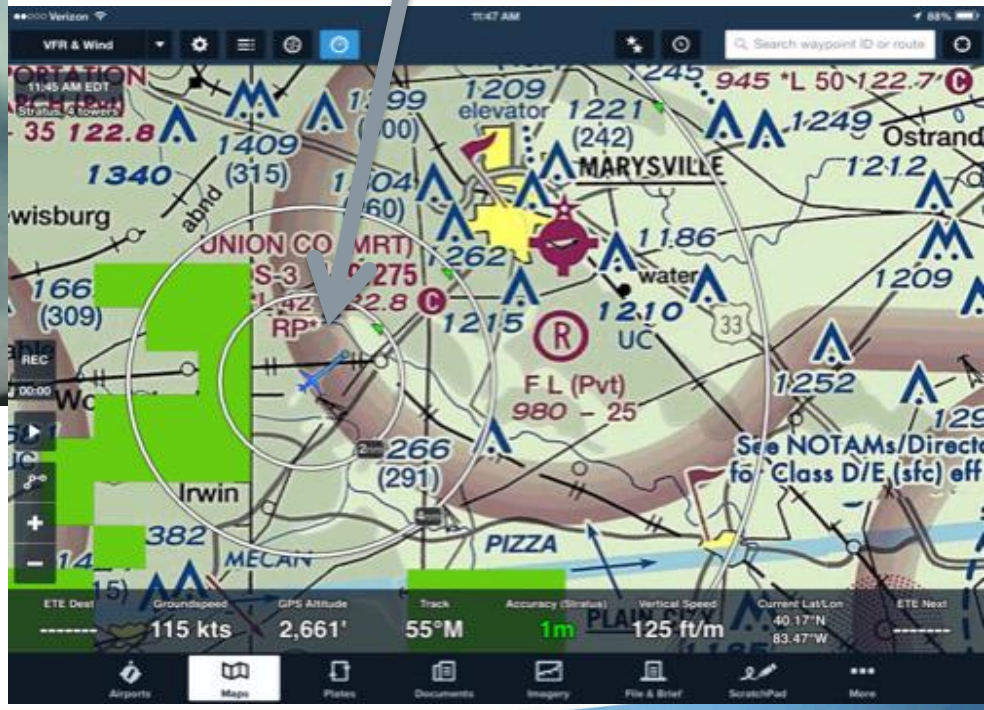
Partnership to Enhance General Aviation Safety, Accessibility, and Sustainability http://www.pegasas.aero

- Team 4A – Quantify Causality
  - Expand accident/incident causal research
- Team 4B – Inadvertent Flight from Visual Flight Rules (VFR) to Instrument Meteorological Conditions (IMC)
  - Address unexpected transitions from VFR to IMC
- Team 4C – GA Weather Alerting
  - Assess feasibility and benefits of agile, low latency cockpit weather alerts
- Team 4D – GA MET Information Optimization
  - Evaluate utility of selected MET products to support pilot decision making

Phase I → II - New Emphases for 2015

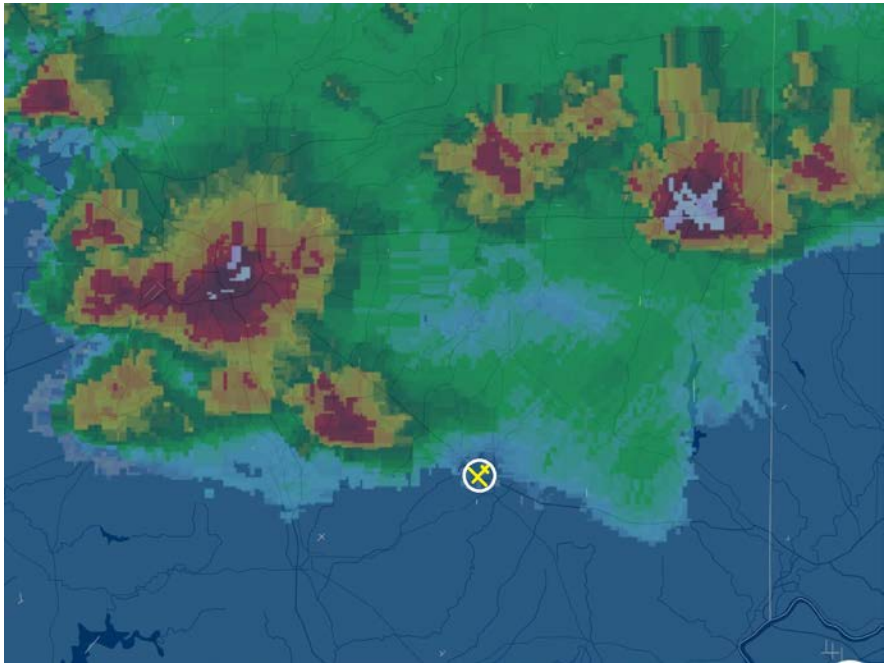
- Phase I and Comment Matrix Revelations
  - GAP RESOLUTION!
- GAP: Identifiable “delta” between desired and actual that our activities are intended to resolve
  - How was this GAP identified / Why is this a GAP?
  - What is causing this GAP?
  - What are you doing to resolve (“close”) this GAP?
  - How / when are you going to “close” this GAP?
- Recognition of FAA WTIC Use of Project 4 Results

Out the Window vs On the Screen



Credit: Shawn Pruchnicki, Team 4A

Out the Window vs On the Screen



Credit: Shawn Pruchnicki, Team 4A

Identified Gaps for Phase II Work

Affecting Pilot SA and Thought → Decision → Plan → Action Links

- Knowledge Gaps
  - Acquisition through Skill / Training
- Skill Gaps
  - Application of Knowledge through Training and experience
- Ability Gaps
  - Natural or acquired ability to perform Skills
- Training Gaps
  - structured activities to inform, instill, and enhance KSA

Identified Gaps for Phase II Work

Affecting Pilot SA and Thought → Decision → Plan → Action Links

- Assessment Gaps
  - Formal evaluations to determine current capabilities in KSA areas
- Technology Gaps
  - Available software or hardware tools to support actual flight or training activities, including pilot KSA
- Information Presentation Gaps
  - Capability of available software or hardware tools to provide information suitable to enhance or expand pilot KSA during flight

Training Scenarios for Cockpit Weather Technologies

1. Decision Making (VFR cross-country – experienced pilot)
2. Convective weather avoidance (IFR cross-country)
3. Using weather sources not intended for aviation (VFR local – student pilot)
4. Risk taking (VFR cross-country – inexperienced pilot)
5. Wind Conditions (VFR cross-country – pilot recently transitioned to new aircraft)
6. Icing Conditions (IFR cross-country – unplanned flight into icing conditions)
7. Turbulence Encounter (VFR cross-country – clear air turbulence
8. Distraction using WX system (VFR local flight)

Lesson 2: Convective Weather Avoidance

Relying solely on cockpit weather technologies to avoid areas of convective weather or extreme precipitation.

Synopsis:

- Pilot departs on an IFR cross country flight with thunderstorms along the route.
- The pilot sees a gap in the weather using cockpit weather, and requests a heading. ATC advises that the requested heading does not appear to avoid the weather. Finally the pilot's radar image updates and he no longer sees the gap that was present 7 minutes ago.
- The aircraft still encounters severe turbulence and heavy precipitation.

Lessons:

- Cockpit based weather is different than on-board weather radar. The time between updates can create a misleading picture of the weather situation.
- ATC can be helpful in weather avoidance. Pilots with cockpit weather should avoid any areas with thunderstorms they cannot visually avoid.

Lesson 2: Convective Weather Avoidance

KBIV 121755Z AUTO 3306G14KT 2SM +TSRA
OVC025CB 11/07 A2989

KMKG 121754Z 32010KT 10SM FEW026 SCT055
BKN080 11/02 A2898

Muskegon County Airport

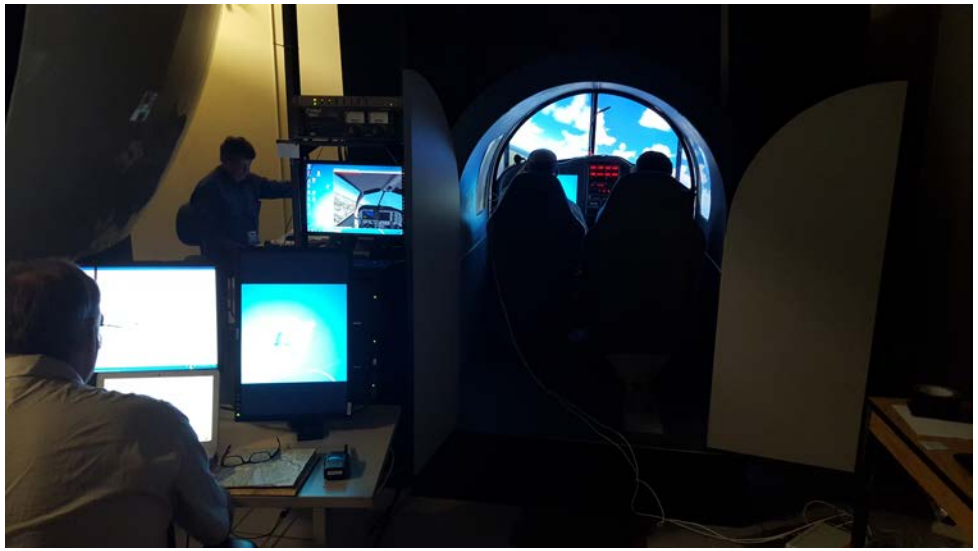
South Bend International Airport

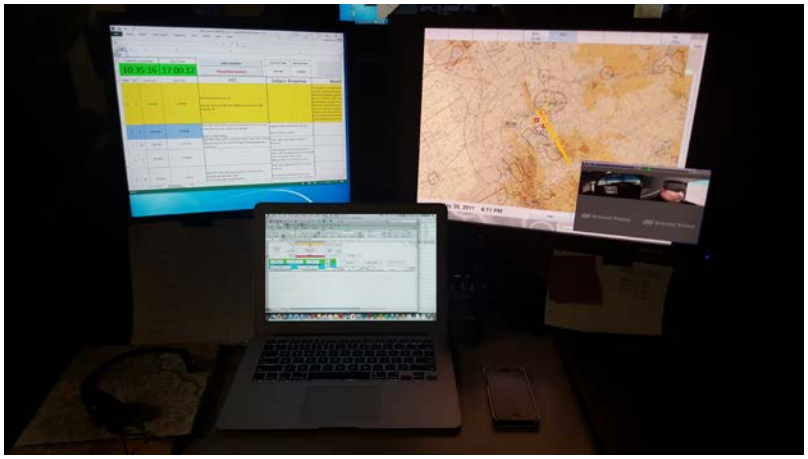
KSBN 121753Z 25015G22KT 10SM SCT075
OVC085 17/01 A2983

Summer 2015 Research Integration at WJHTC

- Participation by Purdue, TAMU, WMU Team Members
- Technology “Shakedowns”; two weeks of data collection
  - Volunteer GA pilot participants
  - Tests of education and training modules; vibrating alerts; alerting modes
  - Realistic scenarios (real events): AK (Juneau-Skagway); NM (Santa Fe-Albuquerque)
- Data analysis still underway: initial indicators…
  - Possible age and experience effects
  - Technology familiarity vs. integration in pilot tasks and decisions
  - Feasibility of vibrating bands in cockpit?

Summer 2015 Research Integration at WJHTC

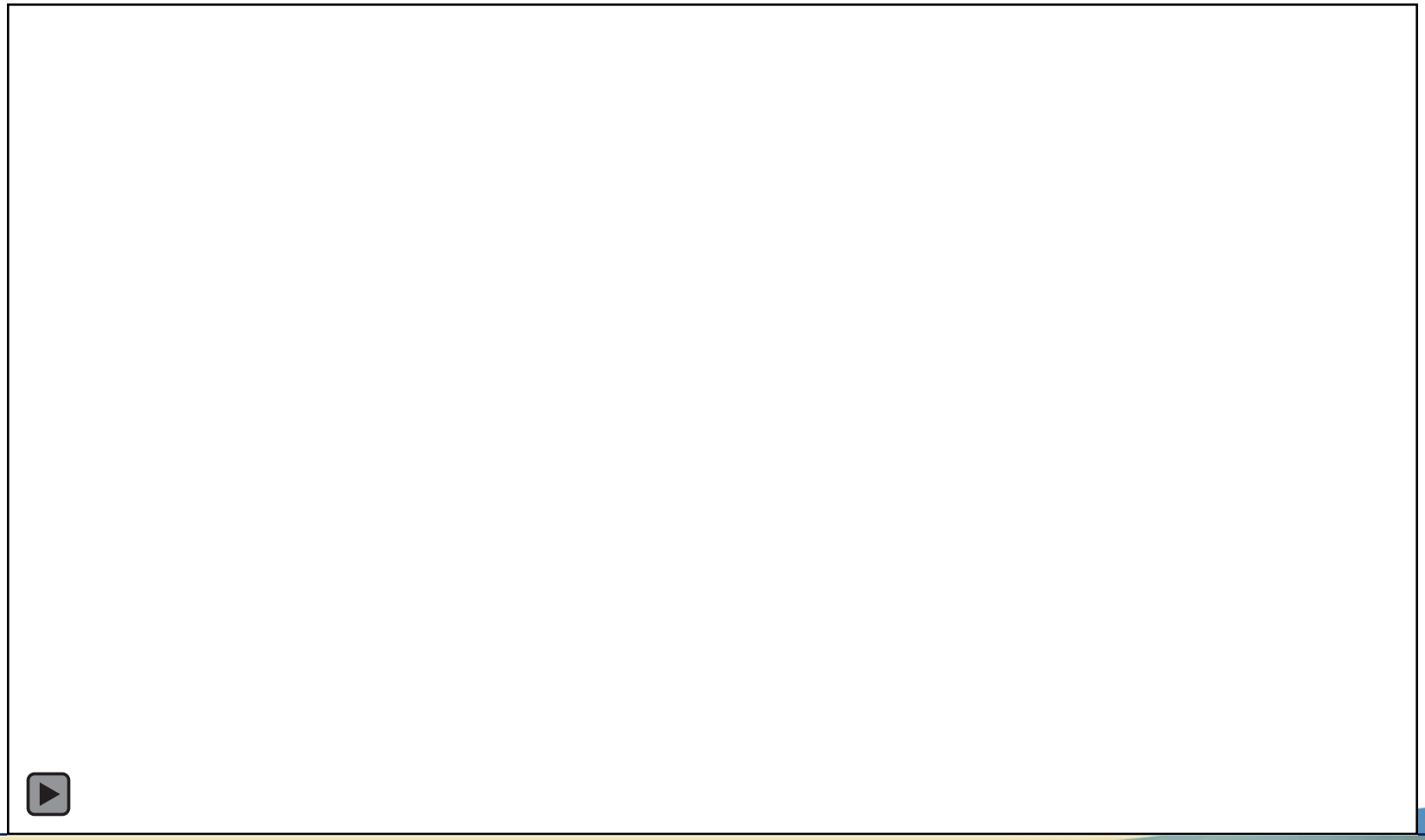




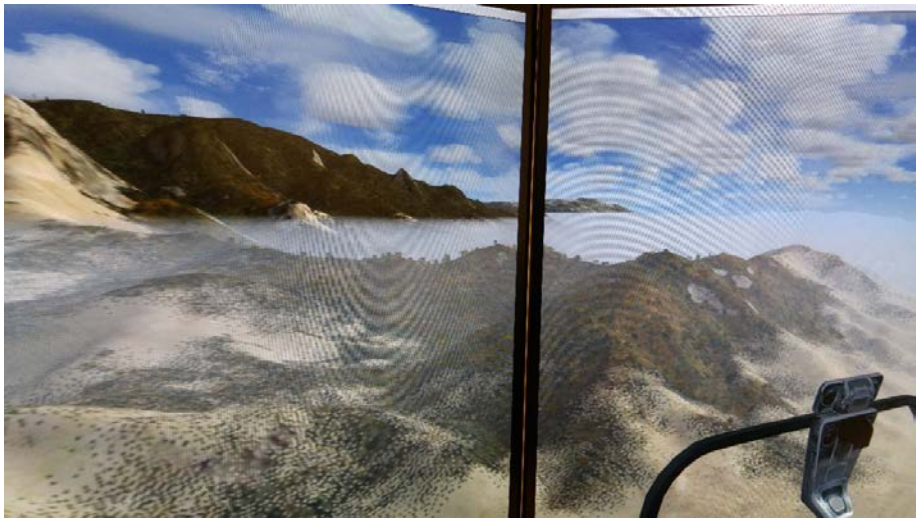
Developing a Controllable Latency Training Device / Demo

- Looping “NEXRAD” with 5-20 minute delays in display
- No commercially available ATD displays realistic weather information delays
- WMU initial prototype development
- PU replication / enhancement
- Experimenter / Instructor controllable delays
  - Out the window is “current”
  - Radar display has latency
- Feasible for under $5000 with multiple scenarios

Developing a Controllable Latency Training Device / Demo



Developing a Controllable Latency Training Device / Demo



Prepar3D images at 11500ft. The WX image is delayed and shows no cloud cover. The out-the-window shows two distinct layers of clouds.

Additional Developments and Opportunities

- Data collection and collaboration with Frasca International
  - Additional partnering with industry: DeLorme, Foreflight, Lockheed Martin, etc.
- Training scenarios for broader dissemination
- Possible 2016 efforts
  - Workshops and engagement (Sun N Fun, AirVenture)
  - Additional GAP resolution based on results and review
  - Implementation of additional scenarios in latency training
- Your input here?

Conclusion

- Phase II activity focusing on resolving multiple Gap areas
- Sentinel scenario issues, new training device capabilities
- Research at FAA (WJHTC), partnering with Frasca and others
- Looking towards additional Gap resolution in 2016

Any Questions?