Geophysical Research Abstracts,
Vol. 11, EGU2009-12585, 2009
EGU General Assembly 2009

Comparison of ground based and satellite derived regional actual evapotranspiration estimation for continental Greece.

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Evapotranspiration is one of the main components of the hydrologic cycle and its impact to hydrology, agriculture, forestry and environmental studies is very crucial. For this reason a continuous effort arises in order to improve its estimation. In this study in-situ data from selected meteorological stations over continental Greece from the network of Greek National Meteorological Service are utilized and daily actual evapotranspiration values are calculated during the growing season combining the FAO Penman-Monteith (PM) and modified Priestley Taylor (PT) evapotranspiration models. Additionally, SEBAL (Surface Energy Balance Algorithm for Land) method is applied to time series of MODIS Level 1B data set for the estimation of actual ET on a pixel-by-pixel basis. SEBAL is an image-processing model comprised of twenty-five computational submodels that computes evapotranspiration (ET) and other energy exchanges as a component of energy balance. For this study Level 1B visible, near-infrared and thermal infrared radiation channels are utilized for the growing season (May – September) of 2004. The same period is utilized for the processing of conventional actual ET calculation. Comparison of actual ET time series gives satisfactory agreement. After mapping SEBAL ET values and comparing them with surface ET values, satellite derived actual ET estimates found to be higher during the study period. The possible reasons for this deviation in actual ET estimation using the data from MODIS sensors are the coarse resolution (1x1 km) of thermal bands and the systematic errors due to theoretical simplifications on the computation of soil heat flux at the first stages of SEBAL methodology. On the other hand, it is remarkable that SEBAL estimates match the expected variance of ET values between open water bodies and soil. These results indicate that combination of MODIS satellite data with surface meteorological data could provide an efficient tool for the estimation of regional actual ET used for water resources and irrigation scheduling and management.