

Satellite-based observation of red tides

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2008: Faculty of Fisheries, Kasetsart University (Thailand)

2015: Nagoya University - Satellite biological laboratory

Water sampling and microscopy

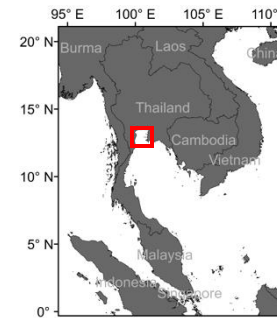


- Labor-intensive and time-consuming.
- Limits on spatial and temporal resolution.

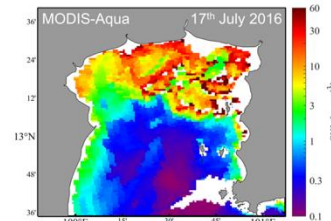


Ocean Color Remote Sensing

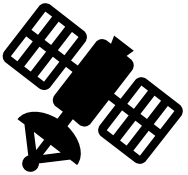
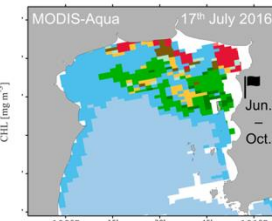
The upper Gulf of Thailand



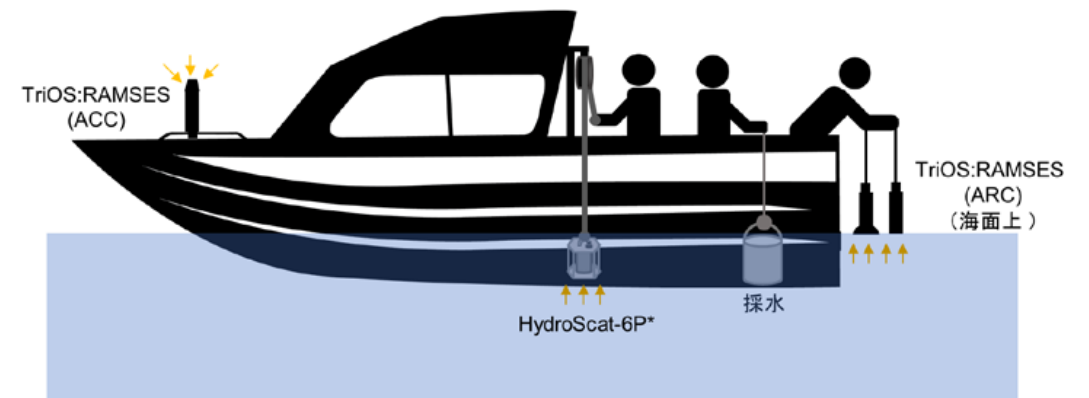
Improved chl-a



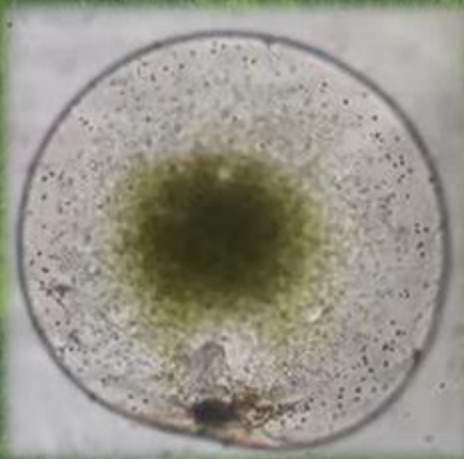
Algal blooms



海表面



Green *Noctiluca scintillans*
(綠夜光虫)



Challenges



- Mitigating the harmful impacts
- Understanding the mechanisms of red tides

Coastal communities



Photo: Facebook – Pattayanews (10.09.2023)

Marine ecosystem



Photo: Facebook – Thanakorn Sooksri (08.09.2023)



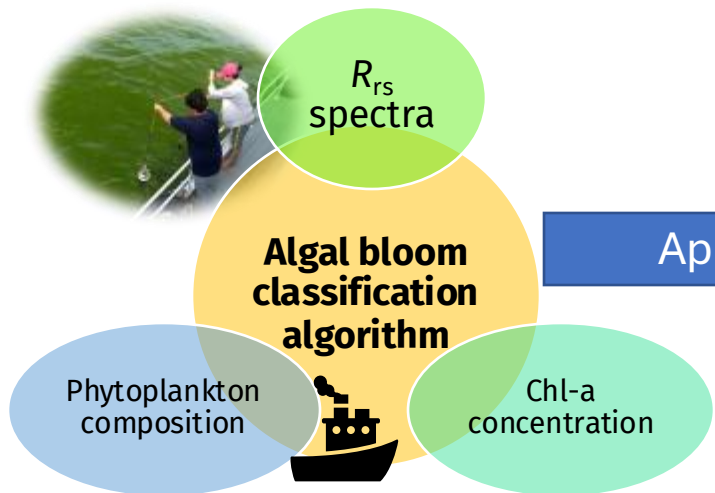
Photo: Facebook - Chonburi Today (16.09.2023)



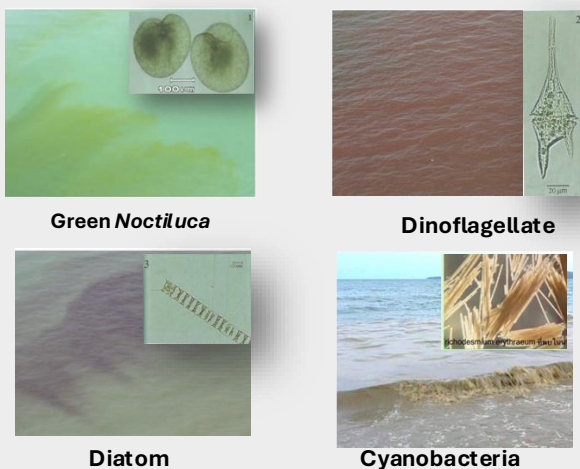
O₂

Hypoxia/Anoxia

R_{rs} : remote sensing reflectance

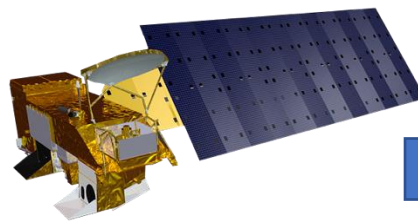


Algal bloom classification:
(Chl-a > 10 mg m⁻³)

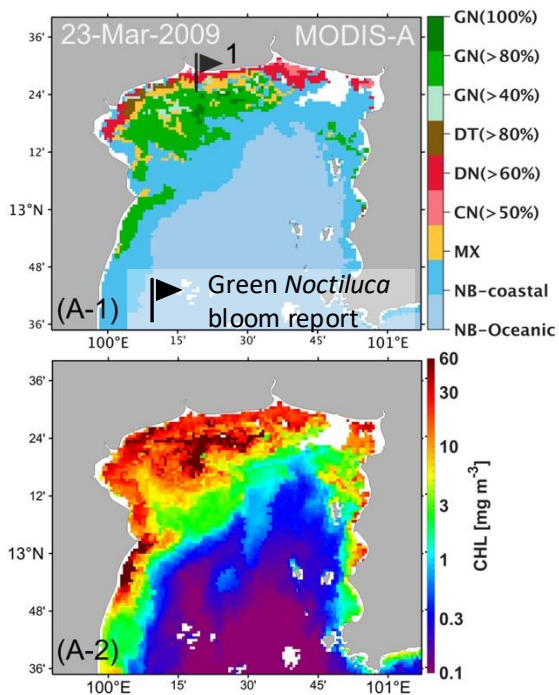


(Chumnantana 2006, Piumsomboon 2009)

Aqua MODIS data
after improving R_{rs} accuracy

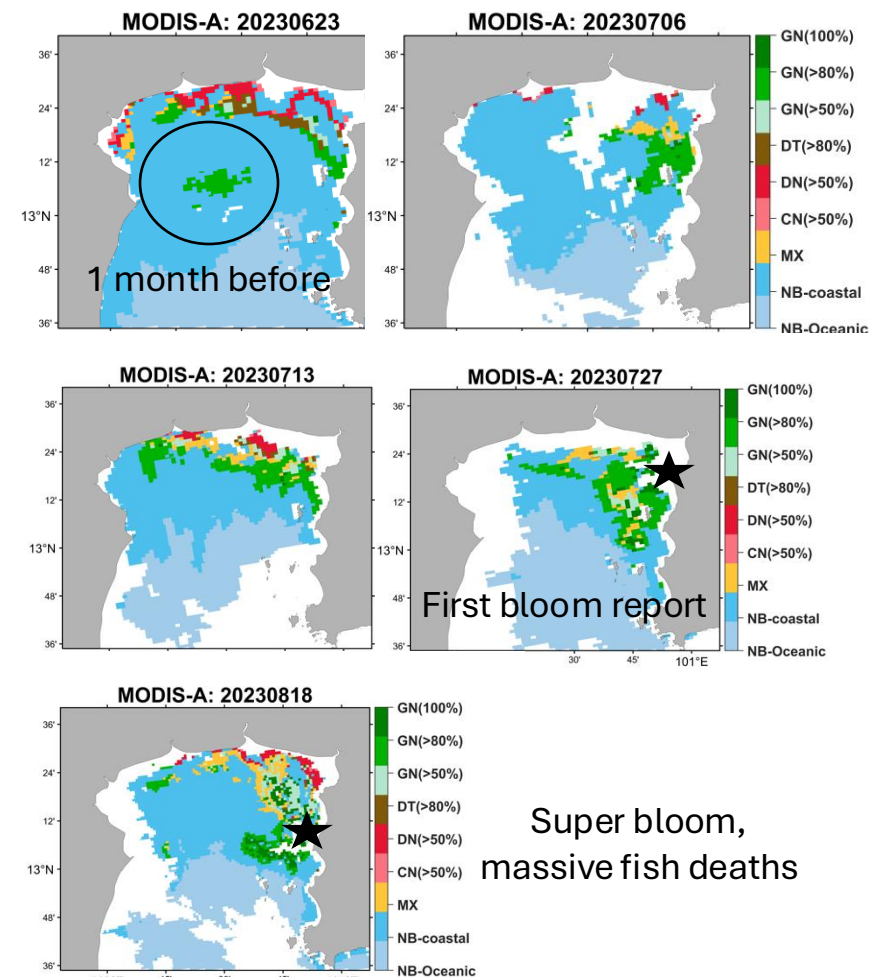


7 types of algal blooms



• **Monitoring green *Noctiluca* blooms**

The 2023 great *Noctiluca* blooms (Jul – Oct)



Super bloom,
massive fish deaths

Future developments

- Expand red tide detection
- Spectral library and deep learning
- Forecasting red tides
- Accessible monitoring system

Acknowledgment

- Cooperation from universities and agencies in Japan and Thailand



Thank you for your attention.
I look forward to collaborating
with you in the future 😊

