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SPACE STUDIES BOARD

Committee on Solar and Space Physics

Presentation to SSB, November 4, 2020
CSSP Fall Virtual Meeting, October 19-20, 2020
https://www.nationalacademies.org/event/10-19-2020/committee-on-solar-and-space-physics-2020-fall-meeting

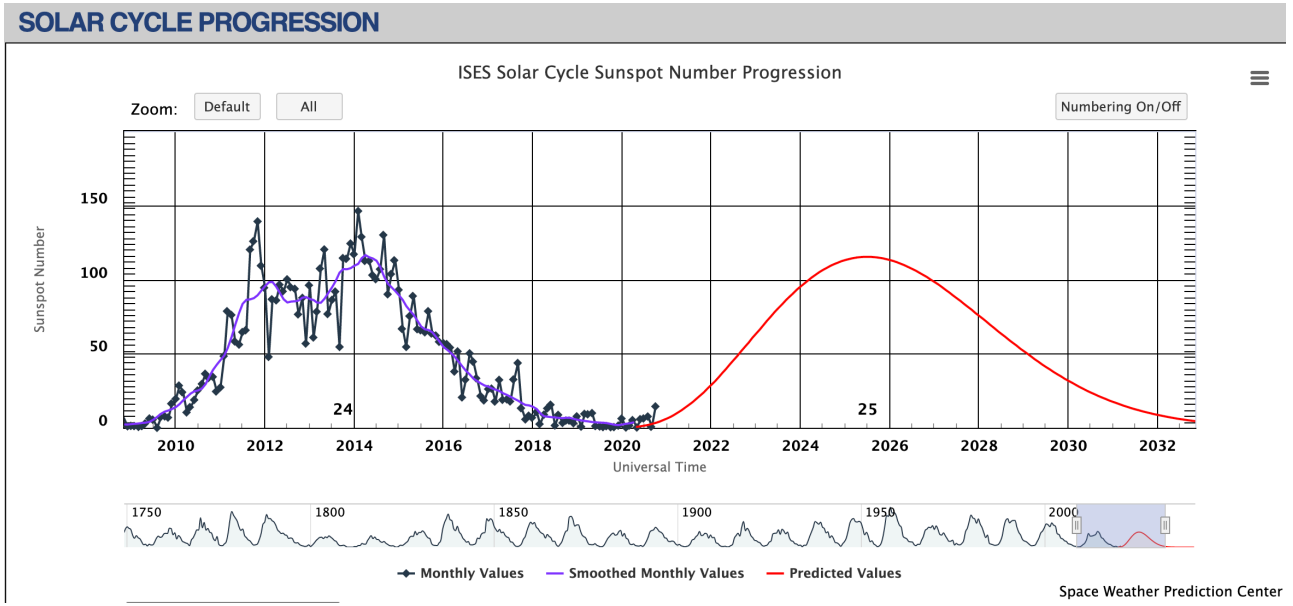
- **Co-Chairs:** Sarah Gibson and Maura Hagan
- **Members:** Brian Anderson, Steven Battel, Rebecca Bishop, Mark Cheung, Christina Cohen, Yue Deng, Tai Phan, Tuija Pulkkinen, Jiong Qiu, Howard Singer, Leonard Strachan, Barbara Thompson
- **Staff:** Abigail Sheffer and Megan Chamberlain

Statements made in this presentation are those of individual CSSP members and do not necessarily reflect the official views of the Space Studies Board or the Academies.

Solar and Space Physics Highlights - NOAA

We are in Solar Cycle 25

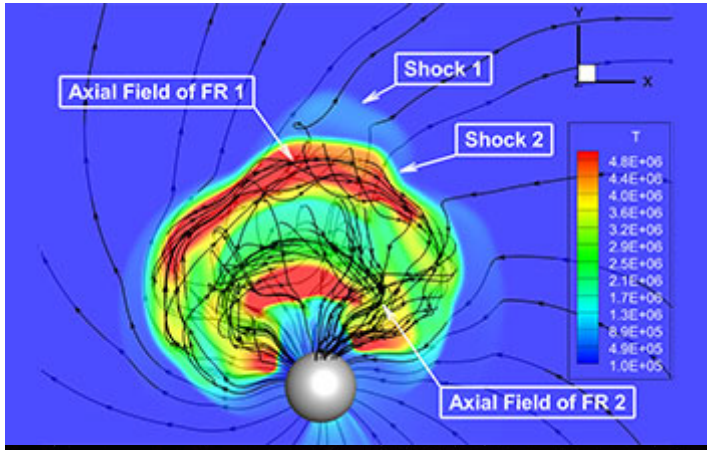
- Solar Cycle 25 Prediction Panel (NOAA-NASA co-chaired) announced we are now in Solar Cycle 25
- September 15 media teleconference with over 20 reporters (NYT, CNN, NPR, ..) Great coverage and follow-up (over 100 outlets)
- Solar Cycle 25 is forecast to be fairly weak, about the same as Solar Cycle 24, with peak Sunspot Number of 115 (± 10) in July 2025
- Solar Cycle 24/25 minimum occurred December 2019, with 13-month smoothed sunspot number = 1.8

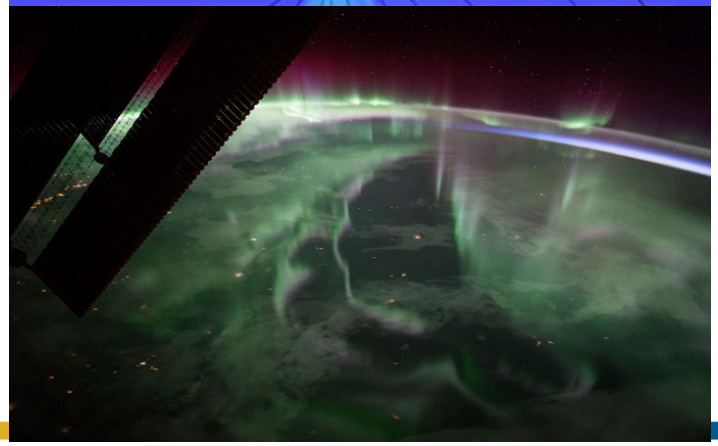


https://www.weather.gov/news/201509-solar-cycle

Solar and Space Physics Highlights – NASA & NSF

Next Generation Space Weather Models with Quantified Uncertainties (SWQU)





Partnership between NASA and NSF GEO/MPS Directorates funded 6 awards to develop next generation space weather models

- (NSF+NASA) Improving Space Weather Predictions with Data-Driven Models of the Solar Atmosphere and Inner Heliosphere (PI: N. Pogorelov, U. Alabama at Huntsville)
- (NSF) NextGen Space Weather Modeling Framework Using Data, Physics and Uncertainty Quantification (PI: G. Toth, U. Michigan)
- (NASA) Ensemble Learning for Accurate and Reliable Uncertainty Quantification (PI: E. Camporeale, CU Boulder)
- (NSF) Composable Next Generation Software Framework for Space Weather Data Assimilation and Uncertainty Quantification (PI: R. Linares, MIT)
- (NASA) A Flexible Community-based Upper Atmosphere Ensemble Prediction System (PI: A. Ridley, U. Michigan)
- (NSF) Forecasting Small-Scale Plasma Structures in the Earth's Ionosphere-Thermosphere System (PI: T.-W. Fang; CU Boulder)

Solar and Space Physics Highlights – NAS

Space Weather Operations and Research Infrastructure Workshop*

- June 16-17, 2020 & September 9-11, 2020; lead sponsor – NOAA
- Review of the current space weather capabilities in order to identify gaps and future needs for space weather products and services
- Thorough examination of Space Weather Follow On program (SWFO)
- Examination of potential improvements beyond baseline SWFO capabilities
  - Examination of future ground-based instruments relevant to space weather
  - Emerging opportunities offered by small satellites and smallsat constellations
  - Emerging capabilities in the commercial sector
- Project website: https://www.nationalacademies.org/our-work/space-weather-operations-and-research-infrastructure-workshop

*report in progress

Solar and Space Physics Highlights

Preparing for the Decadal Survey

- NASA, NSF, and NOAA are drafting the Decadal Survey Statement of Task
  - Leveraging the Midterm Assessment's findings and recommendations, focusing the decadal framework to address Agencies needs
- Discussions with NASEM on the scope and approach underway
  - Lessons learned from the Astro2020 and Planetary Science decadal surveys
- NASA Heliophysics Division intends to support mission concept studies
  - New, compelling science to advance and expand the field
    - Leverage ideas from Heliophysics 2050 Workshop (see next slide)
  - Focus on mission concepts that have not had adequate study
- NASA website

  https://science.nasa.gov/heliophysics/resources/2024_decadal_survey

Solar and Space Physics Highlights – NASA

Preparing for the Decadal Survey - Heliophysics 2050 Workshop

- Community discussions about short-, medium-, and long-term strategies for the field
- Compelling science that pushes the boundaries of the current research and gives a path of growth for the community
- Community-produced proceedings that Decadal Survey white papers can leverage for context and clear linkages
- The Workshop will be enabled by NASA but run by the community
  - Science Organizing Committee will manage the program and organize the sessions
  - 128 white paper submissions
- May 2021 (delayed due to COVID-19)
  - decision for in-person vs. virtual by early December 2020

Solar and Space Physics Highlights

Preparing for the Decadal Survey – State of the Profession Data Gathering Panels

Part 1: Experiences from previous efforts - Cherilynn Morrow & Ramon Lopez

with input from Mark Moldwin, Susan White & Fran Bagenal

- Leverage the efforts and insights of the Planetary Decadal (like last time)
- Repeat the studies of the community to compare with the established 2013 baseline
- Request funding for AIP Demographic Survey/Health of the Profession studies up front
- The European Union General Data Protection Regulation is a serious roadblock to accessing AGU and AAS membership databases for community surveys
- Work with NSF and NASA to acquire PI demographics data related to proposals & awards
- Follow up on 2013 Decadal Survey recommendation to NSF
  - Identify Solar & Space Physics as a subfield in NSF studies of academic departments & as a dissertation research area in NSF's Annual Survey of Earned Doctorates (http://www.nsf.gov/statistics/srvydoctorates/)

Solar and Space Physics Highlights

Preparing for the Decadal Survey – State of the Profession Data Gathering Panels

Part 2: Agency experiences and policies on data gathering and sharing with the public

Michael New, Louis Barbier & Michael Wiltberger

- NASA diagnostics of Division of Biological and Physical Sciences PI diversity
  - Demographic data analyses of proposals submitted and proposals selected
- Centrella, New and Thompson Astro2020 white paper on gender diversity markers in 2008-2016 Astrophysics Explorer-class missions (https://baas.aas.org/pub/2020n7i290/release/1)
- CSSP can request aggregated NASA Heliophysics analysis results analogous to above
- NSF will release aggregated gender data at Directorate level, not at program level

CSSP Transitions

Thanks to….

Sarah Gibson

Jiong Qiu

Barbara Thompson

…for their service

A solicitation of nominations for new members will be announced soon.