

NON-PROPRIETARY DATA

IDENTIFICATION AND SIGNIFICANCE OF INNOVATION

The Automated Radiation Measurements for Aerospace Safety – Dual Monitor (ARMAS DM) Phase II-E project requests funding to address these innovations:

- the first global demonstration of a real-time COTS-based technology for monitoring ionizing-radiation using the combination of a long-duration balloon, a stratospheric UAV, an orbital satellite, and an ISS experiment to capture dose throughout a full 3D column;
- accumulation of the data streams in SQL databases for rapid access;
- demonstration of an operational pathway for 24/7/365 monitoring of the aerospace radiation environment; and
- provide scientific access to ionizing-radiation archives for enabling a better understanding of the dynamic and variable radiation environment due to all sources by measuring total ionizing dose, LET spectra, particles, and gamma-rays.

TECHNICAL OBJECTIVES AND WORK PLAN

The ARMAS DM technical objective in Phase II-E is to measure the above-the-atmosphere domain and complement an in-atmosphere balloon flight with a UAV flight. A key task is to automatically insert the data streams into SQL databases for retrieval by RADIAN assimilation routines and make them available for delivery to end users.

The top-of-the-atmosphere measurements inform us of the primary radiation field for precipitating particles prior to their absorption within the atmosphere where they create a secondary radiation field. Our tasks in the coming months are:

- July–December 2021, integrating the ARMAS ISS instrument (FM9 and Liulin-SET) into its primary payload. This will be followed by launch support (December 2021),
- deployment from ISS soft stow (January 2022),
- operation with data collection and retrieval (February–July 2022),
- data collection and database storage for RADIAN retrieval and assimilative processing (March–July 2022), and
- data analysis throughout 2022.

The ARMAS CUBE FM8 is now orbiting higher than the ISS and will complement its measurements. An important analysis activity will be to compare coincidence measurements made near the same time and location in latitude/longitude columns from LEO to the lower atmosphere. The ISS is in a 28.5 ° inclination orbit while ARMAS CUBE is in a polar orbit.

TRL

Estimated

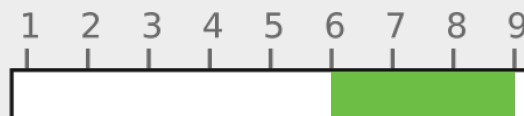


IMAGE TITLE: ARMAS ISS instrument



NASA APPLICATIONS

This proposal helps NASA i) solve important space-related problems; ii) radically improve existing capabilities; and iii) deliver new space capabilities. Our work provides the baseline for radiation exposure to humans from the surface to Low Earth Orbit. Beneficiaries will include air/space traffic management who require future predictive capabilities only possible with physics-based, data assimilative systems. NASA can use our capabilities to manage radiation hazards for travel through the troposphere and stratosphere to LEO space.

NON-NASA APPLICATIONS

SET has concluded a MOU with the Korean Space Weather Center to provide aviation radiation data for serving Korean commercial aviation. SET and WVE have signed a MOU for SET to provide radiation instruments for all WVE balloon flights for two years. There are two dozen commercial purchases of SET's radiation instruments over the past 6 years, including by Virgin Galactic, Dept of Energy, and NASA.

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