Int. Arch. Photogramm. Remote Sens. Spatial Inf. Sci., XL-2/W4, 61-62, 2015
https://doi.org/10.5194/isprsarchives-XL-2-W4-61-2015

Volume XL-2/W4

19 Oct 2015

MULTI-PLATFORM SATELLITE BASED ESTIMATES OF RUNOFF IN UNGAUGED AREAS

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Keywords: Ungauged area, Long-term runoff, Multi-platform satellite, GLDAS

Abstract. Over the past decades, extreme weather events such as floods and droughts have been on a steady increase. Especially, ungauged or hard-to-reach areas turn out to be the most affected areas by the unexpected water-related disasters. It is usually due to insufficient observation data, and deterioration of infra-structures as well as inadequate water management system. For such reasons, reliable estimation of runoff is important for the planning and the implementation of water projects in ungauged areas. North Korea, whose terrain is mostly hilly and mountainous, has become vulnerable to floods and droughts due to poor watershed management based on unreliable hydrological information along with rapid deforestation. Runoff estimation using data from multi-platform satellites having broad spatio-temporal coverage could be of a valuable substitute for ground-observed measurements. In this study, monthly runoff in North Korea (38°N - 43°N, 124°E - 131°E) was estimated by combining space-borne data from multi-platform satellites with ground observations. Period of analysis is from January 2003 to December 2013. Data sets used for this study are as in the following: {1} Terrestrial Water Storage Anomaly (TWSA) from Gravity Recovery and Climate Experiment (GRACE), (2) Evapotranspiration from Moderate Resolution Imaging Spectroradiometer (MODIS), (3) Satellite-observed precipitation from Tropical Rainfall Measurement Mission (TRMM), and (4) Ground-observed precipitation from World Meterological Organization (WMO) (see Figure 1 and Table 1). These components are balanced with the terrestrial water storage change, and runoff can be estimated from eq. (1).

Conference paper (PDF, 764 KB)

Citation: Seo, J. Y. and Lee, S.-I.: MULTI-PLATFORM SATELLITE BASED ESTIMATES OF RUNOFF IN UNGAUGED AREAS, Int. Arch. Photogramm. Remote Sens. Spatial Inf. Sci., XL-2/W4, 61-62, https://doi.org/10.5194/isprsarchives-XL-2-W4-61-2015, 2015.

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