



Identifying the spatio-temporal trends in snow cover in upper Euphrates basin using remote sensing

S. Sürer (1), Z. Akyürek (2), A. Arda Şorman (3), A. Ş. Şorman (3), and A. Ünal Şorman (2)

(1) Middle East Technical University, Geodetic and Geographic Information Technologies, Turkey (serdarsurer@gmail.com),

(2) Middle East Technical University, Civil Engineering Department, Turkey, (3) Anadolu University, Civil Engineering Department, Turkey

The Euphrates and Tigris are the two major rivers which serve as the most important water resources in the Middle East. The precipitation falls mostly in the form of snow over higher elevations of Euphrates Basin and remains on the ground for nearly half of the year. Monitoring of this snow covered area (SCA) which is a key element for hydrological cycle is crucial for making accurate forecasts of snowmelt discharge especially for energy production, flood control, irrigation and reservoir operation optimization in the upper Euphrates basin. Remote sensing allows detection of spatio-temporal patterns of snow cover across large areas in inaccessible terrain like Eastern part of Turkey which is highly mountainous.

In this study the seasonal evaluation of snow cover from 2000 to 2008 is performed by using eight-day snow cover products (MOD10C2). The MOD10C2 is a climate modeling grid product at a 0.05° resolution with global coverage and 8-day availability. The utility of the snow recognition product (SNOBS-1b) of EUMETSAT Hydrological Application Facility (HSAF) project in obtaining snow cover area is also analyzed. The SNOBS-1b snow cover product is a daily product having 0.05° resolution. The final version of SNOBS-1b product has started to be produced since January 2008 by the project team members (METU, AU). Therefore the comparison in retrieving snow cover area from MOD10C2 and SNOBS-1b was performed for the snow year 2007-2008 for eastern part of Turkey. In comparison of the snow cover area for the period of 2000-2008, an earlier melting was observed in the last three years compared to the previous years. This early melting was seen obviously at lower elevation zones (lower than 2000 m) of the basin. At elevation zones having higher elevations than 2000m, the spatio-temporal pattern of snow cover does not show too much variation among the years. In order to investigate the warming trend in the study area, the long term precipitation and temperature data collected at meteorological stations located in the basin were used. Using the snowmelt runoff model (SRM), the relationship among air temperature, precipitation, snow cover and runoff is analyzed. The potential effects of climate change on the runoff characteristics of the upper Euphrates basin are discussed.