The National Academies of
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SPACE STUDIES BOARD

Committee on Solar and Space Physics

Presentation to SSB, May 26, 2021

- **Co-Chairs:** Maura Hagan and Tuija Pulkkinen
- **Members:** Brian Anderson, Steven Battel, Rebecca Bishop, Mark Cheung, Christina Cohen, Yue Deng, Dale Gary, Andrés Muñoz-Jaramillo, Merav Opher, Tai Phan, Howard Singer, Leonard Strachan, Nicholeen Viall-Kepko
- **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.

CSSP Spring 2021 Highlights

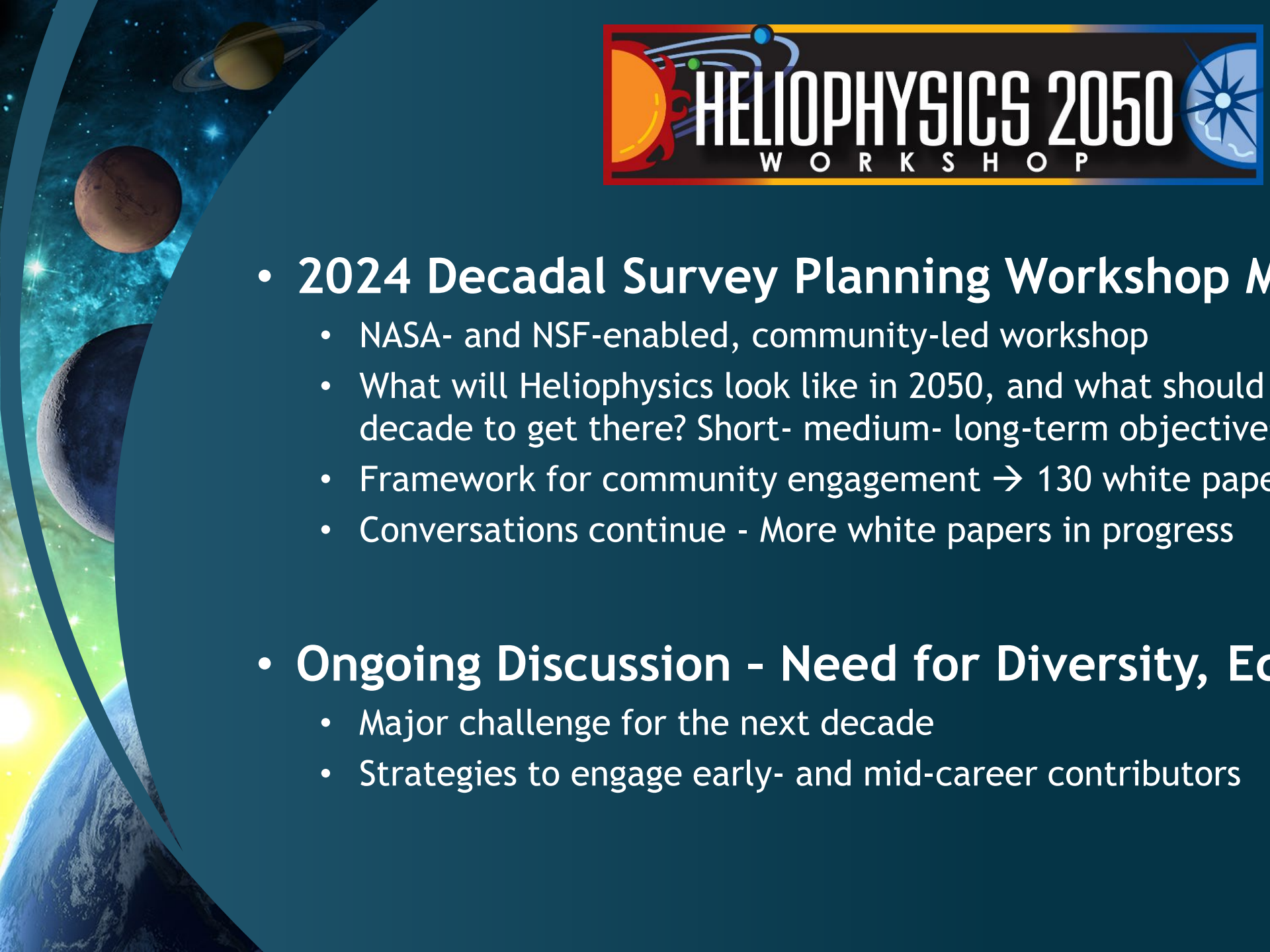
Virtual 24-25 March 2021 Meeting & Follow-on Telecons

- Agency Briefings – NASA, NSF, NOAA
  - Experimented with a new meeting format
  - Shorter presentations focused on new information with more extensive Q&A and discussion
  - Information from previous briefings in back-up slides to ensure new member orientation
  - Successful experiment
    - ✓ more engaged and inclusive meeting participation; lauded by agency reps and CSSP members alike
    - ✓ rich discussion and extensive plans for follow-on action
    - ✓ consequential prioritization of resultant themes via online collaborative whiteboard platform *miro*
- Additional Briefings
  - Planetary Science Workforce Survey
  - Refinement of the Solar-Terrestrial Probe (STP) and Living with a Star (LWS) mission lines
- Interactive Discussion - COVID-19 Impacts on the Solar and Space Physics Communities

CSSP Spring Meeting Outcomes

Themes for Further Discussion

- NASA & NSF Programmatics
- Broader Perspectives on Solar and Space Physics Issues
  - Air Force
  - Department of Defense
  - US Geological Survey
  - Commercial Space Companies (e.g., commercial space weather, rideshare, RF interference)
- Returning to “normal” post-pandemic
- IDEA – Inclusivity, Diversity, Equity, and Accessibility
- Decadal Survey



HELIOPHYSICS 2050 WORKSHOP

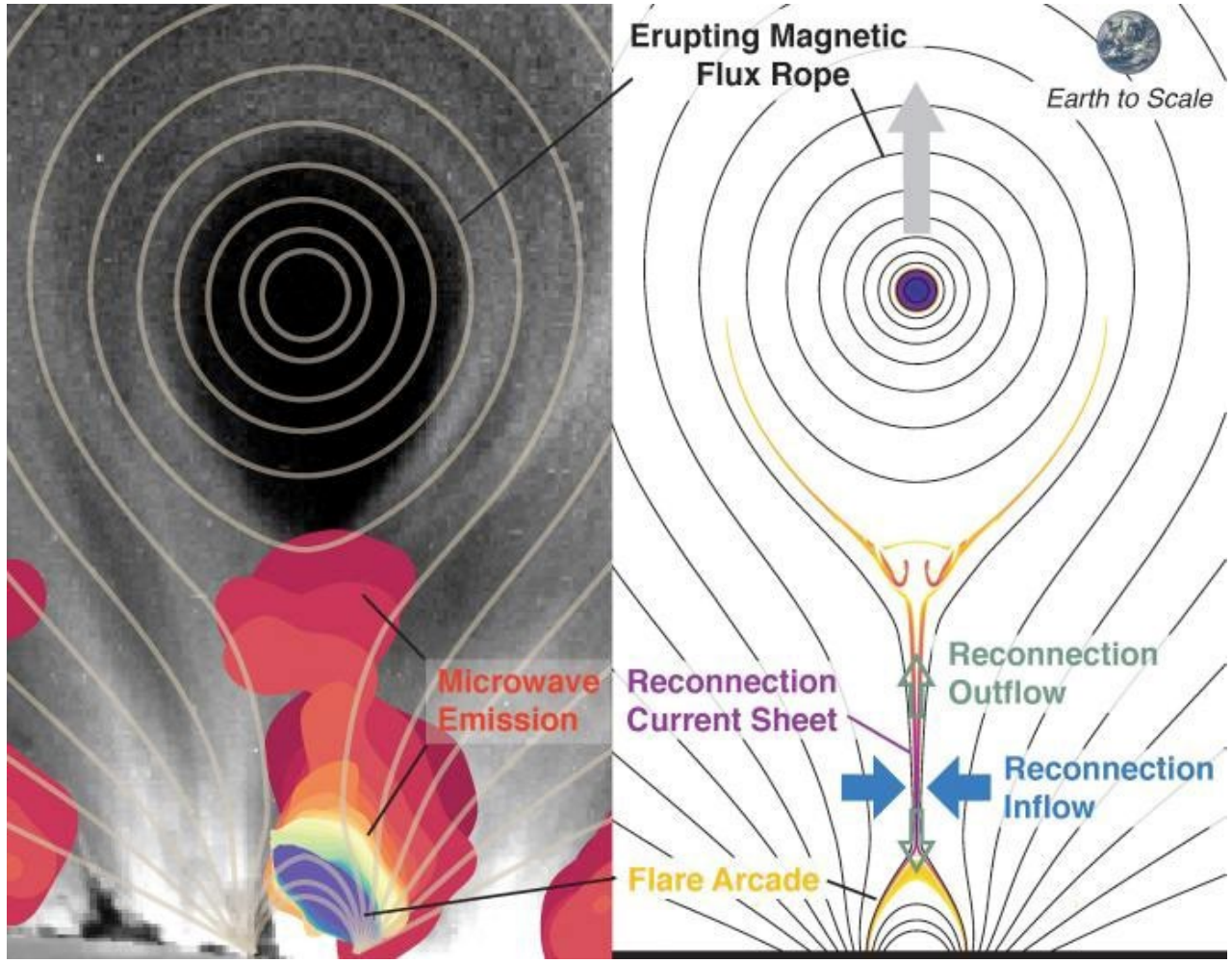
- **2024 Decadal Survey Planning Workshop May 3-7, 2021**
  - NASA- and NSF-enabled, community-led workshop
  - What will Heliophysics look like in 2050, and what should we do in the next decade to get there? Short- medium- long-term objectives & needs
  - Framework for community engagement → 130 white papers & 167 posters
  - Conversations continue - More white papers in progress

- **Ongoing Discussion – Need for Diversity, Equity, Inclusion**
  - Major challenge for the next decade
  - Strategies to engage early- and mid-career contributors

Solar and Space Physics Science Highlight - NSF

Location of Electron Acceleration during Solar Flares

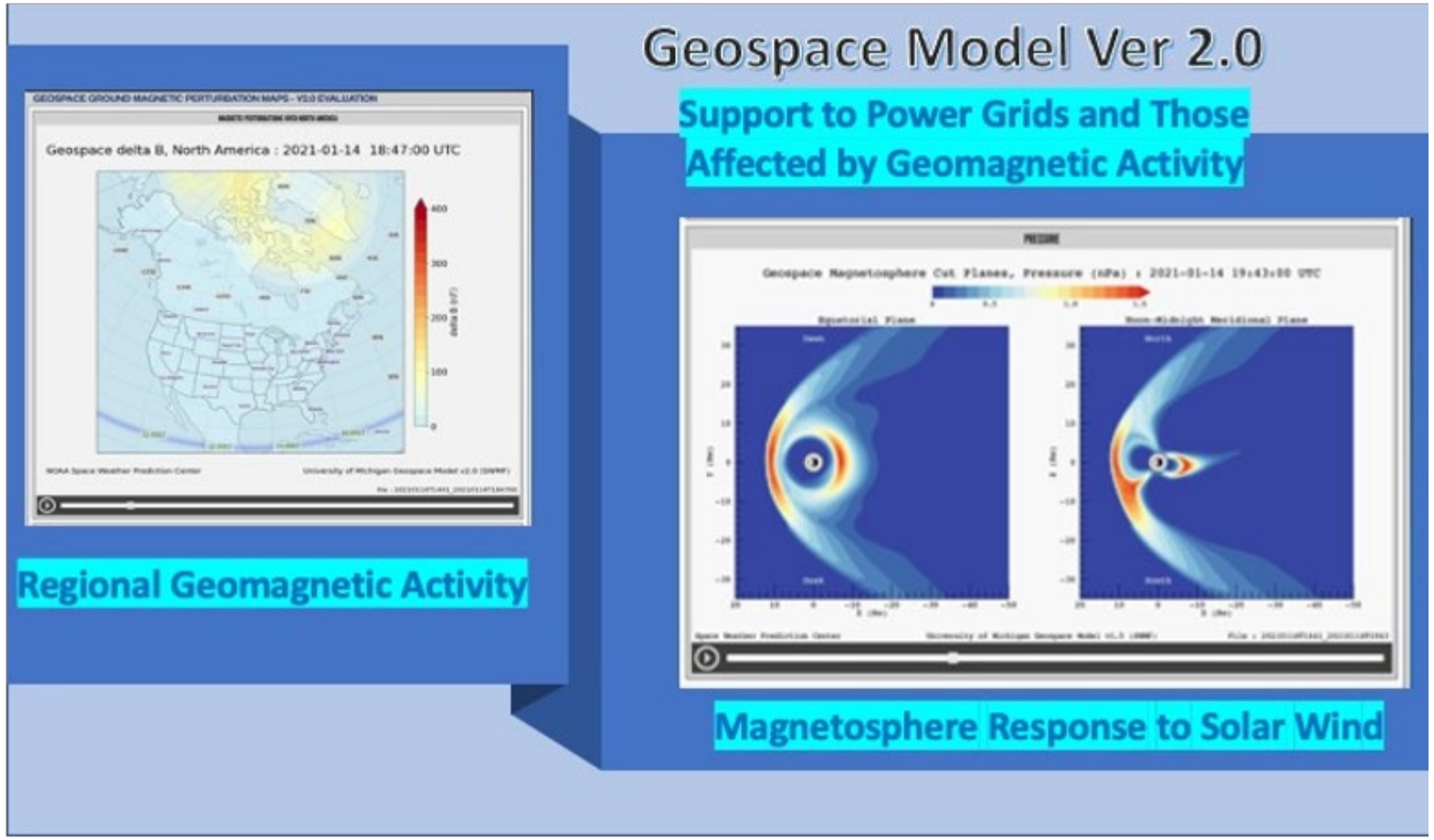
- Observations from the Expanded Owens Valley Solar Array (EVOSA)
- Electron acceleration occurs at the magnetic bottle at the bottom of the current sheet
- Chen, B., Shen, C., Gary, D.E. *et al.* Measurement of magnetic field and relativistic electrons along a solar flare current sheet. *Nat Astron* **4,** 1140–1147 (2020).



Solar and Space Physics Science Highlight - NOAA

Space Weather Prediction Center – Geospace Model, V2 Operational 2/4/21

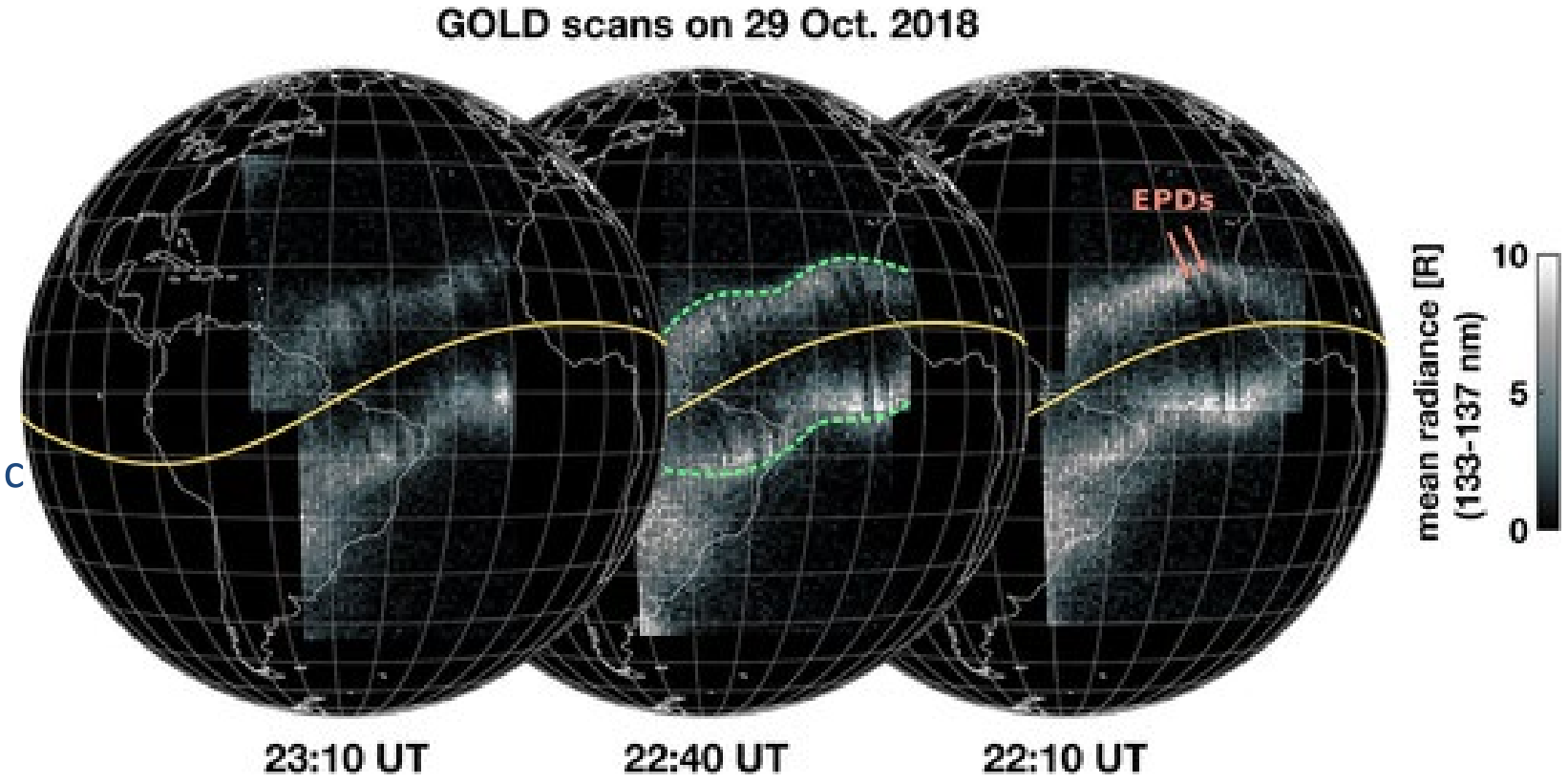
- **Increased Resolution**
  - ~1 to 1.9 million grid cells
  - Better MHD equations solutions
- **Improved auroral oval specification**
- **More realistic Magnetospheric Current Systems**
- New tail composition settings
  - Better **Disturbance Storm Time** (Dst) Index



Solar and Space Physics Science Highlight - NASA

Global-scale Observations of the Limb and Disk (GOLD) Observations

- **Far-Ultraviolet Nightglow Emission Measurements**
  - Proportional to ionospheric electron density
  - Quasi-stationary wave-like structure in the equatorial ionization anomaly (EIA)
  - Symmetric about the magnetic dip equator
- **Equatorial Plasma Depletions (bubbles) imbedded in the EIA**
  - Coincides with wave-like crests



after Rodríguez-Zuluaga et al., *Earth and Space Science*, 2021

Thank You