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Evaluation of an improved vegetation parameterisation in the ECMWF land surface model.

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The land surface scheme TESSEL (Beljaars et al., 1999) has been extensively used at ECMWF for numerical weather, climate prediction and in reanalysis project (i.e ERA40). TESSEL has been tested at various scales (local, catchment, global) with online (atmospheric coupled) and offline version. Some efforts have recently been made to improve the description of the vegetation, a key component surface atmosphere interaction.

In the frame of the geoland/ONC project, TESSEL has been modified by:

1) Introducing a new vegetation map with a seasonal cycle of vegetation cover and leaf area Index (LAI) based on the ECOCLIMAP dataset (Masson et al., 1999).

2) Using a more mechanistic description of the vegetation physiology based on the ISBA-A-gs model (Calvet et al., 1998).

These changes are expected to provide a better description of the evaporation together with the estimation of the vegetation CO_2 fluxes. The description of the carbon cycle gives ultimately the possibility of interactive vegetation, which can react to anomalies of the weather (i.e vegetation mortality during a drought).

The two modifications are tested sequentially. First, simulation are realised with the new vegetation parameter from ECOCLIMAP (new land cover map, Minimum stomatal resistance, new vegetation cover) in a version called E-TESSEL (for ECOCLIMAP TESSEL). Then E-TESSEL is modified to describe the photosynthesis and the carbon fluxes. The stomatal conductance is made dependant on the photosynthesis. The coupled version, called C-TESSEL, allows a better description of the control

of vegetation on evapotranspiration. In this work we present an analysis of the both E-TESSEL and C-TESSEL

The models are tested offline at different locations presenting contrasted vegetation. We will present an evaluation of these models focused on the evaporation, energy balance and where available, the CO_2 fluxes.

References :

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