Geophysical Research Abstracts,
Vol. 10, EGU2008-A-09797, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-09797
EGU General Assembly 2008

The response of a NWP model to the ingestion of observed precipitation data on its different land surface schemes in cases of flash-flood inducing storms

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Improved understanding of land-atmosphere interaction processes is a key element for the accurate and timely forecasting of flash-flood events. In this study, we examine the sensitivity of the WRF-NMM mesoscale model on the different land surface models (LSMs) that is coupled with, when these models are forced with remotely sensed (e.g., radar, satellite) precipitation data instead of the model generated fields. The prescribed technique has been already shown to improve the precipitation forecasting efficiency of the POSEIDON weather forecasting system (based on the NCEP Eta model) upon ingestion of remotely sensed rainfall data in its land surface scheme. The simulations performed in this study are focused on a summertime mesoscale convective system over central Europe that induced flash floods in small mountainous basins. The use of WRF that includes more advanced ice microphysics and land surface schemes facilitates the need for resolving spatial scales (2-4 km) associated with flash floods. A detailed comparison between the different WRF LSMs is provided on the basis of the differences between observed and modelled precipitation and other land surface parameters (e.g., soil moisture, energy fluxes, runoff).