

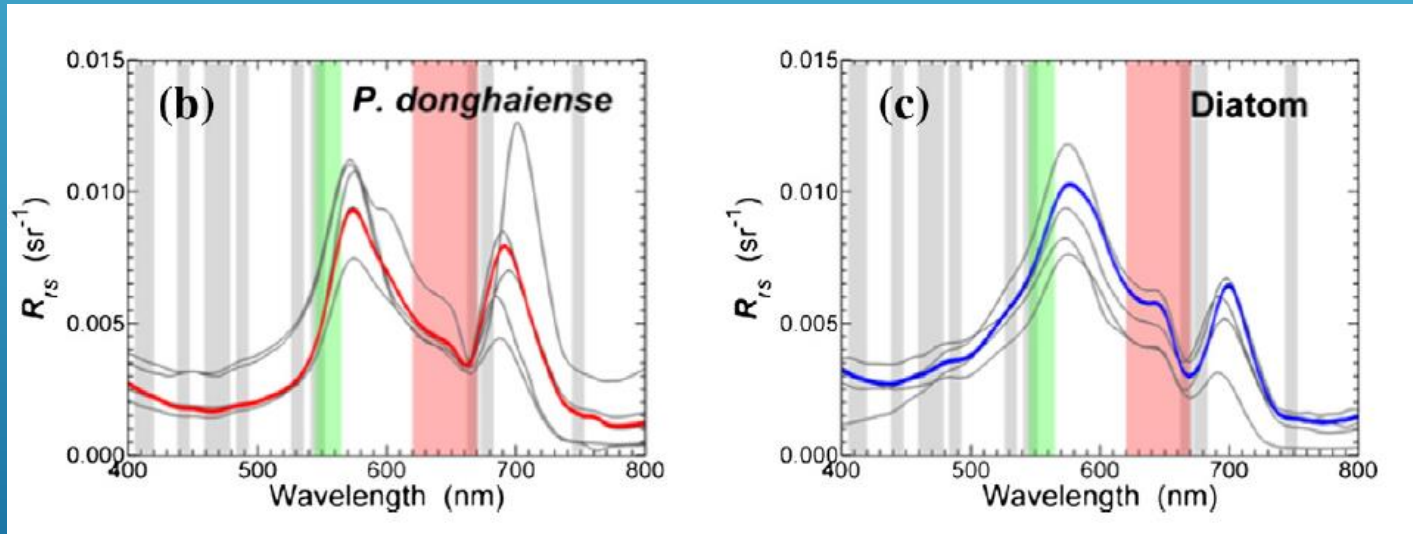
**DETECTION OF PHYTOPLANKTON BLOOMS
OF SPECIFIC GROUPS AND SPECIES –
CURRENT ACHIEVEMENTS, GAPS AND
NEXT STEPS:
ASIAN WATERS**

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Differentiate dinoflagellate bloom from others

Significance: toxin dinoflagellates

Empirical algorithm: used slope difference or slope ratio



Siswanto et al., 2013, Japan
 Tao et al., 2013, 2014, China
 Shang et al., 2014, China

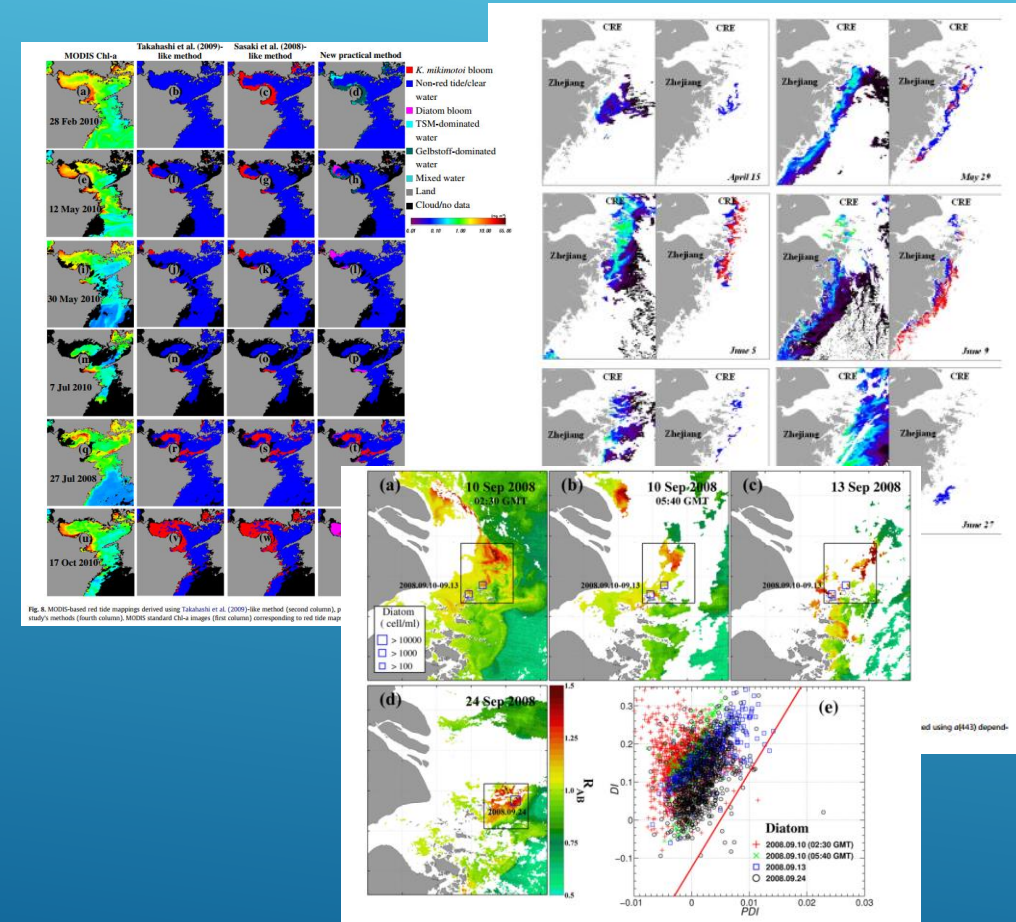


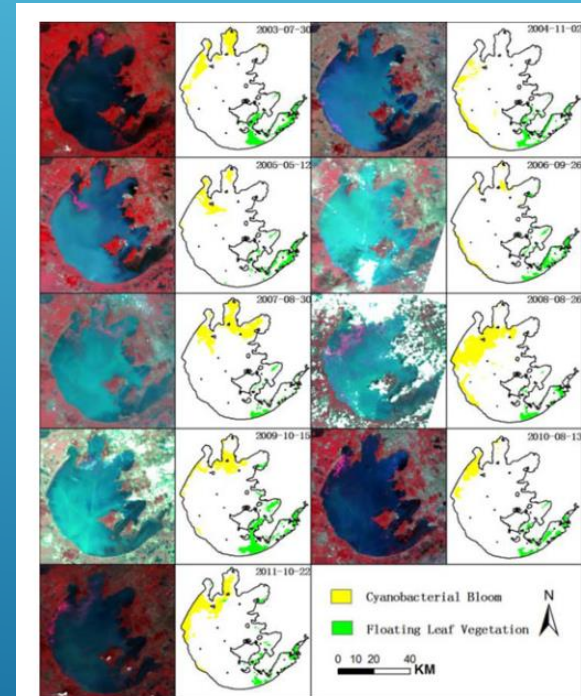
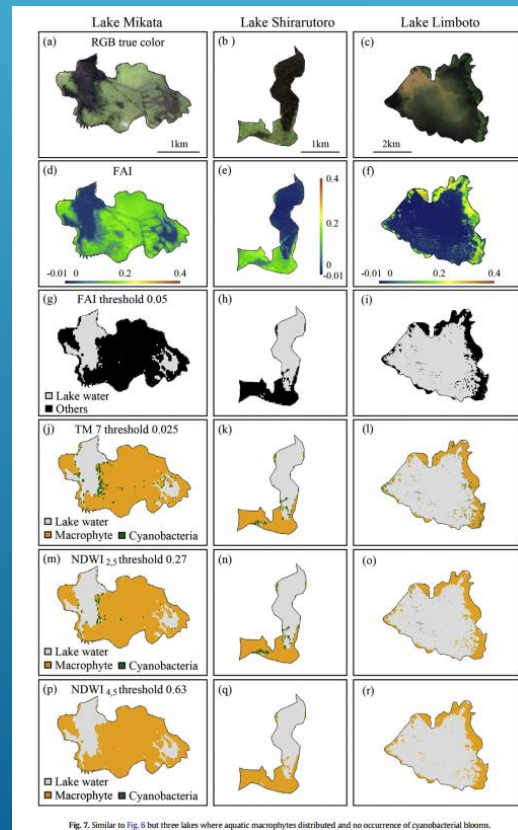
Fig. 8. MODIS-based red tide mappings derived using Takahashi et al. (2009)-like method (second column), p study's method (fourth column), MODIS standard Chl-a images (first column) corresponding to red tide stage

Fig. 11. (a-d) MODIS R_{rs} image series show the progression of a diatom bloom. (e) The scatter plots of PDI vs. DI corresponding to the algal bloom maps are also shown to indicate candidate species. The black rectangle in (a-d) is the area from which the data points shown in (e) were derived. The blue squares represent different diatom concentration in color and the date close to the blue square on each image indicates the in-situ observation time.

Differentiate cyanobacteria bloom from macrophytes in lakes

Significance: often mixing, cyanobacteria more important

Algorithms: decision tree (chl + phycocyanin), or FAI + other index



(Oyama et al., 2015, Japan)(Zhu et al., 2018, China)

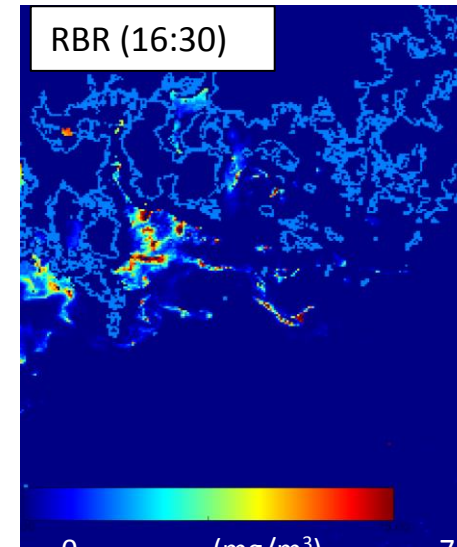
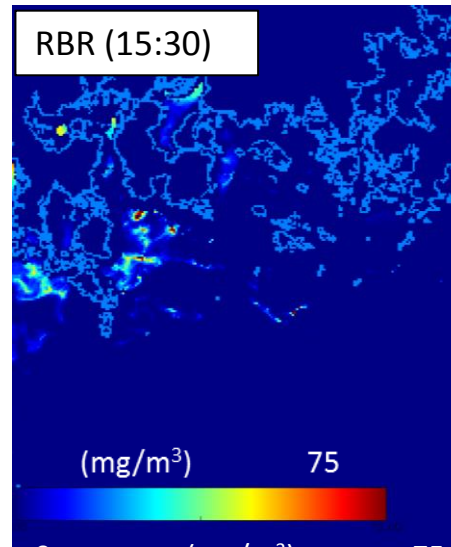
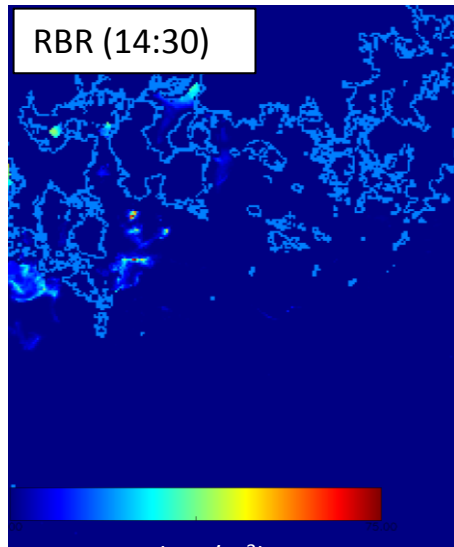
Red tide in Korea

–Wonkook Kim

1. Southern Coast of Korea
 - Recursive outbreak in summer (July-Oct.)
 - main species : *Cochlodinium polykrikoides*
with increasing frequency for *Karenia* species
2. Satellite Observations (example with GOCI)
 - July 26th , 2018
 - Using RBR algorithm (Noh et al., 2018)
applied to GOCI hourly images
 - Species: *Cochlodinium Polykrikoides*



Observation of hourly variability



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MAJOR GAPS AND NEXT STEPS

Gaps-

More advanced satellites in need as

- ▶ low spatial resolution of satellites: blooms mostly in nearshore bays
- ▶ Low spectral resolution of satellites: ancillary mark pigments hard to detect
- ▶ Cloud cover: blooms always in cloudy days

Next targets-

- ▶ Aquatic macrophytes
- ▶ Phaeocystis
- ▶ Subsurface blooms in gyres