



# NASA SDO and STEREO Missions supporting NOAA Space Weather Prediction Center

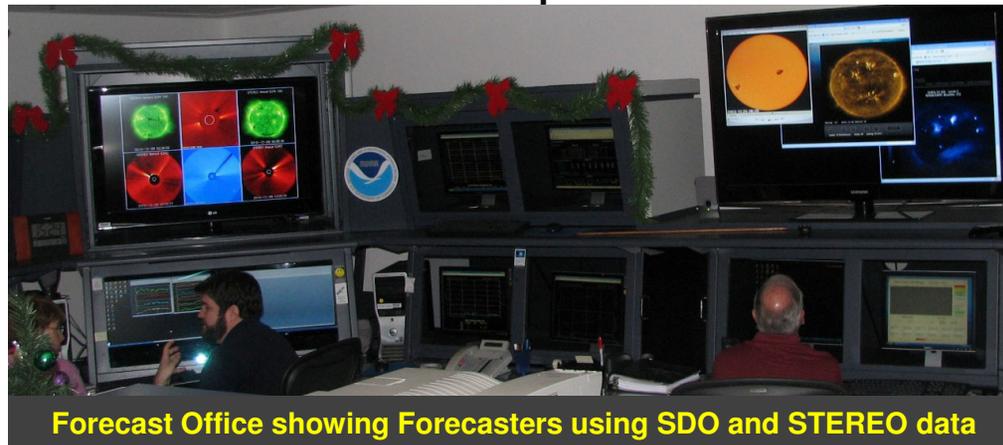


**Dr. Rodney Viereck,**  
*Director of Research*

## *Space Weather Prediction Center*

*Part of the NOAA National Weather Service and one of the National Centers for Environmental Prediction*

- **Research**
  - Putting the Nation's scientific discoveries to work
- **Development**
  - Transitioning research to the operational forecast office
- **Space Weather Forecast Office**
  - Full 24/7 forecast operations



**Forecast Office showing Forecasters using SDO and STEREO data**

*The Nation's official source of space weather alerts, watches and warnings  
Safeguarding the Advanced Technologies of the World*



## NASA's SDO and STEREO Mission: Applications to Space Weather Forecasting



- **SDO Mission:**
  - *AIA Solar EUV images: Critical for tracking solar active regions and identifying flare locations*
  - *HMI Solar Magnetograms: Critical for identifying flaring potential and for providing 1 to 4 day forecasts of space weather storms allowing power grid operators time to protect the electric power grid*
  - *EVE Solar EUV Spectra: Drive space weather models and provide critical backup data for specifying solar flare magnitudes.*
- **STEREO Mission:**
  - *EUV images provide a look at the other side of the sun and advanced warning of impending space weather storms*
  - *Coronagraphs provide three-dimensional view of coronal mass ejections and input to forecast models*
  - *Particle observations provide a preview of what will be coming to Earth*

*These missions provide key data and information for protecting the Nation's critical infrastructure and to allow power grid operators, satellite controllers, emergency responders, and the aviation community, to respond to major space weather events*



# Space Weather Impacts



- **Solar Flares**

- *One of the biggest forecasting challenges*
- *Disrupt HF radio communications for commercial airlines*
- *Cause loss of GPS signal and impacts to radar systems*

- **Coronal Mass Ejections**

- *Create the largest space weather storms at Earth*
- *Can knock out electric power grids with potential impacts in the \$Trillions\**
- *Can destroy satellites with potential impacts in the \$Billions\*\**
- *Cause airlines to lose communication on polar flights costing \$100K for each redirected flight*



*The new discoveries by Schrijver and Title help us understand the mechanisms of how and why solar flares and CME's erupt from the sun which in turn will improve our ability to predict these eruptive events.*

*With improved predictions we at the Space Weather Prediction Center can provide customers with more accurate forecasts of space weather storms so that they can take mitigating actions to protect their systems.*



\* NRC Report on Severe Space Weather Events: Understanding societal and economic Impacts, 2010

\*\* Odenwald, S.F. and Green, J.L., Bracing the Satellite Infrastructure for a Solar Superstorm, *Scientific American*, July 28, 2008