

# ACTIVITY REPORT:

## SOLARIS-HEPPA (Solar Influences for SPARC)

Activity leads:

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**27<sup>th</sup> SPARC SSG meeting**

*December 2019  
Boulder, CO, USA*



**SPARC**  
Stratosphere-troposphere  
Processes And their Role in Climate

# Progress and achievements

## Atmospheric dynamics and predictability

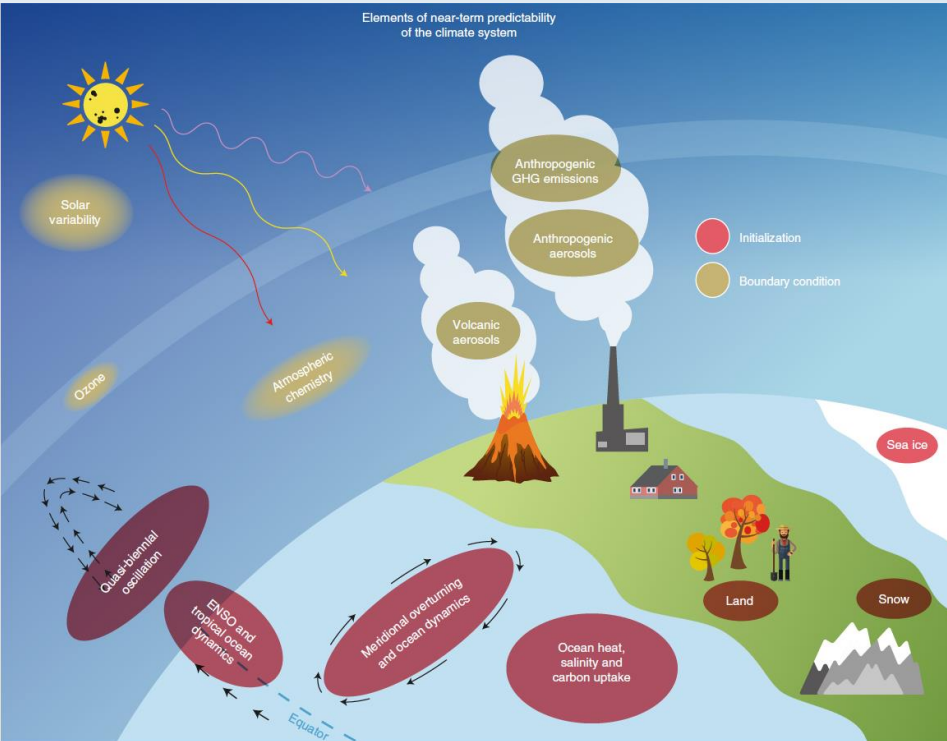


International  
Science Council



World Climate Research Programme

Elements of near-term predictability of the climate system



- Solar variability is a source of decadal climate predictability (Kushnir et al., 2019)
- Solar signals very difficult to separate from internal climate variability (progress in how to extract solar-induced dynamical signals in WG4: methodology)

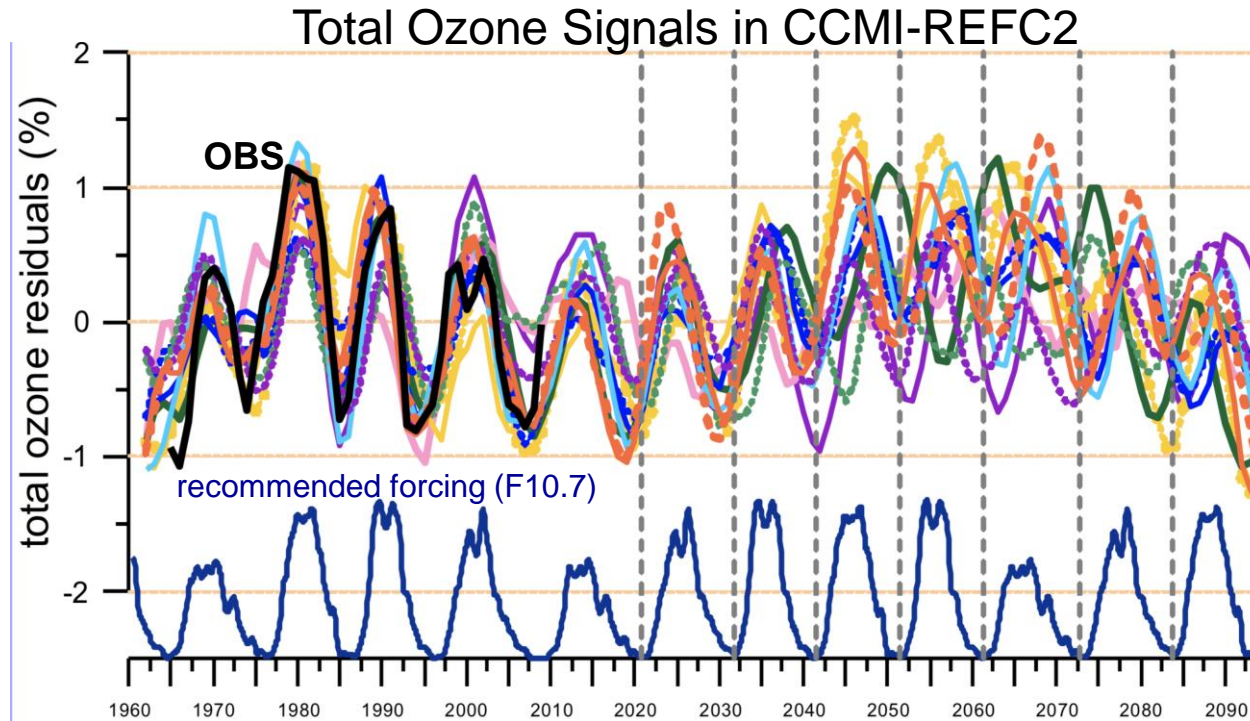
nature  
climate change

PERSPECTIVE

<https://doi.org/10.1038/s41558-018-0359-7>

## Towards operational predictions of the near-term climate

Yochanan Kushnir<sup>1,25\*</sup>, Adam A. Scaife<sup>2,3,25\*</sup>, Raymond Arritt<sup>4,26</sup>, Gianpaolo Balsamo<sup>5</sup>, George Boer<sup>6</sup>, Francisco Doblas-Reyes<sup>7,8</sup>, Ed Hawkins<sup>9</sup>, Masahide Kimoto<sup>10</sup>, Rupa Kumar Koll<sup>11</sup>, Arun Kumar<sup>12</sup>, Daniela Matei<sup>13</sup>, Katja Matthes<sup>14,15</sup>, Wolfgang A. Müller<sup>13,16</sup>, Terence O'Kane<sup>17</sup>, Judith Perlwitz<sup>18,19</sup>, Scott Power<sup>20</sup>, Marilyn Raphael<sup>21</sup>, Akihiko Shimpo<sup>22</sup>, Doug Smith<sup>2</sup>, Matthias Tuma<sup>23</sup> and Bo Wu<sup>24</sup>



- Improved process understanding of solar-chemistry interactions is a major objective of current activities (i.e., CCMI solar analysis).
- An overview paper is in preparation

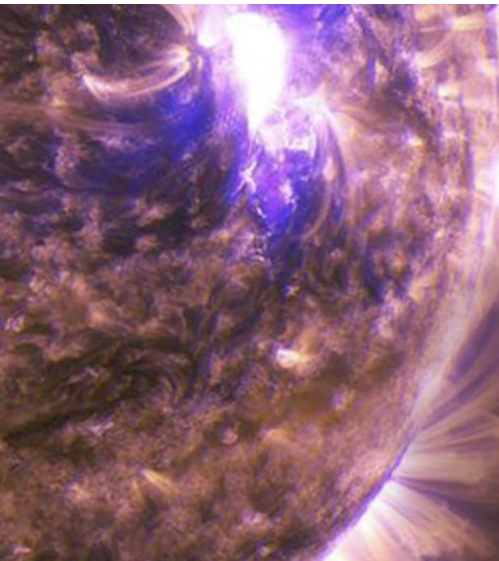


**SOLARIS-HEPPA WG meeting in  
Granada, Spain**

**18./19. September with 17 participants  
(7 remotely)**

**report on the Granada Working Group  
meeting submitted for publication in the  
upcoming SPARC Newsletter**

- Finalization of CCMI solar analysis: submission of CCMI solar analysis overview paper as well as several specific papers related to individual WG activities
- HEPPA-SOLARIS workshop, Bergen, June 2020 (back in back with Working Group meeting): ~50 participants expected (SPARC travel support for early career scientists?)



8th International Meeting  
**HEPPA-SOLARIS 2020**  
Bergen, Norway  
June 8 -10, 2020



**BIRKELAND CENTRE  
FOR SPACE SCIENCE**

- Current SPARC themes and related activities fit very well into the recently defined WCRP strategy goals I-III.
- The **new SPARC strategy** could make **more emphasis in fostering engagement with society** (compliant with WCRP strategic goal IV), particularly regarding the creation of **awareness of stratospheric influences on regional climate**, as well as putting **more emphasis on stratospheric implications for S2S and decadal prediction**.
- **Infrastructure aspects** (i.e. the role of the SPARC data centre) could be reinforced, specifically regarding the **archiving of sustained observations and reference data sets**.

## Emerging research questions:

- **Attribution and detection** of climate variability and trends in particular on a **decadal scale**, to improve **near-term climate predictions** and to fill the gap between weather and seasonal predictions and IPCC-type climate projections since this is relevant to society (people would like to know how the weather will look like in 2030, 2040, 2050).
  - ⇒ more closely link and **work together with the other core programs** (CLIVAR, GEWEX, CLIC)
  - ⇒ more emphasis to “**whole atmosphere**” research by extending the focus to the mesosphere-lower thermosphere region (including observational and modelling aspects)

## **SOLARIS-HEPPA contributions to WCRP Strategic Goals:**

- contributes to Goal I by advancing our understanding of **processes and mechanisms** in the atmospheric component of the climate system.
- contributes to Goal II by providing **external forcing data** sets, quantification of uncertainties, and assessment of their climate impact, thereby **advancing capabilities of S2S and decadal prediction** systems.
- contributes to goal III by advancing our **understanding of non-linear processes and internal variability**, and of system sensitivities to the imposed forcing by the Sun, thereby **reducing uncertainties** in model predictions.