A webgis supported snow information system with long time satellite data for Turkey

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KARBILSIS is an online platform which is developed in order to provide end-users with daily remote sensing snow products for Turkey (www.karbilsis.com). The project has been started as a research activity after an award by Ministry of Science and Technology has been granted to our company.

At the first stage of our project MODIS atmospherically corrected reflectance data has been downloaded covering the period of 2000-2011 which makes more than ten years of satellite imagery for Turkey. The archived MODIS data that have been obtained from National Snow and Ice Data Center (NSIDC) is mainly MOD09GA product that includes seven spectral bands. Only the tiles which are covering Turkey have been archived namely 19&20 horizontal and 4&5 vertical ones.

In order to provide scientists with a website giving the availability of analysis of snow covered area for long terms based on their area of interests, a fractional snow extent (FSE) product has been generated. For FSE product a normalized difference snow index (NDSI) based algorithm has been developed using daily land surface reflectance values (MOD09GA). In addition to MODIS data, four different Landsat images belonging to different days of snowy period (January, March, and May) have been used during algorithm development taking into account a better representation of different reflectance values of snow which highly varies depending on the accumulation and melting periods. Landsat images were used as reference images. First the Landsat images were orthorectified and mapped to a cartographic projection. Then image segmentation was applied to obtain homogeneous tiles, where the homogeneity is defined as similarity in pixel values. The mean-shift segmentation approach, where each pixel was associated with a significant mode of the joint domain density located in its neighborhood, was applied. After segmentation, the image was classified into snow and no-snow classes with Maximum Likelihood Classification Method. FSE products have been produced for around 12 years from 2000 to 2012 and it is being produced daily as the data is available. 72% overall accuracy was obtained from the validation analysis.

Our website will be available to give service to our users to make analysis on snow extent with a long time series database for free. By the help of WEBGIS interface it is going to be possible to produce time series of snow cover areas, and produce graphs and summary statistics for a better management of information on snow cover in various fields from flood forecast integration, energy production planning of hydropower plants which are fed from snow melting, and producing input for climate models.