J3B: Reliably predict atmospheric and radiation environment at Mars to ensure safe surface operations

Targeted Outcome: Phase 2025+, Safeguarding our Outbound Journey

Reliably predict atmospheric and radiation environment at Mars to ensure safe surface operations

Required Understanding

Determine/Predict Long Term Atmospheric, Ionosphere and Radiation Climatology

Internal Processes of the Atmosphere

Causes of Surface, Atmosphere, Ionosphere & Radiation Environment Enhancements

Causes of High Speed Winds and Dust Storm Generation

Variability of Martian Atmosphere, Ionosphere and Radiation Environments

What Conditions & Processes Lead to Extreme Environments?

Enabling Capabilities & Measurements

In situ GCR & SEP fluxes plus primary & secondary surface radiation at Mars

In situ Ionosphere, Atmosphere & solar-interplanetary conditions

Remote measurements of atmospheric, ionospheric, & interplanetary environment enhancements & conditions of occurrence

Assimilative & theoretical models that provide now casting plus near term & long term predictions of environment

Community & program access to system level Sun-Planet models

Measurements needed from planetary surface, atmosphere, ionosphere & interplanetary medium

Implementation Phase 3: 2025+

Assumes, results from robotic surveys of Mars (i.e.MD, MAP occurred) plus results from solar-interplanetary and Geospace missions (SDO, DP, HIS, RBSP, ITSP, LRO, Lunar experience etc) as sources of model & predictive capability development

Enabling

Obs. along Sun-Mars-line (ACE/GOES Equivalent w GPS like capability) w remote solar-interplanetary & in situ plasma-particle obs. as minimum plus Mars atmospheric-ionospheric remote and in situ obs. from space and ground (I.e. MARS Orbiter and MAP equivalents)

Contribuing

GEMINI, SCOPE, Telemachus - if not yet flown

Enabling

Continued Model Development:
Provide linkage between spatial regions plus source-response relationships via solar-interplanetary predictive tools and assimilative NRT observations

Enabling Partnership

Continued Virtual Observatory effort joint with Exploration to feed into model development

Enabling

Theory Program:
To refine understanding of planetary (Earth, Moon, Mars) & interplanetary environment responses to solar-interplanetary and internal drivers