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High resolution energy fluxes climatology and anomalies using satellite data assimilation

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Energy flux exchanges between land and atmosphere are relevant for a number of hydrometeorological processes e.g. extreme atmospheric convection , runoff formation. High resolution climatologies and departures from climatological values of latent and sensible heat exchanges are very important to be quantified both in meteorological and hydrological models for flash flood prediction. They are usually unavailable, due to lack of observations. Here we present the results of a large scale climatological study using a variational data assimilation scheme associated to a simplified energy-mass balance equation at the soil surface: Achab-API (Assimilation Code for HeAt and moisture Balance - Antecedent Precipitation Index). It is a model which estimates evaporative fraction and surface fluxes by assimilating satellite-derived Land Surface Temperatures. Using different data sources (satellite estimates, micrometeorological observations) the model gives a daily spatially distributed description of soil conditions at national scale. The model has been applied to the Italian territory for the period 2005-2009 and its performance validated directly using ground observations and indirectly to estimate initial conditions for operational flash flood models.