

ACTIVITY REPORT:

SOLARIS-HEPPA (Solar Influences for SPARC)

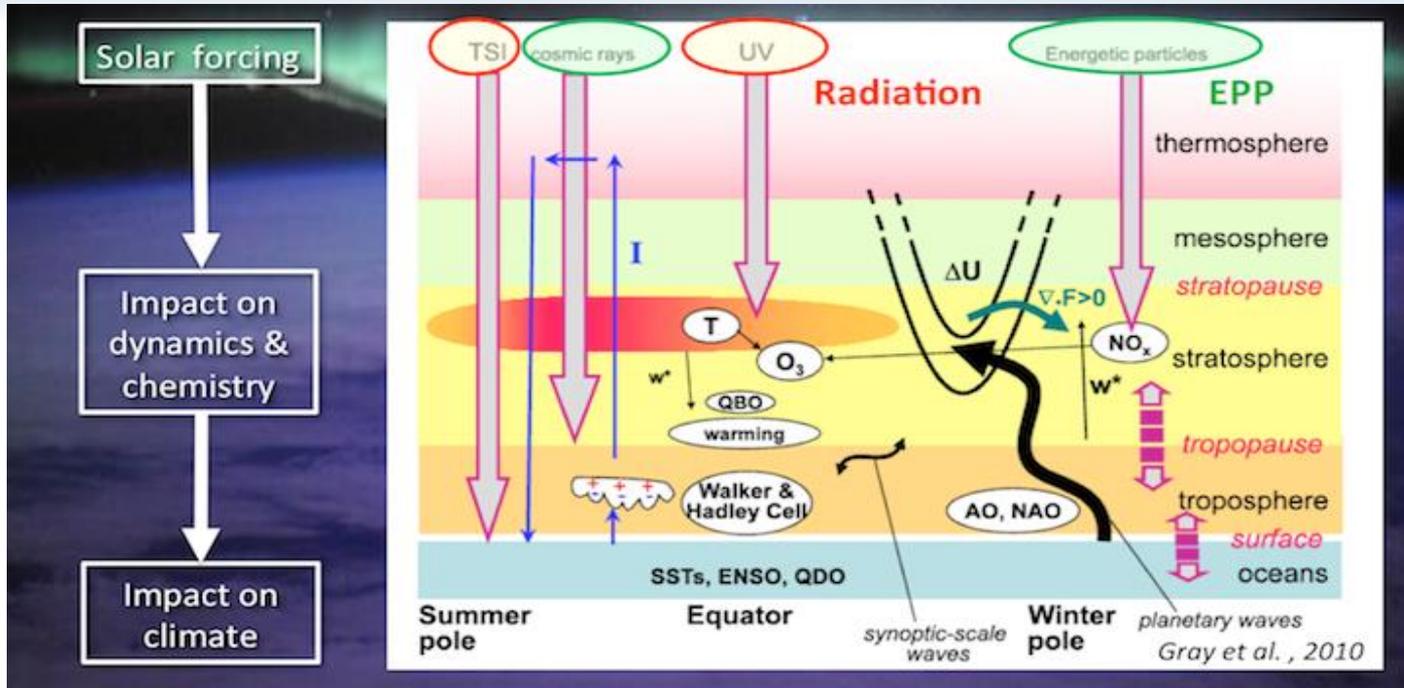
Activity leads:

Katja Matthes, GEOMAR Helmholtz Centre for Ocean Research Kiel &
Christian-Albrechts-Universität zu Kiel, Germany

Bernd Funke, Instituto de Astrofísica de Andalucía (CSIC), Granada, Spain

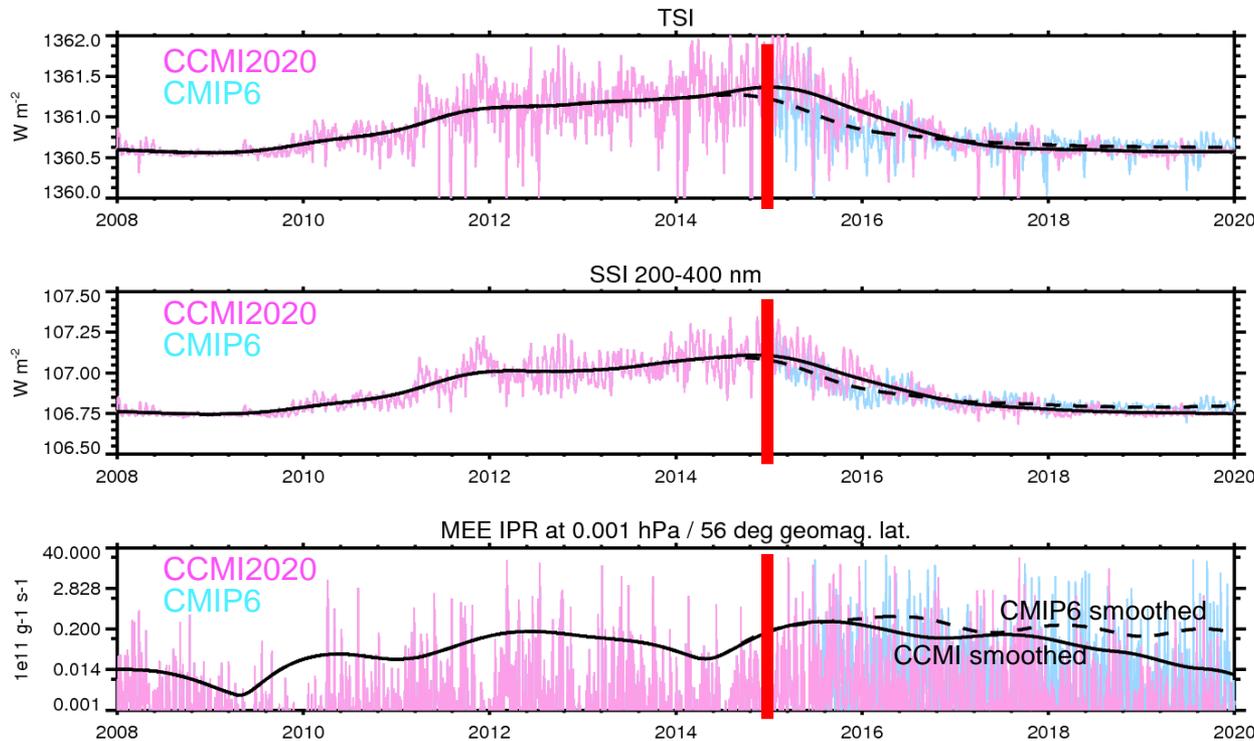
28th SPARC SSG meeting Part II: Activity reporting

February 2021



Activity goal: better understanding of solar influences on climate in order to improve projections and enhance skills of subseasonal-to-seasonal and decadal predictions.

Activity focus: all aspects of the coupled Sun-Earth system including solar forcing components, solar chemistry interactions, as well as dynamical coupling mechanisms and interactions with internal variability modes.



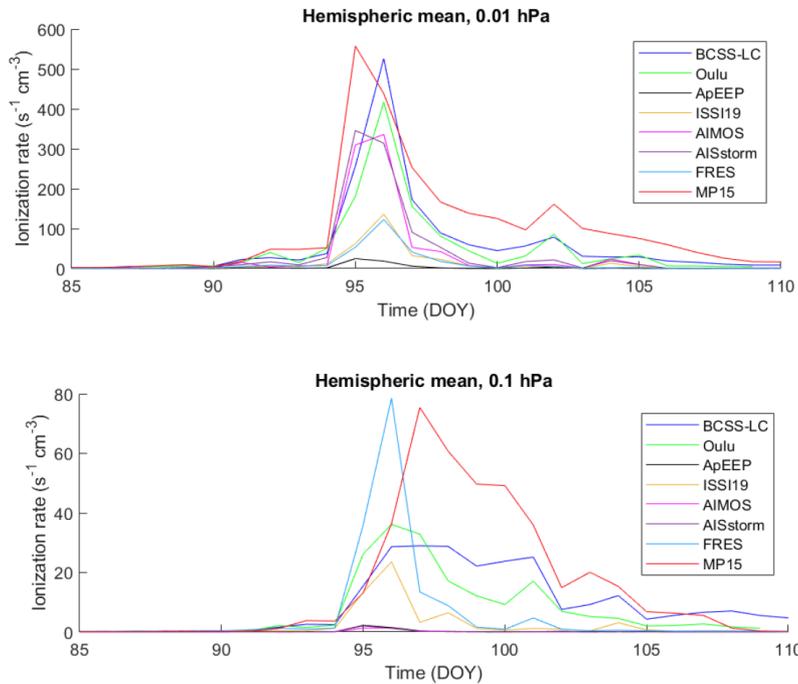
Lower solar irradiance and particle forcing at the end of SC24 than “prognosed” by the CMIP6 ref scenario

Solar forcing recommendations for the planned CCMI experiments in support of the 2022 Scientific Assessment of Ozone Depletion (**CCMI-2020**).

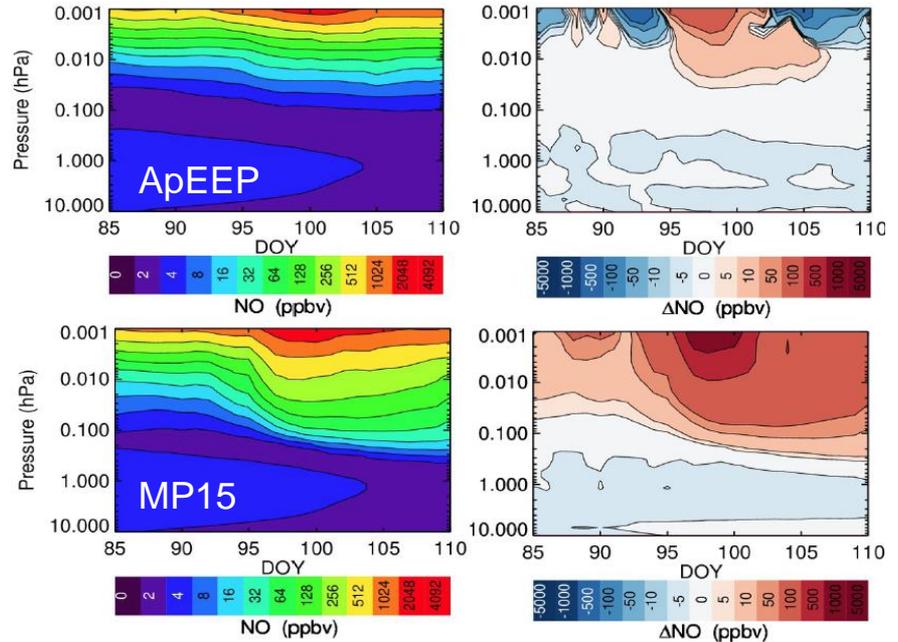
The solar forcing data is an extension of the historical CMIP6 forcing dataset (extended until end of 2019) and can be found at

<https://solarisheppa.geomar.de/solarisheppa/ccmi2022>

Ionization rates for March/April 2010 from 8 models



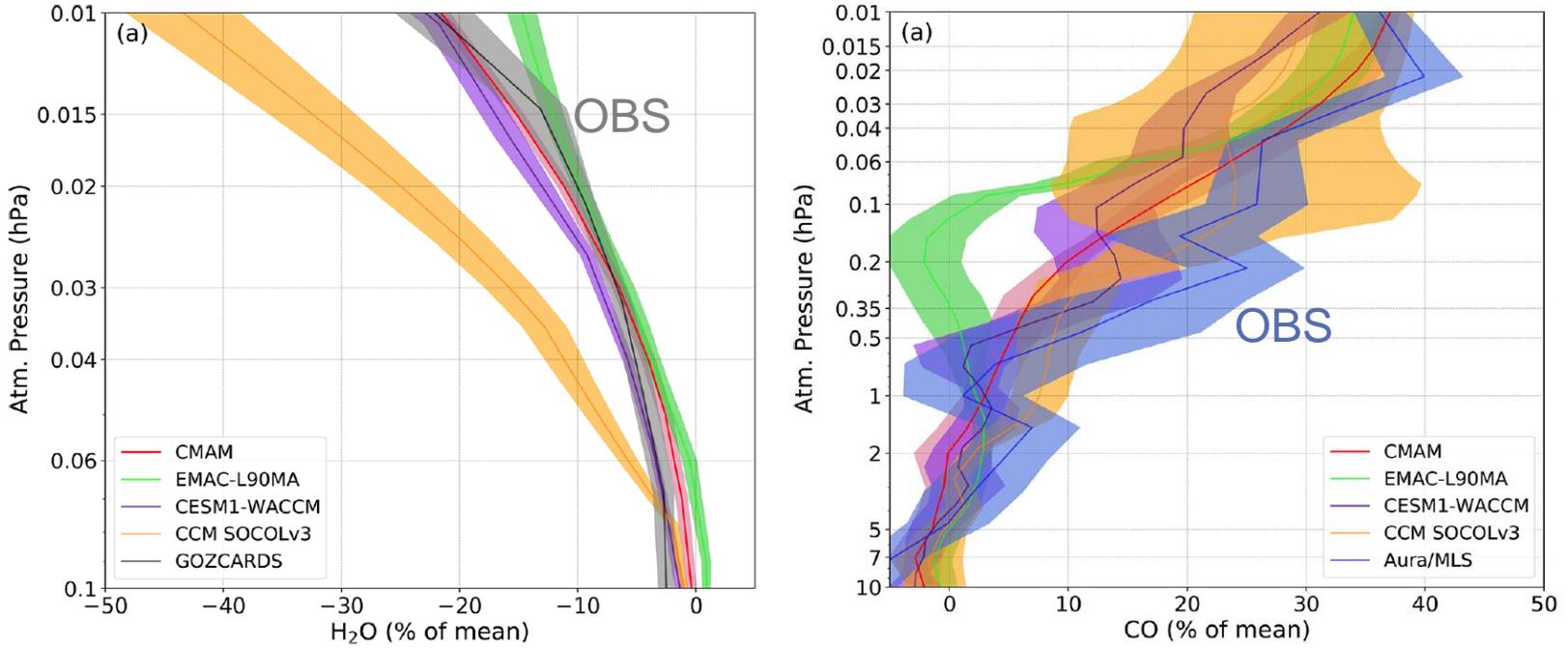
WACCM NO responses with “weakest” (ApEEP) and “strongest” (MP15) ionization rates



Nesse-Tyssoy et al., submitted to JGR

WG5: Assessment of **MEE ionization models** and **atmospheric impacts** by means of an event based multi-model-observation inter-comparison study: two papers (one submitted, the other close to submission)

Observed and modeled responses to solar (F10.7, 100 sfu) variability at 30S-30N



WG3: Assessment of upper stratospheric and mesospheric H₂O and CO responses to the solar cycle in CCM1 REF-CISD simulations and observations (Karagodin-Doyennel et al., ACP, 2021)

- Strong links to WCRP/CMIP6 (solar forcing, DAMIP contributions), as well as WGCM and DCPD
- Strong links to WCRP-NTCP activity (see white paper in Nature Climate Perspectives, Kushnir et al., 2019)
- Strong links to CCMI (focus of current WG activities) and SSiRC (joint effort for natural, i.e. solar +volcanic, forcing impacts)
- Strong links to LOTUS and ATC activities (synergies respect to O₃ and T signal detection)
- Further links to SNAP (decadal predictability), S-RIP (solar influences in reanalysis, particularly USLM), Data Assimilation, TUNER (observational error quantification)

- finalization of the CCMI solar analysis and publication of obtained results in an overview paper. The submission of this paper was originally planned for 2020 but suffered from substantial delays due to COVID-19.
- initiate reassessment of the CMIP6 solar forcing recommendations as preparative step towards CMIP7.
- The postponed 8th HEPPA-SOLARIS Workshop (back in back with Working Group meeting) in Bergen is finally scheduled for June 2021 (but will likely be further delayed)

- we ask for travel support of early career scientists for the planned HEPPA-SOLARIS workshop in June 2021 or later
- We ask for feedback from SPARC community to CMIP6 solar forcing dataset as input/guidance for planned solar forcing revision (in preparation for CMIP7)