

# SSSC Roadmap Targeted Outcome F 2 C

## Targeted Outcome: Phase 2015-2025, Opening the Frontier Quantifying Coupling Mechanisms at Critical Interfaces

Transfer of solar wind information through global current systems

Meteorological Forcing of the ITM

Detailed coupling of magnetotail dynamics to the polar region

### Required Understanding

Feedback of the ionosphere on magnetospheric electrodynamics

Chemical & dynamical coupling between upper atmosphere disturbances & the lower atmosphere

Controllers of mass and energy flow between the solar wind and geospace

Transition of solar eruptive events from release to propagation

Global I-T coupling and the creation of instabilities

### Enabling Capabilities & Measurements

Global characterization of the current systems linking geospace using swarms of satellites

Simultaneous multi-point characterization of the magnetotail and imaging of the auroral oval

Simultaneous, colocated neutral winds, ionospheric densities & drifts

Satellite observations of atmospheric chemistry & key dynamical features

Two-way-coupled modeling capabilities

Multi-point measurements of solar wind and dayside magnetopause

Simultaneous measurement of solar reconnection features and heliospheric density structures

### Implementation Phase 2: 2015-2025

MMS, ITSP, RBSP, SDO, STEREO

The existing Great Observatory provides necessary measurements to understand the linkages

ITM-Waves, GEC, MC, Sentinels  
These are the most important missions in this phase to address coupling mechanisms at interfaces

Solar Probe, SEPP, MTRAP, DBC, GEMINI, AAMP

These are missions that also could provide critical measurements for understanding linkages between regions

Theory/Modeling

Coupled models between regions of space to provide physical insight on mass and energy transfer rates