

Global snow and ice cover observations using GCOM-C1/SGLI for studying climate changes

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The "Global Change Observation Mission-Climate" (GCOM-C) is a project of Japan Aerospace Exploration Agency (JAXA) for the global observation of the Earth environment. The GCOM-C is a part of the JAXA's GCOM mission which consists of two satellite series, GCOM-C and GCOM-W (Water). GCOM-C carries a multi-spectral optical radiometer named Second Generation Global Imager (SGLI), which will have special features of wide spectral coverage from 380 nm to 12 micrometer, a high spatial resolution of 250m, a field of view exceeding 1000km, two-direction simultaneous observation, and polarization observation. The GCOM-C mission aims to improve our knowledge on the global carbon cycle and radiation budget through high-accuracy observation of global vegetation, ocean color, temperature, cloud, aerosol, and snow and ice. As for the cryosphere observation, not only snow and ice cover extent but also snow physical parameters are retrieved from SGLI data such as snow grain sizes at shallow layers, temperature, and mass fraction of impurity mixed in snow layer and so on. These snow physical parameters are important factors that determine spectral albedo and radiation budget at the snow surface. Thus it is essential to monitor those parameters from space in order to better understand snow metamorphosis and melting process and also to study the response of snow and sea-ice cover extent in the Polar Regions to a climate forcing such as global warming. In addition, one of important objectives of the GCOM mission is to monitor long-term trend of the geophysical parameters for understanding the mechanism of earth's climate system. For this purpose, the data from GCOM series satellites are not enough. Thus, JAXA launched a website named "JAXA Satellite Monitoring for Environmental Studies (JASMES)" for semi-near real-time monitoring of earth's environmental variables. Through this website JASMES provides users with not only satellite datasets (flat binary) but also information on the current status of the climate variables such as solar radiation reaching the earth's surface (photosynthetically available radiation: PAR), snow and cloud cover, dryness of vegetation (water stress trend), wild fire and so on. MODIS data since February 2000 are currently processed for this analysis but SGLI data will be used after the launch of GCOM-C. Furthermore, the data from Advanced Very High Resolution Radiometer (AVHRR) onboard polar orbiting satellites operated by the National Oceanic and Atmospheric Administration (NOAA) since 1978 are also under preparation toward establishing a half-century long datasets of remote sensing after the success of the GCOM mission. This presentation will summarize the SGLI cryospheric products and validation plans, and also briefly introduce the JASMES dataset.

Keywords: Snow Cover, Snow Grain Size, Snow Impurity, Surface Temperature, Remote Sensing, Climate