

Step 5: Sun-Solar System Connection Roadmap

Targeted Outcome to Capabilities to Implementation

Targeted Outcome: Phase 2025-beyond, Understanding Our Home

Forecast Climate Change

Required Understanding

Interactions of photons and energetic particles with atmospheric composition

Propagation of solar photons throughout atmosphere and interaction with clouds and aerosol

Changes in spectral (e.g., UV) and directional (direct vs diffuse) characteristics of solar radiation at surface

Responses of surface energy partition and emissions of radiatively-active gases

Interactions among atmospheric radiation, composition, structure, hydrologic cycle, and clouds

Quantitative attribution of climate variations to solar vs internal forcing

Upward propagation of climate changes via waves and mean flows

Enabling Capabilities & Measurements

Continuing global observations of the sun, geospace, and Earth's climate

Systematic and continuing model evaluation using ongoing observations

Whole Earth system data assimilation including life, chemistry, oceans, land, the atmosphere to 650 km

Prediction of future climate change with well-tested coupled models that include solar interactions

Implementation Phase 3: 2025-beyond

Model Development:
Prediction of external and internal forcing and response

New Explorer Missions:
Active atmospheric profiling (laser) for chemistry and structure
Detailed characterization of changing hydrologic cycle?