Geophysical Research Abstracts
Vol. 15, EGU2013-14013, 2013
EGU General Assembly 2013

A watershed model to integrate EO data

Eduardo Jauch (1), Pedro Chambel-Leitao (1), Almeida Carina (1), David Brito (1), Ines Cherif (2), Thomas Alexandridis (2), and Ramiro Neves (1)

(1) MARETEC, Instituto Superior Técnico, Technical University of Lisbon, Av. Rovisco Pais 1049-001 Lisboa, Portugal. e-mail: eduardo.jauch@ist.utl.pt, (2) Lab of remote sensing and GIS, School of Agriculture, Aristotle University of Thessaloniki, Greece. e-mail: icherif@yahoo.com; thalex@agro.auth.gr

MOHID LAND is a open source watershed model developed by MARETEC and is part of the MOHID Framework. It integrates four mediums (or compartments): porous media, surface, rivers and atmosphere. The movement of water between these mediums are based on mass and momentum balance equations. The atmosphere medium is not explicity simulated. Instead, it's used as boundary condition to the model through meteorological properties: precipitation, solar radiation, wind speed/direction, relative humidity and air temperature. The surface medium includes the overland runoff and vegetation growth processes and is simulated using a 2D grid. The porous media includes both the unsaturated (soil) and saturated zones (aquifer) and is simulated using a 3D grid. The river flow is simulated through a 1D drainage network. All these mediums are linked through evapotranspiration and flow exchanges (infiltration, river-soil growndwater flow, surface-river overland flow). Besides the water movement, it is also possible to simulate water quality processes and solute/sediment transport.
Model setup include the definition of the geometry and the properties of each one of its compartments. After the setup of the model, the only continuous input data that MOHID LAND requires are the atmosphere properties (boundary conditions) that can be provided as timeseries or spacial data. MOHID LAND has been adapted the last 4 years under FP7 and ESA projects to integrate Earth Observation (EO) data, both variable in time and in space. EO data can be used to calibrate/validate or as input/assimilation data to the model. The currently EO data used include LULC (Land Use Land Cover) maps, LAI (Leaf Area Index) maps, EVTP (Evapotranspiration) maps and SWC (Soil Water Content) maps. Model results are improved by the EO data, but the advantage of this integration is that the model can still run without the EO data. This means that model do not stop due to unavailability of EO data and can run on a forecast mode.
The LCLU maps are coupled with a database that transforms land use into model properties through lookup tables. The LAI maps, usually based on NDVI satellite images, can be used directly as input to the model. When the vegetation growth is being simulated, the use of a LAI distributed in space improve the model results, by improving, for example, the estimated evapotranspiration, the estimated values of biomass, the nutrient uptake, etc.
MOHID LAND calculates a Reference Evapotranspiration (rEVTP), based on the meteorological properties. The Actual Evapotranspiration (aEVTP) is then computed based on vegetation transpiration, soil evaporation and the available water in soil. Alternatively, EO derived maps of EVTP can be used as input to the model, in the place of the rEVTP, or even in the place of the aEVTP, both being provided as boundary condition. The same can be done with SWC maps, that can be used to initialize the model soil water content.
The integration of EO data with MOHID LAND was tested and is being continuously developed and applied for support farmers and to help water managers to improve the water management.