National Aeronautics and Space Administration

Airspace Systems Program Newsletter

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// Technical/Programmatic Highlights

AIRSPACE SYSTEMS PROGRAM'S TECHNICAL INTERCHANGE MEETING, SAN DIEGO, CA

Image Credit: Kenny McCombs

Akbar Sultan, Deputy Director of the Airspace Systems Program, moderates a panel with selected experts in the air traffic management (ATM) community. Pictured from left to right are: James Crites, DFW Operations; Les Parson, Air Transport Association (ATA); Steve Bradford, Federal Aviation Administration (FAA) Ed Stevens, Raytheon.

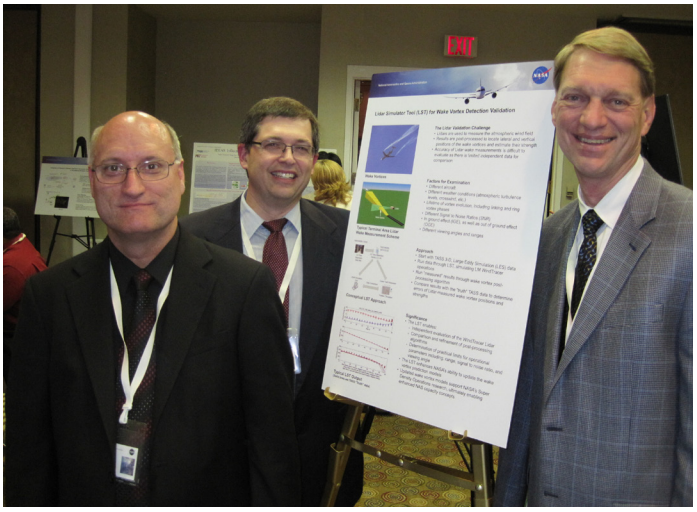
Airspace Systems Program's Technical Interchange Meeting

San Diego, CA

The Airspace Systems Program's Annual Technical Interchange Meeting (TIM) was held in San Diego, CA, March 29-31, 2011. The TIM provided an opportunity to engage in active discussion of key research issues that address the major technical challenges that must be overcome to realize the Next Generation Air Transportation System (NextGen).

Over 300 attendees representing other government agencies, academia, industry and our international partners engaged in discussions that focused on the integration of air traffic management (ATM) technical capabilities developed within the program, and the transition of these capabilities to users and operators for system benefit.

Representatives from other government agencies and industry attended the ASP TIM for focused discussions to enable the reduction of technology transition risk.



Line managers from Langley Research Center enjoyed the technical poster session along with the Program Staff. Pictured from left to right: Fred Proctor, Neil O'Connor and John Cavolowsky, Program Director.

Nancy Mendonca (left), ASP Technical Integration Manager, Mike Madson (right), Deputy Project Manager for the SAIE Project, spend time checking out the demonstrations and poster session.

The forum provided the opportunity for presentation of recent developments and results, open technical exchange, and for soliciting feedback to enhance the Program. Researchers gave technical presentations across a variety of tracks, and co-chaired sessions in surface operations, trajectory-based operations, interoperability research, dynamic airspace, traffic flow management, system performance, super density operations, and maturing integrated technologies.

Extensive demonstrations of decision support tools and air traffic management concepts and technologies as well as technical posters highlighting additional research activities were showcased by researchers and research partners from industry and academia.

The TIM culminated with a panel session with senior members from industry and other government agencies to engage in discussions around targeted partnerships for specific technology evaluation intended for improvement in key areas.

After the three-day meeting, the Program hosted an Industry Day where a smaller group of researchers participated in presentations, demonstrations, and discussions with members of the air transportation industry.

The Airspace Systems Program Office is looking forward to 2012 when we will host our next Technical Interchange Meeting. Stand by for additional information in the coming year. We hope you will plan to attend for more opportunities to engage the Program staff and researchers about future work to realize NextGen.

Left to right: Leighton Quon, Systems Analysis, Integration and Evaluation Project Manager; Dr. Tom Edwards, Director, Aeronautics Ames Research Center, ARMD POC; and Dr. Parimal Kopardekar, Concepts and Technology Development Project Manager enjoy a moment prior to the start of the Demonstration and Poster Session.

Akbar Sultan and Ty Hoang enjoy a moment during the Industry Day technical session.

The keynote address was delivered by Dr. Tony Strazisar, Senior Technical Advisor, Aeronautics Research Mission Directorate.

Future Air Traffic Management Concepts Evaluation Tool Wins 2010 NASA Government Invention of the Year March 2011

NASA Ames Research Center

The NASA Office of the Chief Counsel has selected the Future Air traffic management Concepts Evaluation Tool (FACET) from Ames as its Government Invention of the Year. The team was led by Banavar Sridhar and included team members Karl Bilimoria, Kapil Sheth, Shon Grabbe and Gano Chatterji (UARC). Their outstanding work has made a significant contribution to making our airspace safer, increasing fuel efficiency, and minimizing airplane emissions. This is the first time that a software invention has won the Invention of the Year award. The NASA Administrator will present the NASA Invention of the Year award at the NASA Project Management Challenge in February 2012 in Orlando, Florida.

Datalink Communications Performance Analysis NASA Research Announcement Begins, December 2010

NASA Langley Research Center

Science Applications International Corporation (SAIC) was awarded a one year NASA Research Announcement (NRA) as a result of a competitive selection under ARMD NRA NNH09ZEA001N. The full title of the NRA is Datalink Communication Performance Analysis for Distributed Separation Assurance System Architecture and the technical point of contact is Maria C. Consiglio.

Human-in-the-Loop Simulation of Mechanism for Incorporating User Preferences into Air Traffic Management, December-January 2010/2011

Fairfax, VA; NASA Ames Research Center

On December 15-17, 2010, a contractor team led by George Mason University conducted a human-in-the-loop simulation of a new mechanism for incorporating airspace user preferences into air traffic management decisions. The mechanism is based on "free-pass permits" that users can assign to their flights to exempt them from delays. The number of permits allocated to each user is proportional to the number of flights scheduled by the user, and users can buy and sell permits from each other. Simulation participants had experience working for, or studying, airlines that enabled them to buy, sell, and use permits as an airline would. Initial participant feedback indicates that this concept could be useful for airlines once they learned how to utilize permits effectively. The contractor team demonstrated this concept and presented the results of this simulation to NASA researchers at a contract final briefing at Ames Research Center in January 2011.

Terminal Area Weather and Wake Vortices Papers Presented at AIAA's 49th Aerospace Sciences Meeting, January 2011

Orlando, FL

Nash'at Ahmad presented two papers and served as the co-chair of the Atmospheric and Space Environments session on the "Simula-

tion and Effects of Wake Vortices, Terminal Area Weather and Hurricanes." Don Delisi and Matt Pruis of Northwest Research Associates also attended this session and presented their related work, which was sponsored under a NASA Research Announcement.

Efficient Descent Advisor Human-in-the-Loop Simulation Completed, December 2011

NASA Ames Research Center

The fourth in a series of human-in-the-loop studies to develop requirements for implementing the Efficient Descent Advisor (EDA) in the field was completed in December 2010. In this study, subject-matter-experts from Denver Center evaluated new functionality in EDA, specifically the use of advisories with fixed versus dynamic start points, and EDA's ability to operate with trajectory uncertainty. The study used the Air Traffic Control simulator at the Crew-Vehicle Systems Research Facility at NASA Ames Research Center and employed the Multi-Aircraft Control System software to simulate the air traffic, controller radar displays, and pseudo-pilot control stations. Air traffic data as well as video and audio recordings of controller radar displays and pseudo pilot positions were captured for subsequent analysis.

Weather Translation NASA Research Announcements Have Kickoff Meeting, January 2011

NASA Ames Research Center

The Traffic Flow Management (TFM) research team hosted a NASA Research Announcement (NRA) kick-off meeting at NASA Ames Research Center that included Metron Aviation, Mosaic ATM, and Sensis Corporation. The team members presented their plans and a wide range of approaches and outcomes for improving weather translation models for TFM. The outcomes include maturing existing weather translation models, developing probabilistic capacity models of en-route airspace and airports, evaluating translation models in the Future Air traffic management Concepts Evaluation Tool (FACET) and developing concepts to use weather translation models for strategic TFM. The teams recognized there could be areas where their work could be complementary and expressed interest in collaboration where appropriate. The effort will now include a monthly meeting between the three teams and NASA to share their respective progress.

Mid-Task Review for Surface Conflict Detection and Resolution NASA Research Announcements Conducted, January 2011

NASA Langley Research Center

On January 19, 2011, a mid-task review of NASA Research Announcement (NRA) contracts providing concepts and requirements for surface conflict detection and resolution (CD&R) was held at NASA Ames. Sensis Corp. and Optimal Synthesis Inc. provided in-depth analysis and descriptions of airport surface CD&R systems. The two teams addressed various conflicts, including scheduling, taxiway, and runway conflicts. Each team presented unique and sophisticated solutions for generating surface conflict alerts and identifying algorithms for tactical conflict resolution. These CD&R functions will serve as tools in a broader system to enable more efficient and safe airport operations. NASA researchers, including Denise Jones of CSAOB, presented material related to airport surface research (spot release planner and runway scheduler and aircraft-based CD&R) enabling a common ground between the NRA responses and NASA research. The meeting

concluded by discussing potential directions for increased collaboration and unification to support NASA research goals. Future work for an optional second year includes concepts for integration of the surface and aircraft-based CD&R, enabling a unified approach to CD&R in the airport terminal area.

Facility Upgrade to Support Safe and Efficient Surface Operations Research, January 2011

NASA Ames Research Center

The airport control tower simulator at Ames has been upgraded to enable Safe and Efficient Surface Operations researchers to conduct increasingly more complex and high-fidelity human-in-the-loop experiments. With funding from the American Recovery and Re-investment Act, the simulator's outdated network and computing technology was replaced and upgraded to provide better realism, increased performance and reliability during heavy simulation traffic load scenarios, and improved connectivity that will enable integrated simulations between tower/surface and terminal environments. The simulation platform will now be able to more accurately simulate both surface traffic on radar displays and enable out-the-window visuals that are needed for a robust evaluation of surface traffic management concepts. The simulator will also enable researchers to conduct human-in-the-loop simulations to reduce risk prior to operational testing. The upgraded systems are in place, tested, and available for the next surface scheduling evaluations that follow the development of the Spot and Runway Departure Advisor concept.

Acknowledgement of Patents Awarded in Aviation Systems Division, January 2011

NASA Ames Research Center

Two patents awarded in 2010 for work performed in the Aviation Systems Division were recently recognized at a ceremony at Ames Research Center on January 26, 2011. One patent was awarded to Russell Paielli on "Trajectory Specification for High-Capacity Air Traffic Control." The second patent was awarded to the developers of the Future Air traffic management Concepts Evaluation Tool (FACET)—(Dr. Banavar Sridhar, Dr. Kapil Sheth, Dr. Gano Chatterji, Dr. Karl Bilimoria, and Dr. Shon Grabbe)—for "Air Traffic Management Evaluation Tool."

Interval Management Research Published in Air Traffic Technology International Journal, January 2011

NASA Langley Research Center

Dr. Bryan Barmore, Dr. Jennifer Murdoch and Mr. Brian Baxley, all of CSAOB, were invited to submit an article to the Air Traffic Technology International journal based on an earlier paper presented at the FAA/Eurocontrol Research and Development Seminar in June 2009. The article presents the results of a human-in-the-loop simulation performed in the Air Traffic Operations Laboratory that combined airborne spacing technology with energy and noise efficient arrival procedures. The combined operation was called Flight Deck-based Interval Management. Air Traffic Technology International is respected as the industry's leading review for the comprehensive exchange of the latest ATM ideas

and information, and is read by over 10,000 air traffic technology experts, heads of civil aviation authorities, and governmental departments worldwide. The article has just been published in the 2011 issue of Air Traffic Technology International.

Convective Weather Forecast (Localized Aviation Model Output Statistics Program) Integration with Future Air Traffic Management Concepts Evaluation Tool Task Completed, February 2011

NASA Ames Research Center

Mosaic ATM completed a year-long research task to integrate a probabilistic convective weather product into the NASA-developed Future Air traffic management Concepts Evaluation Tool (FACET). The Localized Aviation Model Output Statistics (MOS) Program (LAMP) produces probabilistic maps of forecasted convective activity up to 24 hours in advance. The objective of this task was to develop the capability to acquire LAMP data and compute national airspace capacity estimates and integrate it with FACET. The software developed under this contract advances NASA capabilities by providing researchers the ability to model weather impact in the strategic traffic flow management planning timeframe, typically two to eight hours. The main technical accomplishments include: review of airspace capacity models, development of a capability to translate a Gridded Probabilistic Forecast into a Deterministic Ensemble Forecast, development of airspace capacity models, each with increasing levels of complexity, validated against actual traffic, and development of a modular software environment that can be used by NASA to continue strategic weather translation modeling research. This effort was funded by the American Reinvestment and Recovery Act.

NASA & FAA Discuss Recent Progress and Future Goals for a Dynamic Airspace Configuration Capability, February 2011

Washington, DC

A meeting of the NASA-FAA Research Transition Team for Dynamic Airspace Configuration (DAC) was held in the Washington, D.C. area February 8-10, 2011. There were over 25 attendees representing NASA, FAA, JPDO, and MITRE/CAASD. NASA researchers presented their work on adaptable/generic airspace, and received valuable feedback from FAA air traffic managers about operational considerations. The general consensus was that our DAC research is heading in the right direction and there was strong support for a technology demonstration of a sector combine/split advisory tool in a FAA facility such as the Seattle Air Route Traffic Control Center.

Integration of Center-TRACON Automation System, FANS-1/A Data Comm, and ERAM for Operational Trials, February 2011

NASA Ames Research Center

Technical meetings with representatives from NASA, Boeing, and Lockheed Martin were held to discuss technical aspects of a task to integrate NASA trajectory automation with the FAA's En Route Automation Modernization (ERAM) system and FANS-

1/A integrated FMS/datalink into a field test system suitable for operational trials in the National Airspace System. The target field test architecture includes a Boeing "Gateway" that enables two-way communication between NASA ground-based trajectory automation (Center-TRACON Automation System, CTAS) and revenue flights equipped with FANS-1/A datalink. A two-way connection between CTAS and ERAM is enabled via an existing ERAM capability called the "Command Serviced Gateway" and the architecture requires no changes to existing ERAM Build 1 software. Lockheed Martin also expressed strong interest in NASA trajectory automation algorithms and software for future builds of ERAM. The goal of this work is to demonstrate an integrated system that could be the basis for future operational trials of a near-term concept for trajectory-based operations with air/ground datalink communication. This task is funded by the American Recovery and Reinvestment Act.

NASA Provides Briefing to the Joint Planning Development Office Aircraft Working Group, February 2011

NASA Ames Research Center

Harry Swenson provided an in-depth briefing on the Super Density Operations research focus area and the Terminal Area Precision Scheduling and Spacing (TAPSS) system technology to the quarterly meeting of the Joint Development and Planning Office Aircraft Working Group. TAPSS is a strategic and tactical planning tool that provides Traffic Management Coordinators, and En Route and Terminal Radar Approach Control air traffic controllers the ability to efficiently optimize the flow of aircraft towards a demand-impacted airport. The briefing included a description of the Super Density Operations concept of operations and a detailed review of the TAPSS technology. The Working Group indicated this work has direct application to the mid-term NextGen concept and NASA is developing a critically needed technology.

Human-in-the-Loop Flight Prioritization Simulation Completed, February 2011

NASA Ames Research Center

A system for prioritizing flights traveling through constrained airspace was evaluated in a simulation environment at Metron Aviation, Inc., February 22-24, 2011. The system allows airline dispatchers to specify their high priority flights by assigning them credits, which are allocated to the dispatchers according to their number of flights. The credit assignment software developed at NASA was integrated in the FAA's System-wide Enhancements for Versatile Electronic Negotiation (SEVEN) framework. The FAA has planned for SEVEN to become operational in the fall 2011 under the Collaborative Trajectory Options Program. The integrated system provides flights with the most credits their requested departure times and routes. Flights with fewer credits may be delayed or re-routed to alleviate congestion. To evaluate the system's feasibility and benefits, five airline dispatchers from Continental, Delta, JetBlue, Southwest, and United Airlines used the system to manage a set of flights through several simulated air traffic scenarios. A current FAA air traffic manager set constraints on airspace capacities. Data and post-experiment surveys indicated

that dispatchers effectively mitigated delays among their flights based on their priorities. Credits allowed them greater flexibility to achieve their business objectives. Recommendations for future experiments included researching other credit allocation schemes and evaluating alternate constraint resolution methods.

Sector Combining Advisory Algorithm Presented at Cleveland Center, February 2011

Oberlin, OH

NASA Ames researchers Karl Bilimoria, Michael Bloem, Michael Drew, and Bob Windhorst visited Cleveland Air Route Traffic Control Center in Oberlin, Ohio to present and gain operational feedback on the Sector Combining Advisory Algorithm (SCAA). SCAA uses predictions of air traffic and available staffing levels to advise air traffic supervisors about how and when to combine airspace volumes, called sectors, controlled by air traffic controllers, into larger volumes. The NASA team presented SCAA advisories for Cleveland airspace based on historical traffic to fifteen Cleveland Center staff, including nine controller supervisors. After viewing SCAA advisories, the Cleveland Center staff gave positive feedback on the usefulness of SCAA and also suggested some additional capabilities, such as using a more accurate measure of controller workload than aircraft count and providing advisories for when more than one controller is needed for a sector. Two opportunities for future collaboration were identified: the first, for SCAA advisories to inform sector design decisions in an ongoing Cleveland Center airspace redesign project; the second, a future field demonstration of SCAA at Cleveland Center.

NASA Contribution to International Aviation Safety and Performance Requirements Document, February 2011

NASA Langley Research Center

RTCA Special Committee 186 and EuroCAE Working Group 51 has just released the Flight Deck Interval Management for Spacing Safety and Performance Requirements (SPR) document for final comment and resolution. This SPR is the first major step towards setting surveillance and avionics equipment standards. This document will form the basis for future operational approval and detailed equipment standards and is one of the first concrete steps to integrating Interval Management, both the airborne and ground components, into the National Airspace System. NASA Langley has had a leading role in the development of this document through the activities of Dr. Bryan Barmore and Mr. Michael Palmer of CSAOB and Mr. Terrence Abbott of Booz-Allen Hamilton. This SPAR was approved at the plenary meeting of SC-186 and WG-51.

NASA and Massachusetts Institute of Technology / Lincoln Laboratory Airport Surface Management Technical Interchange Meeting, March 2011

Lexington, MA

NASA and MIT/Lincoln Laboratory (MIT/LL) met at the MIT/LL facility in Lexington, Massachusetts, on March 8, 2011, to share results and plans for airport surface management research. Gautam Gupta, Yoon Jung, and William Chan from NASA Ames

presented results and optimization algorithms used in NASA's fast-time airport surface simulation platform as well as from an airport surface human-in-the-loop simulation conducted in April-May 2010. Researchers from MIT/LL presented their progress in developing the Tower Flight Data Manager system, discussed the pushback control study at Boston's Logan Airport, taxi time estimation, improvements in surface winds forecasts, and strategies for enabling the Route Availability Planning Tool to work with airport surface management. The meeting ended with plans for both research groups to discuss possible areas of mutually beneficial collaboration.

Generic Airspace Phase 5 Simulation, March 2011

NASA Ames Research Center

The radar air traffic control (ATC) Laboratory in the Crew-Vehicle Systems Research Facility and the Pilot Simulation Laboratory in Future Flight Central successfully hosted the fifth in a series of human-in-the-loop simulations evaluating the Generic Airspace concept. The simulation team, including software developers and researchers from Ames SimLabs (Aviation Systems Division) and the Human Systems Integration Division, evaluated the Controller Information Tool (CIT), an auxiliary display used to provide enroute controllers with critical information on traffic flows, sector information, and special use airspace. The CIT is designed to reduce sector information requirements and allow future air traffic controllers to manage air traffic in Next Generation Air Transportation System (NextGen) airspace with reduced training. In this simulation, a new integrated, onscreen CIT was compared against the existing separated or off-screen CIT used in prior Generic Airspace simulations. The effect of mixed aircraft datacomm equipage on the FAA's Mid-term, High Altitude Airspace Concept was also investigated. In a parallel effort, researchers from the Massachusetts Institute of Technology and the University of Waterloo evaluated controller decision-making in this simulation. The Multi Aircraft Control System (MACS) software was used to emulate the FAA's en-route air traffic control Display System Replacement radar display and user interface. MACS was configured to provide several NextGen automation tools including datacomm, conflict probe, and manual conflict resolution. Sixteen experienced air-traffic controllers and eight pseudo pilots supported the simulation. The data are currently being analyzed.

Research Product Transition, January–February 2011

NASA Langley Research Center

Gary Lohr of the Crew Systems and Aviation Operations Branch (CSAOB) received a request on January 25 from John Marksteiner, leader of the FAA's NextGen Surface / Terminal Portfolio Team and co-chair of the NextGen Integrated Arrival/Departure/Surface (IADS) Research Transition Team, for NASA's current Tactical Runway Configuration Management (TRCM) software. The software would be incorporated in the Surface Decision Support System which the FAA uses to conduct Surface Trajectory Based Operations research. The FAA sees this as a transfer of interim deliverables to ensure the FAA can take full advantage of the NASA research. The FAA understands that the NASA research in System Oriented Runway Management is ongoing and would like to receive advancements to TRCM as they are developed. Status of the TRCM algorithms and the transfer to the FAA is being worked

with the appropriate NASA officials along with line and project management. The extent of NASA involvement in FAA evaluations using the software is still under evaluation.

Mid-Term Review for Metroplex NRAs, February 2011

NASA Langley Research Center

A mid-term review was held at the National Institute of Aerospace (NIA) for the four one-year metroplex-related NASA Research Announcements (NRAs) that were awarded last year. These NRAs are being monitored by Rosa Oseguera-Lohr, Michael Sorokach and Lakisha Crosby. Although the kick-off meetings that took place several months ago were conducted mostly independently of each other, it was felt that a joint mid-term review would be a valuable opportunity for researchers to provide input to the NRA teams, at a point in the development process where modifications to simulation test plans could still be made. All four NRA teams showed preliminary results, which were generated from their algorithm development thus far, indicating appropriate progression according to the terms of the contract. These NRAs are focused on developing concepts and methodologies to impact the current and NextGen by leveraging the metroplex airport approach. These concepts and methodologies will influence interdependencies of air traffic flows into and out of proximate airports within the metroplex realm to increase ATS capacity and throughput without degrading system safety. Additional contributing factors currently hindering the realization of NextGen goals and objectives which will be addressed and remedied by the research include: (1) traffic volume (2) convective weather (3) poor situational awareness (4) reduced visibility conditions (5) conservative air traffic spacing (6) unbalanced air traffic flows (7) mixed equipage (8) rigid operational rules and flight plans. Technical feedback from other NRA teams and from other interested researchers was mostly very positive, and several echoed the feeling that the joint mid-term review was very worthwhile and informative. Two of the four teams presented their research at the NASA Airspace Systems Technical Interchange Meeting in March; it was felt that the nature of, and maturity level of, the work in these two efforts lended themselves better to the theme of integration that was the emphasis of the ASP TIM. The other two teams, whose work is in areas that are considered less technically mature, presented posters of their work at the TIM.

System Oriented Runway Management Quarterly Contract Review, March 2011

NASA Langley Research Center

The seventh quarterly review of a contract supporting System Oriented Runway Management research under the Airspace Systems Program was held at Mosaic ATM, Inc. Headquarters in Leesburg, Virginia. Mosaic ATM leads a team comprised of AvMet, LMI, U Minnesota, and William & Mary for a three year contract. During the second year of the contract, research has focused on Tactical Runway Configuration Management (TRCM), the determination of the runway configuration within the next hour at an airport. The TRCM algorithm uses pre-defined runway usage policies based on general strategies, weather, traffic demand and other considerations to recommend a runway configuration plan (set of "active runways") and schedule for runway configuration changes. One aspect of the contract focuses on quantification

and forecasting of weather phenomenon to support more informed runway configuration selection and the best time to change configurations. The limited ability to accurately predict convective weather significantly impacts operations in and around airports. Current efforts in this area are centered on "Radial Sector Pattern Recognition," which superimposes a radial grid over the airport and surrounding airspace and maps convective weather in terms of intensity and velocity.

In year-three of the contract, algorithms will be developed that address runway configuration management in the multiple-airport, or Metroplex, environment. The review was attended by Paul Stough, Dr. Burnell McKissick, and Gary Lohr (contract technical monitor) of the Crew System Aviation and Operations Research Branch.

Visit by Wake Vortex NRA Team Members for Six-Month Review, March 2011

NASA Langley Research Center

On March 14, 2011, Neil O'Connor (CSAOB), Wake Vortex Tech Lead and TM for the contract "Enable Super-Dense Operations by Advancing the State of the Art of Fast-Time Modeling Wake Vortex Modeling," hosted the three year contract's fifth six-month review. A total of 21 researchers were in attendance from NASA and the contractor team. The NASA Research Announcement (NRA) contract team consists of NorthWest Research Associates, Lockheed Martin Coherent Technologies, Aerospace Innovations, and George Mason University. The NRA's three objectives were reviewed, with significant progress noted for all three. These objectives are: 1) To characterize the capabilities of state-of-the-art, deterministic, fast-time, wake vortex prediction models, 2) To quantify the accuracy of Lidar sensor technology used to collect existing wake vortex strength and position data sets, and 3) To develop probabilistic, fast-time wake vortex prediction tools applied to reduced aircraft spacing. Of particular note is the development of a Lidar Simulator Tool to emulate operation of the Lockheed Martin WindTracer lidar—the state of the art for wake vortex detection. This tool can assess the operation of the WindTracer while also enabling development of improved wake vortex post-processing software — software that is critical to the development of more robust wake prediction models. The team envisions that validated wake fast-time models may form the basis of wake-enabled, super high density NextGen solutions.

Participation in Wakenet USA Working Group Meeting, March 2011

Miami, FL

Neil O'Connor, Dr. Nash'at Ahmad, Don Bagwell, Dr. Ed Johnson, and Dr. Fred Proctor of the Crew Systems and Aviation Operations Branch, participated in the semi-annual Wakenet USA's working group meeting held at the Airbus Training Center in Miami. NASA, along with the FAA, are founding members of Wakenet USA, which is an information gathering and exchange activity between the aviation user community and the wake vortex research and development participants (industry, academia, and government). Wakenet USA provides a mechanism by which its participants are updated on the progress of US and international wake vortex research and development activities and obtain feed-

back concerning that progress. Wakenet USA is linked to Wakenet Europe, with mutual exchanges of research and development information. The approximately 60 participants included airplane manufacturers, pilots, researchers, engineers, and regulators from North America and Europe.

Neil O'Connor, the wake vortex technology lead, participated as an invited member on a panel discussion that included topics such as planned and ongoing R&D that can support FAA/NextGen goals. Fred Proctor presented an update on the APA Suite Wake Vortex Fast-time Model and Nash'at Ahmad presented results of an evaluation study that looked at the current state-of-the-art in mesoscale weather prediction models.

Traffic Aware Strategic Aircrew Requests Presentation and Demo, March 2011

San Diego, CA

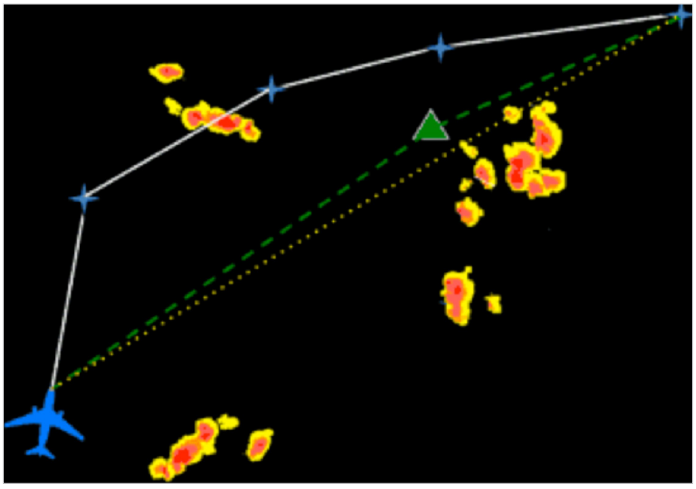
David Wing joined colleagues from Langley and Ames in presenting research concepts and technology solutions to the Air Traffic Management R&D and flight operational communities. David first presented an overview of Langley's "Autonomous Flight Rules" concept and the extensive research and technology accomplishments over the last decade. This work represents a long-term "self-separation" vision for ADS-B In surveillance application. He then presented a newly proposed near-term concept called "Traffic Aware Strategic Aircrew Requests" (TASAR). In this innovation, NASA flight-deck technology, matured through extensive simulation to enable the far-more-demanding operations of self-separation, would be leveraged for use in current-day operations to provide near-term benefits. It would do so by providing pilots with an advisory tool that assists in formulating trajectory change requests (e.g., reroutes, new altitudes) to improve flight efficiency without causing traffic conflicts. It is anticipated that such "traffic-aware" requests would be more likely approved by the controller than requests generated without knowledge of the surrounding traffic aircraft. The presentation garnered significant interest and spun off many off-line discussions. A demonstration of the TASAR concept was also provided, thanks to the skill of the Engility Corporation software development team in quickly prototyping a TASAR-like tool and to the dedication and resourcefulness of Sheri Hoadley for crafting the scenarios and building (on site) an innovative and very popular interactive mock-up.

Study Finds Dynamic Weather Reroutes Save an Average of 4 Minutes per Eligible Flight, March 2011

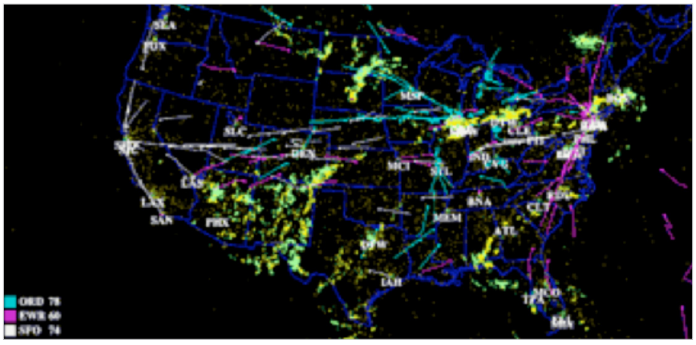
NASA Ames Research Center

An initial study was conducted to explore the benefits of time-saving route amendments that avoid weather, called dynamic weather reroutes, using a dataset of flights that operated during twelve hours of severe weather that occurred over four days in the Fort Worth (Texas) Air Route Traffic Control Center. NASA's Direct-To decision support tool was used to select flights with direct routes that saved at least 5 minutes. Dynamic weather reroutes were generated from those direct routes that crossed convective weather and which were extended to traverse around the weather. The dynamic weather reroutes were found to save an

average of four minutes per flight when compared to the original flight plan. Although the time savings found in this study are noteworthy, the study only investigated a small number of flights. A new study investigating a larger sample is needed to substantiate the benefit and efforts are underway to expand the dataset.



This figure represents an example of a dynamic weather reroute. The white solid line represents the aircraft's current flight plan. The image shows that the aircraft must be rerouted due to convective weather. The yellow dotted line shows an initial direct route to its downstream fix that reduces flight time, but this route also encounters convective weather. The green dashed line shows a new dynamic weather reroute that avoids weather and decreases flight time.



FACET integrates weather and air traffic information, which enables systems operators to reroute flights to maintain safety and minimize delay.

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