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Snow mass variation in the Arctic regions using GRACE gravimetry products

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River discharges at northern latitudes are mostly influenced by the winter snow mass storage and its subsequent melt. Thus, several studies suggest a relation between the variability of snow cover extent and depth and river runoff. Passive microwave observations are commonly used to retrieve both snow extent and depth at high latitude. The launch of the Gravity Recovery and Climate Experiment (GRACE) space mission in March 2002 enables to quantify the terrestrial hydrological cycle through measurements of geoid (i.e., gravity field) variations, which represent over land, the vertically-integrated water mass changes inside aquifers, soil, surface reservoirs and snow pack, with a precision of a few mm in terms of water height. Thanks to an iterative inverse approach, the contributions of the continental water storage and snow pack can be derived from the time-varying gravity field. For the first time, we will be able to compare direct measurements of total land water and snow storages with river discharges. In this study, we use the GRACE land water and snow solutions computed through an iterative inversion of monthly geoids to estimate time-series of basin-scale regional land water and snow volumes. We present estimates of land water and snow masses for seven of the most important Arctic drainage basins from August 2002 to February 2007. We compare them to passive microwave measurements of snow water equivalent (SWE) from the Special Sensor Microwave/Imager (SSM/I) and the Advanced Microwave Scanning Radiometer - Earth Observing System (AMSR-E) and to in situ observations of river discharges. Strong correlations were found between snow estimates and river discharges in the Arctic basins revealing the linkage between snow volume stored during winter and streamflow.