Geophysical Research Abstracts,
Vol. 10, EGU2008-A-09515, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-09515
EGU General Assembly 2008

Regional scale extension “satellite assisted” FAO-56 model. Case study in southern Spain

E. A. Torres, A. Calera, E. Rubio, J. Gonzalez
Instituto de Desarrollo Regional, Universidad de Castilla-La Mancha (enrique.torres@uclm.es)

In semi arid regions evapotranspiration (ET) is the largest component of the water balance. Therefore, the accuracy of ET determination in the water budget is critical. Usually, hydrological models just use information of vegetation class neglecting information about actual vegetation condition, i.e. water stress, management, diseases, etc. The methodological approach presented here will be based on the capability to derive the vegetation conditions from spectral vegetation indices in the form of a basal crop coefficient. So, this “spectral basal crop coefficiente”, Kcb*, jointly with the reference evapotranspiration and coupled with a daily soil water balance in the root zone, allows us to perform a more accurate determination of ET (actual ET). This approach introduces the vegetation status by means of Kcb* and also the possible reduction of ET due to the water shortage in the root zone, as well as is described in FAO-56 methodology.

The extension of this methodology to large areas requires the spatial distribution of Kcb* and its temporal evolution along the annual hydrological cycle. A multi-temporal sequence of multi-spectral satellite images in the solar range can be used for this purpose. So, the basic input for characterizing the status and dynamics of vegetation is the information derived from multi-temporal image sequence of high spatial resolution (typically achievable resolution is 1 ha, for Landsat imagery). Applying water balance at this spatial resolution we can obtain diffuse recharge, as percolation under the root zone at the grid level.

These basic assumptions have been implemented in a computer model HidroMOREő programmed in ANSI C language. It was applied for several annual hydrological cy-

cles (moist and dry) over the aquifer 08.29 (Mancha Oriental) in Albacete, Spain, a semi-arid area (350 mm of average annual precipitation and 1200 mm of accumulated reference evapotranspiration) of 10.000 Km2, of which 10%, about 100.000 hectares, are irrigated using groundwater abstraction. Required input, such as daily reference evapotranspiration and precipitation layers, are estimated from meteorological stations and soil characteristics are assigned from an available soil textures map.

Results show that the total water extractions and the total recharge change from year to year and recharge is strongly influenced by the local precipitation. The temporal distribution of recharge usually happens around single events, associated with heavy rain. In wet years, the recharge is lightly higher than extractions, but in dry years the extractions are much higher than the recharge. To avoid aquifer overexploitation, urgent measures must be adopted, replacing groundwater abstraction by surface water.