

Monitoring saline intrusion in rivers near paddy fields using satellite data

Production

Demonstration

Item: Paddy rice

Climate disaster mitigation

Outline

Salinity cannot be directly estimated from satellite imagery. However, the strong correlation between electrical conductivity and river turbidity can be used to indirectly estimate seasonal changes in river salinity. This technology enables the implementation of proactive measures to prevent saltwater intrusion into rice paddies.

Background/effect/note

River turbidity is high in upstream areas near the ocean (Fig. 1). Freshwater from river water becomes turbid due to the strong repulsion between negatively charged suspended particles. The mixing of cations with the entry of seawater suppresses the repulsion between particles, and the suspended particles agglomerate (flocculate). Based on this correlation between electrical conductivity and turbidity (Fig. 2(a)), the electrical conductivity of river water can be indirectly estimated from the green band reflectance of Sentinel-2 satellite data (Fig. 2(b)). The use of satellite imagery is an effective method in understanding the spatial and temporal changes in saline intrusion, which will facilitate the implementation of proactive measures to prevent saltwater intrusion into rice paddies (Fig. 3).

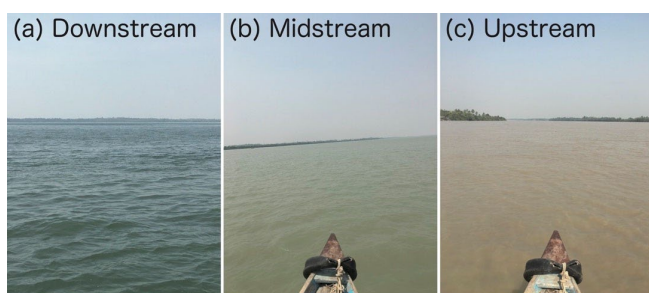


Fig. 1. Photographs of river water conditions in the (a) downstream, (b) midstream, and (c) upstream reaches of Ywe River on 9 March 2018

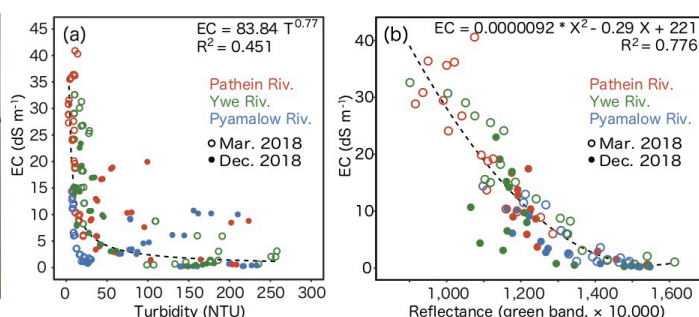


Fig. 2. Correlation between (a) turbidity and electrical conductivity (EC), and (b) EC and green band reflectance retrieved from Sentinel-2

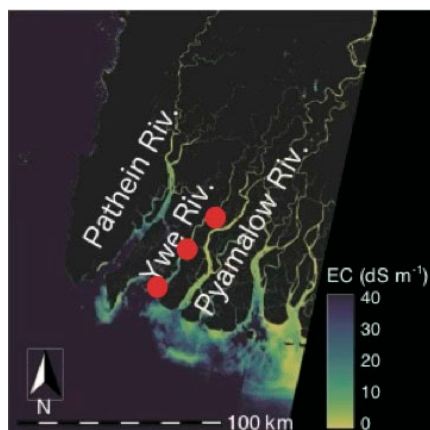


Fig. 3. Electrical conductivity (EC) map derived from the reflectance of the green band in the satellite image (March 12, 2018)

The red dots are locations where the images shown in Fig. 1 were captured.



Technical details:
https://www.jircas.go.jp/en/publication/research_results/2020_a03

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