Geophysical Research Abstracts
Vol. 21, EGU2019-12926, 2019
EGU General Assembly 2019

Using multi-source satellite data to assess recent snow-cover change and its uncertainty in the Tibet Plateau

Yingsha Jiang, Fei Chen, Yanhong Gao, Michael Barlage, and Jianduo Li

Northwest Institute of Eco-environment and Resources, CAS, Key Laboratory of Land Surface Process and Climate Change in Cold and Arid Regions, China (jiangys@lzb.ac.cn)

Snow cover in the Qinghai-Tibet Plateau (QTP) is a critical component in the water cycle and regional climate of East Asia. Satellite data from three different sources (i.e. the Multi-Sensor Synergy of FengYun-3 (FY3A/B/C MULSS), the Moderate Resolution Imaging Spectroradiometer (MODIS), and the Interactive Multi-sensor Snow and Ice Mapping System (IMS)) were used to analyze the QTP fractional-snow-cover (FSC) change and associated uncertainties in the last decade. A four-step cloud removal procedure was applied to those data, which effectively reduced the cloud percentage from 40.8–56.1% to 2.2–3.3%, with an averaged error about 2% estimated by a random sampling method. Compared with in-situ observations, the cloud-removed FY3B and MODIS have annual mean classification accuracy of about 94%, which is higher than other FY3 data and IMS. Five data sets (FY3A/B/C, MODIS, IMS) show significant differences in snow cover fraction, extent, variation trends and duration changes. IMS has the widest snow cover extent with highest FSC (4.7% and 9.5% higher than MODIS and FY3B FSC, respectively). FY3A/C and MODIS, on morning overpass satellites, have around 5% higher FSC than afternoon-overpass FY3B. The annual FSC and snow duration decrease for 2012–2017 shown by at least two of the FY3B, MODIS and IMS data, but they increase for IMS and decreases for MODIS in recent decade (2006-2017) due to different changing rates of snow onset and melting. Meanwhile, their variation rates increase with the increasing elevation bands lower than 6 km. For uncertainties, higher elevation bands (<6 km) have higher uncertainties, and snow-melting trend has higher uncertainty than snow-onset trend.