Estimation of snow contribution to water resources of the Yellow, Mekong and Volga Rivers using satellite images

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Snow hydrology was one of the first areas in water resources to make effective use of remote sensing data. From a remote sensing/satellite imagery perspective, snow cover is one of the most readily identifiable hydro-meteorological variables. In many parts of the wold, the melting of the seasonal snow cover is the single most important event of the water year, particularly in the northern hemisphere, where the snow-covered extent is approximately 46.0 million km2 (40~50% of total land area) in winter. The accurate estimation of accumulated snow in a river basin is important for hydrological modelling of the water balance and river discharge, and also for flood forecasting and warning. In addition to influencing a number of hydrological processes snow also influences climate processes, and vice versa. Analyses of the variation of snow cover in time and space also allows inferences to be made about the impacts of climate processes in the basin and also the role snow plays in altering regional climates. This paper reports a comprehensive analysis of snow contribution to water resources of the rivers located in different physiographic and climatic conditions of Eurasia. Namely, the Yellow, Mekong and Volga River basins have been investigated. The information on spatial and temporary distribution of a snow-covered area in these basins has been obtained from NOAA AVHRR and MODIS satellite data. The method developed to calculate a snow water equivalent (SWE) in watershed scale based on using SCA was applied to each basin. The temporarily distribution of the amount of snowmelt water in the study catchments was estimated and the contribution of snowmelt to water resourses in each basin analyzed. In addition, the relationship between the El Nico/Southern Oscillation (ENSO) and the amount of SCA/SWE in the Yellow, Mekong and Volga River basins as well as the link between Caspian Sea level and SCA/SWE in the Volga River is investigated.