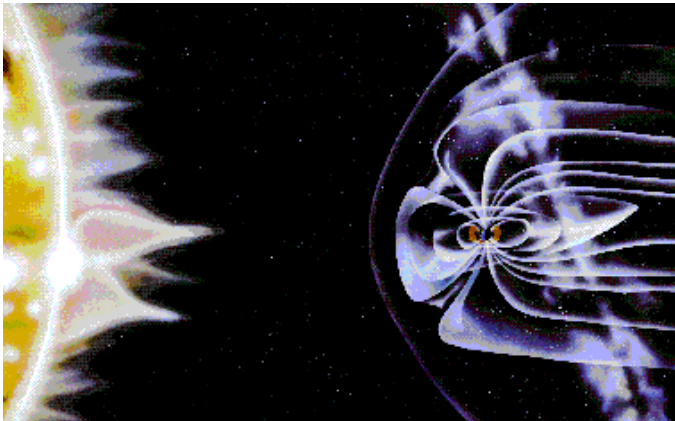




# NOAA's Space Environment Center



## Providing the Nation with critical space weather services to protect life and property in space, in the air, at sea, and on land

*The space environment extends from the surface of the Sun to Earth's upper atmosphere, affecting our technological systems everywhere on Earth and in space.*

NOAA's Space Environment Center (SEC) is the national and international warning center for disturbances in the space environment that can affect people and equipment. SEC conducts research to understand the space environment, and performs critical space weather operations, jointly staffed by NOAA and the U.S. Air Force, to provide forecasts and warnings of solar and geomagnetic activity to users in government, industry, the private sector, and the public.



*The Space Environment Center is the Nation's official source of space weather alerts and warnings.*

*Space Weather Operations is staffed 24x7.*

SEC continually monitors and forecasts Earth's space environment. The Center provides accurate, reliable, and useful solar-terrestrial information; conducts and leads research and development programs to understand the environment and to improve services; advises policy makers and planners; plays a leadership role in the space weather community; and fosters the commercial space weather services industry.

### Some Economic Impacts of Space Weather

- NASA relies on SEC data to protect the \$1 billion arm on the International Space Station.
- \$500 million in space asset claims from 1994-99 were attributed to, or aggravated by, space weather.
- Federal Aviation Administration requires dispatchers to take into consideration HF communication degradation for each dispatched polar flight. Flights can be diverted based on SEC solar radiation alerts if air traffic control communication is compromised, with estimated costs as high as \$100K per flight. A 23-day period in 2001 saw 25 flights diverted.
- Increased accuracy in space weather services allowing for a 1% gain in continuity and availability of GPS would be worth \$180M per year.

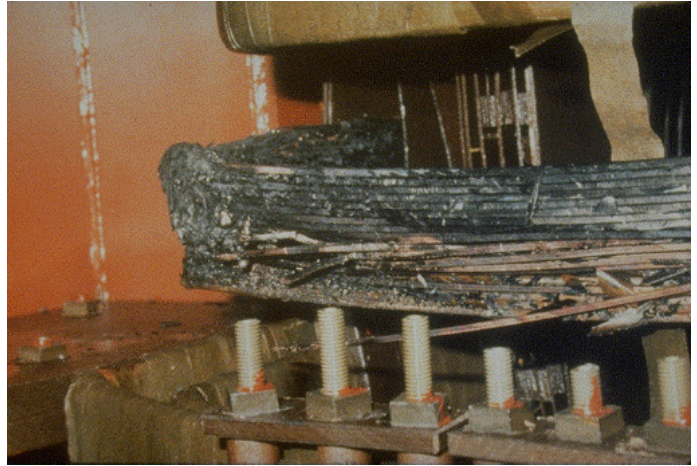
### Who Depends on Space Environment Center Services

- U.S. power grid infrastructure
- Commercial airline industry
- Department of Transportation (use of GPS)
- NASA human space flight activities
- Satellite launch and operations
- U.S. Air Force operational support
- Commercial and public users (more than half a million hits per day on SEC websites)

# NOAA's Space Environment Center

## Responsibilities for Data and Information

- End-to-end system responsibility for universally used space environment data acquired by the U.S. geostationary and polar environmental satellites. Includes requirements, data processing and product development.
- Real-Time Solar Wind data from the NASA ACE satellite which alert users of impending space weather storms on Earth.
- Assembly of data sets for use in operational, assimilative, numerical models.



*A \$10 million transformer is destroyed by a geomagnetic storm.*

## National Science Imperatives and Statements of Need That Drive SEC's Mission

### NOAA Strategic Plan, 2003 - 2008

- Monitor and observe the space environment and conduct sound, state-of-the-art research
- Space weather linked to public safety and to expand services to support national needs for space weather data
- To understand and predict changes in Earth's environment

### National Research Council – A Decadal Research Strategy in Solar and Space Physics, 2003

- NOAA should assume full responsibility for space-based solar wind measurements
- NOAA should expand its facilities for integrating data into space weather models
- NOAA, with NASA, should plan to transition research instrumentation into operations

### National Space Weather Program Implementation Plan, 2000

- Interagency program can not succeed in meeting users' needs without NOAA SEC observations, research, model development, and transition to operations

### NASA's Living With a Star Program, 1999 –

- \$1 Billion invested in Sun-Earth system research program; depends on SEC to transition research data and results into operational support

### National Security Space Architect Study, 2000

- Finds NOAA's current and planned activities essential to meet Department of Defense's space weather needs
- Nation's investment of \$500M to mitigate space weather effects will not be returned without NOAA SEC data, R&D, and operations

## Recent Major Accomplishments

- First Solar X-Ray Imager(SXI) providing minute-by-minute real-time images for space weather on GOES-12, operational April 2003
- SEC's annual "Space Weather Week" meeting in April 2004 is *the* forum for bringing together the entire space weather community
- Delivery of the prototype version of first data assimilation model for transition to operations
- Vigorous partnerships with
  - DoD, DoE, DoI, NASA, NSF, DoT
  - First industrial space weather services providers
  - International Space Environment Service (ISES) and European Space Agency (ESA)

*SEC has 46 federal employees and works with additional university and contract employees. The Space Environment Center is located in Boulder, Colorado, and does both research and operational support for NOAA's customers of space weather services.*

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