Assimilation af remote sensing data i vejrforudsigelsemodel.

Charlotte Bay Hasager[1]**, Niels Woetmann Nielsen**[2]**, Henrik Soegaard**[3]**, Eva Boegh**[3]**, Jens Hesselbjerg Christensen**[2]**, Niels Otto Jensen**[1]**, Michael Schultz Rasmussen**[3]**, Poul Astrup**[1] **and Ebba Dellwik**[1]

[1]Risø National Laboratory, Wind Energy Department, Frederiksborgvej 399, 4000 Roskilde, Denmark

[2]Danish Meteorological Institute, Lyngbyvej 100, 2100 Copenhagen Ø, Denmark

[3]University of Copenhagen, Institute of Geography, Øster Voldgade 10, 1350 Copenhagen K, Denmark

Abstract

Earth Observation (EO) data from imaging satellites are analysed with respect to albedo, land and sea surface temperatures, land cover types and vegetation parameters such as the Normalized Difference Vegetation Index (NDVI) and the leaf area index (LAI). The observed parameters are used in the DMI-HIRLAM-D05 weather prediction model in order to improve the forecasting. The effect of introducing actual sea surface temperatures from NOAA AVHHR compared to climatological mean values, shows a more pronounced land-sea breeze effect which is also observable in field observations. The albedo maps from NOAA AVHRR are rather similar to the climatological mean values so for the HIRLAM model this is insignicant, yet most likely of some importance in the HIRHAM regional climate model. Land cover type maps are assigned local roughness values determined from meteorological field observations. Only maps with a spatial resolution around 25 m can adequately map the roughness variations of the typical patch size distribution in Denmark. A roughness map covering Denmark is aggregated (ie area-average non-linearly) by a microscale aggregation model that takes the non-linear turbulent responses of each roughness step change between patches in an arbitrary pattern into account. The effective roughnesses are calculated into a 15 km by 15 km grid for the HIRLAM model. The effect of hedgerows is included as an added roughness effect as a function of hedge density mapped from a digital vector map. Introducing the new effective roughness maps into the HIRLAM model appears to remedy on the seasonal wind speed bias over land and sea in spring. Further is a method for the estimation the evapotranspiration from albedo, surface temperatures and NDVI succesfully compared to field observations. The HIRLAM predictions of water vapour at 12 GMT are used for atmospheric correction of the satellite parameters derived in the afternoon.

The work is reported in a report
Hasager, C.B., Nielsen, N.W., Soegaard, H., Boegh, E., Christensen, J.H., Jensen, N.O., Rasmussen, M.S., Astrup, P. and Dellwik, E. 2002 SAT-MAP-CLIMATE project results. Risø-R-1350(EN), Roskilde, Denmark. Available at http://www.risoe.dk/rispubl/VEA/ris-r-1350.htm