

J3B: Targeted Outcome to Capabilities to Implementation

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

Determine relationships of trapped & SEP fluxes plus atmosphere & ionosphere changes with solar-interplanetary conditions

Measurements of atmospheric, ionospheric, magnetospheric & interplanetary environment enhancements & conditions of occurrence

Assimilative & theoretical models to provide linkage between observables & near term plus future environmental enhancements

Measurements needed from planetary atmospheres through interplanetary medium

Which Sentinels? Can't do all in Phase 1 ... What measurement is SDO providing for this?

Current Missions:

TIMED, Soho, ACE, Cassini, Polar, Cluster, etc.: Extend environment data bases & inform on current environment conditions in support of model development & testing

Model Development:

To provide linkage between spatial regions plus source-response relationships

Implementation Phase 1: 2005-2015

SDO, RBSP, ITSP & Sentinels to provide new environmental measurements and provide the data for new model and theory development. E.g SDO- relates spot magnetic structure to SEP probability; Sentinels- radial evolution and enhancements by travelling shocks; RBSP and ITSP-response in near Earth space

MMS, what else?

Additional environmental measurements and data for new model and theory development

Theory Program:

To understand responses of planetary (Earth, Moon, Mars) & interplanetary environments to solar and internal drivers

Rocket Campaigns:

Provide upper atmosphere and lower ionosphere responses to energy inputs