Cloud fractions estimated from satellite and shipboard observations

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Clouds have an important role in the earth climate system in terms of radiation budget. They have cooling and warming effects on solar and terrestrial radiations, respectively. Their radiative impacts depend on the cloud amount, optical thickness, particle size, top and bottom heights, and so on. Cloud is one of the greatest error sources for the climate prediction (IPCC 2013). Satellite observation is one of the most suitable approaches to understand the cloud properties on a global scale. However, it is not easy to observe cloud properties because their spatiotemporal variations are very large. It is therefore required to validate the cloud products retrieved from satellites. There are a lot of validation sites over land, but we do not have enough validation sites over ocean, even though ocean extends about 70% of the earth surface. Therefore, shipborne observation is one of the possible counterparts for the spaceborne platforms over the oceans.

R/V *Shirase* performed the Antarctic cruise between Japan and Antarctica from 12 November 2017 to 12 April 2018 during the 59th Japanese Antarctic Research Expedition (JARE 59). Cloud fractions were estimated from R/V *Shirase* observations with whole-sky camera, ceilometer and eye after JARE 55 (Kuji et al. 2018).

Japan Aerospace Exploration Agency (JAXA) launched a polar orbiting satellite, Global Change Observation Mission – Climate (GCOM-C), in 23 December 2017 (http://suzaku.eorc.jaxa.jp/GCOM_C), which carries Second Global Imager (SGLI). The whole-sky camera was originally mounted on R/V *Shirase* for the purpose of the validation of cloud products from GCOM-C/SGLI. The cloud products are available in G-Portal (https://gportal.jaxa.jp/gpr/?lang=ja). The product level ver. 1 was used in this study.

We investigated the cloud characteristics from GCOM-C/SGLI observation along the track of R/V *Shirase* . We estimated cloud fraction based on the cloud flag and compared it with the R/V *Shirase* observation. As a result, the correlation coefficient of GCOM-C/SGLI versus the whole-sky camera is high with 0.82.

In this study, cloud characteristics from GCOM-C/SGLI observations is investigated along the ship track of R/V *Shirase* observation for the validation. We are going to extend the analysis period and improve the estimation of the cloud fraction.

References

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