

NASA SBIR/STTR Technologies

S1.08-8680 - Automated Radiation Measurements for Aviation Safety (ARMAS)



PI: W. Kent Tobiska

Space Environment Technologies, LLC - Pacific Palisades, CA

Identification and Significance of Innovation

The Automated Radiation Measurements for Aviation Safety (ARMAS) project uses an innovative approach with a low-cost dosimeter sensor to enhance Earth science research and improve aviation safety. The ARMAS team will deploy and obtain data from dosimeters to be flown on commercial aircraft. These data will be retrieved in real-time, downlinked to the ground, and used in the validated Nowcast of Atmospheric Ionizing Radiation for Aviation Safety (NAIRAS) modeled radiation environment. The result will be improved accuracy of radiation dose and dose rates along flight tracks. In doing so, the ARMAS project has made a significant contribution toward improving U.S. and international aviation safety by laying the groundwork for an automated, reliable operational system that can monitor the natural galactic and solar radiation environment at commercial aviation flight levels.

Estimated TRL at beginning and end of contract: (Begin: 7 End: 8)

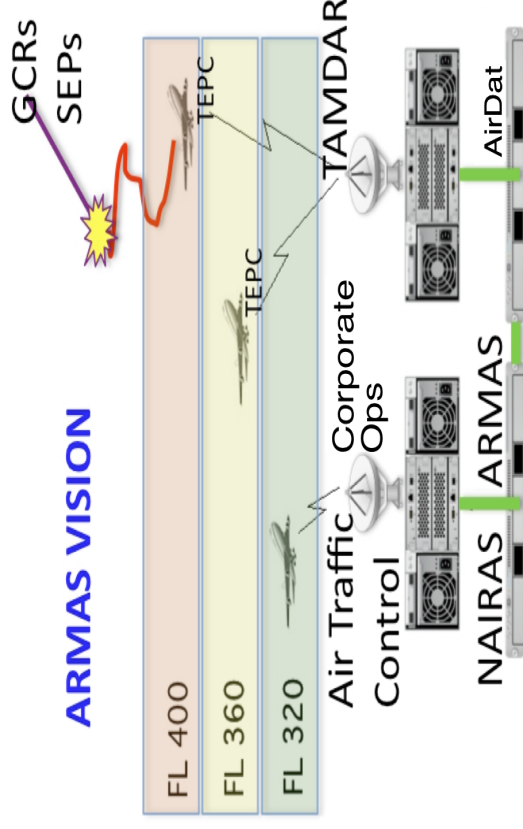
Technical Objectives and Work Plan

The ARMAS team will: i) integrate, fly, and operate two micro dosimeters on aircraft; ii) validate and calibrate the micro dosimeters with a tissue equivalent proportional counter (TEPC); iii) retrieve the micro dosimeter dose and dose rate data in real-time via an automated downlink system; iv) use the dose and dose rate measurements in a data assimilation algorithm to correct the NAIRAS model dose and dose rate output along the flight track; and v) report the corrected dose and dose rate via server, web, Google Earth, and smart phone apps for aviation safety.

Work Plan:

The ARMAS team will: i) purchase (Teledyne), qualify and calibrate (PV/AMU, Boeing, Aerospace Corp) the dosimeters as well as develop a platform (SET, AirDat) for them in Year 1; ii) calibration will be with the TEPC instrument and with beam lines at national labs; iii) the dosimeters will be integrated with an aircraft (AirDat), test flown, and operated (SET) in the first half of Year 2; and iv) the data will be used to correct the NAIRAS radiation (USU SWC) and then provided to corporate and public users (SET) in the second half of Year 2.

ARMAS VISION



NASA Applications

Aviation safety is a NASA concern for the Next Generation Air Transportation System (NextGen), particularly for improved aviation crew safety. ARMAS will provide data for assimilation into NAIRAS and facilitate safer, more efficient air transportation. It will enable the airline industry, crew, frequent flyers, and FAA to quickly and accurately mitigate radiation exposure risk due to cosmic rays and solar energetic particle events.

Non-NASA Applications

End-users that will benefit from ARMAS are airline companies, aircrew professional associations, frequent flyers, FAA, NIOSH, DoD aviation, and NOAA SW/PC. ARMAS will retrieve data through AirDat services and will expand dosimeter-equipped aircraft with the objective of global aviation radiation risk mitigation in major air transportation corridors (CONUS, North Atlantic, Pacific, Cross-Polar).

Firm Contacts

Hollie Richards
Space Environment Technologies, LLC
1676 Palisades Drive
Pacific Palisades, CA, 90272-2111
PHONE: (310) 573-4185
FAX: (310) 454-9665

NON-PROPRIETARY DATA