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Poster
Space weather events — including solar flares, coronal mass ejections, and ionospheric disturbances — pose a growing operational risk to civil aviation's communication and navigation infrastructure. Despite documented disruptions to HF radio, GPS/GNSS, SATCOM, and VHF/UHF systems during the December 2023 X2.8 flare and the May 2024 Gannon Storm, the National Airspace System (NAS) currently lacks a standardized, real-time framework for detecting, characterizing, and communicating space weather impacts to operational users.
This poster presents a conceptual framework for a Real-Time Communication and Navigation Impact Reporting and Test Capability within the FAA, addressing four core functions: (1) real-time monitoring and impact detection integrating NOAA/SWPC data streams, FAA WAAS network outputs, and oceanic ARTCC operational logs; (2) structured dissemination of impact assessments to traffic managers, controllers, dispatchers, and flight crews through existing NAS pathways; (3) a simulation-based test capability at the FAA William J. Hughes Technical Center for Advanced Aerospace to evaluate alerting thresholds and procedural responses independent of live solar events; and (4) post-event analysis to validate models and refine operational thresholds over time.
We describe a data architecture leveraging existing FAA, NOAA, NASA, USAF, and international datasets and outline a phased development path from a near-term pilot dashboard at the ATCSCC to a NAS-wide predictive capability. A governance model centered on a Space Weather Impact Program Office, an interagency Working Group, and a 24/7 NAS Space Weather Cell addresses the cross-organizational coordination this capability requires.
This work supports Aviation Sector Recommendations from the 2024 National Survey of User Needs for Space Weather and provides an operational roadmap for translating space weather science into actionable impact intelligence for aviation.
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23
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