

海洋観測におけるリモートセンシングの活用の今後

2021.12.02

富栄養化・貧栄養化に関する リモートセンシングの現状と 今後の展望

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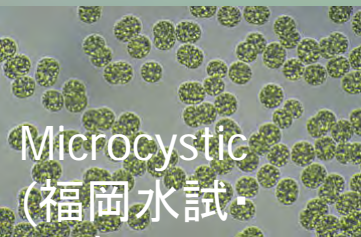
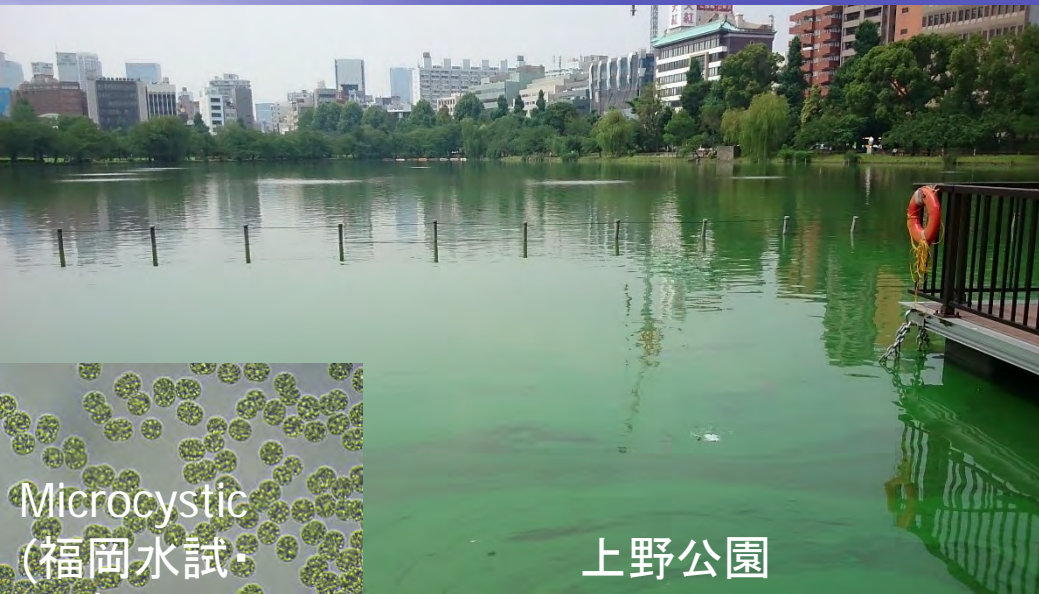


NAGOYA
UNIVERSITY



宇宙地球環境研究所
Institute for Space-Earth Environmental Research

淡水赤潮(アオコ)

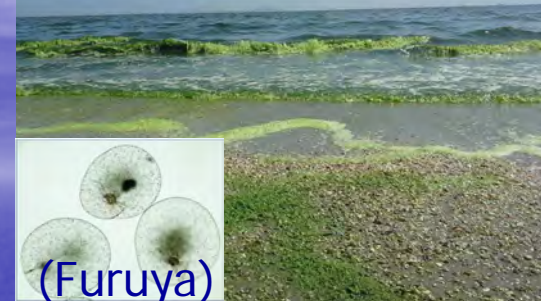


Microcystic
(福岡水試
環境研)

上野公園

沿岸域の赤潮

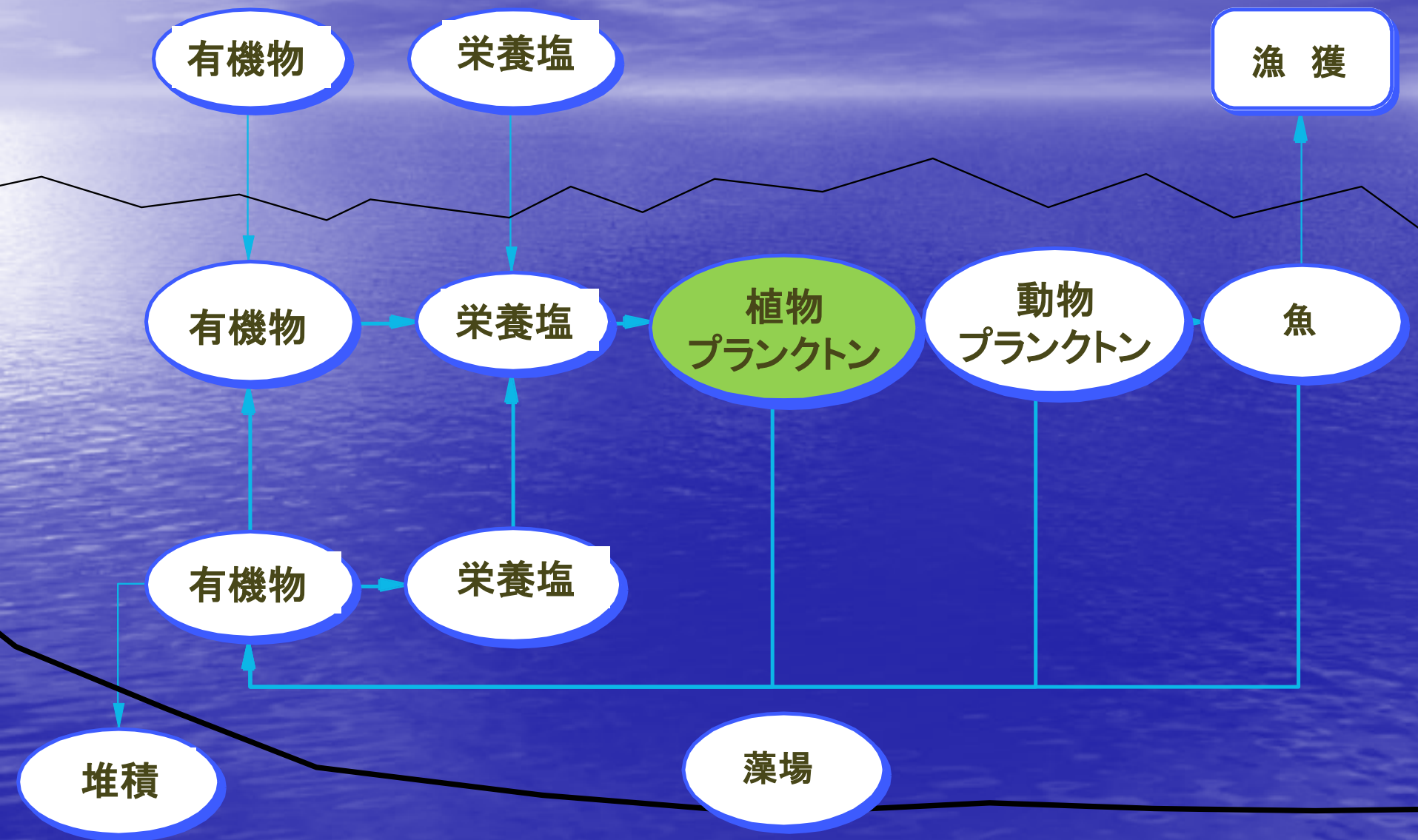
(Buranapratheprat)



(Furuya)

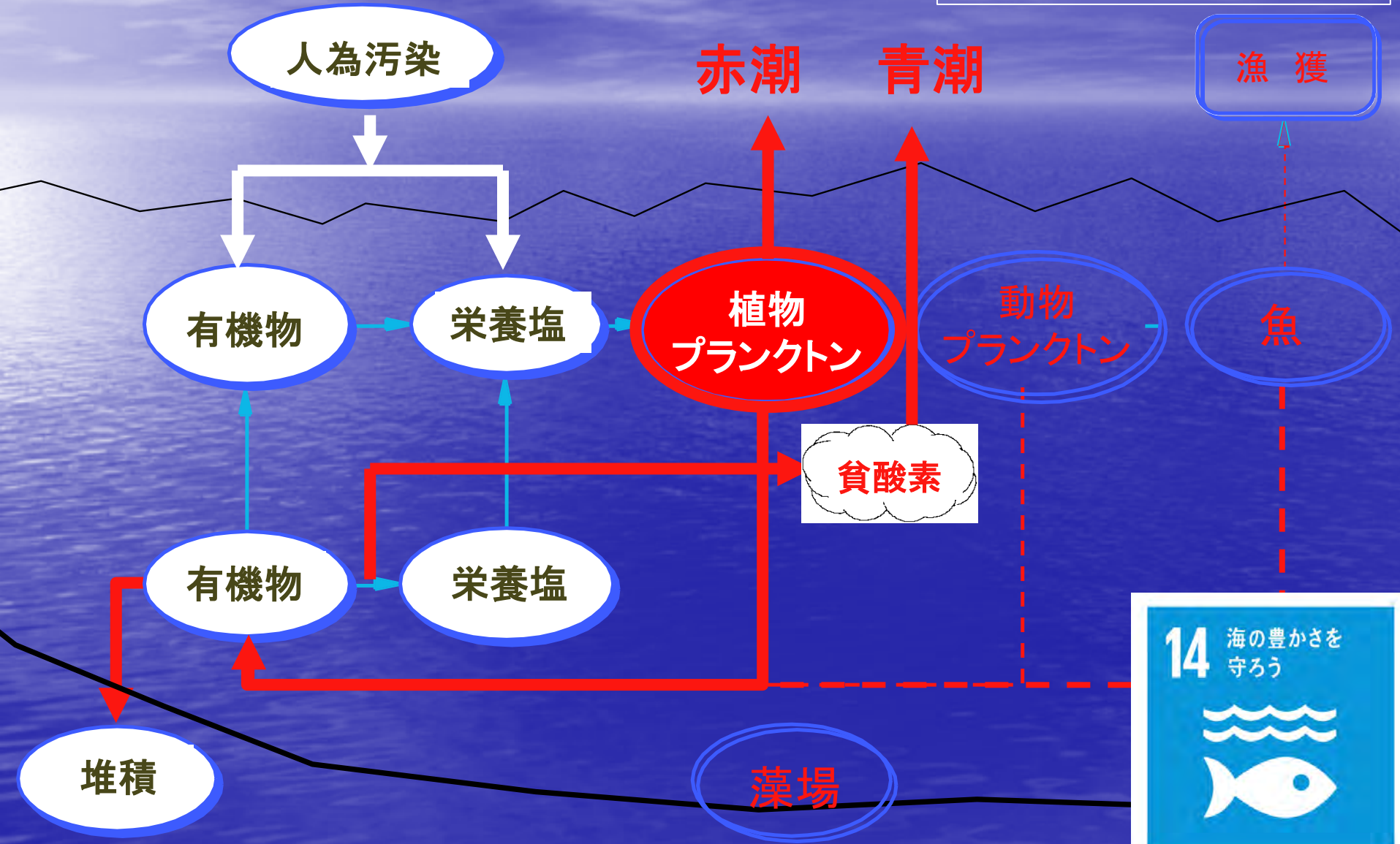
様々な種類の赤潮
多くは
有害藻類増殖(HAB)
(水産被害を含む)

富栄養化前



富栄養化後

指標 14.1.1
沿岸富栄養化指数 (ICEP)
及び
浮遊プラスチックごみの密度



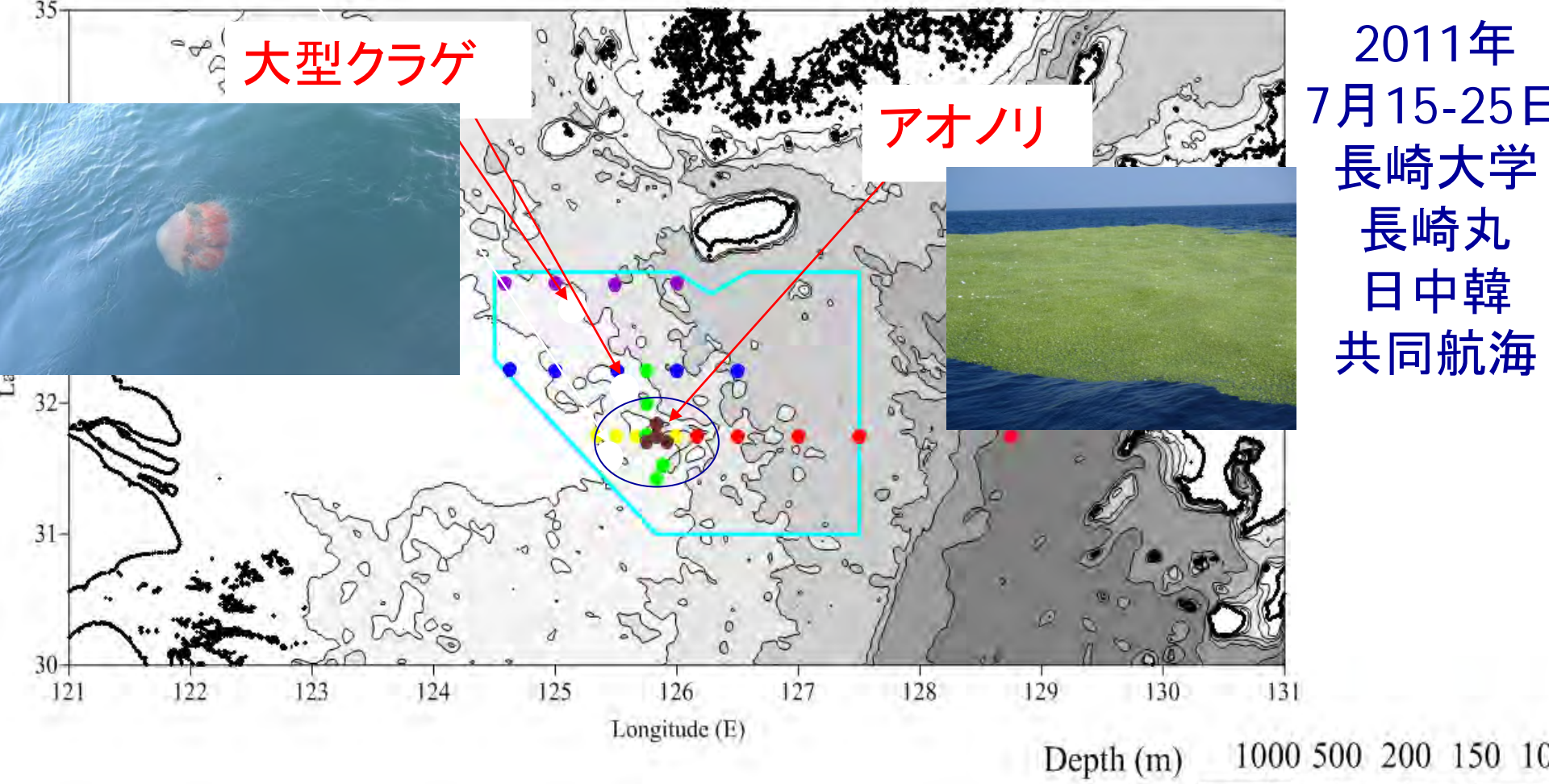
大型クラゲ



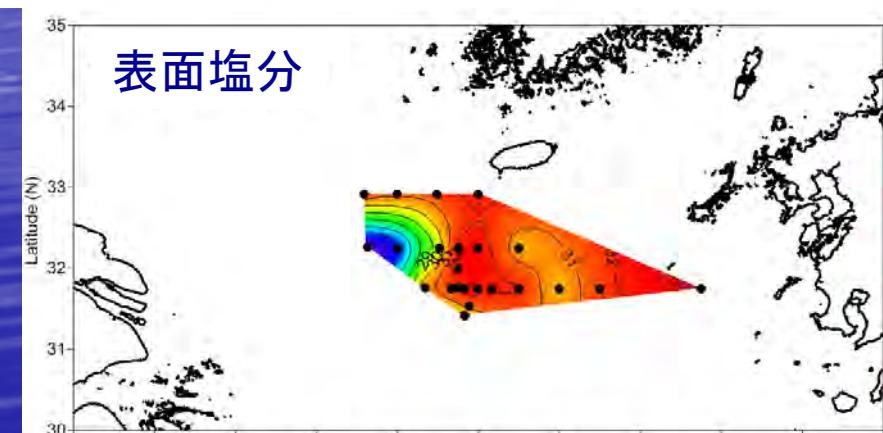
アオリ



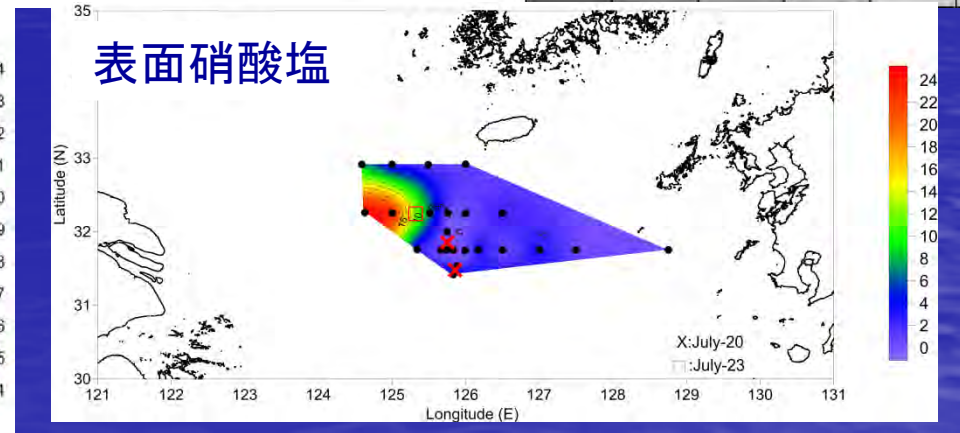
2011年
7月15-25日
長崎大学
長崎丸
日中韓
共同航海



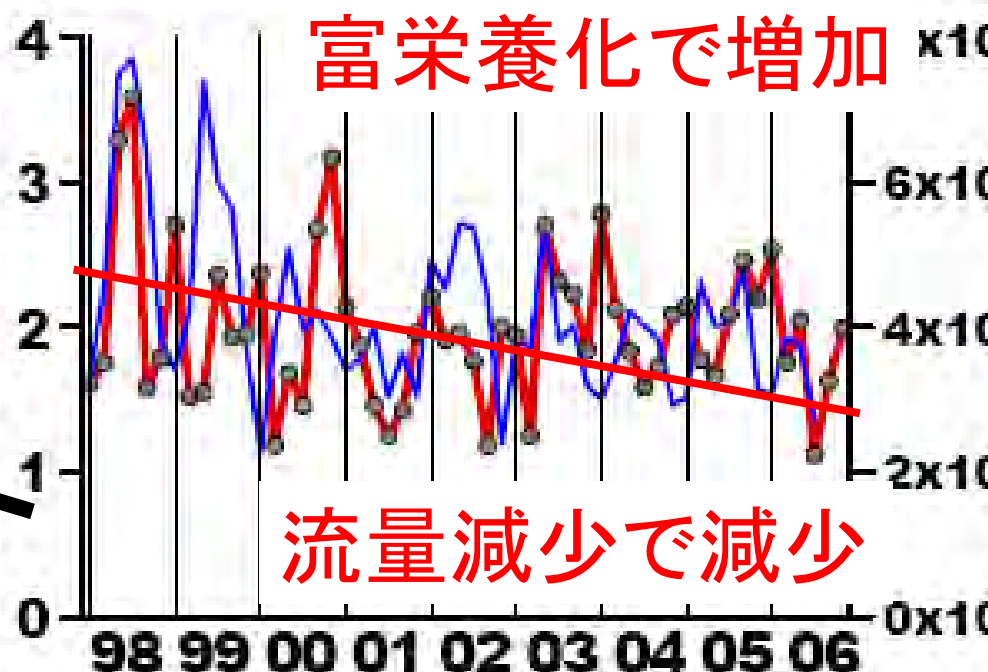
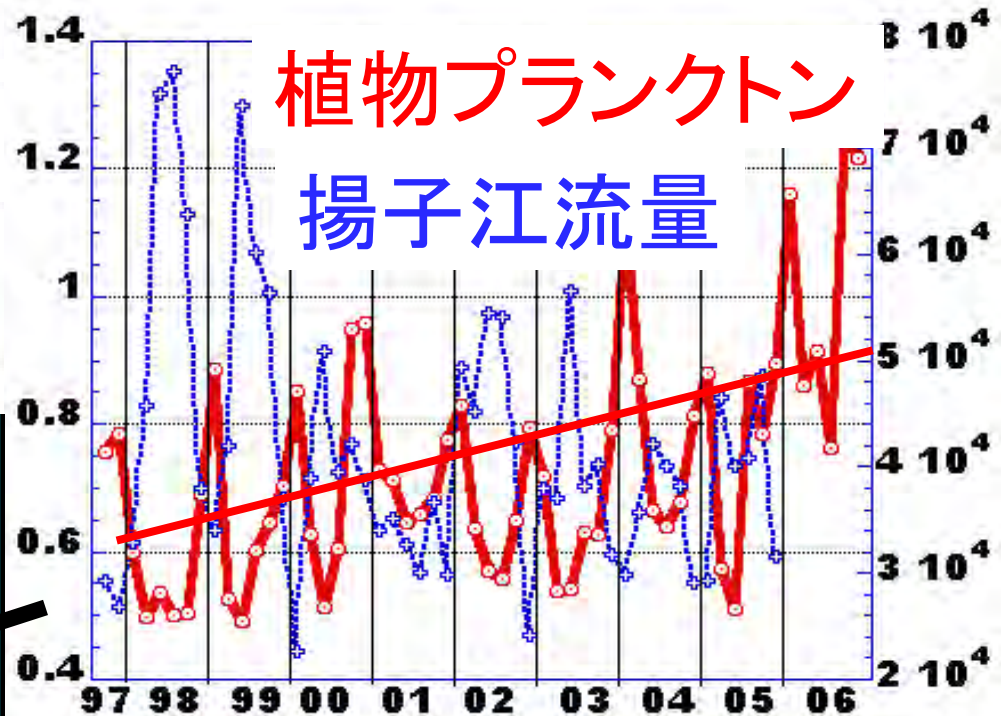
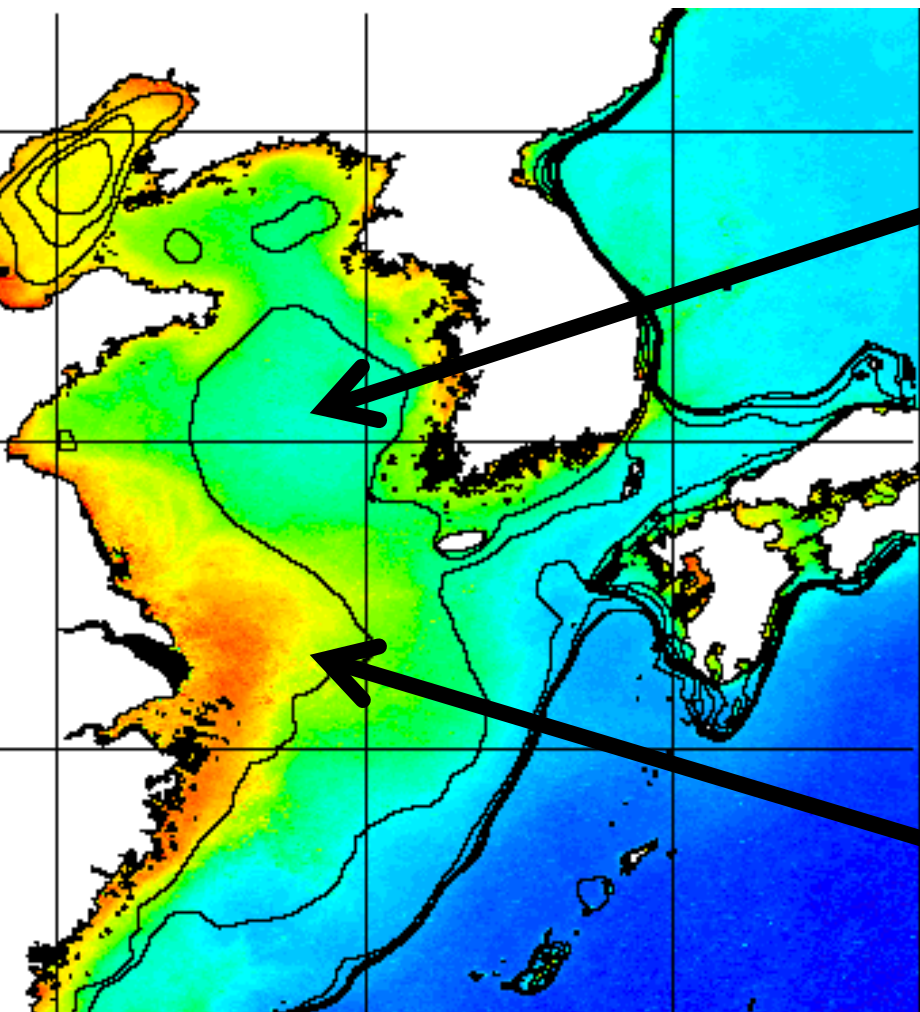
表面塩分

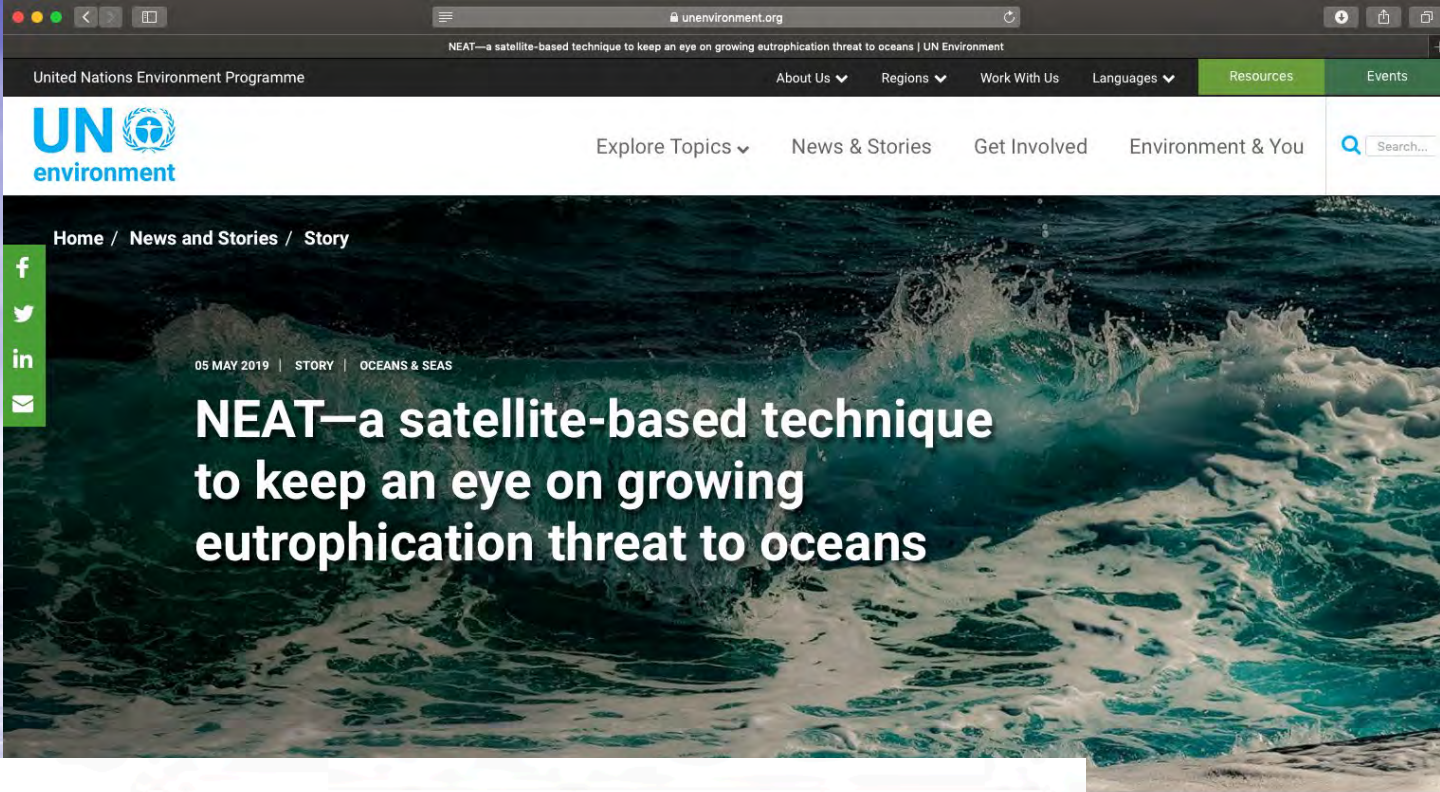


表面硝酸塩

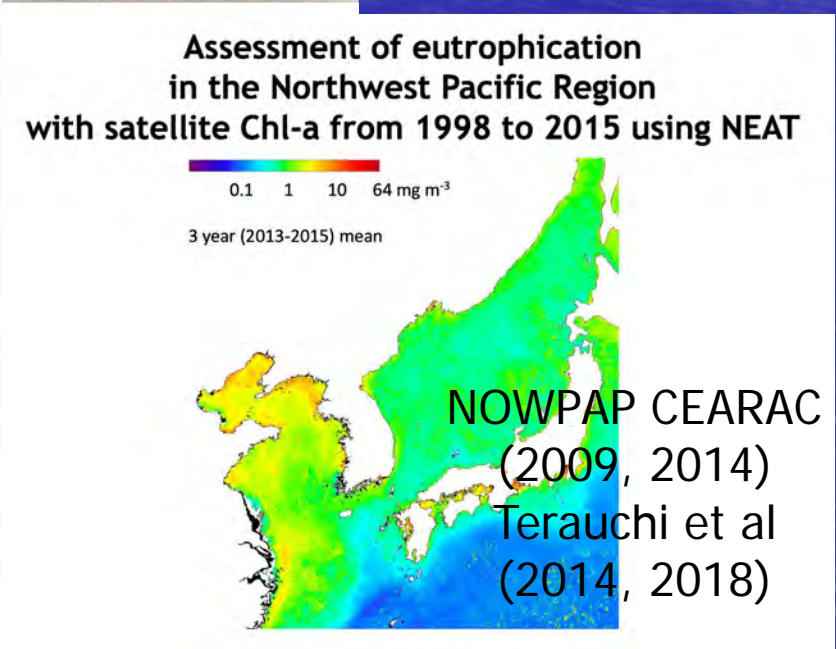
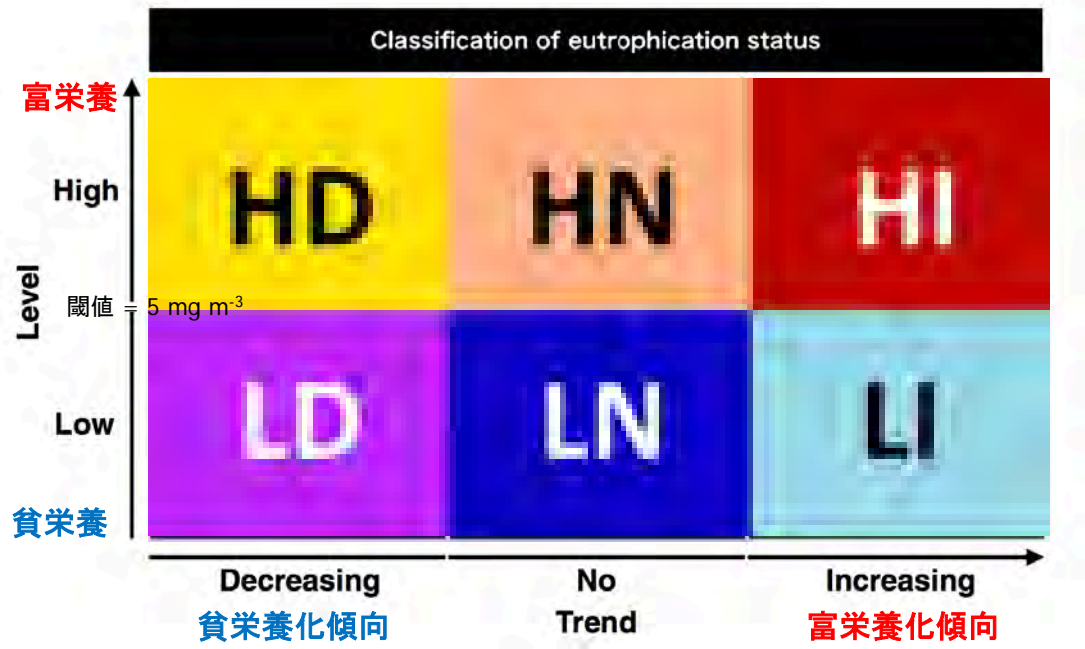


夏の揚子江流量と植物プランクトン量 (1997-2006) (Yamaguchi et al., 2012)





NOWPAP
 UNEP
 (北西太平洋
 行動計画)
 NOWPAP
 Eutrophication
 Assessment
 Tool (NEAT)



Global Eutrophication Watch

Earth Engine Apps Experimental Search places

Global Eutrophication Watch

Dataset Specification

How the dataset

データ選択 (MODIS標準 or 北西太平洋)

Trend Detection Interval

増加・減少の判定期間 2003- (MODIS標準) 1998- (北西太平洋 SeaWiFS-MODIS)

CHL Composite Interval

Chl-aの多少の閾値 平均期間 濃度

Select cutoff level: 5 [mg/m³]

Layers 地図 航空写真

ある場所の時系列

Chlorophyll-a (CHL) Annual Max

— Trend — chlor_a

CHL [mg/m³]

Date

Eutrophication Watch

LD LN LI HD HN HI

The Global Eutrophication Watch is designed to allow users to perform a preliminary screening of coastal eutrophication using satellite-derived chlorophyll (CHL) data. A default MODIS/Aqua-derived CHL product is bundled with the App. However, users can also provide a link to their own asset of monthly CHL. In addition to that, the YOC CHL product (a regional dataset in the Northwest Pacific region) is also provided with the App.

The article for this app, accessible from the link: <https://doi.org/10.1038/s41467-021-26391-9>, introduces the terms eutrophic potential, eutrophication potential, and oligotrophication potential for waters with high CHL levels (HD, HN, and HI), with increasing CHL trends (LI and HI), and with decreasing CHL trends (LD and HD), respectively. LI and HI are of a particular interest as they indicate waters in a process of becoming eutrophic (LI) or a progression of an already eutrophic (HI) water body.

Google

キーボードショートカット 画像 ©2021 NASA, TerraMetrics | 1000 km 利用規約

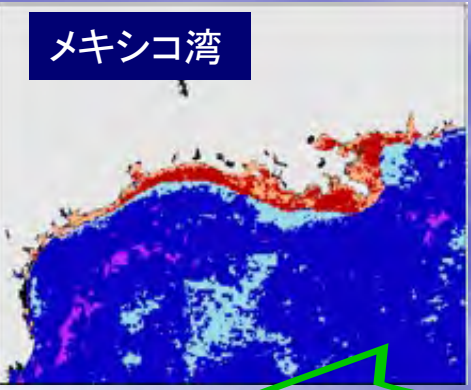
Globally consistent assessment of coastal eutrophication

Eligio de Raús Maúre , Genki Terauchi, Joji Ishizaka, Nicholas Clinton & Michael DeWitt

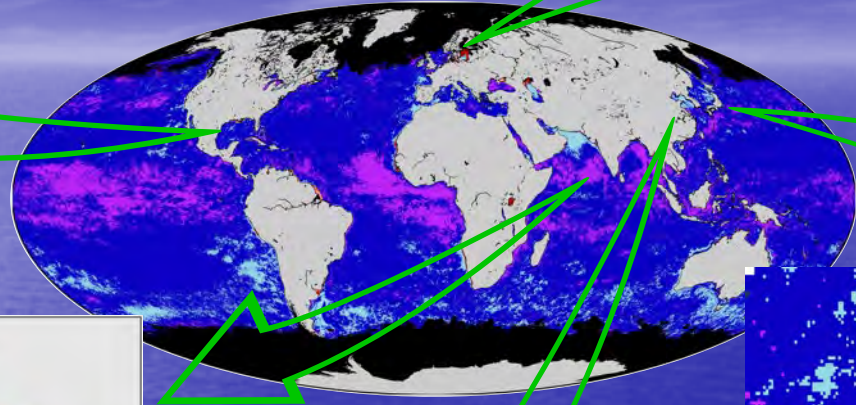
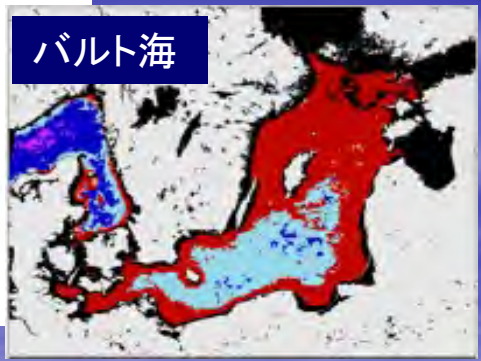
Nature Communications **12**, Article number: 6142 (2021) | [Cite this article](#)

1657 Accesses | [Metrics](#)

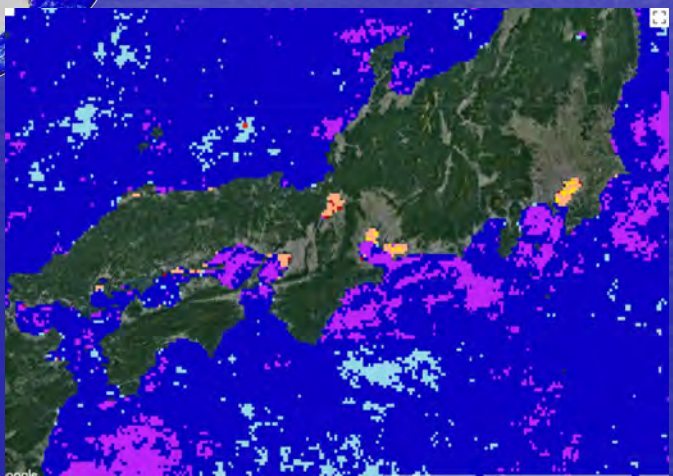
メキシコ湾



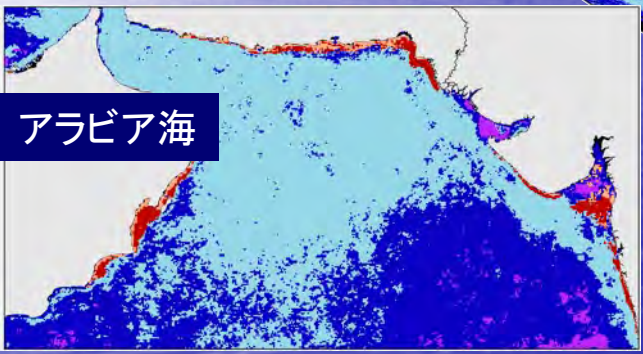
バルト海



日本沿岸域



アラビア海



渤海

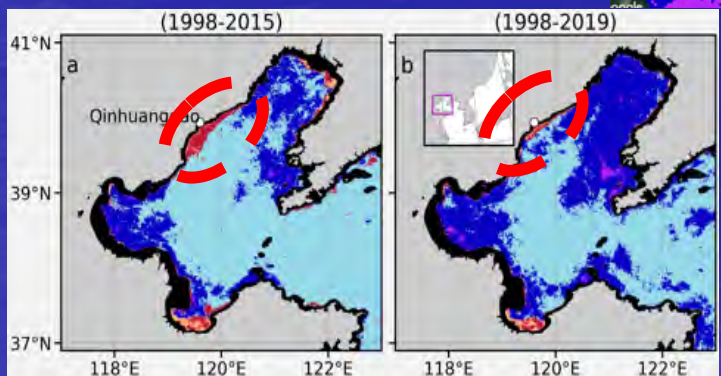




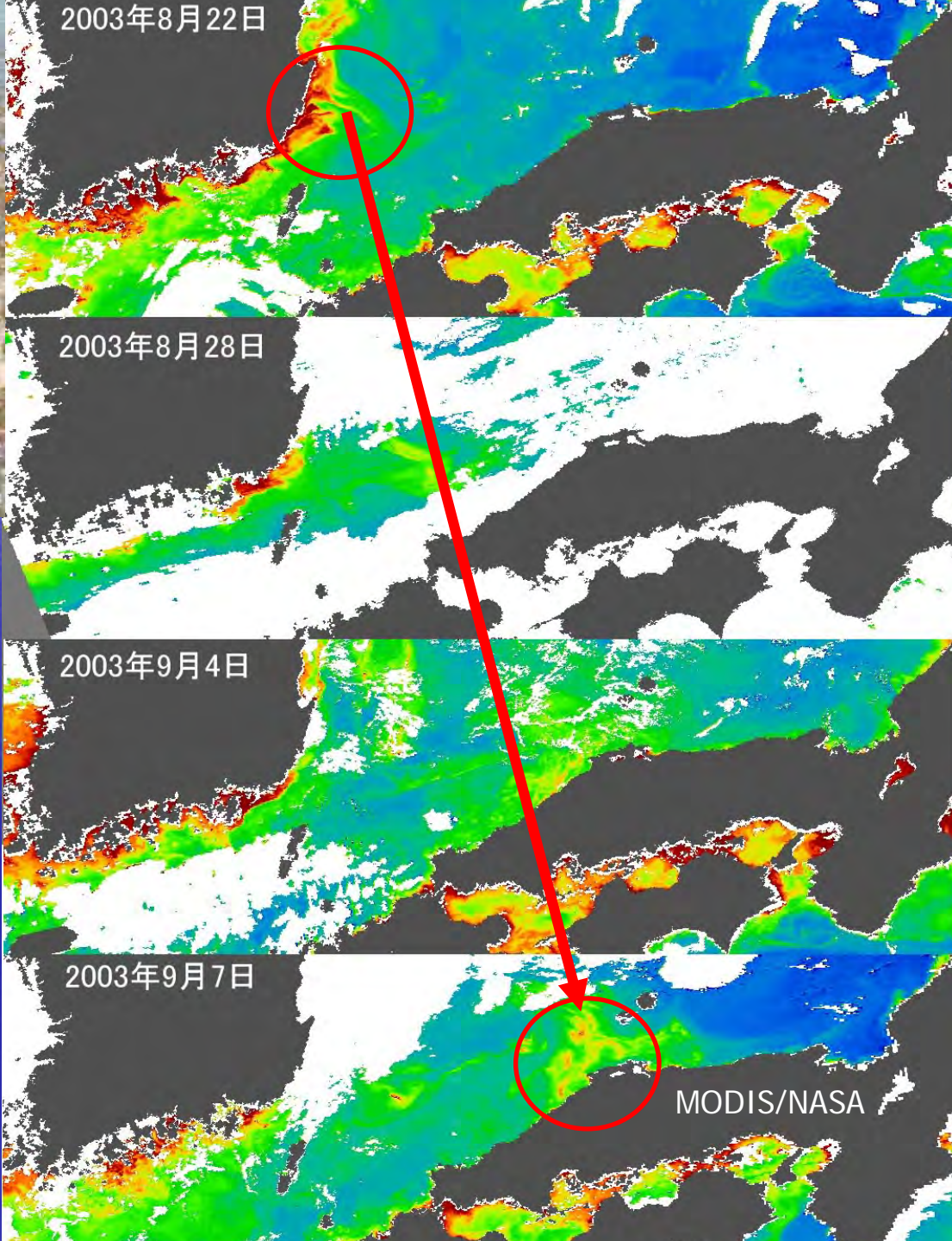
Photo from NFRDI

NFRDI

C. Polykrikoides 赤潮の移動

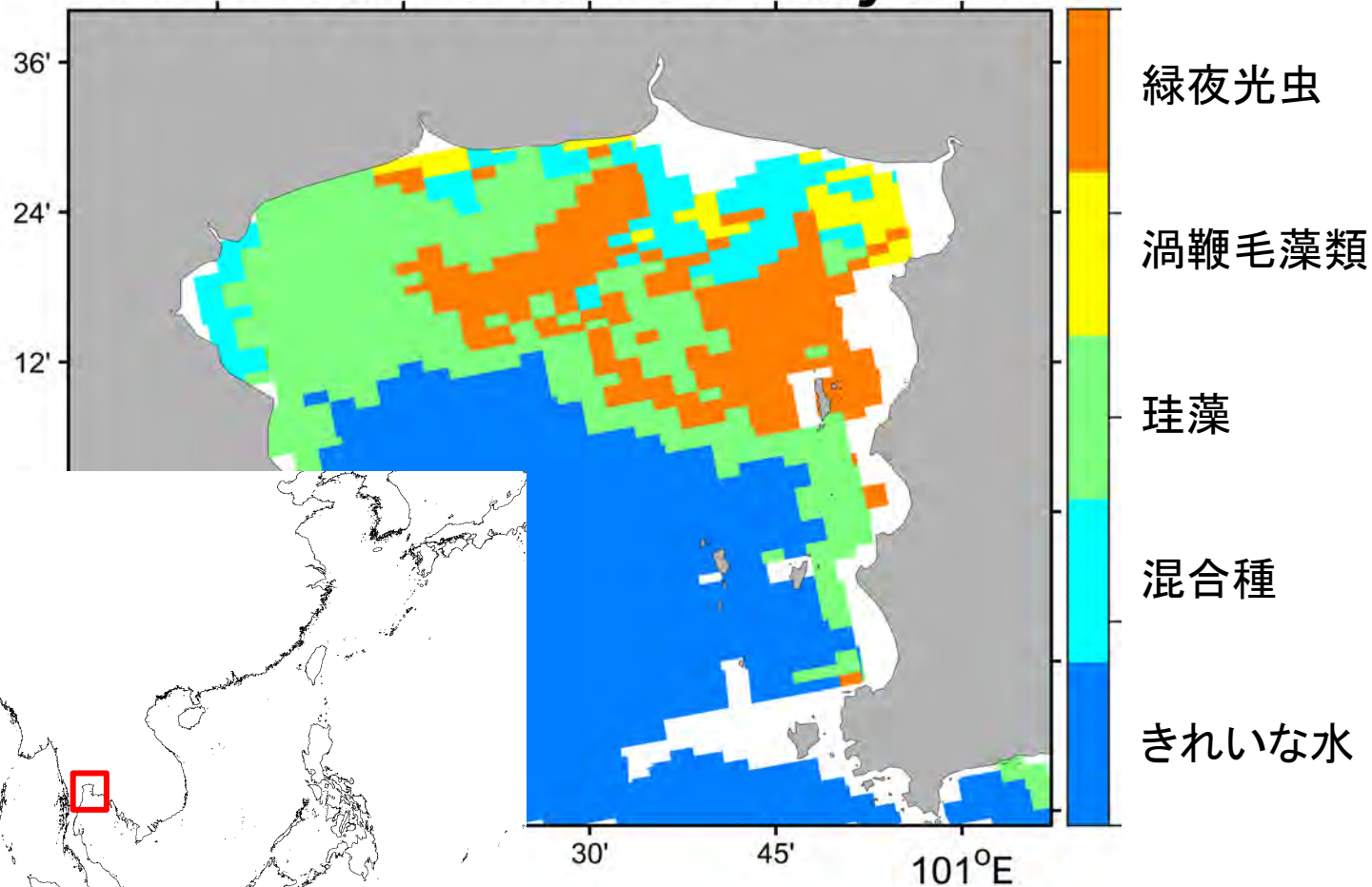


Iwataki



台湾 赤潮判別

Level-2 MODISA: 17th July 2016



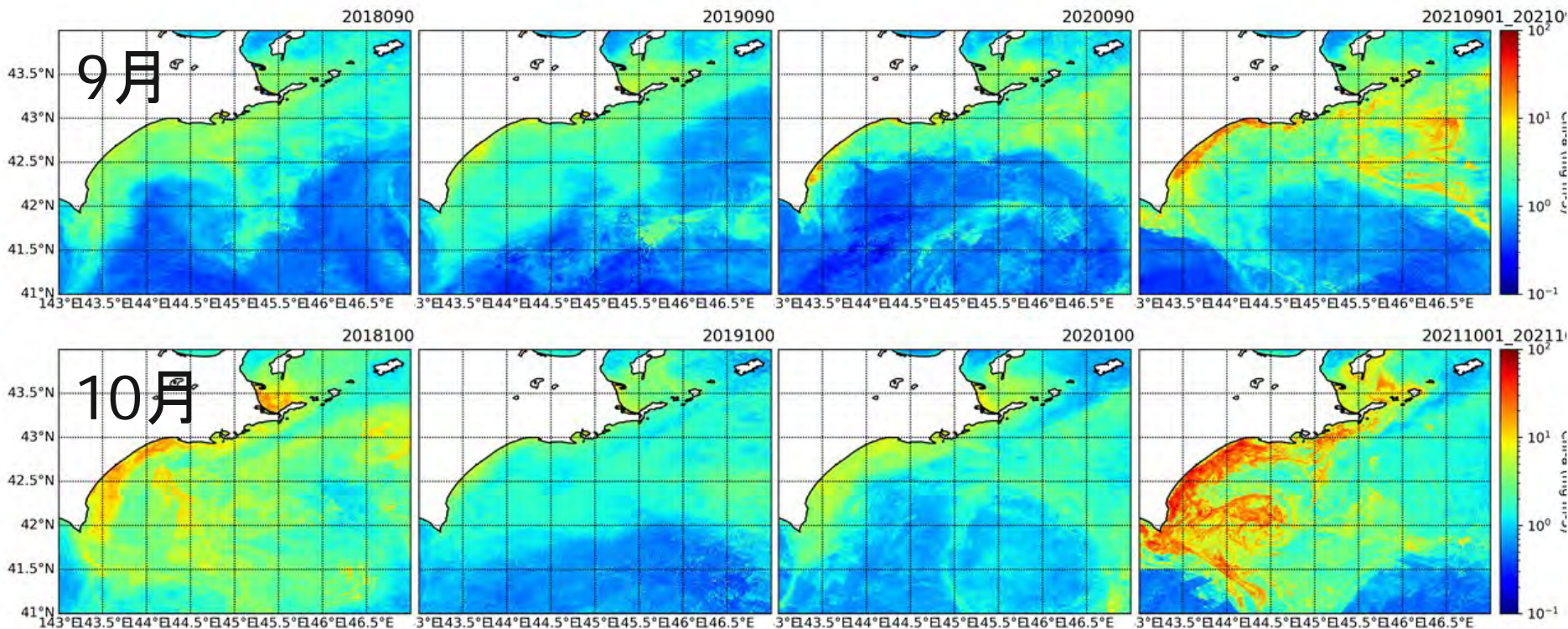
2018-2021年9・10月の道東の クロロフィルa平均値

2018

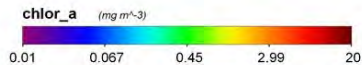
2019

2020

2021



Chl-a



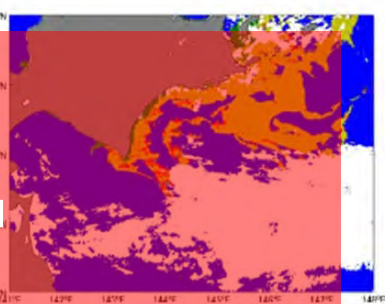
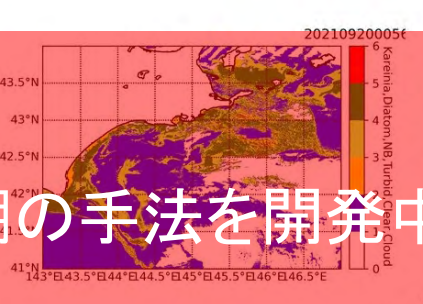
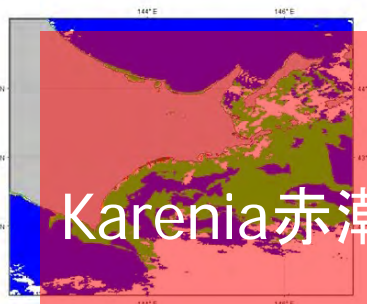
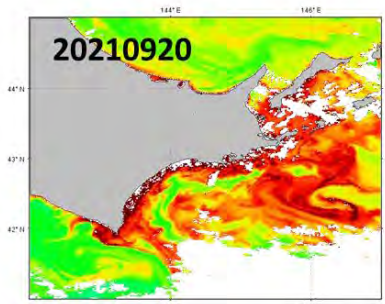
MODIS-Bbp



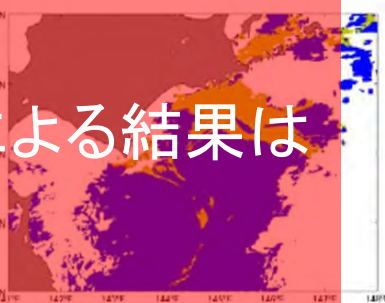
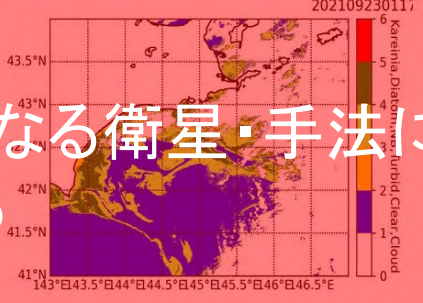
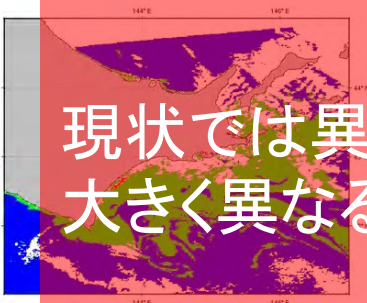
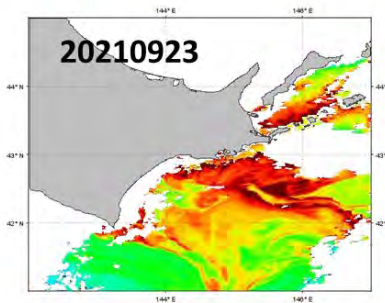
SGLI-Bbp

SGLI results

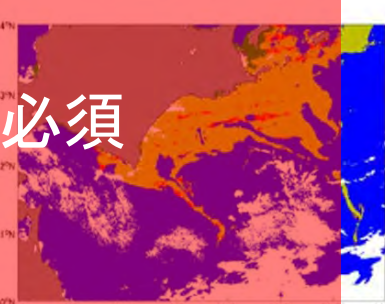
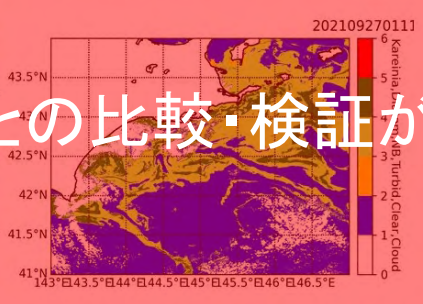
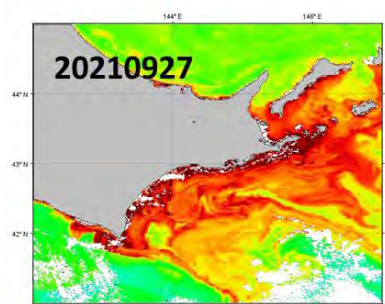
MODIS-Rrs



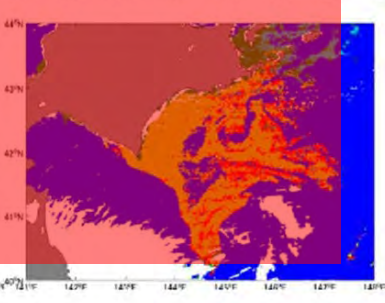
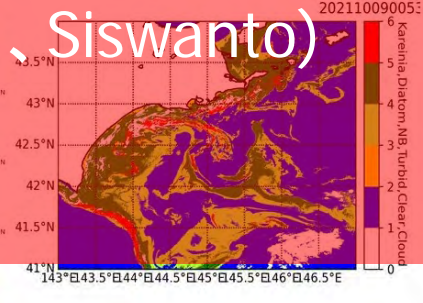
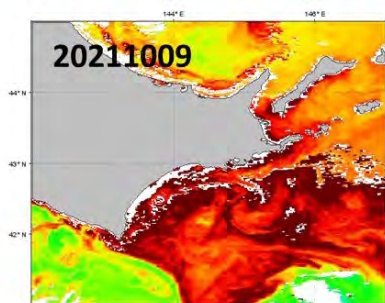
Karenia赤潮の手法を開発中



現状では異なる衛星・手法による結果は大きく異なる



現場データとの比較・検証が必須



(Feng, 石坂、Siswanto)

まとめ

- 富・貧栄養化の検知システム(25年間)
- 赤潮を含めた植物プランクトン群集の変化の検知
- 継続的な海色衛星情報の確保が必要
(しきさい観測の継続・後継)
- 高解像度データの高頻度化に期待
(ひまわりの高度化など静止海色衛星)
- 現場と衛星データの共有化(共同研究等)が重要
- データ配布・解析システム(センター?)の強化