REDAC/NAS Ops



NextGen – Wake Turbulence (Wake R,E&D)

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Review of FY 2020 - 2023 Proposed Portfolio



Wake R,E&D Overview

What are the benefits to the NAS Users?

Wake R,E&D development of wake risk mitigations (safe separations for new aircraft types, concepts enabling future flight capacity increasing NAS Operational Improvements) provides:

- Safe, flight capacity efficient wake risk mitigating separation recommendations for new aircraft types entering service in the NAS
- Wake risk mitigating concepts to allow increased flight capacity of the nation's airports and congested airspace
- Resulting in fewer flight delays/cancelations, reduced inflight operating costs, while ensuring the safety of the aircraft, crew, passengers & cargo

What determines program success?

- No increase in the reported wake encounters per flights in the NAS
- Increased Airport Arrival Rates set by ATC when forced to go to IFR operations
- ATC able to mitigate wake for en route aircraft at distances less than 5 NM

Wake R,E&D Project Support

People:

- Jillian Cheng, Project Manager
- Other federal resources: AIR Wake CSTA and AFS-400
- Contract support SMEs: 4 world renowned wake experts, two previous AFS Chief Science and Technology Advisors for Wake, retired branch manager for AFS-450

Laboratories/R&D Centers:

- MIT/LL
- Volpe Center



Wake R,E&D – Accomplishments in FY20

- Developed wake risk mitigating separation recommendations for ATC operations with ICAO designated aircraft slated to begin operating in the NAS (~75 evaluations this year)
- Assessed UAS operations for wake risk mitigation and provided wake mitigating recommendations
- Progressed in the development of Absolute Wake Encounter Metrics for use in evaluating safe separations between aircraft
- Continued development of concepts for using NWS HRRR model data and real time aircraft observed weather data to enhance Decision Support Tools (DSTs) used by ATC to support their application of wake risk mitigations
- Continued the collection of aircraft wake tracks at SFO and JFK airports adding the processed wake track data into the statistical data base for use in recommending wake risk mitigations for proposed new ATC procedures in the terminal area
- Way forward determined for the use of the previously developed wake encounter screening utility that can scan Flight Operational Quality Assurance (FOQA) data post flight to collect statistical information on wake encounters that are occurring in the NAS (an indicator in prior and post flight safety evaluations of changes in ATC wake risk mitigating procedures)

Wake R, E&D Anticipated Research in FY21

Planned Research Activities:

- Develop wake risk mitigating separation recommendations for ATC operations with ICAO designated aircraft slated to begin operating in the NAS (~75 evaluations for FY21)
- Assess proposed UAS operations in the NAS for needed wake risk mitigation and provide wake separation recommendations
- Development of Absolute Wake Encounter Metrics for use in evaluating safe separations-data collection using Level D flight simulation
- Continue development of concepts for using forecast and real time weather data to enhance DSTs to support application of wake risk mitigation
- Continue collection of aircraft wake tracks at SFO and JFK airports and use of the SU for scanning FOQA data

Expected Research Products:

- Wake separation recommendations for new aircraft types operating in the NAS
- Wake risk assessments of proposed UAS operations in the NAS as requested
- High level concept for using weather data in ATC wake risk mitigating en route operations
- Recommended wake separation related parameters for use in current and future ATC DST's

Wake R, E&D Anticipated Research in FY22

Planned Research Activities:

- Develop wake risk mitigating separation recommendations for ATC operations with ICAO designated aircraft slated to begin operating in the NAS (~75 evaluations for FY22)
- Continue collection of aircraft wake tracks at SFO and JFK airports and use of the SU for scanning FOQA data
- Development of Absolute Wake Encounter Metrics for use in evaluating safe separationscorrelation of modeling and data collection to finalize metric
- Evaluate changes to ATC procedures which involve wake risk mitigation before and after implementation

Expected Research Products:

- Wake separation recommendations for new aircraft types operating in the NAS
- Absolute wake encounter metrics for several aircraft types
- Wake risk assessments of proposed changes of ATC operations in the NAS
- Recommended wake separation related parameters for use in current and future ATC DST's

Emerging FY23 Focal Areas

- Determining wake risk mitigating separation recommendations for new types of aircraft that will begin operating in the NAS
- Complete the development of Absolute Wake Encounter Metrics for use in evaluating safe separations
- Evaluate changes to ATC procedures which involve wake risk mitigation before and after implementation
- Continue collection of aircraft wake tracks at SFO and JFK airports and use of the SU for scanning FOQA data to enhance the statistical data used in wake risk mitigation assessments and setting of wake related parameters in ATC DSTs

Wake R,E&D

Research Requirements

 Determine safe, throughput capacity maintaining wake risk mitigation separations for use in today's ATC operations and in future wake risk mitigation solutions developed to increase the flight capacity of the nation's airports and air corridors

FY 2023 Planned Research

- Assess new aircraft types for wake risk mitigation separations
- Assess proposed changes to ATC procedures for wake safety
- Complete development of metrics (Absolute Metrics) for evaluating wake risk in cases that use of relative risk is not applicable
- Continue collection of wake track data and wake encounter data to enhance the statistical data used for wake risk assessments and setting of wake related parameters in ATC DSTs

Outputs/Outcomes

- Recommended safe, throughput capacity efficient wake risk mitigating separations for new aircraft types
- Wake risk assessments of proposed changes to ATC procedures
- Recommended wake separation related parameters for use in current and future ATC DST's

Past, Current and Planned Project Funding

| | FY17 | FY18 | FY19 | | | |
|-------|------|------|------|------|------|------|
| 7 F&D | 7.6 | 5.8 | 5.6 | | | |
| (\$M) | FY20 | FY21 | FY22 | FY23 | FY24 | FY25 |
| | 3.9 | 2.8 | 2.8 | 2.8 | 2.8 | 2.8 |