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The stratospheric response to a discrepancy of the SSI data

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The solar radiation is the main energy source in the Earth atmosphere. It is highly variable especially at the ultra-violet region of the solar spectrum. The UV radiation penetrates down to the stratosphere and its variability can lead to the substantial response of the atmosphere in this region. In particular, the Herzberg continuum (200-242 nm) and Hartley band (200-300 nm) irradiance variability strongly influences the stratospheric composition and temperature.
The recent SIM and SOLSTICE measurements onboard SORCE satellite show that the variability in UV can be several times higher than all previous estimates (e.g., Lean et. al., 2005). Moreover the irradiance variability measured by SIM is different from the one measured by SOLSTICE in their common spectral part.
To investigate an influence of these discrepancies to the stratospheric response we have run the 1D and 3D versions of climate-chemistry model SOCOL forced by the different SSI. The SSI input for the SOCOL model is the spectral solar irradiance from 121 to 750 nm. We used four different SSI datasets. Two of them were composites based on the SIM and SOLSTICE measurements. First composite is based on SOLSTICE measurements up to 210 nm and SIM outwards (SIM dominated dataset) and the second one is based on SOLSTICE measurements up to 290 nm and SIM outwards (SOLSTICE dominated dataset).
We have simulated atmospheric evolution for the period from May 2004 to February 2009 and estimated the OH, O_3 and temperature changes between 2004 and 2008. The modeled results were compared with the ERA INTERIM re-analysis and the data measured by several space instruments: SCIAMACHY/ENVISAT, SABER/TIMED, MLS/AURA and SBUV/NOAA. Overall the comparison shows that the atmospheric measurements are in better agreement with the data simulated with SIM and SOLSTICE SSI than with the data modeled with weaker UV variability.