

What Can You Do with 100 Years of Ocean Data?: Experience from World Ocean Database for South China Sea Research



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2 big question

- What is World Ocean Database and how the data was collected?
- How we use the data to understand South China Sea

ARGO Floats



Argo

National contributions - 3881 Operational Floats

February 2018

Latest location of operational floats (data distributed within the last 30 days)

★ ARGENTINA (1)	★ EUROPE (94)	★ INDIA (124)	★ KENYA (1)	★ PERU (3)	★ USA (2179)
★ AUSTRALIA (361)	★ FINLAND (3)	★ INDONESIA (1)	★ MEXICO (2)	★ POLAND (5)	
★ BRAZIL (3)	★ FRANCE (277)	★ IRELAND (12)	★ NETHERLANDS (24)	★ KOREA, REPUBLIC OF (53)	
★ CANADA (87)	★ GERMANY (142)	★ ITALY (55)	★ NEW ZEALAND (8)	★ SPAIN (5)	
★ CHINA (105)	★ GREECE (2)	★ JAPAN (156)	★ NORWAY (7)	★ UK (163)	



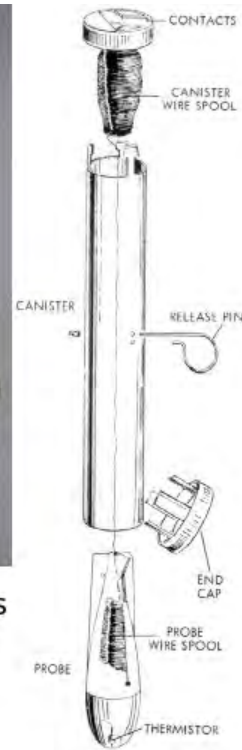


Temperature, Salinity & Depth

using CTD and
XBT

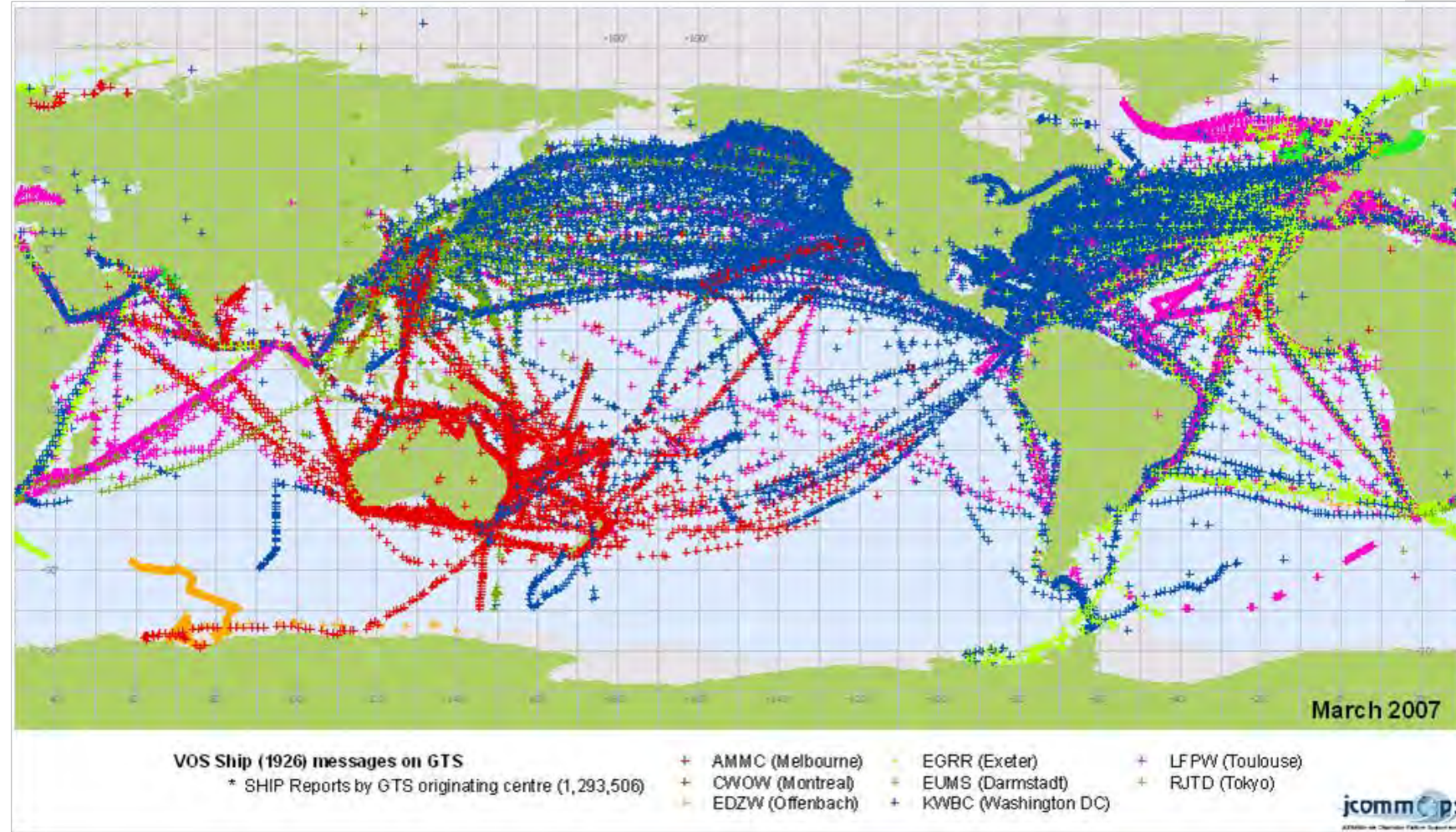


An EXpendable BathyThermograph (XBT) with it's probe inside a canister (top). On the right is an exploded view of the XBT.



Shown with
optional cage,
SBE 5P pump,
& SBE 43 DO
sensor

Ship of Opportunity



World Ocean Database (from 1919)



WORLD OCEAN DATABASE SELECT AND SEARCH

Note: At this time, World Ocean Database 2018 (WOD18) contains prereleased data and flags for the WOA18.

The WOD is an NCEI product and an [IODE](#) (International Oceanographic Data and Information Exchange) project.

This work is funded in partnership with the NOAA OAR [Ocean Observing and Monitoring Division](#).

The WODselect retrieval system allows a user to search *World Ocean Database* and new (quarterly updated/added) data using a user-specified search criteria. A distribution map and cast count of these search criteria will give the user the option to have the data extracted and placed on the NODC FTP site in the *WOD* native, 'csv', and netCDF data formats.

To build a user defined search query:

1. Place check mark in front of any number of criteria.
2. Press the "Build a query" button.

(If any criteria below are not checked, the default will apply).

SEARCH CRITERIA: [\(definitions\)](#)

- Geographic Coordinates**
- Observation Dates** - e.g., Year(s), Month(s), Day(s)
- Dataset** - e.g., OSD, CTD, XBT
- Measured Variables** - e.g., Temperature, Salinity, Nutrients
- Biology** - e.g., Phytoplankton, Zooplankton
- Deepest Measurement**
- Country**
- Ship/Platform**
- Cruise**
- Accession #**
- Project**
- Institute**
- Data Exclusion Using WOD Quality Control Flags**
- Data Additions**

DEFAULT:

- whole world
- all years/months/days
- all datasets
- all available variables
- all available plankton
- all depths
- all countries
- all ships/platforms
- all cruises
- all accessions
- all projects
- all institutes
- no exclusion
- WOD18 released data

Build a query

Reset

UMT Coastal Observation



- Our planet is constantly changing in ways that impact every facet of our society. To keep coastal communities, economies, and ecosystems healthy requires keeping track of ocean and coastal areas—monitoring and assessing how these areas are changing

Ocean Challenges



Pollution



Offshore Structures

Overfishing



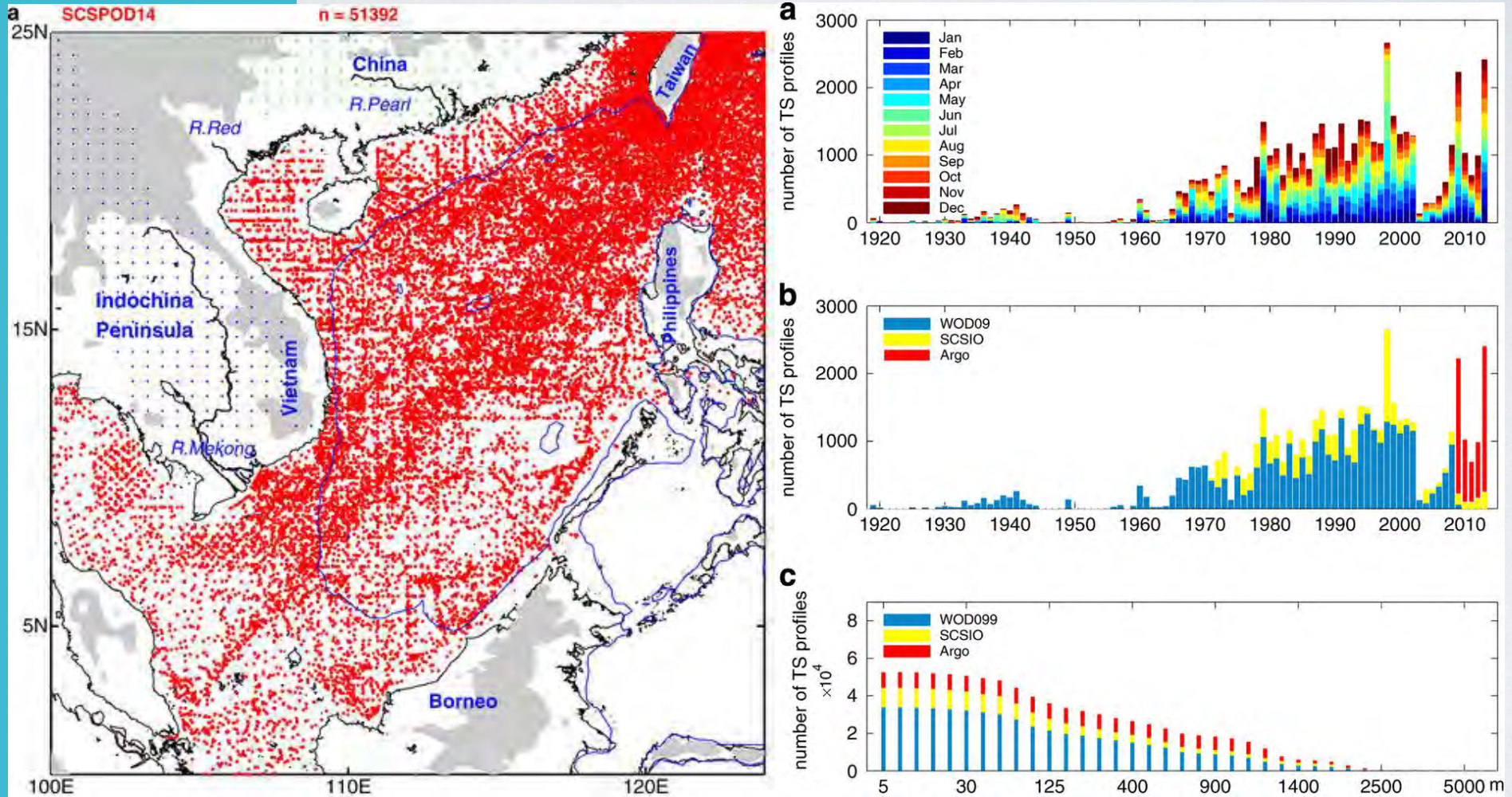
Disaster



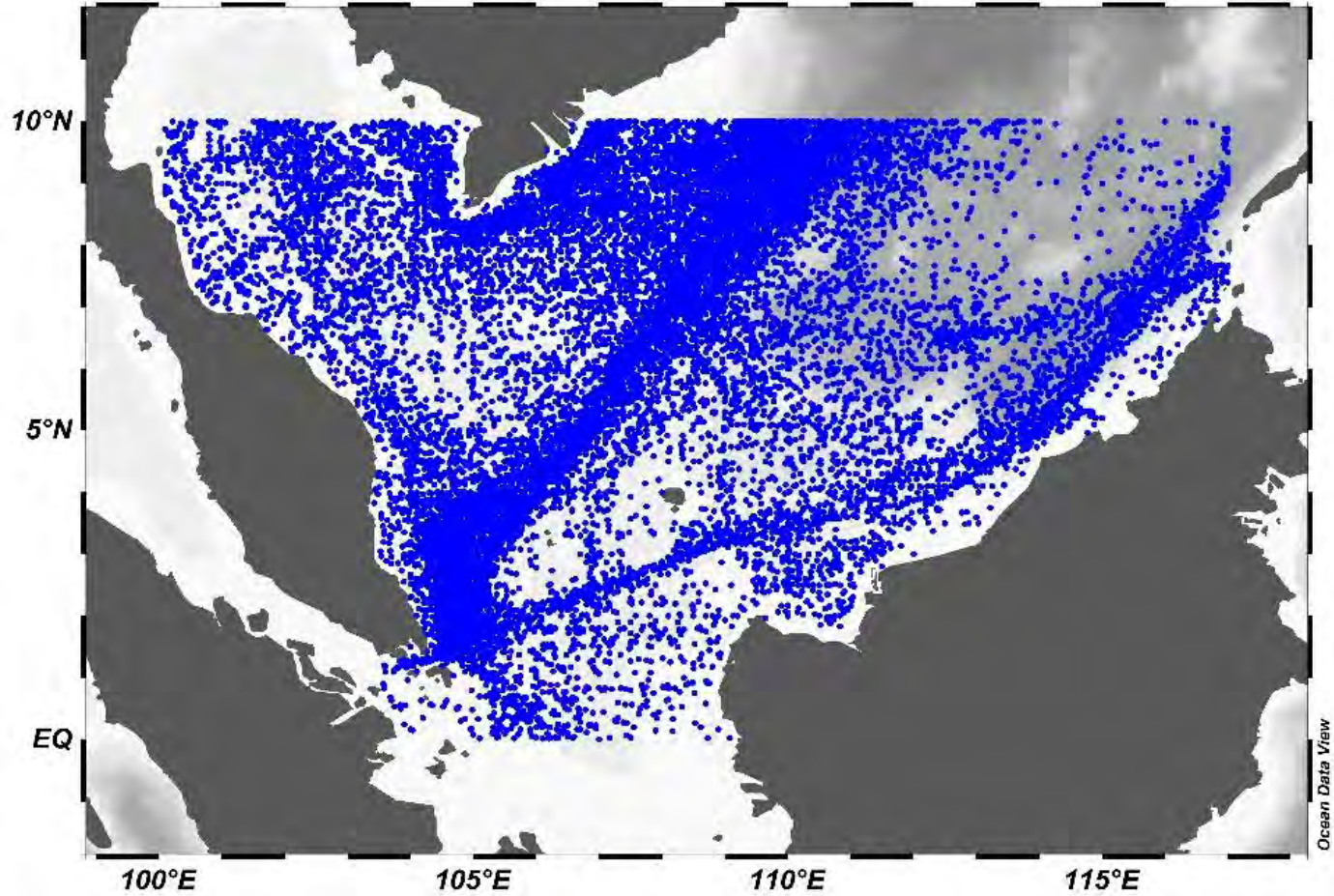
Development



SCS: Statistics of hydrographic station



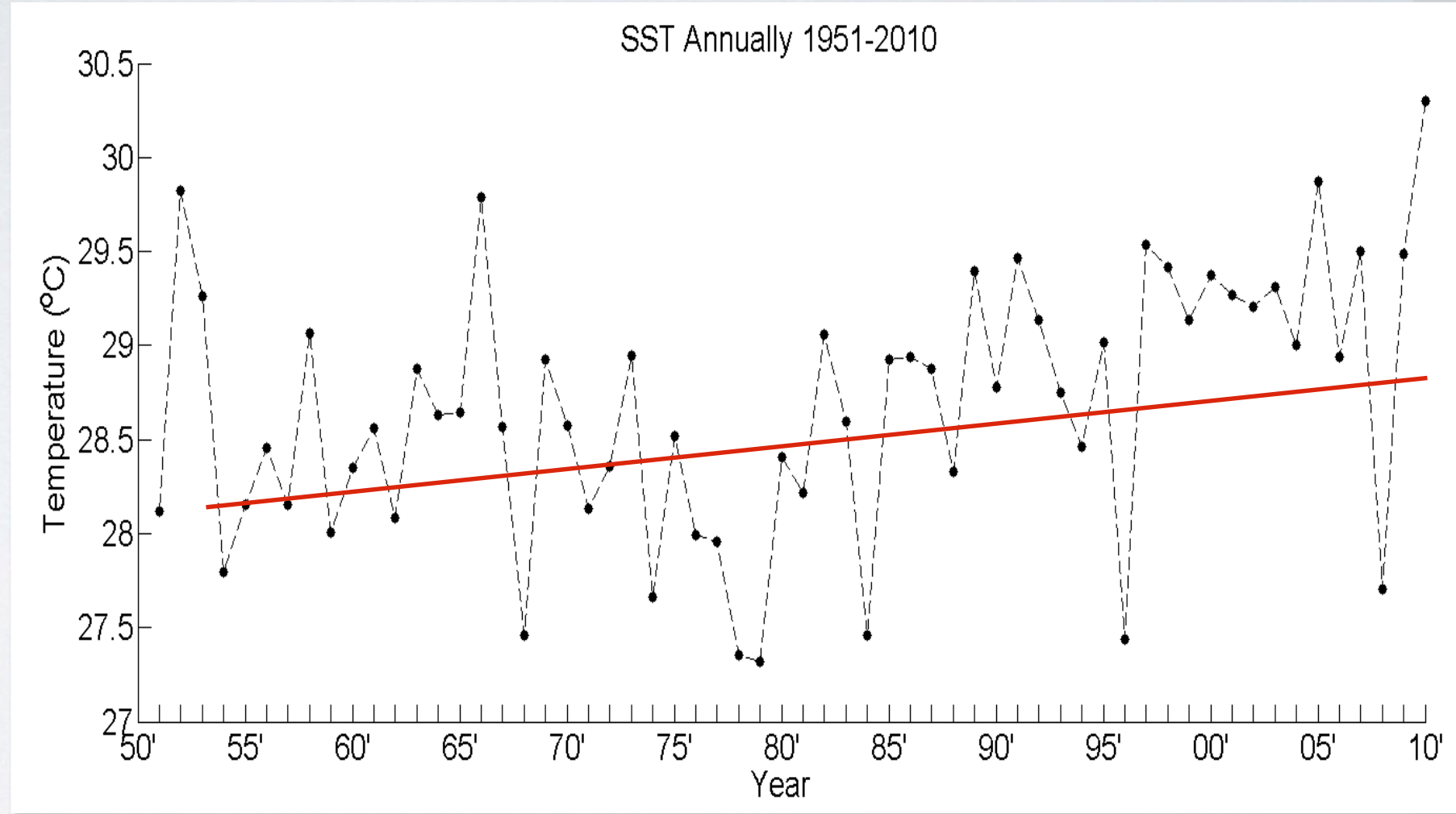
Data from WOD



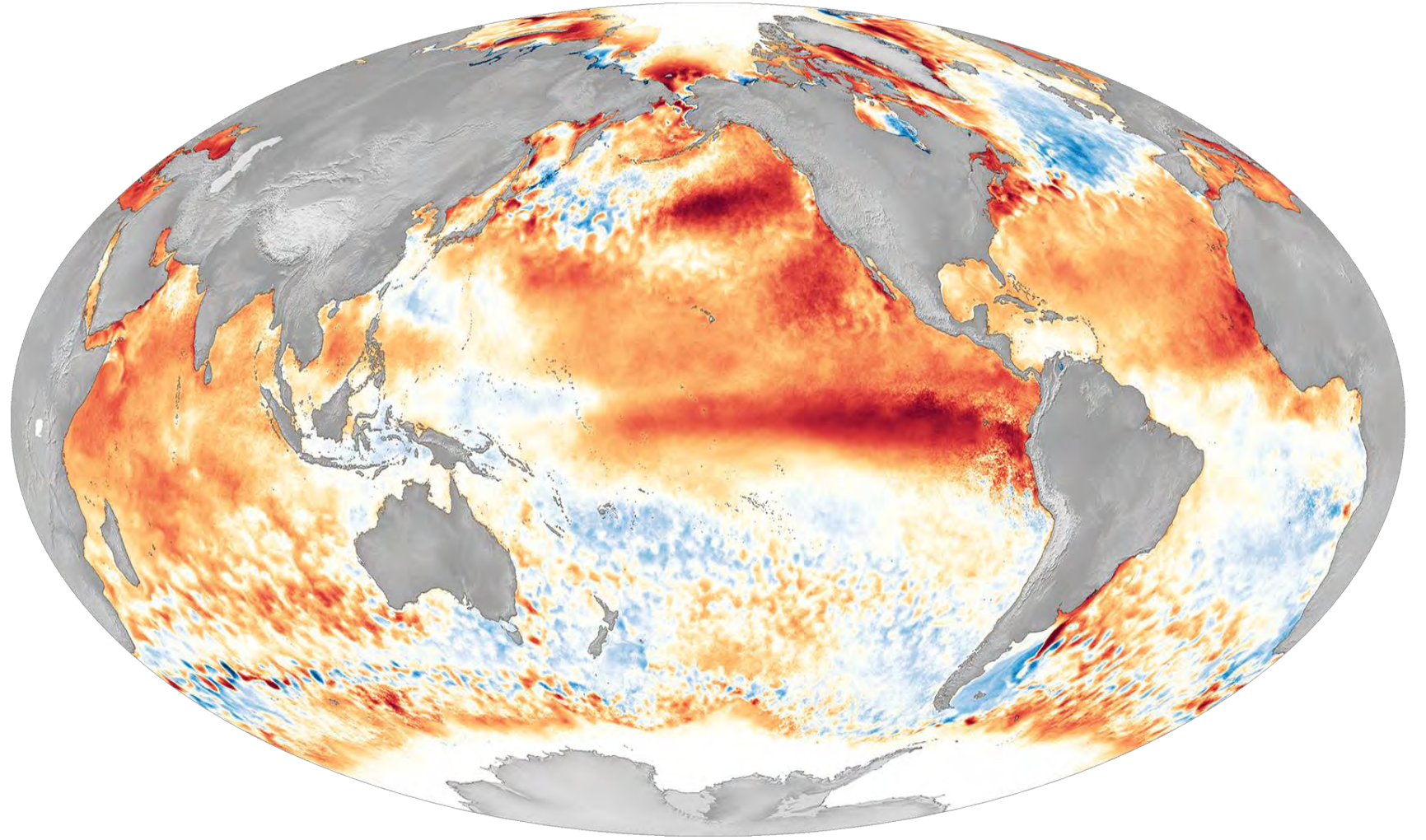
- Total number of datasets is 23,252
- Datasets included from year 1919 until recent years
- Particular regions show the high compactness of data distribution

- How we use the data to understand South China Sea?

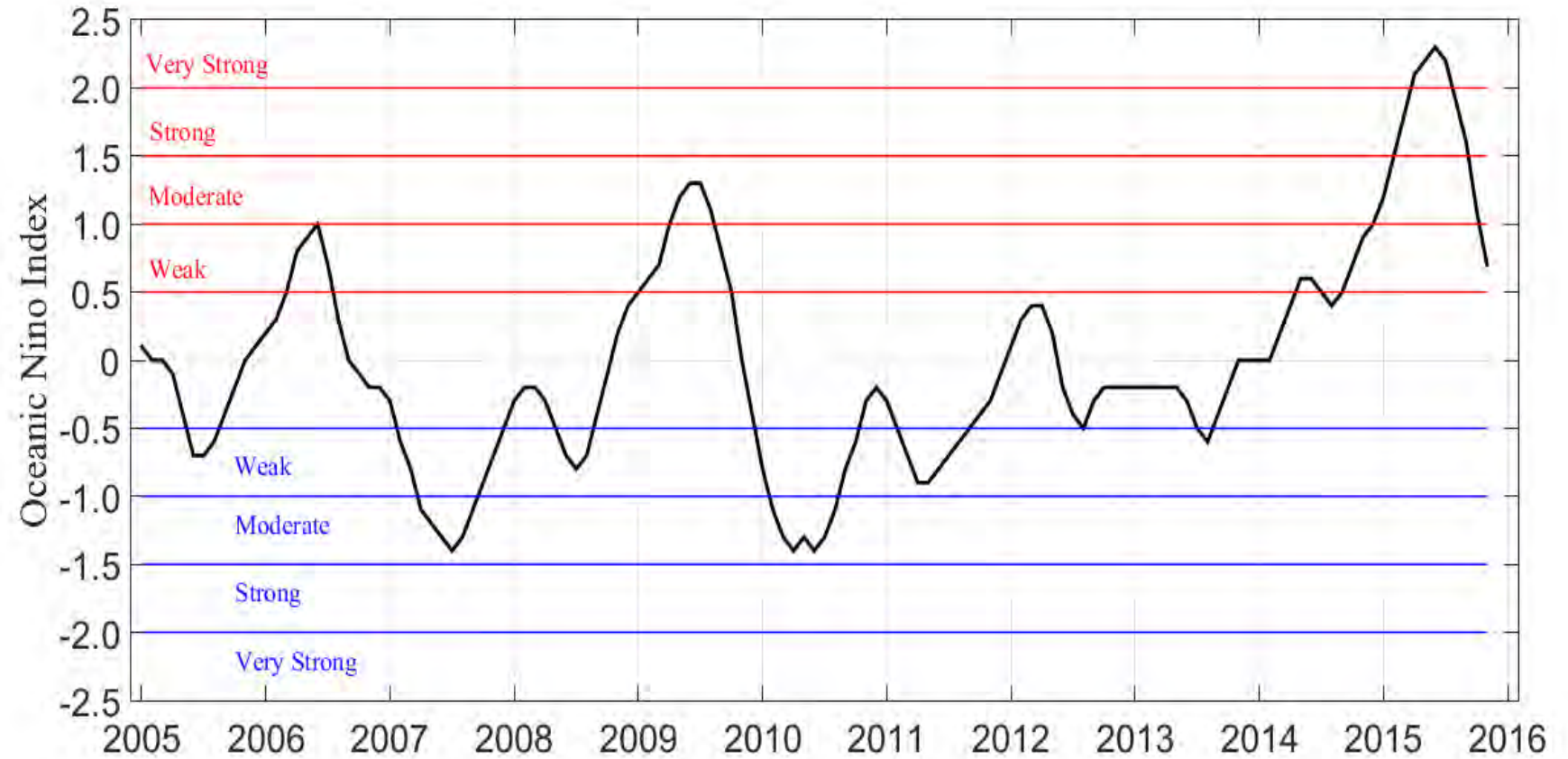
Climate Change ?



**EL-NINO
Southern
Oscillation
(ENSO)**

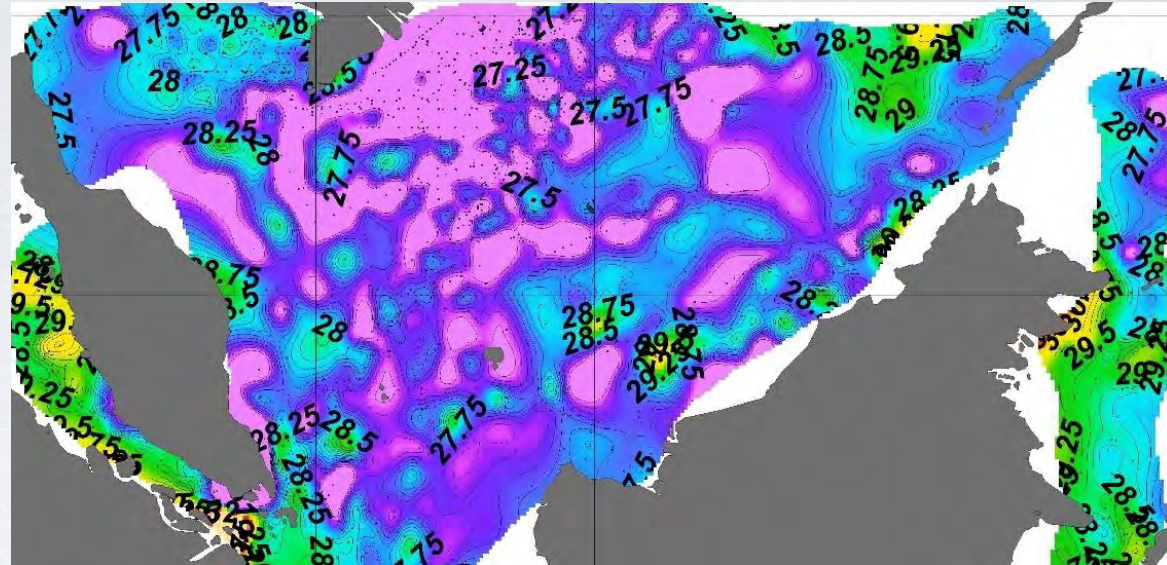
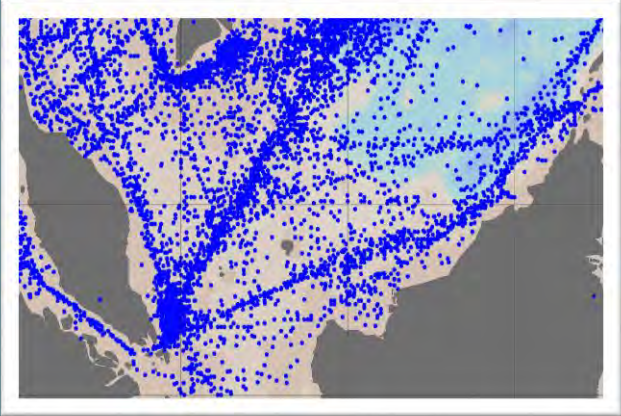


EL-NINO EFFECT ON THE REGION

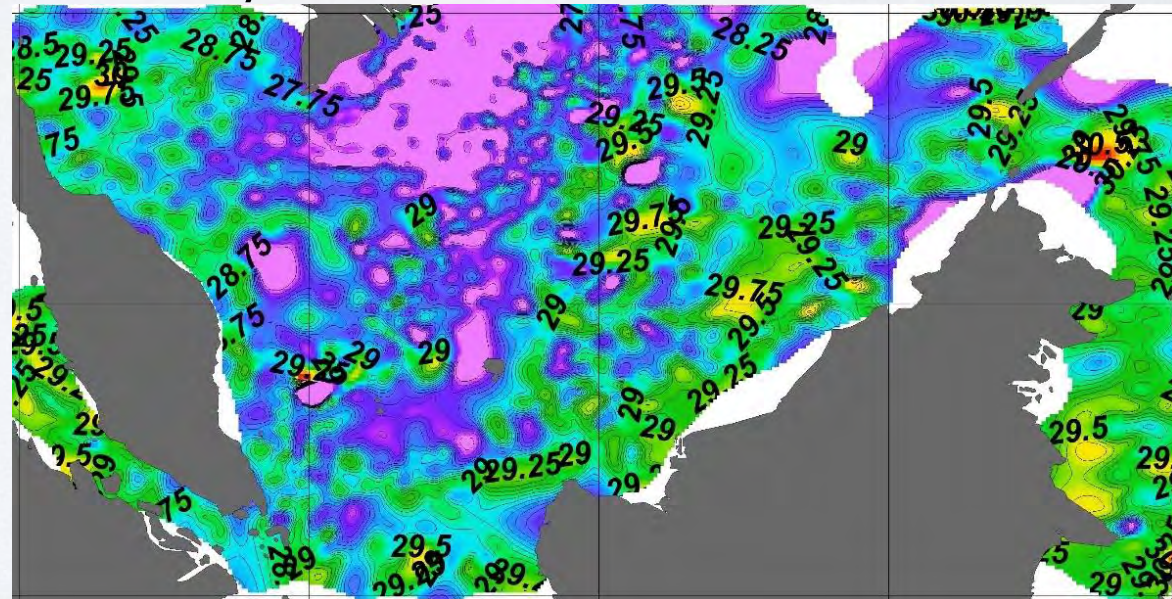


Ocean Nino Index

Non El Nino years



El Nino years



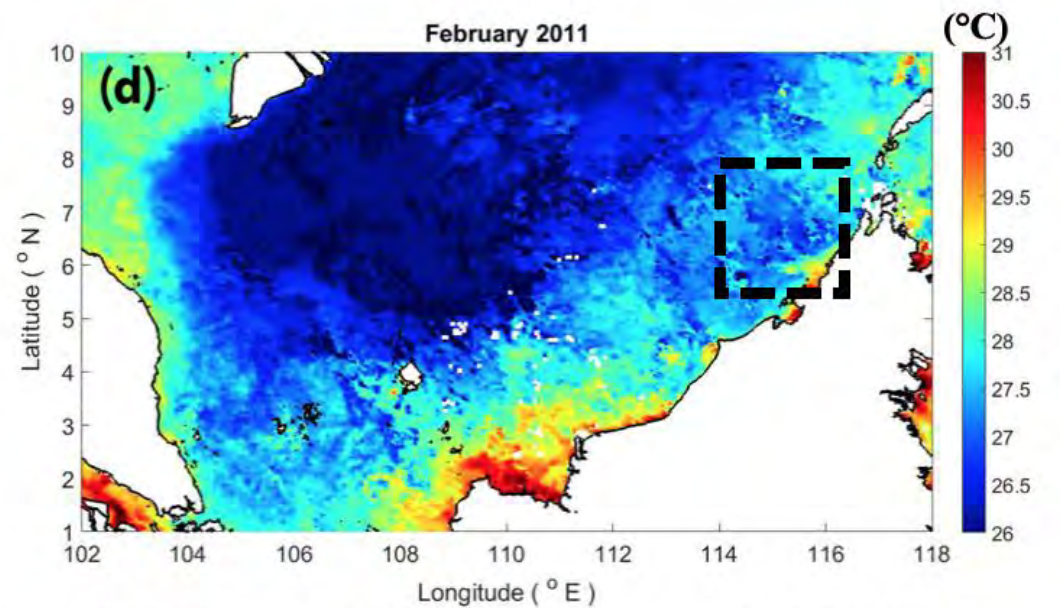
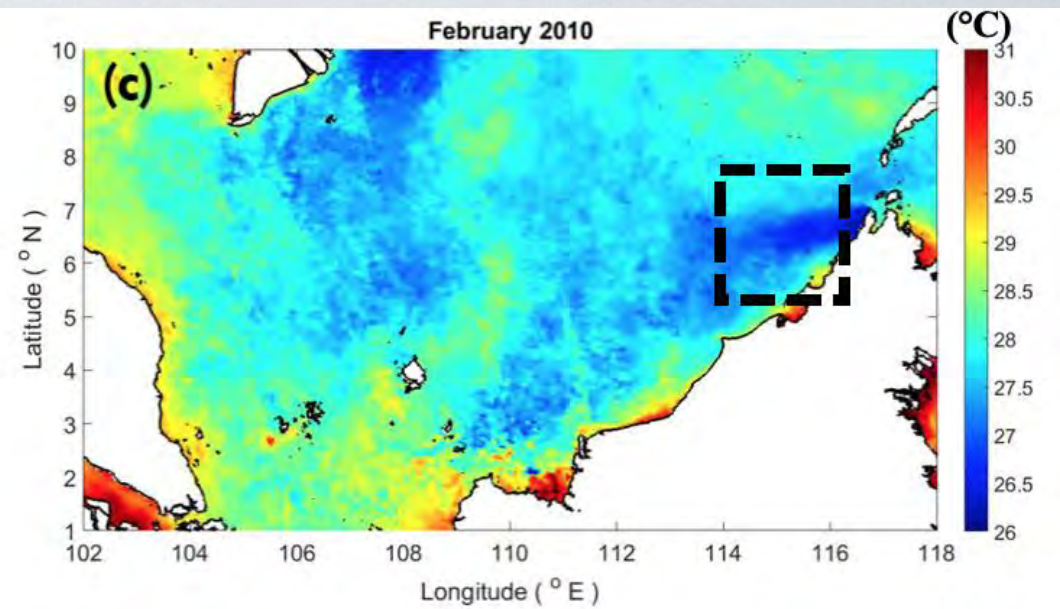
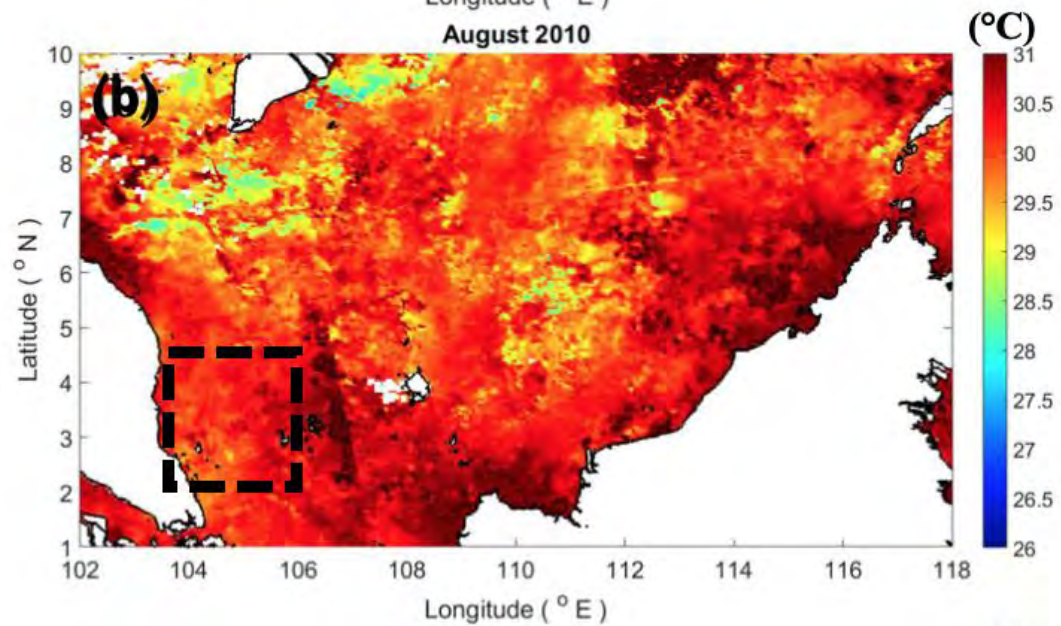
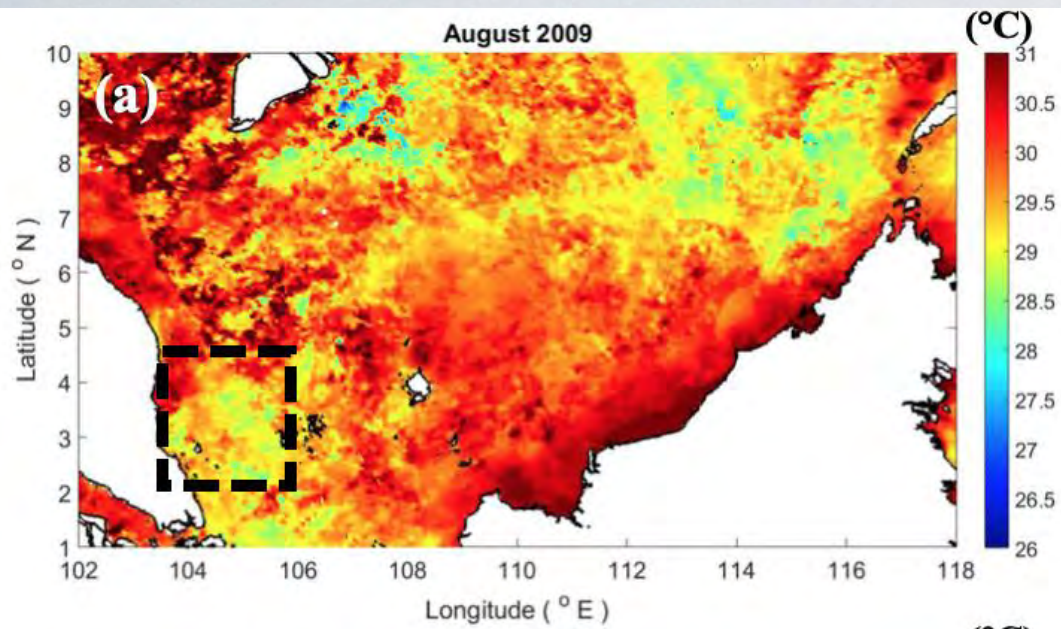
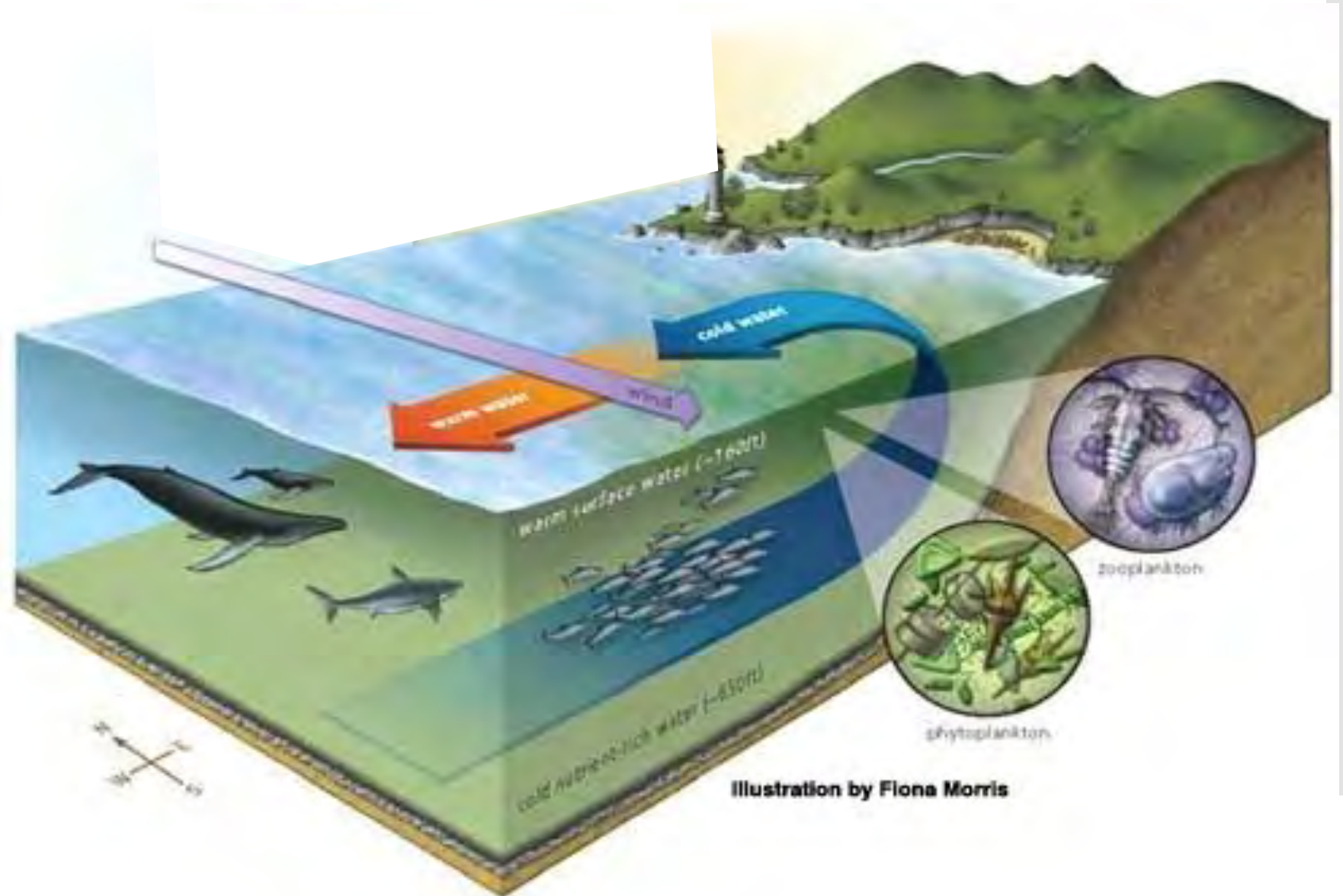


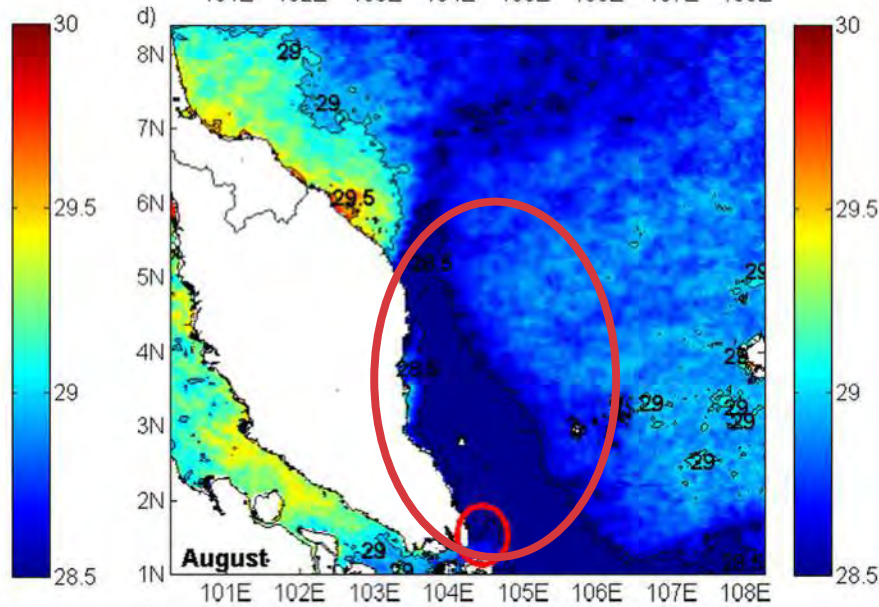
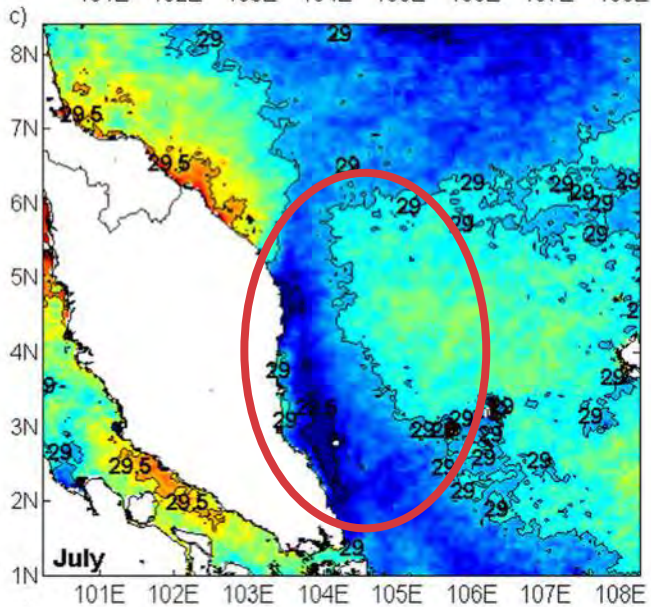
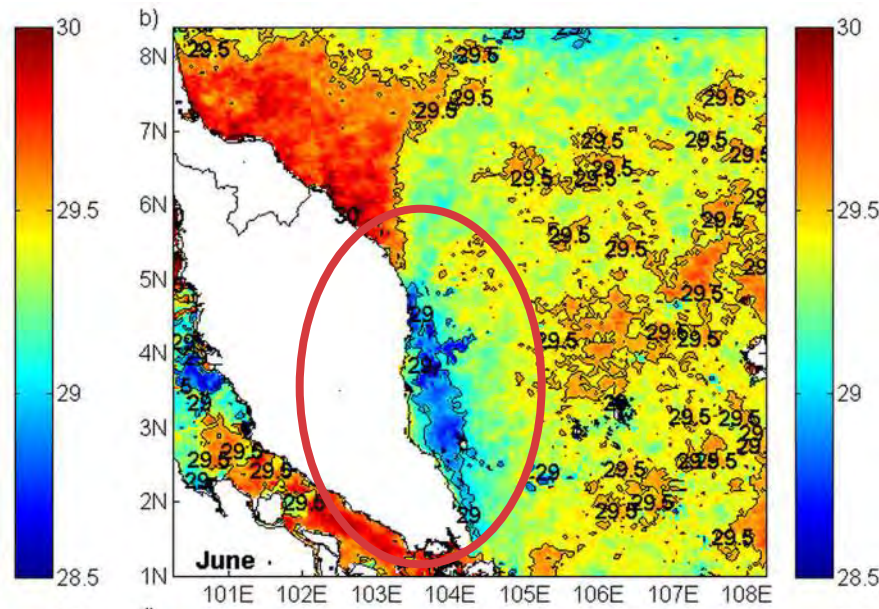
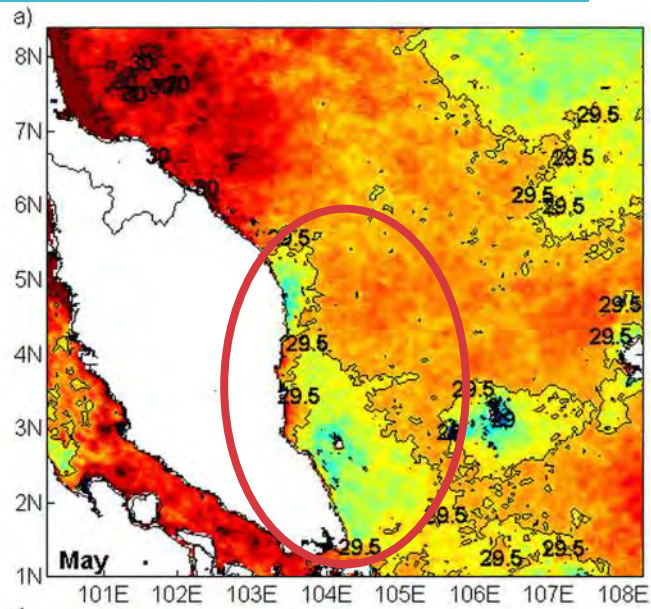
Figure 10 Monthly SST for the study area. (a) August El-Nino year (b) August post El-Nino year (c) February El-Nino year (d) February post El-Nino year. Black-dashed polygon indicate the main area of coastal upwelling.

Upwelling system

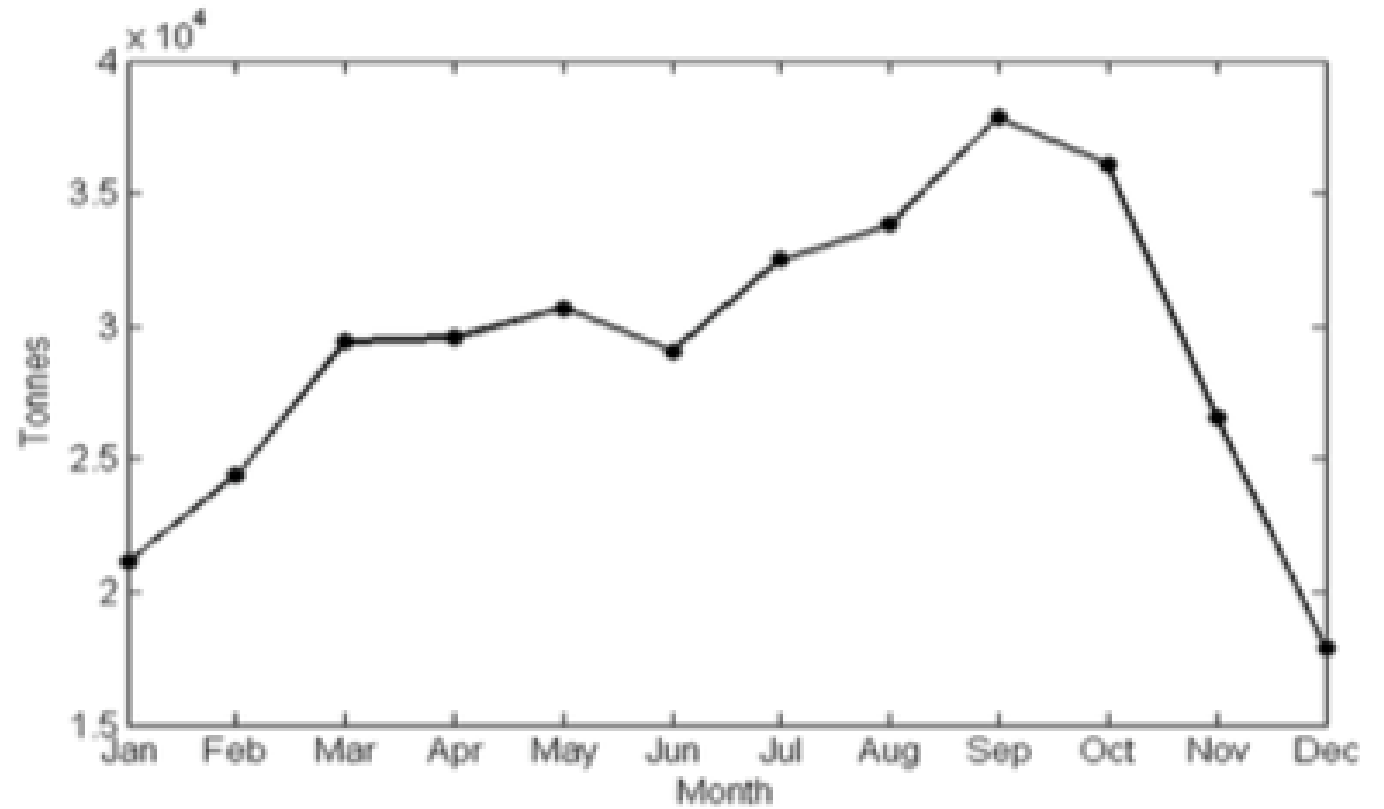


UPWELLING SYSTEM:

AREA WITH HIGH PRODUCTIVITY



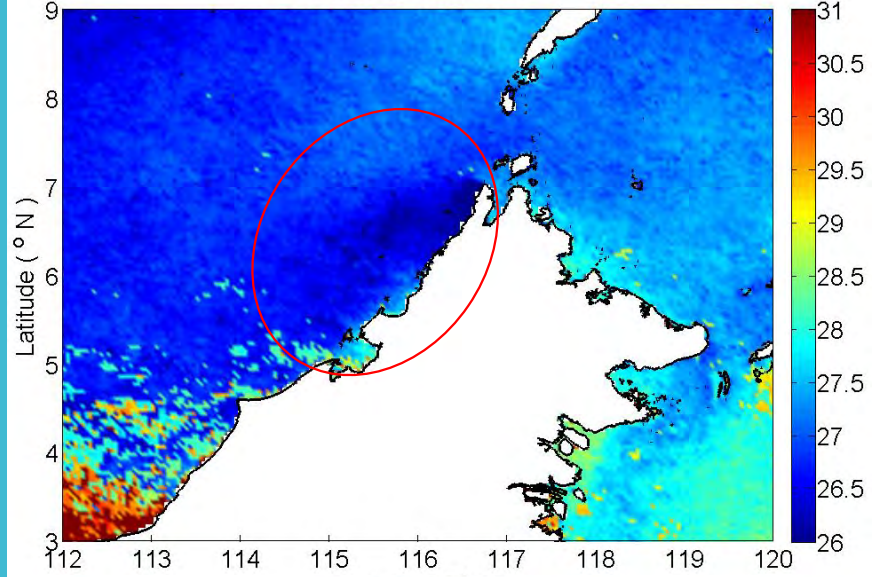
FISH LANDING



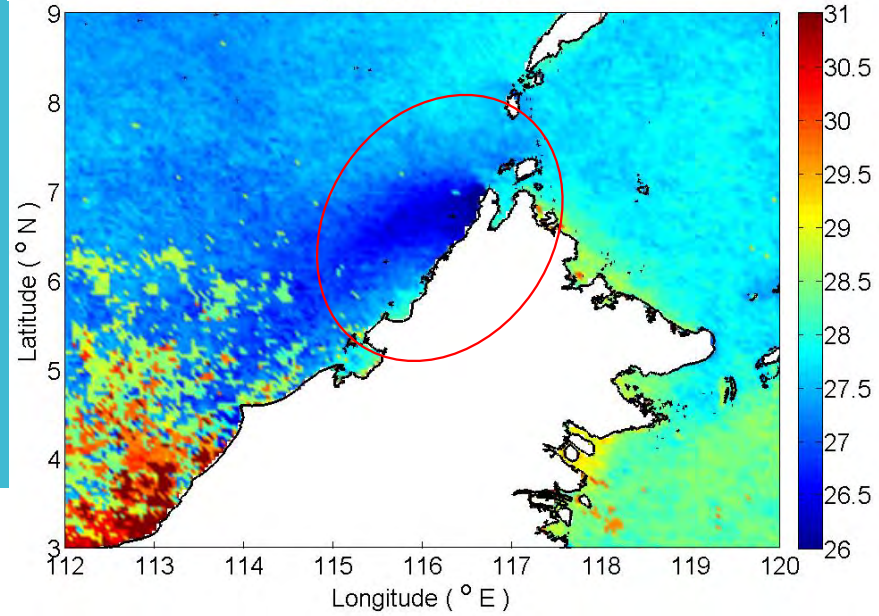
Monthly mean of marine fish landing in the period of 2003 – 2013

SST

February 2003-2015

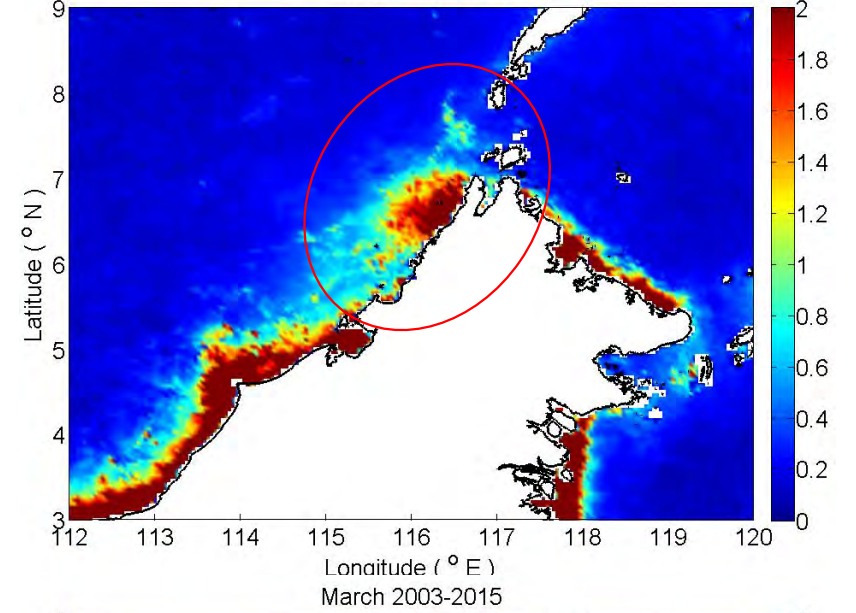


March 2003-2015

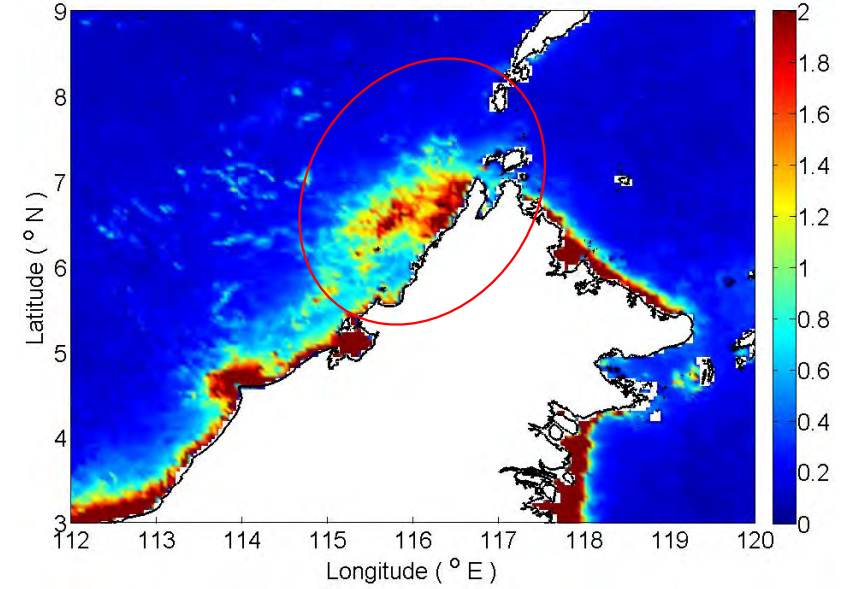


Chl-a

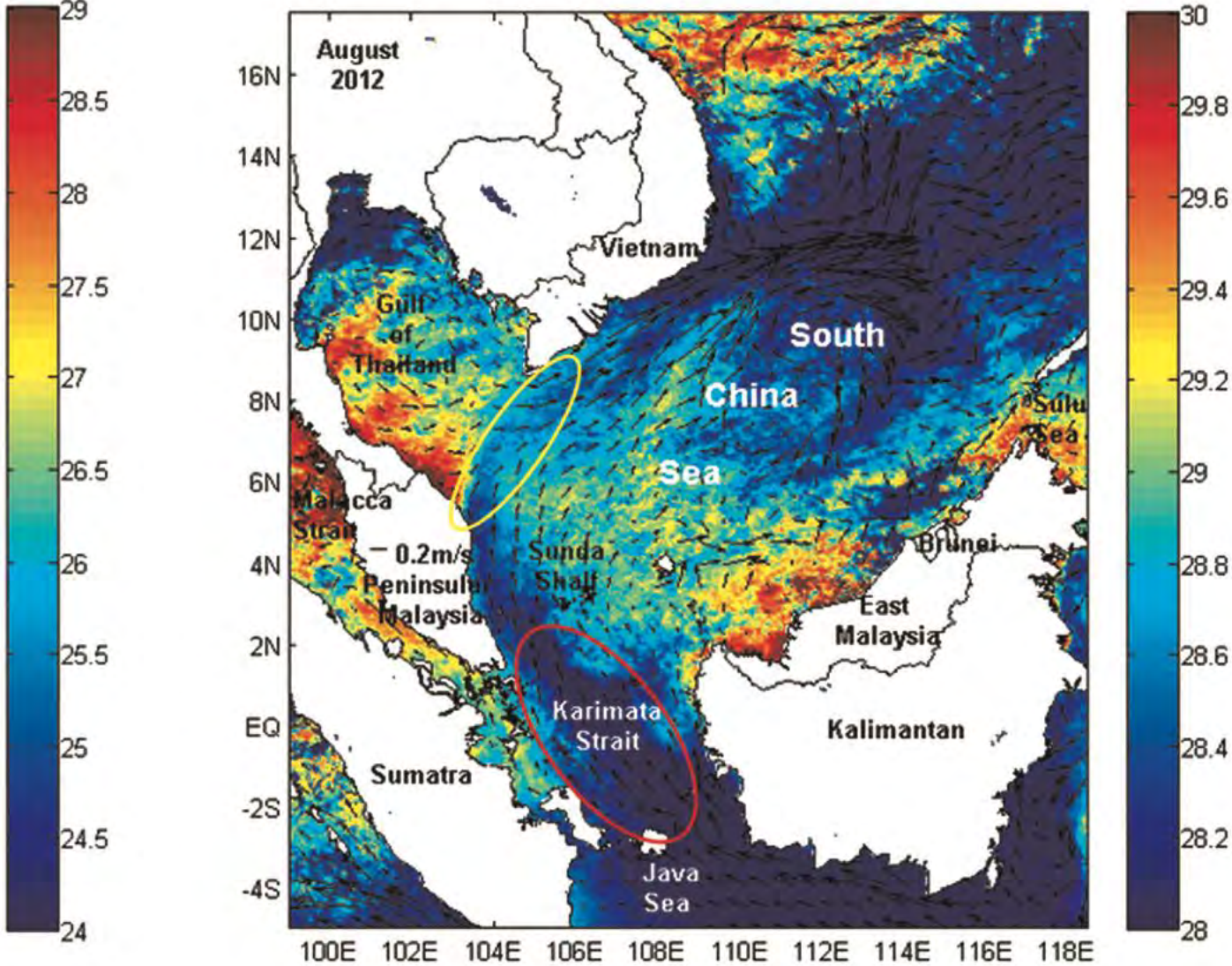
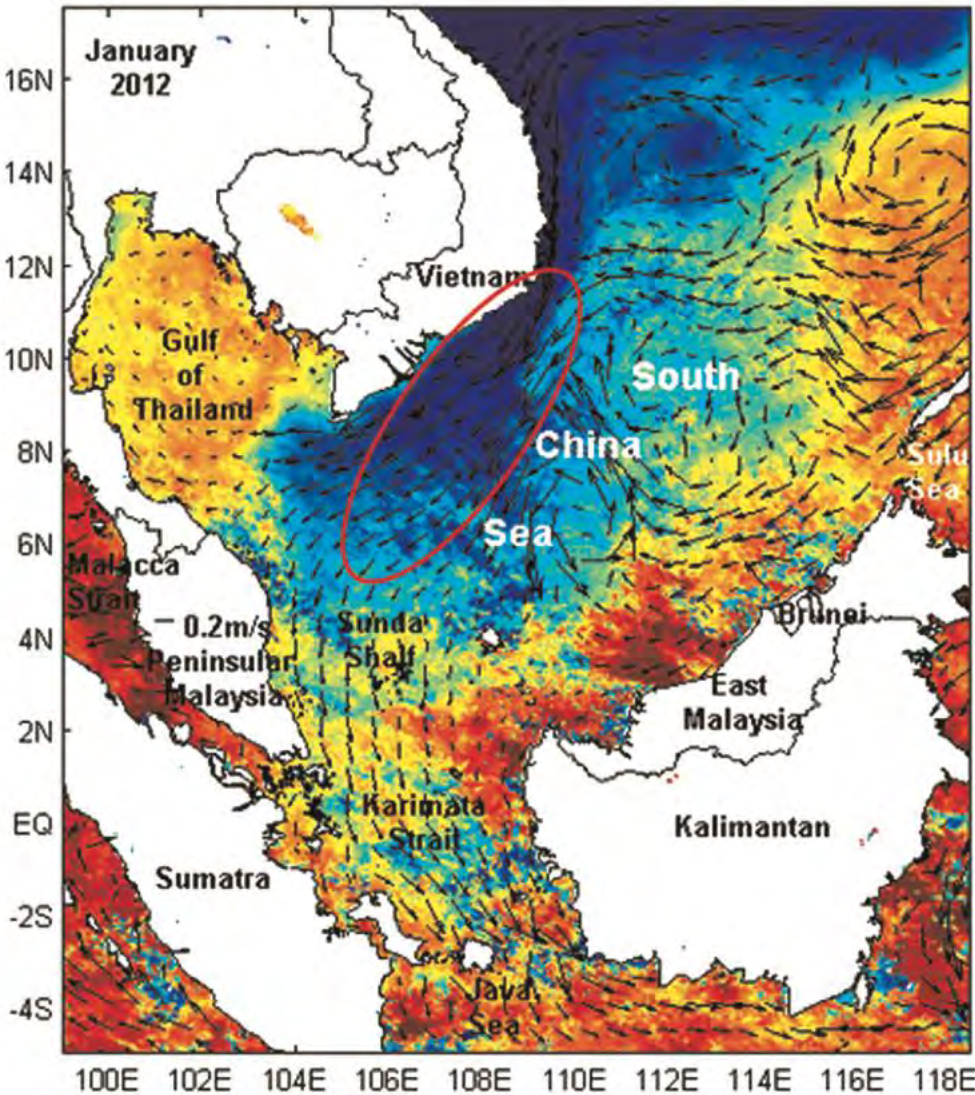
February 2003-2015



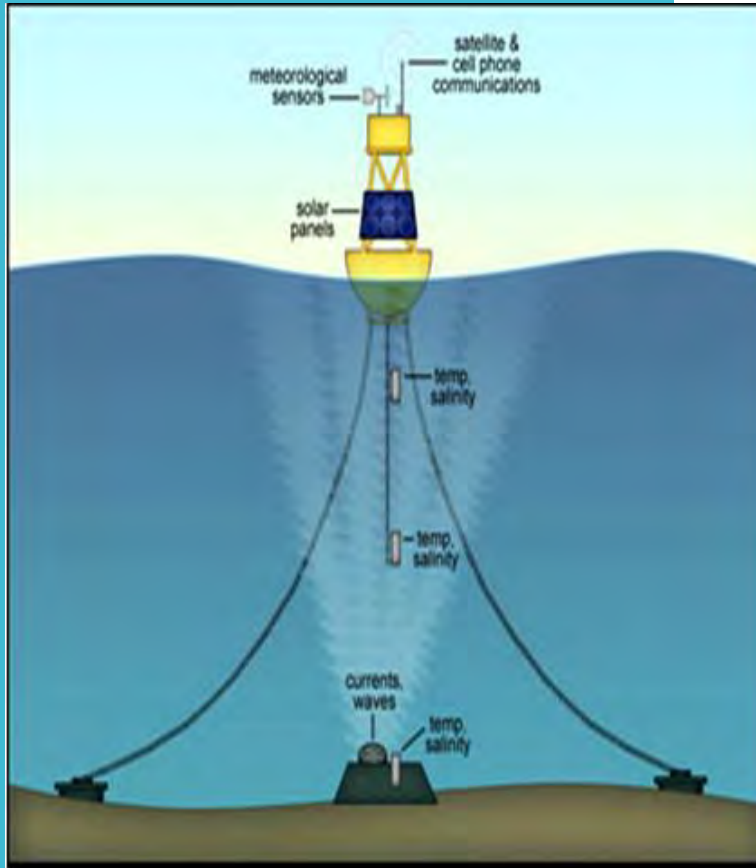
March 2003-2015



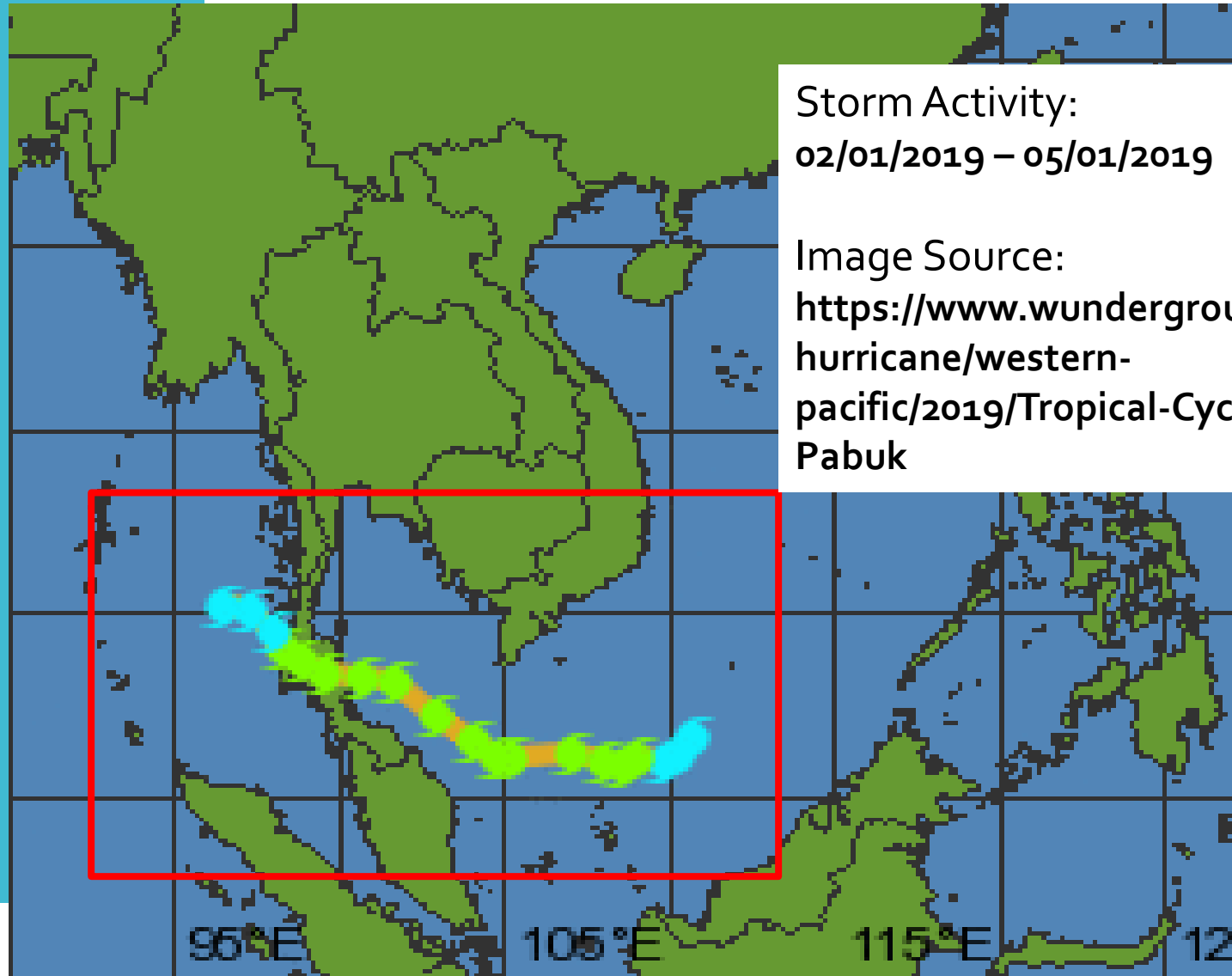
Thermal Front



CONTINUOUS OBSERVATION – OCEAN BUOY



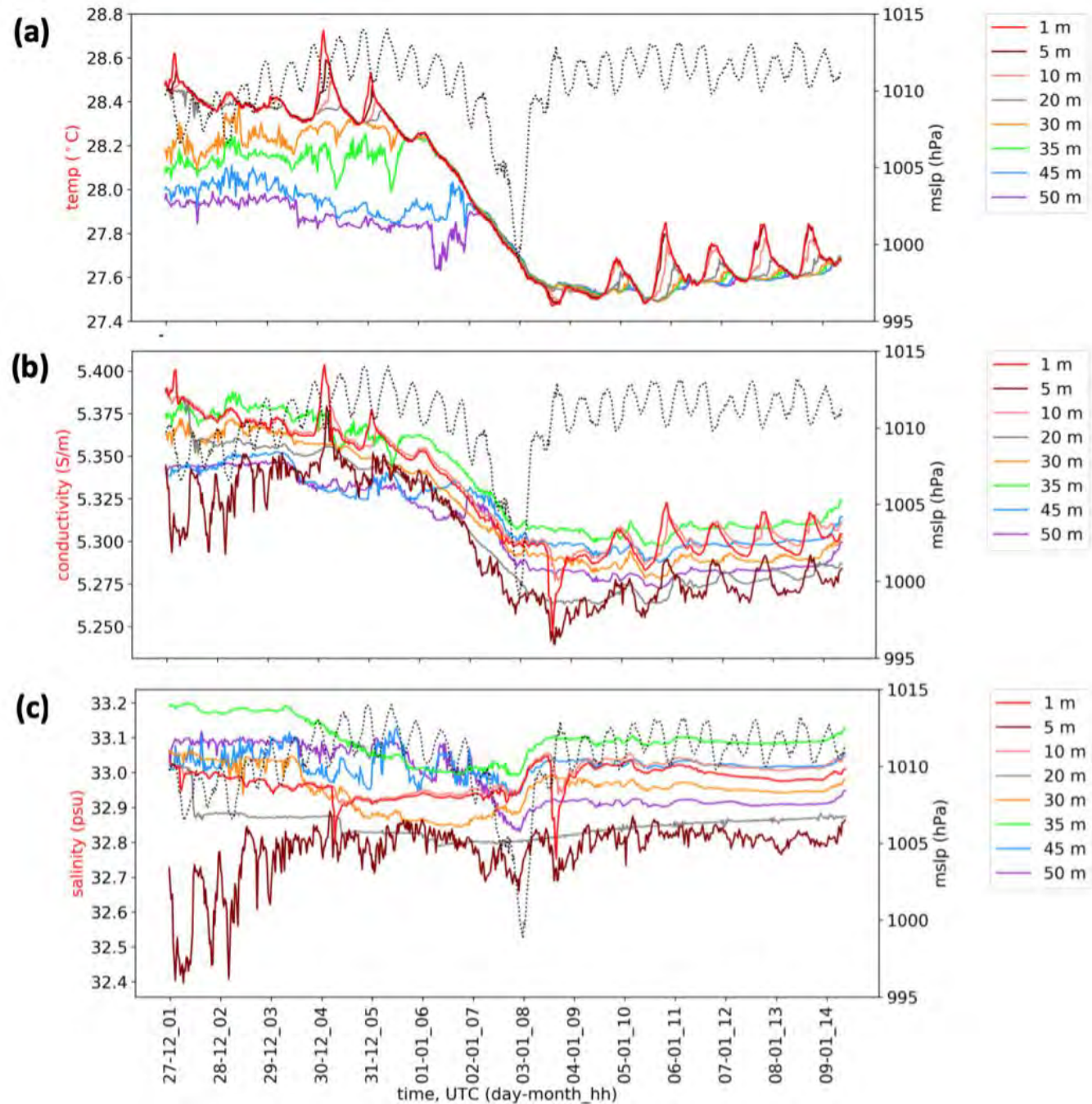
Track of Tropical Cyclone Pabuk



Storm Activity:
02/01/2019 – 05/01/2019

Image Source:
<https://www.wunderground.com/hurricane/western-pacific/2019/Tropical-Cyclone-Pabuk>

Buoy measurement during Tropical Storm Pabuk (Jan 2019)



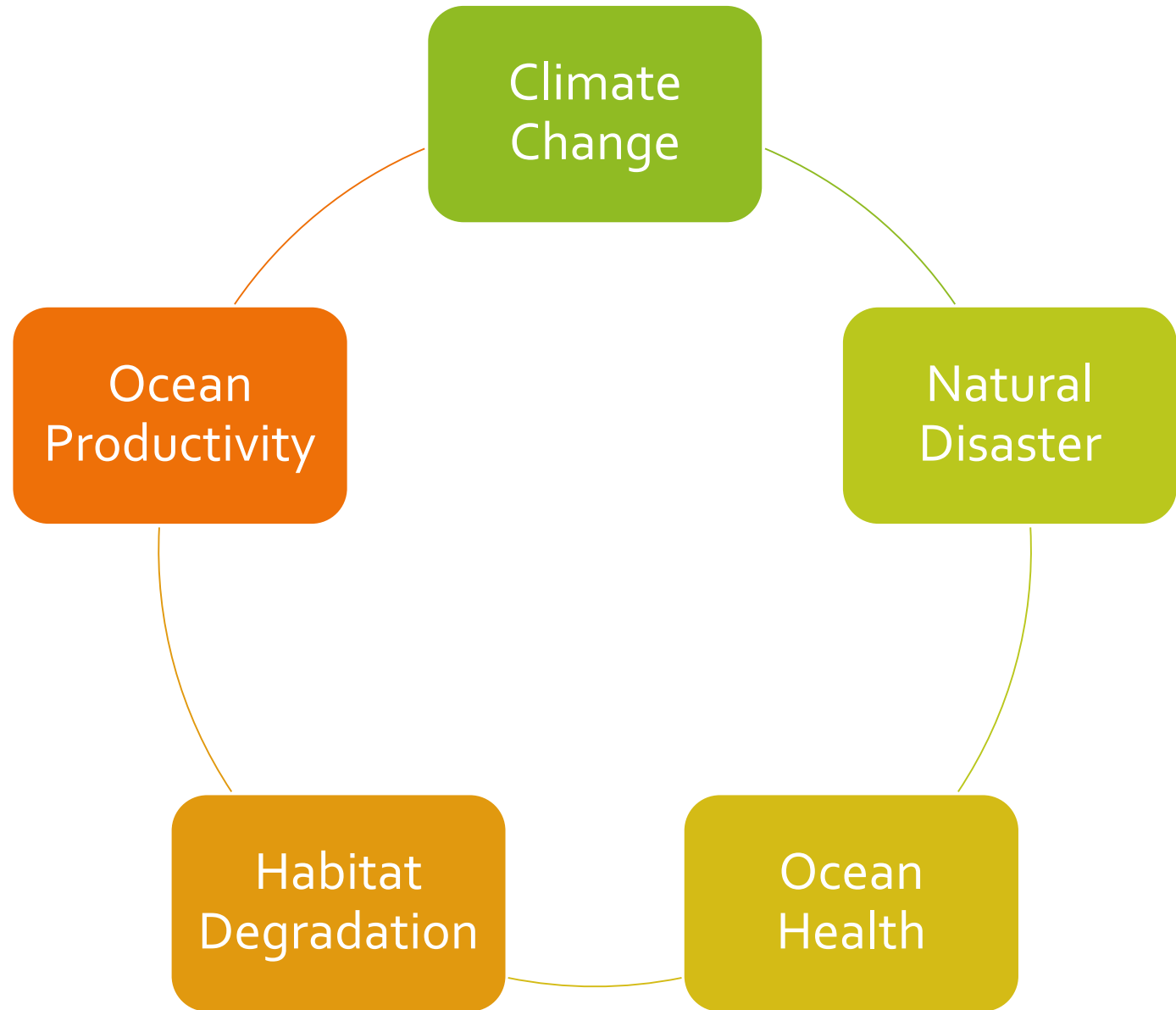
Dead Coral accumulation



Extreme erosion



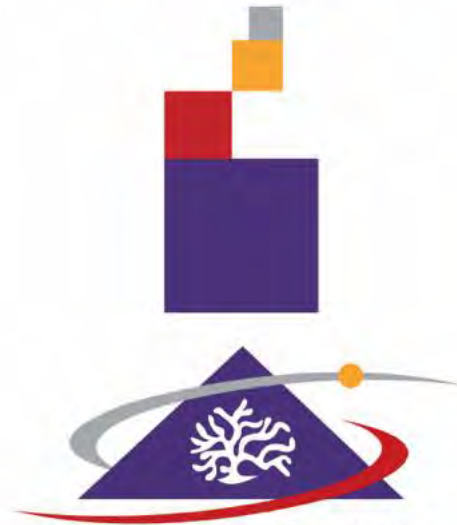
Motivation
to endless
underwater
exploration



30:41

ظَهَرَ الْفَسَادُ فِي الْبَرِّ وَالْبَحْرِ بِمَا كَسَبَتْ أَيْدِي النَّاسِ
لِيُذِيقَهُمْ بَعْضَ الَّذِي عَمِلُوا لَعَلَّهُمْ يَرْجِعُونَ ﴿٤١﴾

Corruption has appeared throughout the land and sea by [reason of] what the hands of people have earned so He may let them taste part of [the consequence of] what they have done that perhaps they will return [to righteousness].



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UMT

TERIMA KASIH / *THANK YOU*

www.umt.edu.my

