

SOLARIS activity report for 2005 SPARC SSG meeting in Oxford

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After the SSG meeting in August 2004, we organized a session on "Solar influence on climate through mesospheric-stratospheric chemical and dynamical processes" at the AGU Fall meeting (San Francisco, December 2004) to identify the main problems related to the solar influence on climate.

To add depth to the discussion at the AGU sessions, a half day meeting with 20 presentations was held in a hotel. The discussion focused on the following subjects.

- Role of energetic particles on minor constituents
- Ozone distribution and the role of the QBO
- Stratosphere -troposphere coupling
- Interaction with the ocean and cryosphere

Following the above discussion, a new SPARC working group joint with SCOSTEP on solar influence was formed. The new group activity "Solar influence study for SPARC (SOLARIS)" is coordinated by Kodera and Matthes as a continuation of the GRIPS solar influence study group. Additionally, Gray joined the group activity from the CAWSES program. Discussion and exchange of ideas were first made with different model groups through Internet.

Thirteen GCM and CCM groups among the nineteen showing interest to join the new activity, met in Toulouse the 25th July 2005 during the IAGA general assembly for three hours. Problems discussed included:

- Difference of time-varying solar forcing and perpetual solar max/min runs.
- Difference of multiple forcing v.s. solar only forcing
- Origin of the spatial structure of solar signals in ozone and temperature fields.
- Reality of the solar cycle modulation of the period of QBO.
- Stability of the poleward-downward propagation of solar signal.
- Influence of energetic particle in the stratosphere

A comparison of ocean-atmosphere coupled models and paleo-climate simulations were not discussed due to the lack of time and concerned participants.

For the GRIPS intercomparison, the participating models were limited to GCMs with a complete hydrological cycle to study the climatic impact. For the new SOLARIS intercomparison, also mechanistic models will be included to investigate specific processes such as QBO/ozone interaction, QBO period modulation by the solar cycle, lower stratospheric effects on the troposphere, solar proton effects.

One specific problem of the solar influence on the middle atmosphere is that observational results are not that reliable: different persons show different results based on different data set and different analysis methods. The necessity for a coordinated study of the solar signal estimated from observations that is needed for a model evaluation in SOLARIS was also discussed.

The following subthemes and coordinators were proposed.

i) TMST-model (Fomichev)

Thermospheric and mesospheric response

ii) CCM (Langematz)

Ozone and temperature response

iii) A-GCM

Dynamical response and the role of QBO (Gray)

Stratosphere-troposphere coupling (Matthes)

Additionally, a simpler comparison on solar influence on atmospheric tide will be made as an individual initiative by Hirooka.

A small SOLARIS workshop will be planned in one year to discuss new results obtained until then because a lot of groups are now starting new model simulations.