

Assimilation of satellite-derived soil moisture into the COSMO model

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In operational weather forecasts, soil moisture is most often not assimilated at all. Usually, it is taken from the model first guess and adapted by an analysis so that the increments of low-level atmospheric temperature and moisture are minimized. However, in semi-arid regions, where land-surface heterogeneities often control the initiation of convective cells, the realistic representation of the soil moisture essentially influencing the land-surface temperature and the bowen ratio becomes more important.

The technique of the CDF (cumulative distribution function)-matching was chosen to assimilate AMSR-E soil moisture for the initialization of the COSMO model. For this purpose, a two-year climatology of soil moisture for West Africa was produced with the stand-alone version of the COSMO soil-model TERRA . The model was forced with data prepared for the AMMA Land surface Model Intercomparison Project (ALMIP). Two soil-moisture products derived from AMSR-E measurements were compared for the whole year of 2006, showing significant differences due to largely differing algorithms. Finally, the satellite-derived soil moisture from both products was matched to that of TERRA. The resulting soil-moisture fields as well as COSMO forecasts started from those turned out to be quite similar.