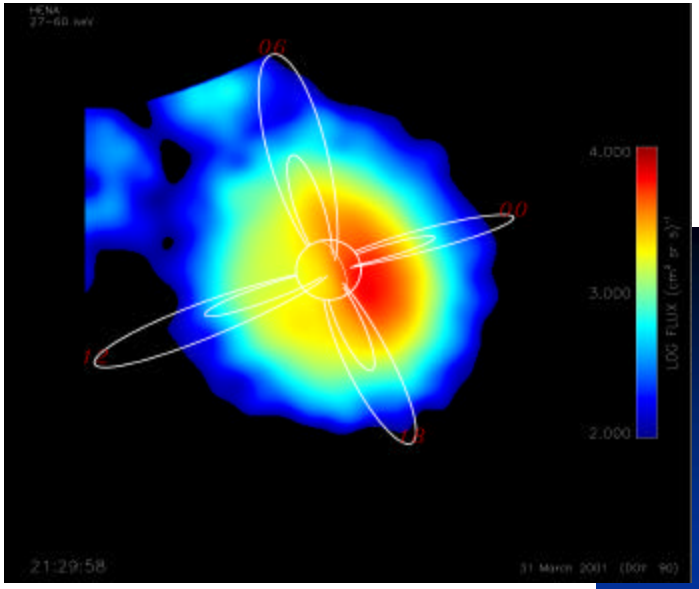
Storm Enhanced Densities



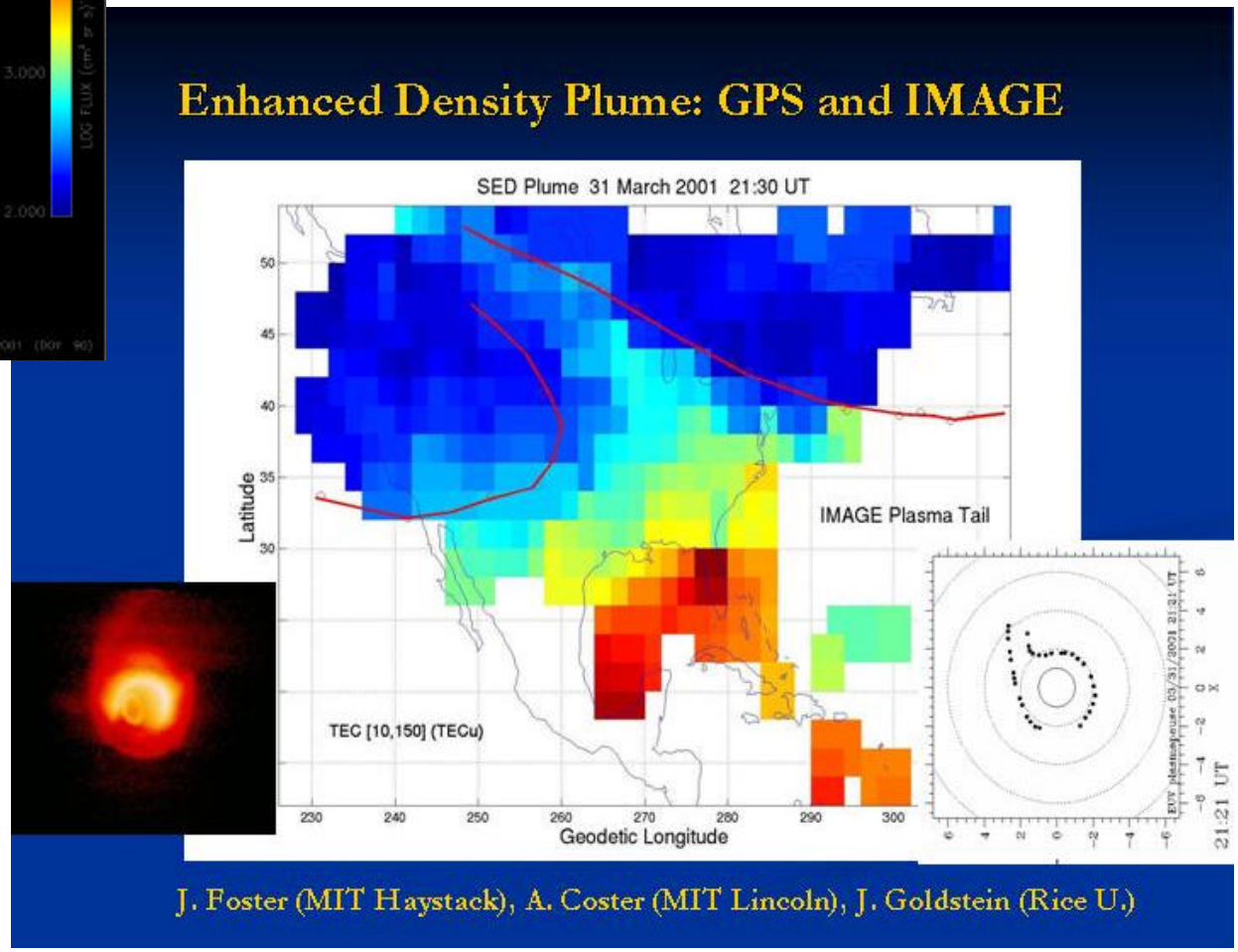


IMAGE HENA
31 March 2001

Midnight enhanced ring current pressure; electric field connected ionospheric and magnetospheric convection

SOHO
EIT

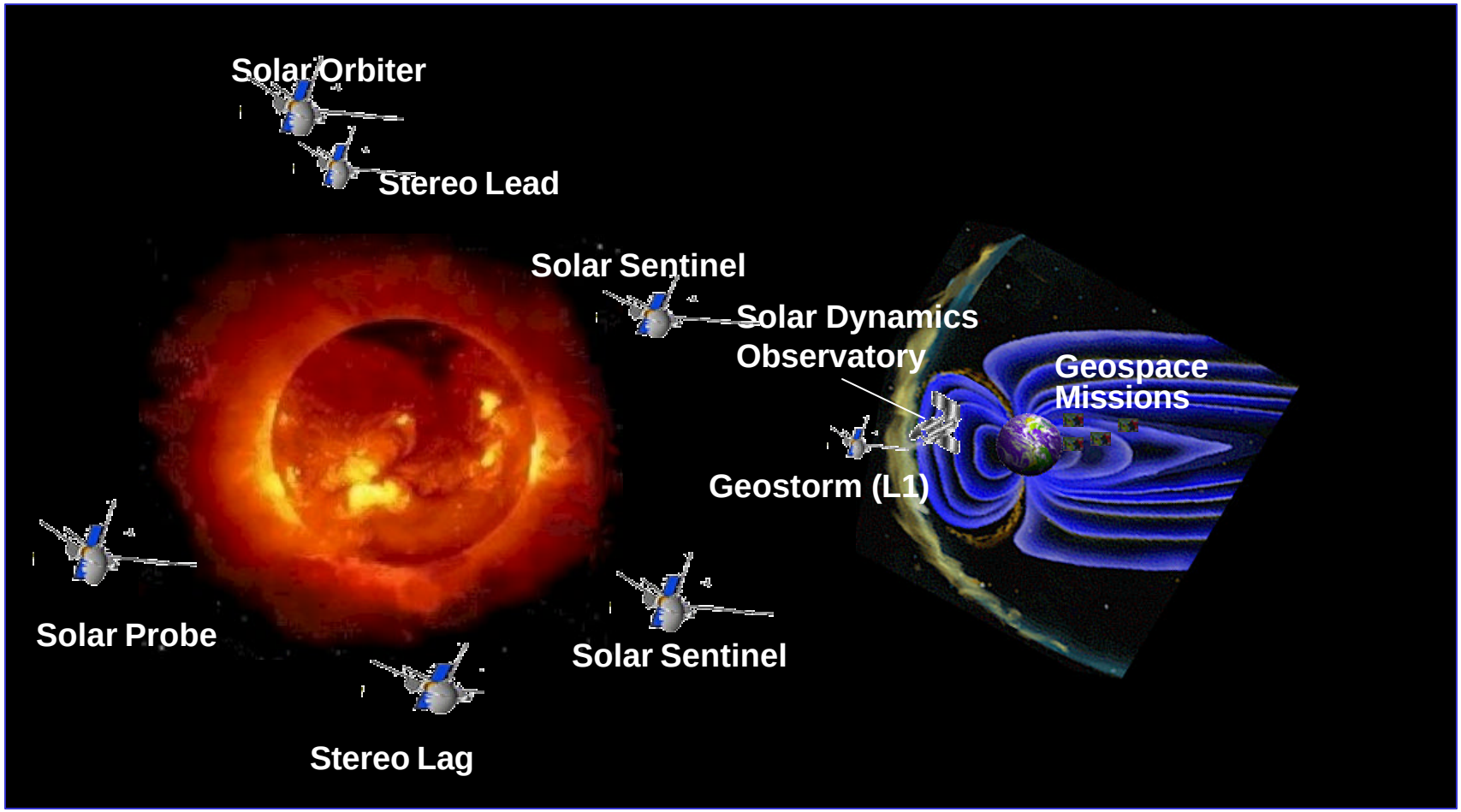
Magnetosphere: U Michigan MHD

IMAGE
ENA
Oxygen

Global TEC

JPL GPS
network

Living With a Star Space Weather Research Network

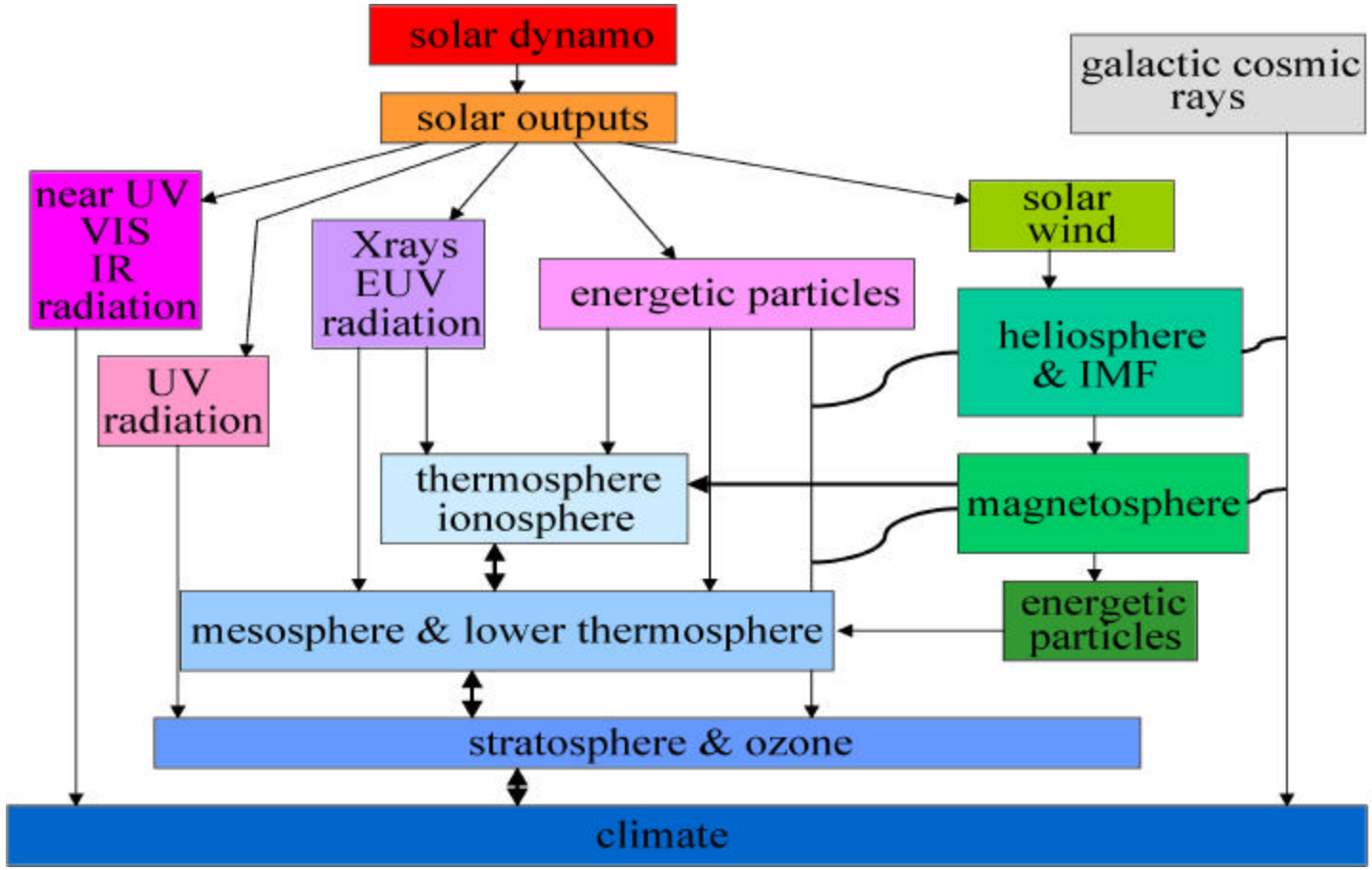


Distributed network of spacecraft providing continuous observations of Sun-Earth system

- ? ***Solar Dynamics Network*** **observing Sun & tracking disturbances from Sun to Earth**
- ? ***Geospace Network*** **measuring Geospace response with network covering key regions**

LWS is a Systems Approach

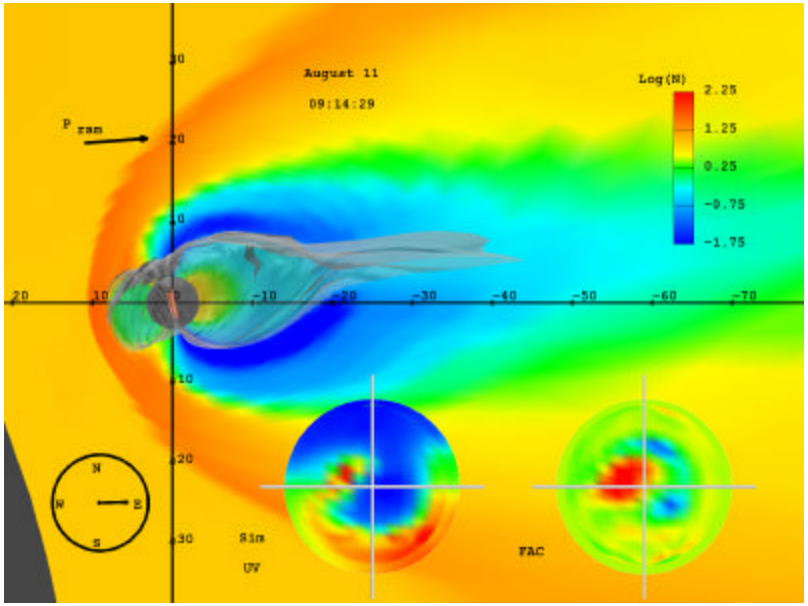
LWS focuses not on any one region of space, but rather on our Sun Earth Region as one system.



A very important part is the study of the connection between the regions and how one drives a response in another.

Societal Benefit Through Enabling Science and Models

- **Detailed models of radiation belts for the cost-effective design of spacecraft subsystems and anomaly resolution; human exposure protection**
- **Dynamic global ionospheric models applicable to communications, navigation and radar**
- **Dynamic neutral density models from which to accurately predict satellite drag**



NASA's Living With a Star (LWS) goals and objectives as articulated by the Sun Earth Connection Advisory Subcommittee

LWS Goal

Develop the scientific understanding necessary to enable the United States to address those aspects of the connected Sun-Earth system that directly affect life and society

LWS Objectives

- Identify and understand variable sources of mass and energy coming from our Star that cause changes in our environment with ***societal*** consequences, including the habitability of Earth, use of technology, and the exploration of space.
- Identify and understand the reactions of Geospace regions whose variability has ***societal*** consequences (impacts).
- Quantitatively connect and model variations in the energy sources and reactions to enable an ultimate U.S. forecasting capability on multiple time scales.
- Extend our knowledge and understanding gained in this program to explore extreme solar-terrestrial environments and implications for life and habitability beyond Earth.