Development of atmosphere and in-water combining algorithm using GCOM-C/SGLI in Tokyo Bay

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GCOM-C / SGLI launched at the end of December 2017, has an excellent spatiotemporal resolution such as one time observation every two or three days at a resolution of 250 m on coastal area, is expected to monitor coastal areas where water environment change is siginificantly large and water area is comparatively small. However, high accuracy of water estimation is exceedingly difficult because coastal light environment in water changes complexly. In the traditional ocean color atmospheric correction algorithm, it is assumed that the water leaving radiance in the near infrared region is 0 and radiance due to air in the visible region is calcuration after estimating the radiance of atmospheric scattering. However, as in the coastal region, in the case of organic matter and inorganic matter increasing significantly, the water leaving radiance in the near infrared region increases and the assumption does not hold. Because of this, an aerosol reflectance is over estimated and an error occurs in the estimation of the water leaving reflectance in the visible region band. To improve this, there is a method of estimating aerosol reflectance while estimating water leaving reflectance in the near infrared region by the iterative method, and if the in-water model is suitable for the water area, highly accurate water leaving reflectance estimation Is possible. SGLI uses this iterative method in a low turbidity water such as the case1 water, and estimates atmospheric reflectance from a short-wavelength infrared channel without using an in-water model in a coastal area or other high turbidity water area, However, its accuracy is not as good as the high turbidity area.

In this study, we tried to develop a combination algorithm of atmospheric correction model, and in-water model which is adequate for coastal areas as a target of Tokyo Bay where organic matter is dominant. This is a modification of the in-water model used at the atmospheric correction stage to the Bio-Optical model created based on the measured SIOPs(Specific inherent optical properties) in Tokyo Bay, an selection aerosol model and estimation of reflectance at each wavelength are conducted by iterative calculation based on three parameters of Chl-a(Chlorophyll-a), CDOM(Color dissolvedorganic matter) and NAP(Non-algal particles). As a result, the suggested model became possible to estimate Chl-a and Rrs with high accuracy compared to normal SGLI atmospheric correction.

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