

# J2B: Earth/Moon Space Weather Forecasting & Mars Nowcasting

*Targeted Outcome: Phase 2- 2015-2025, Opening the Frontier*

## Required Understanding

CME energy buildup

CME initiation and onset (triggering)

Ability to recognize precursors and triggers of large CMEs & incorporate them into models

Origin of SPEs and relation to CMEs and other phenomena

Relationship between solar magnetic field evolution, triggers, CME strength and propagation

Propagation of Ambient SW, SW transients, and SEPs

Relationship between CME evolution, SW conditions and SEP fluxes

## Enabling Capabilities & Measurements

Next generation remote sensing and multi-point in-situ precursor measurements & models in place

Predict eruption of CMEs at the Sun

Predict the character of CMEs and their efficiency to accelerate particles

Predict particle escape from shock and transport through heliosphere

Assimilation of Integrated Sun-Earth-Moon-Mars models using observational inputs for predictive models

Enabling

*Sentinels, SWB – Provide multi-point network of in-situ observations*

Enabling

*LI-diamond, MagCon, IMC - Characterize near-Earth environment (Explorer Mission Candidates?)*

## Implementation Phase 2: 2015-2025

Enabling

*DOPPLER, SHIELDS, SEPP, RAM - Identify NEW observational techniques & Precursor Signatures of CMEs and SPEs (Explorer Mission Candidates?)*

*Model/Theory Development - Integrated predictive models for Earth-Moon and Mars System*

Enabling

*Mars GOES – provide remote sensing and in-situ observations to enable local space weather nowcasting at Mars (2025-2035)*