

JPDO Weather IPT Observations and Sensors Team Friends and Partners Vision Meeting

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Observational Needs

- More capable, higher resolution weather forecast models require more not fewer observations
- Key observational needs
 - Improved coverage, density and data quality in planetary boundary layer
 - Atmospheric state variable measurements in and beneath clouds
 - Higher density measurements in frontal zones
 - Special measurements supporting unique aviation needs (e.g. de-icing decision support)



Weather IPT Structure

Sub Team Responsibilities

Observations

- Inventory existing programs
- Conduct trades/cost-benefit analysis
- Align programs to support IPT vision
- Determine optimum mix of space-, airborne-, and ground based observation systems
- Review/update observation policies

Forecasts

- Develop NGATS requirements
- Inventory existing programs
- Conduct trades/cost-benefit analysis
- Align programs to support IPT vision
- Prepare and implement forecast roadmap supporting delivery of probabilistic gridded information

Dissemination

- Develop NGATS database requirements
- Inventory agency/industry efforts
- Prepare and implement roadmap designed to deliver national weather information network by 2012, with probabilistic capability by 2015
- Work closely with AATS and SA IPTs

Integration

- Develop NGATS requirements
- Inventory existing programs
- Conduct trades/cost-benefit analysis
- Define and document system interfaces (ICD)
- Create and implement govt/industry roadmap for weather decision support tool development

Training

- Evaluate agency aviation weather training activities
- Develop and implement policy and procedures to provide weather training for each NGATS decision maker
- Institutionalize weather training and orientation visits to enforce understanding of operational needs
- Evaluate need for NGATS proficiency requirements

Mitigation

- Define aircraft specific transformation needs and requirements
- Turbulence
- Icing
- Synthetic Vision
- Gust Alleviation
- Vortex Suppression



Obs & Sensors Sub-Team Composition

- Current organizations represented:
 - FAA & FAA AWRP PDT's
 - NASA Aeronautics and Science Mission Directorates
 - NOAA NWS, NESDIS, OS&TP, FSL & Space Env Lab
 - OFCM
 - MIT Lincoln Laboratory
 - NCAR
 - University of Wisconsin/NOAA CIMSS
- Target, future additions:
 - Private weather vendors
 - Customer organizations (e.g. airlines, GA)



Unique Aviation Weather Measurement Requirements

The Observations and Sensors Sub-Team supports the full range of aviation weather forecasting, mitigation, and ATS Integration requirements for:

- Detection, characterization and forecast of both severe and non-severe thunderstorms
 - spatial and temporal accuracies sufficient to determine the availability of individual flight routes and thereby the capacity of en route sectors and terminal facilities
- Support for multi-hour ceiling and visibility forecasting
- Convective and clear air turbulence
- Measurements supporting weather dependent adaptation of wake vortex separation standards
- Measurements supporting in-flight icing and ground deicing decisions
- Measurements supporting volcanic eruption, ash cloud detection and drift forecasting



Key Observing Systems Current and Future

- Space Based
 - Geostationary Environmental Satellites
 - Low/Mid-Earth Orbit Environmental Satellites
- Airborne
 - In-situ sensors
 - On-board weather radars
 - Other remote sensors
- Ground Based
 - Weather Radars
 - Surface Stations
 - Profilers



Space- based Observations

- Space-based observations underpin numerical weather models today
 - Geostationary Operational Environmental Satellite soundings
 - Polar-orbiting Operational Environmental Satellite soundings
- Satellite observations will play an ever increasing, critical role in populating the aviation weather information network
 - GOES is singularly capable of providing seamless, dense temporal and spatial framework
 - NPOESS will provide higher resolution but incomplete spatial and temporal coverage
 - MEO satellites in both polar and equatorial orbits may possibly address this gap
- Strong advocacy for high resolution profiles of temperature, water vapor, microphysics and chemistry observations from GEO satellites is required



Satellite Observation Decision Points

- Near Term (now-2008)
 - Adequate GOES-R Sounder Requirements?
 - Identification of additional capabilities needed for GOES and NPOESS, Eg. GEO Lightning, POES Aerosol and Chemistry
- Mid Term (2008-2015)
 - Affect design and planning for future GEO and MEO satellites to ensure high resolution aviation weather observation requirements
- Long Term (2015-2025)
 - Deploy and integrate next-generation satellite systems



Airborne Observations

- Airborne in situ observations currently fill critical sounding gaps for numerical aviation weather forecast and nowcast models and terminal aerodrome forecasts for severe weather
 - MDCRS
 - TAMDAR
- Increased coverage by airborne observations can help overcome insufficient temporal and spatial resolution of ground and space based systems
 - In situ soundings from more airports needed
 - Source of dense airborne soundings in regions of active and incipient severe weather is a significant gap that needs to be addressed
 - Airborne radar observations need to be integrated
- Trade studies are needed to produce an integrated roadmap for aircraft and ROA/UAV observations needed to fill critical gaps between ground and space-based systems



Airborne Observation Decision Points

- Near Term (now-2008)
 - Significantly expand AMDAR profiling observations
 - Develop airborne observation strategy to fill critical gaps between ground and space-based profiling architecture
 - Study adequacy of airborne radar observations for integration with ground-based radar observations
- Mid Term (2008-2015)
 - Airborne technology development to fill atmospheric profile observation gaps for numerical weather prediction and nowcasts, E.g., severe weather, icing, turbulence, volcanic ash
 - Commence acquisition of capability
- Long Term (2015-2025)
 - Deploy and integrate aircraft and ROA/UAV sensors

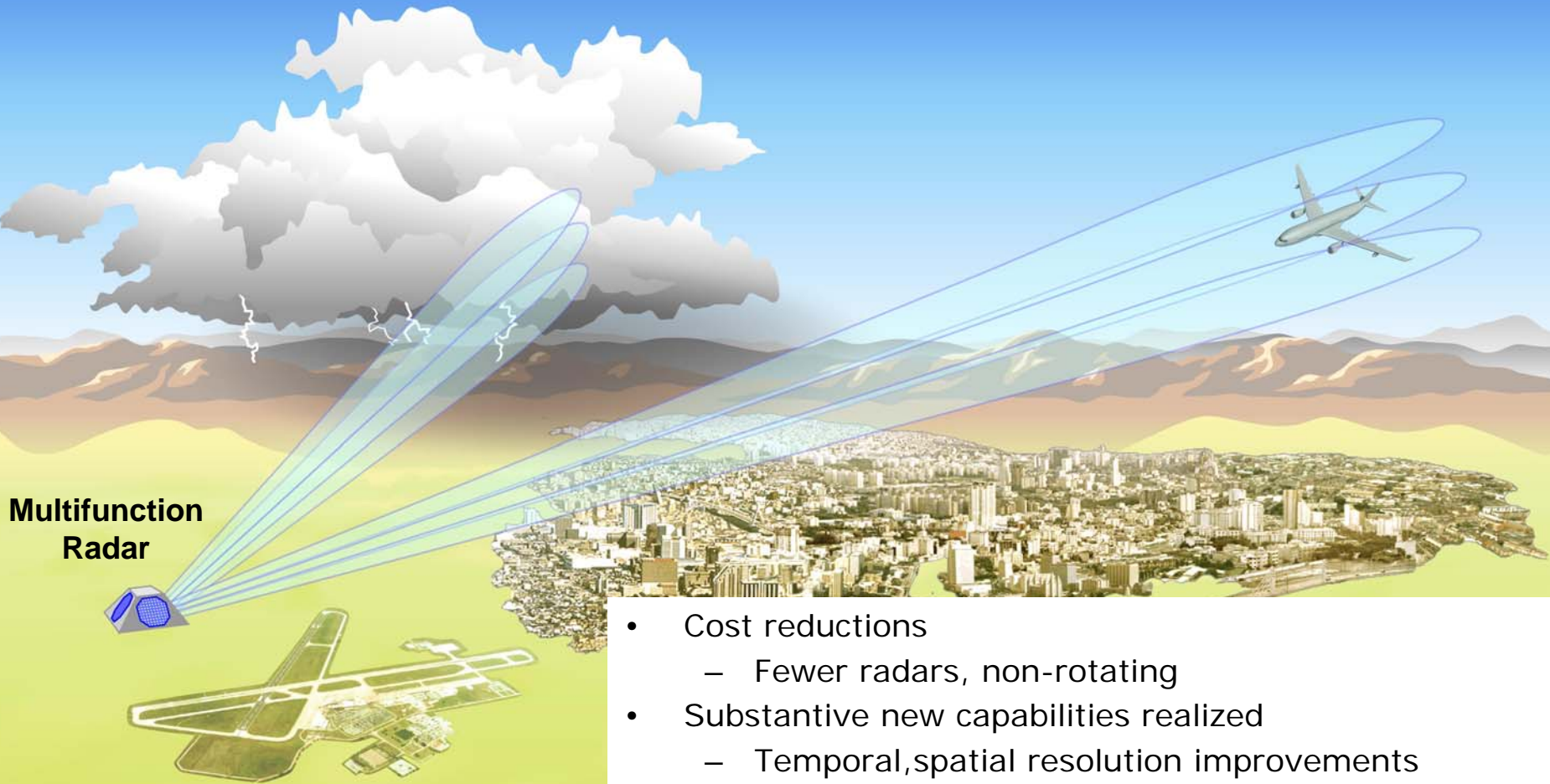


Surveillance Radar Network

- Ground based weather radar networks are an essential part of today's severe weather observing system
 - NEXRAD
 - TDWR
 - ASR-9/ASR-11 Weather Processors
- Changing surveillance paradigms will force substantial evolution by 2025
 - Cooperative ATC surveillance
 - Homeland defense air situational awareness
 - Enhanced weather radar
- An integrated roadmap for the sustainment, evolution and replacement of today's ground based surveillance radar network is required



Multifunction Surveillance Radar



Multifunction Radar

- Cost reductions
 - Fewer radars, non-rotating
- Substantive new capabilities realized
 - Temporal, spatial resolution improvements
 - New measurement capabilities (e.g. full wind vector)

Surveillance Radar Network Decision Points

- Near Term (now-2008)
 - Future surveillance architecture
 - Sustainment and evolution programs for existing radar networks
 - OFCM multifunction phased array radar R&D plan
 - CASA “dense boundary layer radar network” concept
- Mid Term (2008-2015)
 - Execute sustainment and evolution programs
 - Commence acquisition of replacement network(s)
- Long Term (2015-2025)
 - Deploy and integrate replacement networks



Summary of Obs Priorities

- Optimize obs and sensor acquisition strategies by obtaining JPDO support for obs team trade studies
- Realize Potential Near Term Successes
 - GOES R sounder adequacy
 - TAMDAR expansion throughout CONUS
 - DOD satellite data for volcanic early warning
 - National Radar Network Plan

