## Consistent Earth System Data Records for Climate Research: Focus on Shortwave and Longwave Radiative Fluxes

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Shortwave (SW) and longwave (LW) radiative fluxes at the Earth's surface determine the energy exchange between the land and the atmosphere and consequently, control the hydrologic cycle; they are also needed for the evaluation of similar quantities as derived from numerical models. Environmental satellites are considered as useful tools for providing information on such fluxes at various temporal and spatial scales, leading to improvement in estimation of terrestrial water and energy storage and oceanic heat fluxes. Satellite systems differ in their capabilities to provide information that meets a range of existing needs. For instance, geostationary satellites represent well the diurnal cycle however, merging such information for a global view is still a challenge. Information from a single polar orbiting satellite, in particular, from recent ones such as MODIS has numerous advantages yet the number of observations per day is limited. The duration of observations from these more advanced systems is shorter and does not meet climate needs for long term time series. In this paper we report on:

- a) Results from implementing an improved methodology to estimate SW radiative fluxes within the atmospheric system at a climatic time scale (1983-2009) and results from a newly developed inference scheme for deriving LW fluxes at 0.5<sup>0</sup> spatial resolution at 3-hourly time scale. This was done in support of a MEaSURES project aimed at the development of capabilities to estimate major components of the terrestrial water cycle at climatic time scale.
- b) Results on SW and LW surface fluxes at global scale as derived from MODIS observations utilizing updated information on the atmospheric states and surface properties for a period of about ten years of available MODIS observations.

The merits and advantages of each approach will be discussed with a focus on problematic climatic regions (such as high latitudes) and information will be provided on data availability. Results from evaluation of various recent reanalysis products of radiative fluxes against the satellite based estimates will be presented.

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