Geophysical Research Abstracts
Vol. 14, EGU2012-7422, 2012
EGU General Assembly 2012

Improving evapotranspiration in land surface models by using biophysical parameters derived from MSG/SEVIRI satellite

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Vegetation parameters derived from the geostationary satellite MSG/SEVIRI have been distributed at a daily frequency since 2007 over Europe, Africa and part of South America, through the LSA-SAF (http://landsaf.meteo.pt/). We propose here a method to handle two new remote sensing products from LSA-SAF, leaf area index and Fractional Vegetation Cover, noted LAI and FVC respectively, for land surface models at MSG/SEVIRI scale. The developed method relies on an ordinary least-square technique and a land cover map to estimate LAI for each model plant functional types of the model spatial unit. The method is conceived to be applicable for near-real time applications at continental scale. Compared to monthly vegetation parameters from a vegetation database commonly used in numerical weather predictions (ECOCLIMAP-I), the new remote sensing products allows a better monitoring of the spatial and temporal variability of the vegetation, including inter-annual signals, and a decreased uncertainty on LAI to be input into land surface models. We assess the impact of using LSA-SAF vegetation parameters compared to ECOCLIMAP-I in the land surface model H-TESSEL at MSG/SEVIRI spatial scale. Comparison with in-situ observations in Europe and Africa shows that the results on evapotranspiration are mostly improved, and especially in semi-arid climates. At last, the use of LSA-SAF and ECOCLIMAP-I is compared with simulations over a North-South Transect in Western Africa using LSA-SAF radiation forcing derived from remote sensing, and differences are highlighted.