Geophysical Research Abstracts
Vol. 15, EGU2013-5755, 2013
EGU General Assembly 2013

High resolution land surface energy and water flux estimates from satellite data

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Evaporation is an essential component of the global hydrological cycle connecting the energy and water cycles. In recent years global products of land surface evaporation have become available, however, the spatial and temporal resolution of around one degree in space and monthly means in time are still rather coarse. Within the Global Energy and Water Cycle Experiment (GEWEX) the LandFlux-EVAL project aims at evaluating and intercomparing existing land evaporation products. An early result (Jimenez, et al. 2011) showed that the spread between existing products is quite large with around 25 W m^{-2} at the maximum of the globally averaged annual cycle of 60 W m^{-2}.

In order to address the uncertainties inherent in existing evaporation products this study presents a new product which allows for the estimation of land surface energy and water fluxes based mainly on remote sensing satellite observations as input. Major data input is taken from geostationary satellite observations which are available at a very high temporal (30 min) and moderate spatial ($\leq$ 5x5 km) resolution from the ISCCP reprocessing effort. The land surface scheme consists of a single layer surface resistance model which is driven by consistent input from remote sensing observations and is constrained by the coupling to a dynamic boundary layer model.

This study presents simulations of energy and water flux estimates of the land surface for the period 2001 to 2005. The simulations (P—E) are validated against run-off measurements in globally distributed large catchments as well as in-situ observations from global FluxNet measurements within the simulation domain of 50°N to 50°S.