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Overview of JAXA's Global Change Observation Mission (GCOM) and its application to the cryosphere

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The "Global Change Observation Mission" (GCOM) is a JAXA's project for the global and long-term observation of the Earth environment. The GCOM is expected to play an important role in monitoring and understanding global water circulation and climate change. It will be a kind of health checkup of the Earth from space. The GCOM also aims to construct, use, and verify systems that enable continuous global-scale observations of various geophysical parameters. The GCOM consists of two satellite series, GCOM-W (Water) and GCOM-C (Climate), spanning three generations in order to perform uniform and stable global observations for 13 years.
GCOM-W carries the AMSR2 (Advanced Microwave Scanning Radiometer 2), a multi-frequency, dual-polarized, passive microwave radiometer to observe water-related targets such as precipitation, water vapor, sea surface wind speed, sea surface temperature, soil moisture, and snow depth. AMSR2 is being designed and manufactured based on the experience of AMSR aboard ADEOS-II and AMSR for the EOS (AMSR-E) on NASA's AQUA satellite that is currently in orbit gathering continuous data.
GCOM-C carries the SGLI (Second Generation Global Imager), a multi-spectral optical radiometer which will have special features of wide spectral coverage from 380nm to 12um, 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 contribute to improving our knowledge and prediction of the global carbon cycle and radiation budget through high-accuracy observation of global vegetation, ocean color, temperature, cloud, aerosol, and snow and ice through the SGLI observations.
The GCOM will take over the Advanced Earth Observing Satellite-II (ADEOS-II) mission and transition into long-term monitoring of the Earth. Currently the first satellite of GCOM-W (GCOM-W1) is scheduled to be launched in 2011. Also, the first GCOM-C (GCOM-C1) is planning to be launched around 2014. Achieving such a global comprehensive long-term observation, the GCOM will eventually contribute to improving future climate projection through a collaborative framework with climate model institutions. Demonstrating capabilities of operational applications through providing continuous data to operational agencies is another important purpose.
One of the important targets to be observed by GCOM is snow and sea ice in the cryosphere. AMSR2 on GCOM-W1 will take over the role of AMSR-E for monitoring sea ice cover around the both polar oceans and snow depth on the continents, whereas SGLI on GCOM-C1 will retrieve not only snow cover extent but also snow physical parameters such as snow grain size, temperature, and impurity mixed in snow for better understanding snow metamorphosis and melting process. A final goal of these observations is to improve processes in numerical climate models by accumulating knowledge on the evolution of snow and sea ice in the cryosphere.