IRS2012-173
International Radiation Symposium 2012
Dahlem Cube, Berlin, Germany, 06 – 10 August 2012

Global inspection of cloud feedbacks to radiative forcings from a satellite perspective

M. Chiacchio (1), M. Wild (2), and B. Liepert (3)

(1) International Centre for Theoretical Physics (ICTP), Trieste, Italy (mchiacch@ictp.it), (2) ETH, Institute for Atmospheric and Climate Science (IAC), Zurich, Switzerland, (3) NorthWest Research Associates, Redmond, Washington, USA

The knowledge of the response of clouds to a warming or cooling of the climate still needs to be properly quantified and its relationship to the cloud radiative effect (CRE) should be more clearly defined. This will be accomplished by first deriving the CRE by using satellite all-sky and clear-sky surface fluxes from the NASA/Global Energy and Water Cycle Experiment (GEWEX) Surface Radiation Budget (SRB) Project and direct satellite measurements from the Clouds and Earth's Radiant Energy System (CERES) instruments currently onboard three different satellite missions. The CRE in the longwave (LW) and shortwave (SW) will be derived at the surface and top of the atmosphere (TOA) throughout the year during the period 2000-2010. This quantity will be investigated on an annual basis and zonally in order to determine the seasonal variability and global distribution, respectively. A detailed inspection of this distribution will determine whether the net CRE will be dominated by SW cooling or LW warming globally and in a particular region. Depending on the time period, the physical mechanism according to the sign of the CRE will be examined through related climate events that are in play, e.g. El Nino including its associated cloud structure. In addition, the TOA CRE from SRB will be compared to that from CERES to identify any discrepancies between the two data sources taking into account their errors. Decadal variations of the CRE will also be analysed to study its temporal evolution through time. Such an exercise will provide a measure for the cloud feedback. These results will be compared to those from other related studies and to provide a better understanding of how clouds respond to a change in the climate.