Overview of GCOM – C1 / SGLI science

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ABSTRACT

GCOM-C1 is to contribute to the understanding of the climate system, which aims to contribute to the understanding of carbon cycle and radiation budget in particular [1]. Therefore, 51 products will generated in this mission. Those algorithms will being developed mainly by 35 PIs (Principal Investigators). In the summer of 2009, GCOM-C1 PI team has been formed. Experiences of ADEOS-II / GLI have been utilized in the development of many algorithms. Its experiences have been utilized in many verification methods, too [2]. These things made it possible to streamline and shorten the project time. There were few products on land under ADEOS / GLI project. Therefore, algorithm development land for new approach was needed. In particular it is needed to develope a new algorithm using the multi-angular observation data of SGLI [3], [4]. Multi-angular observation is one of SGLI Features.

The following products will be generated under GCOM-C1 project.

1) Land group

Precise geometric correction, Atmospheric corrected reflectance (incl. cloud detection), Vegetation index, fAPAR, Leaf area index, Above-ground biomass, Vegetation roughness index, Shadow index, Surface temperature, Land net primary production, Water stress trend, Fire detection index, Land cover type, Land surface albedo

2) Atmosphere

Cloud flag/Classification, Classified cloud fraction, Cloud top temp/height, Water cloud OT/effective radius, Aerosol over the ocean, Land aerosol by near UV, Aerosol by Polarization, Long-wave radiation flux, Short-wave radiation flux

3) Ocean

Normalized water-leaving radiance (incl. cloud detection), Atmospheric correction parameter, Photosynthetically available radiation, Euphotic zone depth, Chlorophyll-a concentration, Suspended solid concentration, Suspended solid concentration, Colored dissolved organic

matter, Inherent optical properties, Sea-surface temperature, Ocean net primary productivity, Phytoplankton functional type, Red tide, multi sensor merged ocean color, multi sensor merged SST

4) Cryosphere

Snow and Ice covered area (incl. cloud detection), Okhotsk sea-ice distribution, Snow and ice classification, Snow covered area in forests and mountains, Snow and ice surface Temperature, Snow grain size of shallow layer, Snow grain size of subsurface layer, Snow grain size of top layer, Snow and ice albedo, Snow impurity, Ice sheet surface roughness, Ice sheet boundary monitoring

Validation can be divided into the following four.

1) Verification based on typical ground-based measurement.
2) Verification scale up spatially using model.
3) Verification by comparison with other satellite products.
4) Verification by comparison with other data.

This paper provides an overview of the products. Example of the product using SGLI feature, that is, Above-ground biomass is introduced. These methods are used to multi-angular observation [5]. The development of these methods requires multi-angular observation data of ground. The products of this project can contribute enormously to Understanding of the climate system.

[1] IPCC, *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K. B. Averyt, M. Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and NewYork, NY, USA, 996 pp., 2007.

[2] T. Nakajima, H. Murakami, M. Hori, T. Y. Nakajima, H. Yamamoto, J. Ishizaka, R. Tateishi, T. Aoki, T. Takamura, M. Kuji, N. D. Duong, A. Ono, S. Fukuda, and K. Muramatsu, "Overview and science highlights of the ADEOS-II/GLI project," *J. Remote Sens. Soc. Japan*, vol. 29, no. 1, pp. 11-28, 2009.

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[4] A. Konda, H. Yamamoto, K. Kajiwara, and Y. Honda, "The use of multiangular reflectance for remote sensing of land vegetation," *in Proc. IGARSS 2005*, pp. 3247-3250,2005.

[5] GCOM Home, What is GCOM-C, http://suzaku.eorc.jaxa.jp/GCOM_C/w_gcomc/whats_c.html/ (accessed 11 Nov. 2009)