

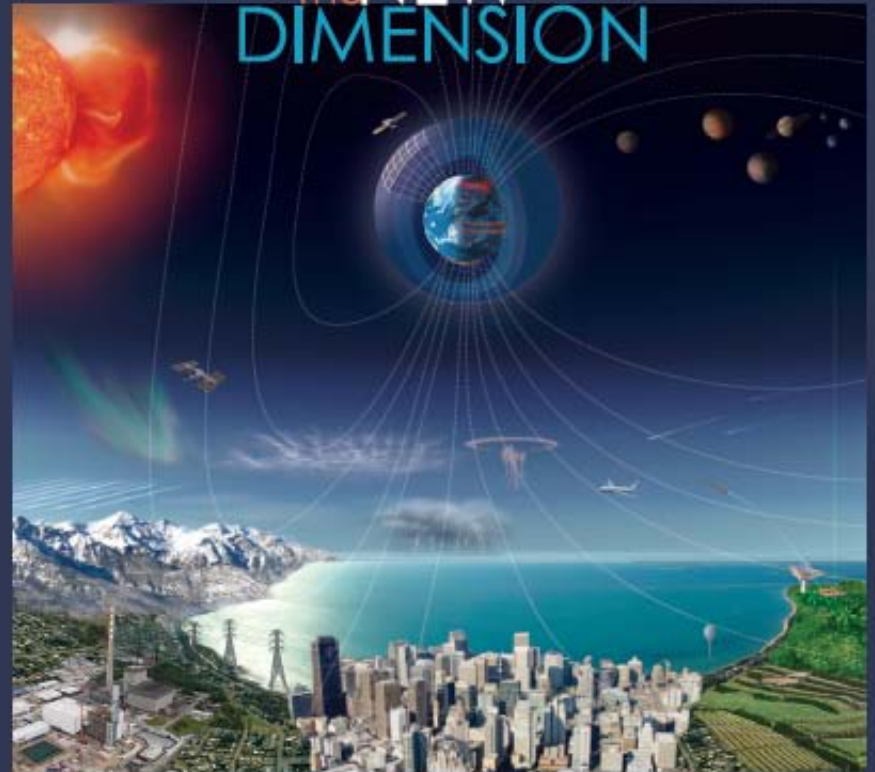


Man must rise above the Earth – to the top of
the atmosphere and beyond – for only thus will
he fully understand the world in which he lives.

– Socrates

CEDAR

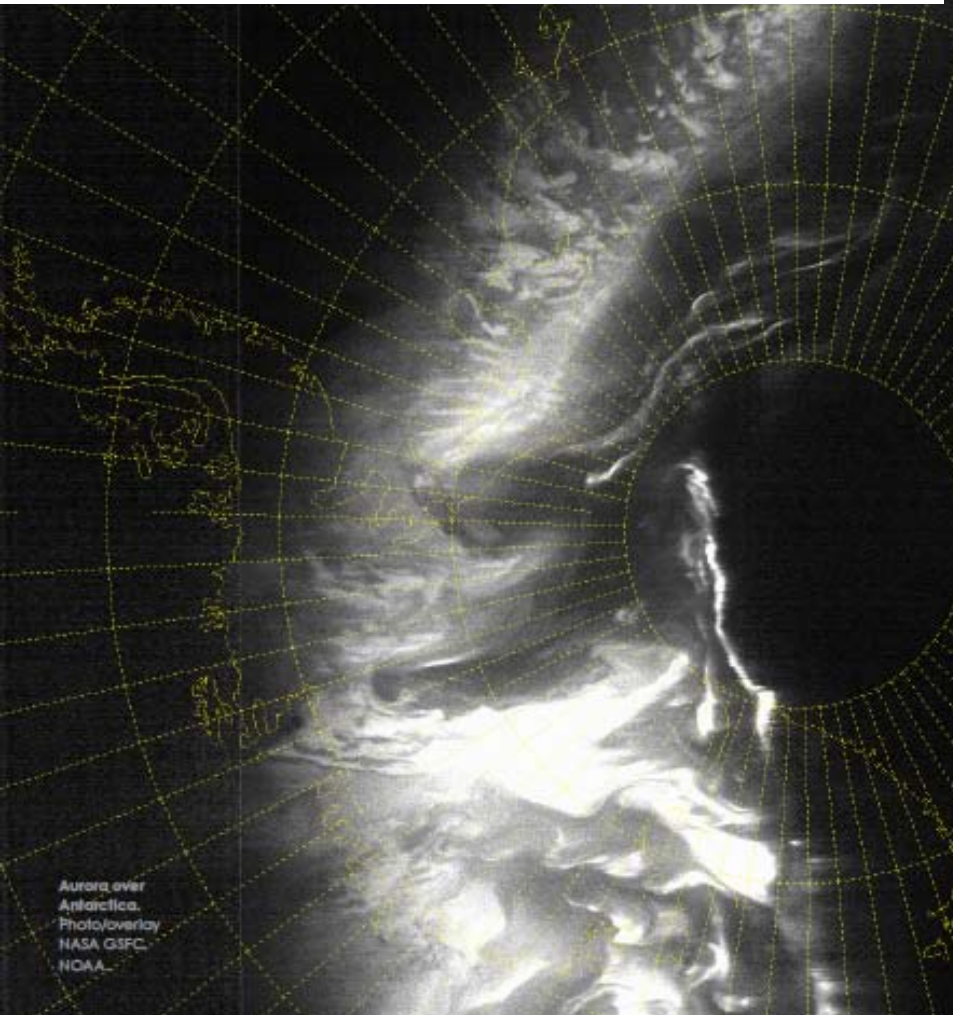
The **NEW**
DIMENSION



STRATEGIC VISION
for the National Science Foundation Program on
COUPLING, ENERGETICS AND DYNAMICS OF ATMOSPHERIC REGIONS

1 Introduction

Focusing on complexity within the upper atmosphere provides a transformative step toward accurately and reliably predicting upper atmosphere conditions, and toward understanding this region's interconnections to other parts of the Sun-Earth system.



Aurora over
Antarctica.
Photo/overlay
NASA GSFC,
NOAA.



The CEDAR mission is to understand the fundamental properties of the space-atmosphere interaction region (SAIR); identify the interconnected processes that define the SAIR's global behavior, evolution, and influence on the Sun-Earth system; and to explore the SAIR's predictability.



2 The Space-Atmosphere Interaction Region

To understand the processes that govern the coupling, energetics, and dynamics of the upper atmosphere, it is useful to envision this as an *interaction region*, coupling the lower atmosphere with space and the universe beyond.

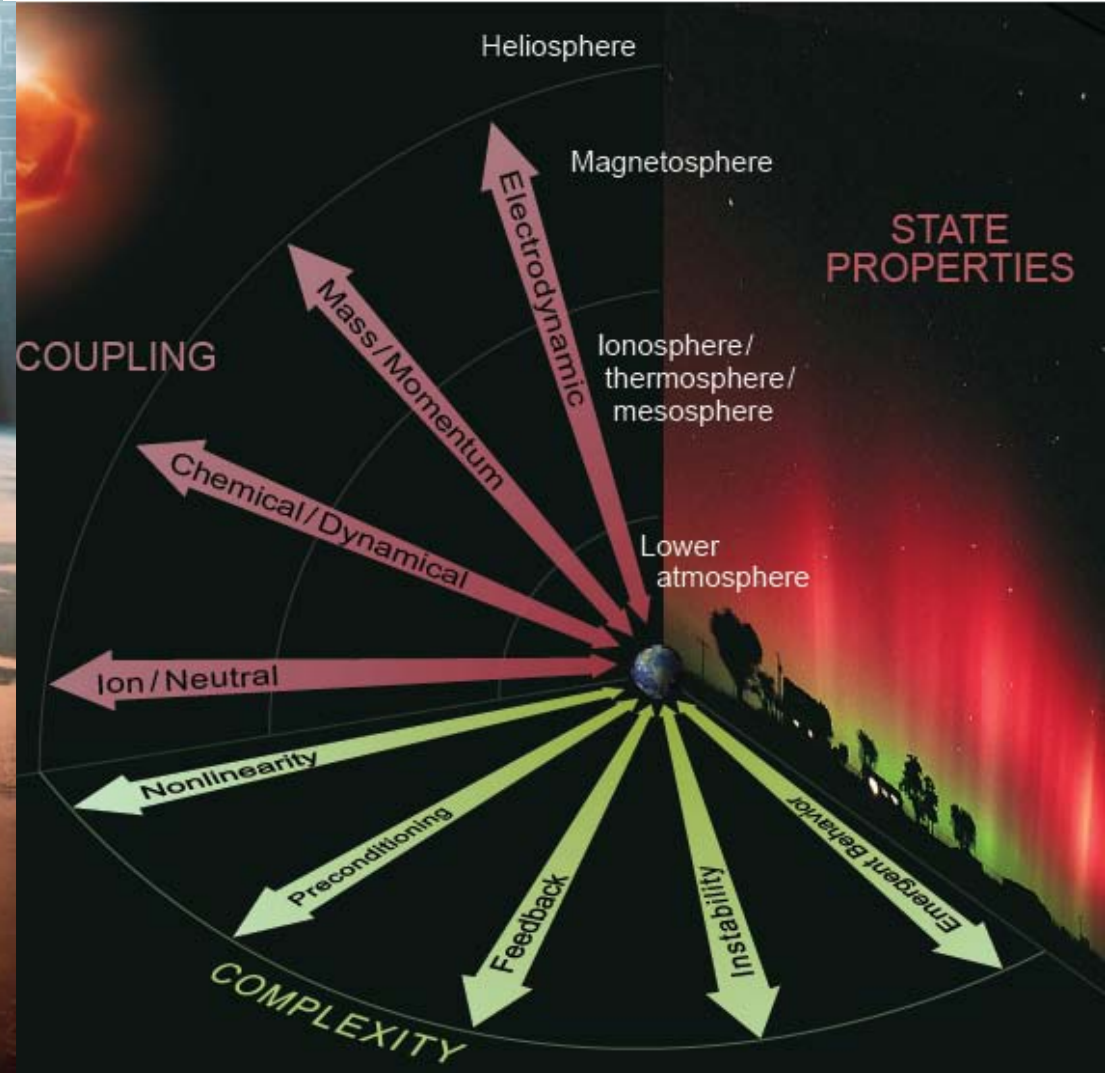


Sunset over western South America. International Space Station Imagery, NASA.



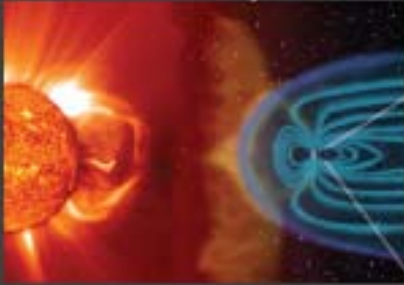
3 The Systems Perspective

The systems approach transcends the concept of scale, enabling the characteristics of a complex system to be generally applied to many problems in the Sun-Earth system.



Systems Perspective

Solar-terrestrial System

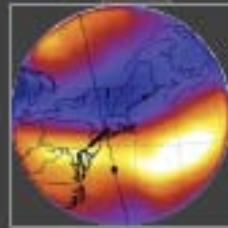
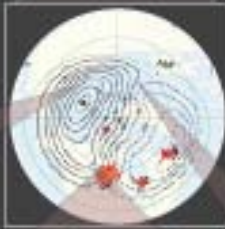


Geocorona

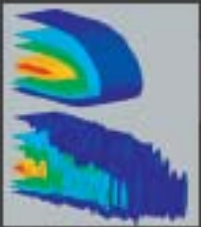


Equatorial Plasma Bubbles

Ionospheric Convection



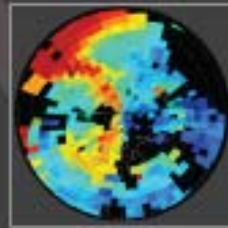
Stable Auroral Red Arcs



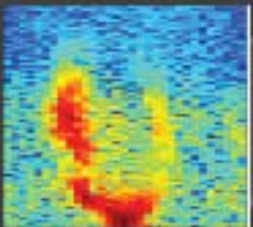
Plasma Density Patches



Discrete Aurora



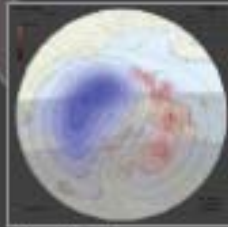
Plasmaspheric Drainage



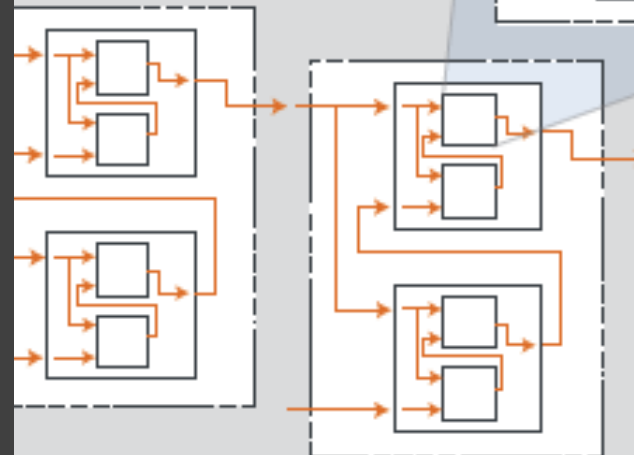
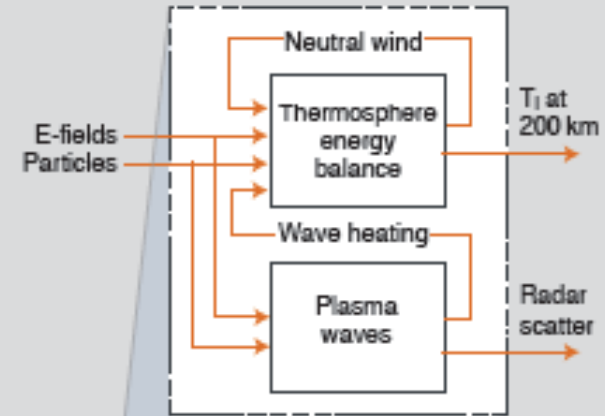
Ion-acoustic Turbulence



Ionospheric Outflow



Electrojet Instabilities



4 The Way Forward

The 21st century approach to understanding the Sun-Earth system is to explore new avenues of progress, building on past decades of accomplishments.



- 1** Encourage and undertake a Systems Perspective of Geospace
- 2** Explore Exchange Processes at Boundaries and Transitions in Geospace
- 3** Explore Processes Related to Geospace Evolution
- 4** Develop Observational and Instrumentation Strategies
- 5** Fuse the knowledge Base across Disciplines
- 6** Manage, Mine, and Manipulate Geoscience/Geospace Data and Models

Acknowledgements

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