

ATBD of GCOM-C Floating Algae Index

Hiroshi Murakami

JAXA/EORC

Large-scale floating algae, *Sargassum horneri* and *Ulva prolifera*, have been captured by satellites^{[1][2]} and in-situ^{[3][4]} in the East China Sea from spring to summer. Monitoring and understanding of the growth and distribution have been important under the context of the recent environmental change^[5]. The flow of the algae is expected to be a new environmental information about the surface-water flow such as ocean currents, floating materials, and river-water outflow and so on.

Method

Sea-surface reflectance at near infrared (NIR) becomes high due to the algae floating on the sea surface. Floating Algae Index (FAI) is calculated by molecule scattering corrected reflectance (ρ) at NIR subtracted the baseline (corresponding the aerosol and other signals) from ρ at neighboring bands^{[1][2]} (Fig. 1). Higher resolution FAI can be derived from multiple high-gain bands with 250-m spatial resolution of the Second-generation Global Imager (SGLI) on Global Change Observation Mission - Climate (GCOM-C).

SGLI FAI is derived by using VN10 (865nm), SW03 (1630nm), and VN07 (672nm) with coefficients minimizing aerosol reflectance by the linear combination^[6] (Eq.(1)).

$$\text{FAI} = \rho(865\text{nm}) - 0.3399 \rho(1630\text{nm}) - 0.6356 \rho(672\text{nm}) \quad \text{..(1)}$$

$$\rho(\lambda) = (\rho_{\text{TOA}}(\lambda) - \rho_{\text{m}}(\lambda)) / t_{\text{m}}(\lambda)$$

$\rho(\lambda)$ shows the reflectance at wavelength, λ , molecular scattering, ρ_{m} , and transmittance, t_{m} , are corrected.

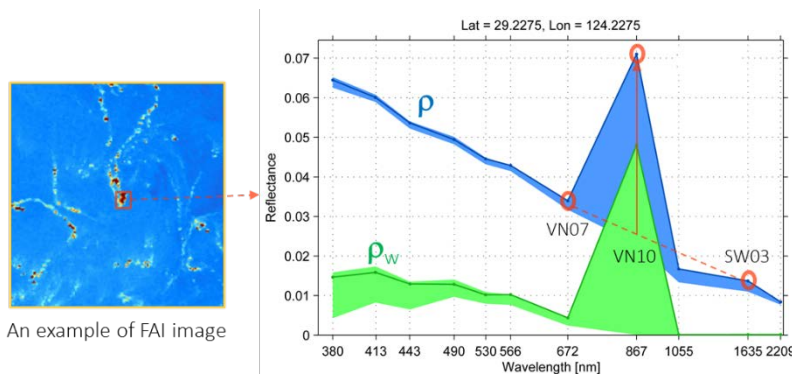


Fig 1 Concept of FAI calculation

The blue line shows ρ , and the green line, sea-surface reflectance after the aerosol correction, ρ_w . $\rho(\text{VN10})$ from the neighboring channels can give the almost same information of $\rho_w(\text{VN10})$. The filled areas show reflectance ranges around the algae.

Notice for date use

- Confusing patterns can appear near cloud or land due to small mis-registration among channels
- FAI becomes low where turbid areas of high 672nm reflectance
- Different kind of algae such as brown and green algae cannot be distinguished by the FAI which only has NIR information

Reference

- [1] Hu, C., A novel ocean color index to detect floating algae in the global oceans, RSE, 113, 2009.
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- [6] Frouin, R. et al., Retrieval of Chlorophyll-a Concentration via Linear Combination of ADEOS-II Global Imager Data, J. Oceanogr., 62, 331-337, 2006.