ABSTRACT

The Ags parameterization of canopy conductance from ISBA-Ags is implemented in TESSEL, the ECMWF land surface scheme. We present first results of the investigation of the model behavior in view of an operational use in a data assimilation system. It is shown that the performance of the Ags module is sensitive to the land surface model in which it is embedded.

AGS PARAMETRIZATION

The present ECMWF land surface scheme TESSEL distinguishes 6 tiles over land surfaces. Vegetation is represented by a dominant high type and dominant low type [Van den Hurk et al., 2000]. The canopy conductance is calculated using a Jarvis-type parameterization, which assumes that environmental factors act independently on the conductance.

A more realistic, physiological way to parameterize the canopy conductance is to derive it from the CO$_2$ assimilation by the vegetation [Jacobs et al., 1996]. This so-called Ags scheme is implemented within the ISBA soil-vegetation-atmosphere transfer (SVAT) scheme at Meteo France, including a biomass evolution scheme [Calvet et al., 1998]. Biomass growth directly depends on CO$_2$ assimilation, whereas biomass decline is based on nitrogen dilution [Calvet and Soussana, 2001]. Through the dynamic representation of LAI, the model can account for interannual variability, droughts in particular.

We implemented the Ags module in TESSEL, referring to as C-TESSEL. For that purpose, we increased the number of vegetation tiles to represent the 7 plant functional types of ISBA-Ags (deciduous, coniferous and evergreen trees, C3 and C4 grass, C3 and C4 crops).

We present first results of the investigation of the model behavior in view of an operational use in a data assimilation system using leaf area index (LAI) data from satellite measurements.
Fig. 1. Model output of C-TESSEL compared with ISBA-Ags for SMOSREX 2003: a. Soil moisture stress function, \((\theta - \theta_{pwp})/(\theta_{cap} - \theta_{pwp})\); b. LAI.

The representation of the soil and its characteristics determines for a large part the availability of soil water. We have seen that the Ags module is sensitive to soil moisture, so it is obvious that the performance of the Ags module depends on the land surface model in which it is implemented. Apart from the soil, other differences in representations and parameterizations may influence the Ags behavior both directly and indirectly. Examples are the surface climatology (albedo, roughness length) and the interception reservoir.

REFERENCES


