PRESTO Officers

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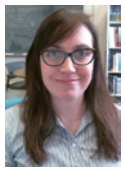
chair
Ramon E. Lopez
USA

co-chair
Jie Zhang
USA

co-chair
Eugene Rozanov
Switzerland

Pillar 1: Sun, interplanetary space and geospace



co-leader
Allison Jaynes
USA

co-leader
Emilia Kilpua
Finland

co-leader
Spiros Patsourakos
Greece

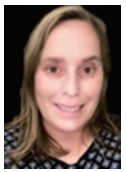
Pillar 2: Space weather and the Earth's atmosphere

co-leader
Loren Chang
Taiwan

co-leader
Duggirala Pallamraju
India

co-leader
Nick Pedatella
USA

Pillar 3: Solar activity and its influence on the climate of the Earth System



co-leader
Odele Coddington
USA

co-leader
Jie Jiang
China

co-leader
Stergios Misios
Greece

PRESTO (PREdictability of the variable Solar-Terrestrial cOupling) is a science program that seeks to improve the predictability of energy flow in the integrated Sun-Earth system on times scales from a few hours to centuries by promoting international collaborative efforts. PRESTO is sponsored by SCOSTEP, the Scientific Committee on Solar Terrestrial Physics.

The Sun is a variable star and its variability influences the Earth's space environment. Furthermore, changing solar magnetic fields, radiative and energetic particle fluxes force the Earth's atmosphere and climate. Transient energetic events such as flares, coronal mass ejections (CMEs), interplanetary shocks, stream interaction regions (SIRs), corotating interaction regions (CIRs) and energetic particles adversely impact critical technologies based in space and on Earth that our society is increasingly dependent upon. At the same time, the middle and upper atmosphere/ ionosphere are impacted by processes originating at lower altitudes, e.g., by atmospheric gravity waves, tides and planetary waves and changes in radiatively active gases. Solar influence on climate is gaining increasing attention since variations in solar activity do not only impact middle atmosphere chemistry and physics, but also impact decadal variability at the Earth's surface. This is of particular interest and importance for decadal climate predictions. With the enhanced understanding of causal connections in the Sun- Earth system over the last several decades, fueled by both observations and theoretical modelling, we are in a position to transform this understanding to improved predictions of the Sun-Earth coupled system, which is of relevance to the society and the focus of the current PRESTO program.

International interdisciplinary programs conducted by SCOSTEP

1976-1979: IMS (International Magnetospheric Study)
1979-1981: SMY (Solar Maximum Year)
1982-1985: MAP (Middle Atmosphere Program)
1990-1997: STEP (Solar-Terrestrial Energy Program)
1998-2002: SRAMP (STEP-Results, Applications, & Modeling Phase)
: PSMOS (Planetary Scale Mesopause Observing System)
: ISCS (International Solar Cycle Study)
: EPIC (Equatorial Processes Including Coupling)
2004-2008: CAWSES (Climate and Weather of the Sun-Earth System)
2009-2013: CAWSES II
2014-2018: VarSITI (Variability of the Sun and Its Terrestrial Impact)
2020-2024: PRESTO (Predictability of the Variable Solar-Terrestrial Coupling)

PRESTO

Predictability of the Variable Solar-Terrestrial Coupling

2020-2024

SCOSTEP
Scientific Committee on Solar-Terrestrial Physics

https://scostep.org

3 Pillars of PRESTO and their science questions

Pillar 1: Sun, interplanetary space and geospace

Question 1.1:

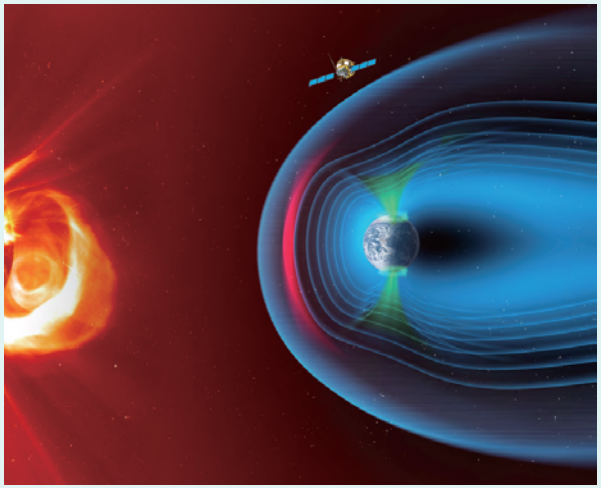
Under what conditions are solar eruptions, CMEs, and SEPs produced, and which indicators of pre-CME and pre-flare activity are reliable?

Question 1.2:

What are the required/critical model input parameters for most successfully forecasting the arrival of SEPs and the geoeffectiveness of CMEs, SIRs/CIRs and the consequences of the interactions between SIRs/ CIRs and CMEs?

Question 1.3:

How are different magnetospheric disturbances and waves (which are critical for the ring current and radiation belt dynamics) driven by variable solar wind structures, and/or internal magnetospheric processes?



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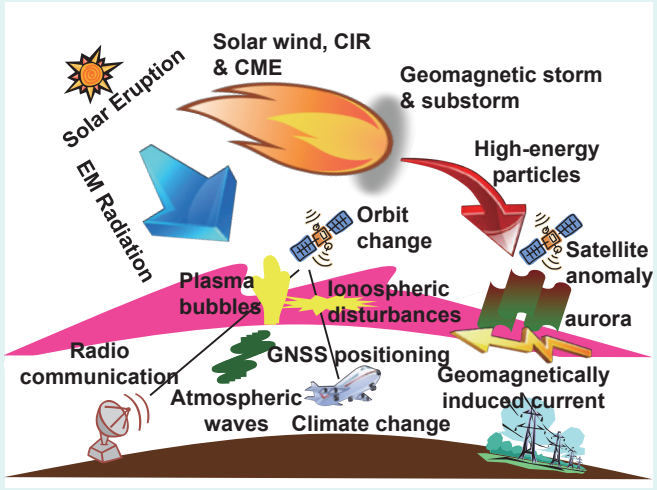

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Pillar 2: Space weather and Earth's atmosphere

Question 2.1:

How does the thermosphere and ionosphere respond to various forcings from above and from below?

Question 2.2:

How do atmospheric waves and composition changes impact the middle and upper atmosphere?

Question 2.3:

What is the magnitude and spectral characteristics of solar and magnetospheric forcing, needed for accurate predictions of the atmospheric response?

Question 2.4:

What is the chemical and dynamical response of the middle atmosphere to solar and magnetospheric forcing?

Pillar 3: Solar activity and its influence on climate

Question 3.1:

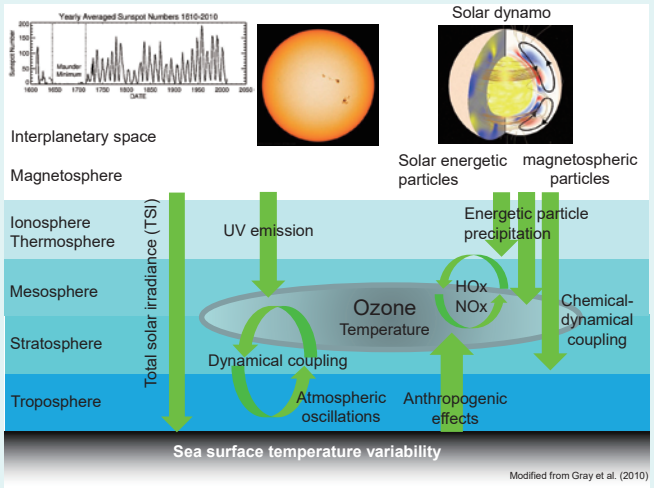
How will future solar activity vary over different timescales and what are the physical reasons for the variations?

Question 3.2:

How will the solar forcing on the Earth's system evolve in the future?

Question 3.3:

What is the role of the coupling between atmospheric regions in the realization of the long- and short-term solar influence on the Earth system and how are those responses affected by increasing green-house gases?



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