Geophysical Research Abstracts,
Vol. 10, EGU2008-A-06462, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-06462
EGU General Assembly 2008

Measuring and modelling the incoming solar radiation at the top of the atmosphere

E. Raschke, G. Kopp, S. Kinne, Y. Tsushima

Meteorol. Institute University of Hamburg, LASP University of Colorado, JAMSTEC Yokohama, MPI-Meteorology Hamburg

Incoming solar radiation reaching the top of the atmosphere (TOA) is the dominating source for all processes within the Earth's climate system. Therefore for global and regional climate modelling and analyses, its total amount (as expressed by the Total Solar Irradiance, TSI), variations, and distribution over all regions of the globe must be known accurately. While earlier measurements of the TSI (sometimes incorrectly termed the "solar constant") provided values ranging between about 1365 and 1380 Wm^{-2}, the measurements of the newest TSI instrument, the Total Irradiance Monitor, measures a lower value of 1361 Wm^{-2} for the TSI at the minimum of the Sun's activity. During the maximum of the 11-year solar cycle this value is about 1.2 Wm^{-2} higher.

Model results for the TSI during the next (24^{th}) and following sunspot cycles are still too uncertain for conclusive predictions of the climate forcing by the Sun in the near future.

In climate models and in empirical studies of the Earth's radiation budget often slightly different TSI values are used. Further these models compute the distribution of the insolation at the TOA in different ways resulting in different meridional profiles, which affect the simulated regional circulations, as we show with two different climate models.

Very recent results will be presented. Our major recommendation is that models and climate studies use the same values and temporal variations of the insolation at TOA.

Some of these results were obtained within efforts to assess the GEWEX radiation products.