Validating MODIS snow data in Slovakia

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Snow is an important component of the hydrological balance, and an integral part of the hydrological modelling. In the territory of Slovakia the data of the snow cover have been collected since the middle of the 20th century. There are many various sources how to obtain necessary information about the snow cover. An important source of snow data is the satellite images, mainly to assess the spatial and temporal distribution of the snow in the river basins.

We evaluated the snow cover in the upper Hron River Basin in Slovak Republic by the measured data of the decade 2000 – 2010 and the data obtained from the MODIS snow product for the same decade. The measured data were from the six climate stations of Hron River Basin, which was selected as a pilot basin. The data of MODIS snow product were from the official website of National Snow and Ice Data Centre (http://nsidc.org/). These data were obtained from the Moderate Resolution Imaging Spectroradiometer (MODIS) sensor on NASA's Earth Observing System (EOS) Aqua and Terra satellites.

In this work, we give the details of the study area and describe the MODIS snow product, then we provide analysis where the accuracy of MODIS data were compared with the measured ones from the study area. The result of comparison is that the accuracy of the MODIS data is approximately 40 %. Next, we used the spatial filtering of MODIS images to increase the accuracy of images. We replaced the pixels classified as clouds by values of the neighbouring cell for decreasing these pixels. So, we replaced the pixel classified as cloud by pixel value if the neighbouring pixel is snow or land. After that we compared the MODIS data with the measured data and the accuracy increased by 4 %. Finally, we used the temporal filtering in various time steps for the increasing of the accuracy of MODIS data.