Geophysical Research Abstracts
Vol. 13, EGU2011-7039-1, 2011
EGU General Assembly 2011

Spatial and Temporal Analysis of the Snow Line in the Eastern Part of Turkey Based on MODIS-Terra Data for 2000-2010 period

Kenan Bolat (1), Serdar Surer (1,2), Orhan Gokdemir (1), and Zuhal Akyurek (3)

(1) Hidrosaf Software and Informatics Ltd. Co., Ankara, Turkey, (2) Middle East Technical University, Geodetic and Geographic Information Technologies Department, Ankara, Turkey, (3) Middle East Technical University, Civil Engineering Department, Ankara, Turkey

Snow cover is an important feature of mountainous regions. Depending on latitude, the higher altitudes are completely covered by snow for several months in a year. The high surface albedo of snow greatly influences the local climate, decreasing the surface net radiation and thus the energy transfer. Snow cover is an important factor for optimum use of water in energy production, flood control, irrigation and reservoir operation optimization, as well as ski tourism. The snow line is an indicator of snow coverage. Its spatial and temporal fluctuations reflect climatic behaviour. Turkey is a mountainous country and many basins in the country are largely fed from snow precipitation whereby nearly two-thirds occur in winter and may remain in the form of snow for half of the year. The concentration of discharge mainly from snowmelt during spring and early summer months causes not only extensive flooding, inundating large areas, but also the loss of much needed water required for irrigation and power generation purposes during the summer season. The difficulty in accessibility to perform the measurements at the remote sites makes the use of satellite images and/or aerial photographs in monitoring and estimating the snow parameters more valuable. In this study it is aimed to monitor the spatial and temporal changes in the snow line in Karasu basin for the period of 2000-2010. Time series data of the snow line were obtained from the snow cover areas derived from MODIS-Terra data. MOD09GA and MOD11A1 data covering Turkey boundaries have been used. 10 MODIS data tiles for each day which makes more than 35.000 tiles for 11 years period have been explotied. The daily process load of data was around 400 MB and the total size of the satellite time series data was more than 4 TB that were used for the analyses. Snow mapping was performed by reclasfying the fractional snow cover areas obtained by the algorithm derived for the region. An automatic approach was developed in deriving the snow lines. Maximum snow cover occurs in winter months in Karasu basin and the amount of maximum snow cover is between 80 -90 % of the total area. 45% of the area is covered with snow in the autumn, the melting occurs in spring and 15% of the area is covered with snow during spring months. At the begining of April there is snow above 1900 m in the basin, at the lower elevations snow does not stay after the end of February.The previous studies indicate warming trends for the basin's temperatures. Statistically insignificant decreasing trends in precipitation in the basin except autumn season for the period of 1975-2008 was obtained. An insignificant downward trend in Karasu basin's flow and very slight shift in snow melting time was also detected in the same study. The spatial and temporal behaviour of the snow line is analyzed in a complex terrain. The use of snow line as an indicator of climate change for the mountainous areas is discussed.