

# H1C: Identify the Impacts of Solar Variability on the Earth's Atmosphere

*Phase 2005-2015, Understand our Home in Space*

## Required Understanding

Temporal and spectral variability of solar ionizing and dissociating irradiance

Temporal, spectral, and spatial variability of solar energetic particle inputs

Composition changes resulting from solar energy deposition

Radiative cooling in response to variable energy deposition

Effect of solar variability on Neutral & plasma dynamics, structure, & circulation

Tidal, planetary, and gravity wave generation, modulation, and coupling

Horizontal and vertical energy and constituent transport

Parameterizations of turbulence and wave effects in GCMs

## Enabling Capabilities & Measurements

Spectral, spatial, and temporal variation of photon and energetic particle inputs over a solar cycle

Global imaging of the ITM

Global density, composition, temperature, and winds: surface - 650 km? over a solar cycle

Energy redistribution by tides, gravity and planetary waves and turbulence

First principles data-assimilating models for predicting atmospheric structure and composition and their response to varying energy inputs

Long term calibrated observations of changes in different atmospheric layers

## Implementation Phase 1: 2005-2015

Existing Assets

TIMED – ITM temp, density, CNOFS, DMSP

Rocket Campaigns: Energy inputs, Atm. coupling

Enabling LWS Program

ITSP, IT Imaging

Contributing LWS Program

SDO  
EUV input into system

Enabling Explorer Program

AIM

Polar mesospheric clouds

Enabling Explorer Candidate

ITMWaves, SECEP

Theory Program:

Wave interactions and Coupling  
Climate change mechanisms

Model Development:

Whole Atmosphere GCM

Enabling Partnerships

L1 Monitor, DMSP,  
NPOES