

Top-of-atmosphere albedo climate data record from multispectral satellite data

Shunlin Liang, Zhen Song, Dongdong Wang, and Chuan Zhan

university of maryland, Dept. of Geographical Sciences, College Park, United States (sliang@umd.edu)

Top-of-atmosphere (TOA) albedo is an important component of Earth's energy budget. It is typically estimated from broadband satellite data, such as Clouds and the Earth's Radian Energy System (CERES). However, CERES data are available only from 2000. We have developed a TOA albedo climate data record (CDR) from Advanced Very High Resolution Radiometer (AVHRR) (TAL-AVHRR). TAL_AVHRR CDR starts from 1981 to present with the spatial resolution of 0.05 degree. A direct estimation algorithm was first developed for estimating TOA albedo from Moderate Resolution Imaging Spectroradiometer (MODIS) data (TAL-MODIS) (Wang and Liang 2016; Wang and Liang 2017). TAL_MODIS product was then used to train the AVHRR estimation model, and the estimated instantaneous TOA albedo values from AVHRR data were further "turned" by the CERES TOA albedo product (Song et al. 2018). We also compared five TOA albedo products over land surfaces, including three global TOA albedo products (TAL-AVHRR, TAL-MODIS, and CERES), one regional product from the Climate Monitoring Satellite Application Facility (CM SAF), and the harmonized product called Diagnosing Earth's Energy Pathways in the Climate system (DEEP-C) (Zhan et al., in prep). We found significant differences among these products. Particularly in the high-latitude regions, the different is as large as 0.19.

This presentation will briefly outline the estimation algorithms, and then mainly focus on the characteristics of the TAL-AVHRR CDR including its differences with other satellite products.

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