

# J2A: Understand the Magnetic Processes that drive Space Weather

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

## Required Understanding

Dominant processes controlling reconnection and acceleration

How processes accessible in the Earth's magnetosphere relate to other planetary magnetic systems

Source driver for solar/stellar dynamos

Creation and evolution of planetary dynamos

Critical parameters that determine coupling phenomena across multiscale interfaces

Dynamics and topology of magnetospheres as a function of internal and external drivers

## Enabling Capabilities & Measurements

Remote and in situ near-Sun particle and field observations

Large scale observations of magnetically controlled phenomena

Hybrid computer algorithms for complex cross-scale models

Community access to system level Sun-Earth models

Spatially and temporally resolved observations of multiscale interface regions Sun-Corona, SW-CME, SW-Mag, Mag-IT, IT-Atm, Helio-Interstellar

## Implementation Phase 2: 2015-2025

Great Observatory  
Assumes launch of Solar-B, STEREO, MMS, SDO, RBSP, THEMIS, IBEX, LWS FUV Imager

Enabling LWS missions  
Sentinels – will provide the large scale system dynamics

Contributing LWS Program  
ITSP – will provide the coupling parameters

Enabling STP Program  
MagCon – will provide configuration of plasma and mag field for large scale mag system, provide information on acceleration and reconnection

Contributing STP Program  
GEC – will provide the coupling phenomena of IT-Atm system

Enabling Flagship mission  
Solar Probe – will provide obs of acceleration process near sun

Model/Theory Development - Community wide modeling workshops focusing on model development + Theory Program

Potential Discovery  
Mission to provide a comparative magnetosphere to test understanding

Potential Explorer  
Mission to provide dynamics and topology of large scale magnetic system and coupling parameters

Other Agencies  
US: L1 Monitor  
Foreign: ORBITALS, Ravens, Solar Orbiter