

# CURRENT RESEARCH ON ITF AND EASTERN INDIAN OCEAN UPWELLING

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# Background

- The Indonesian Throughflow (ITF), connecting the tropical Pacific and Indian Oceans, is a crucial link of the ocean general circulation that affects not only properties of these two oceans but also global climate.
- Upwelling in the Eastern Indian Ocean driven by monsoonal winds. The upwelling has profound impacts on regional and global climate through its intensive interaction with the atmosphere during Indian Ocean Dipole (IOD) events

# The Transport, Internal Waves and Mixing in the Indonesian Throughflow regions and its Impact on Marine Ecosystem (2015 – 2018)



Real Track Map of TIMIT Cruise 2015



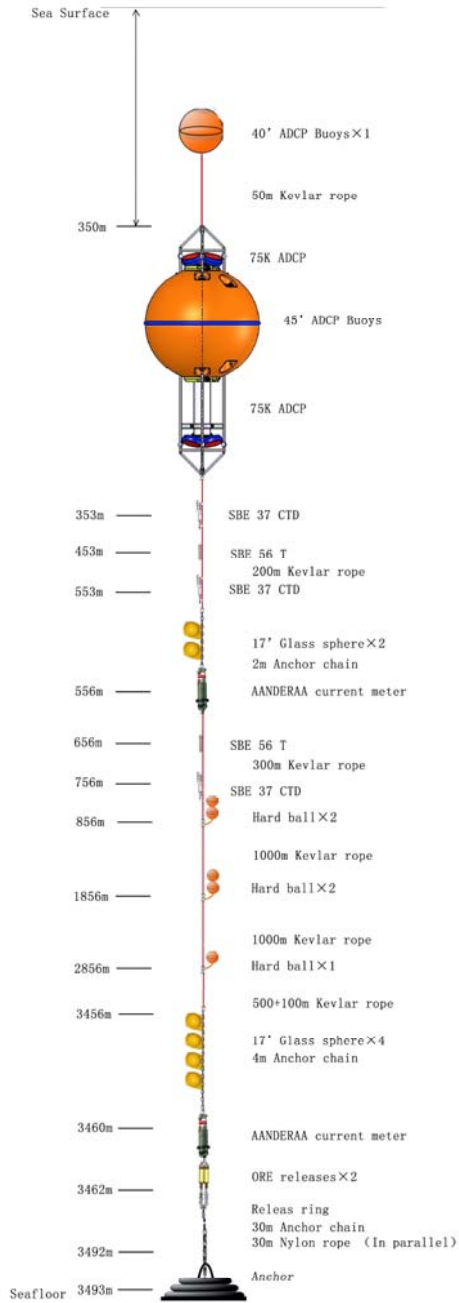
# Detailed objectives

1. To measure flow variability in ITF regions, obtain the velocity profile and quantify the transport/exchange of ITF in Makassar, Lombok in ITF regions.
2. To measure the internal waves in ITF region, obtain the time series of temperature profile and thermocline, and study the generation, propagation and dissipation of internal waves.
3. To measure the vertical mixing in ITF region, to calculate the vertical mixing coefficients along the ITF path.
4. To investigate the effects of internal waves and mixing on ITF variability and the dynamics in Indonesian Seas.
5. To relate marine ecosystems and fish migration to the ITF characteristics
6. To better understand the role of mixing in ITF region associated sea-air fluxes, including CO<sub>2</sub>.

# TIMIT SCHEDULE

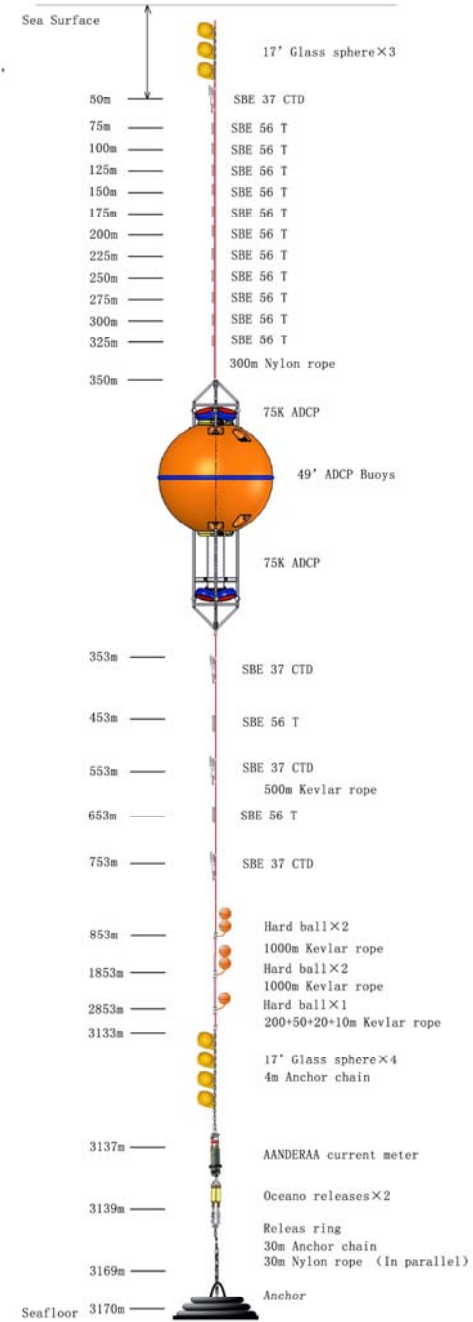
No.	Time	Activities
1.	1 – 18 October 2015	Deploy 3 moorings (2 moorings in Makassar strait, 1 mooring in Lombok strait)  24 CTD stations, 3 stations Turbo Map, 5 towed CTD lines
2.	Sept/Oct 2016	Mooring recovery and re-deployment  CTD stations (?)
3.	Sept/Oct 2017	Mooring recovery  CTD stations (?)

Station M1.  
Depth 3490m



	Station	M1
	Draw	Guanli
	Authorize	Shuji

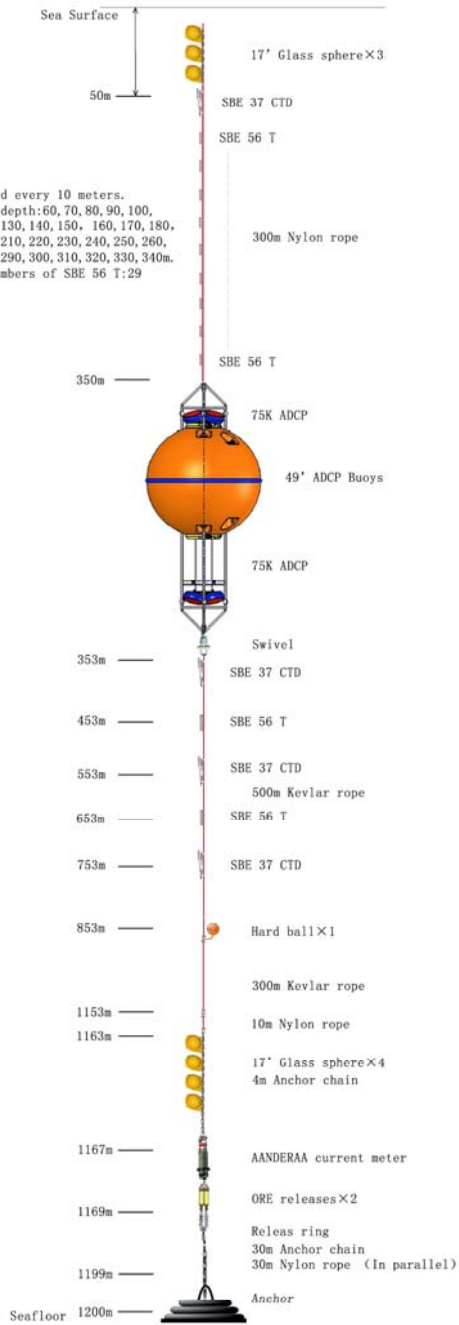
Station M2.  
Depth 2950m



	Station	M2
	Draw	Guanlin Wang
	Authorize	Shujiang Li

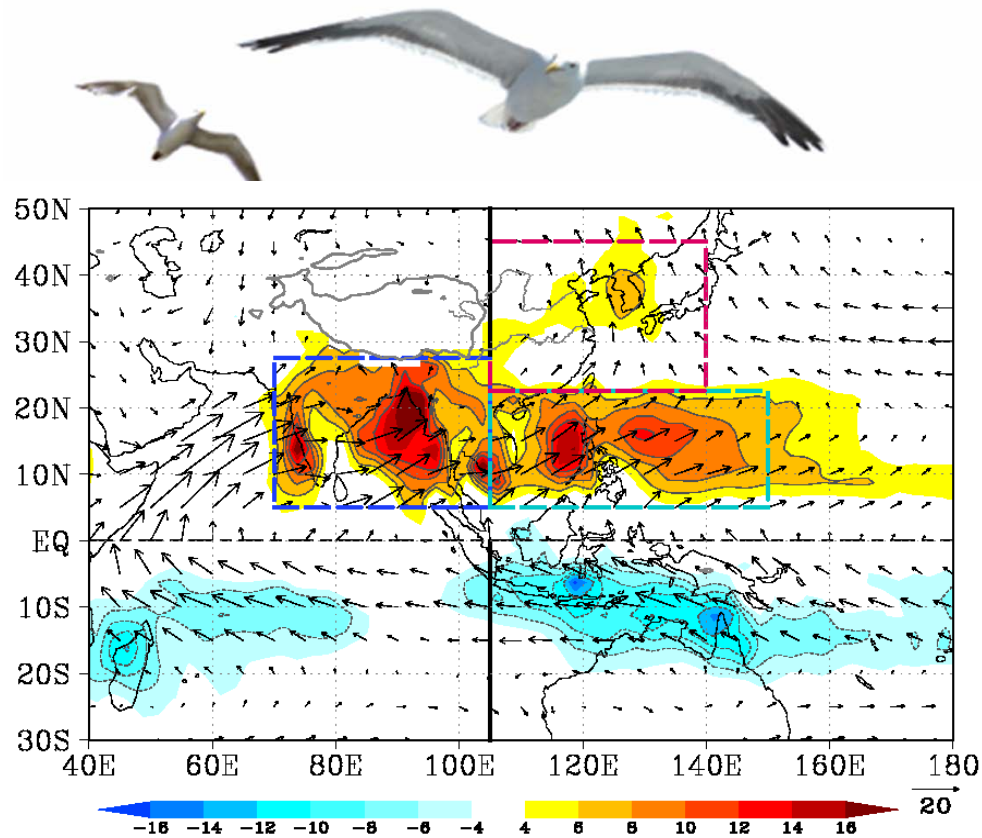
**Station LI.**  
Depth 1200m

Installed every 10 meters.  
Install depth:60, 70, 80, 90, 100,  
110, 120, 130, 140, 150, 160, 170, 180,  
190, 200, 210, 220, 230, 240, 250, 260,  
270, 280, 290, 300, 310, 320, 330, 340m.  
Total numbers of SBE 56 T:29



Station	LI
Draw	Guanlin Wang
Authorize	Shujiang Li

# MONSOON ONSET MONITORING AND ITS SOCIAL AND ECOSYSTEM IMPACTS (MOMSEI)



- Onset of dry season for Java
- Onset of upwelling
- Time window for salt industry
- High productive season off Java and Sumatra



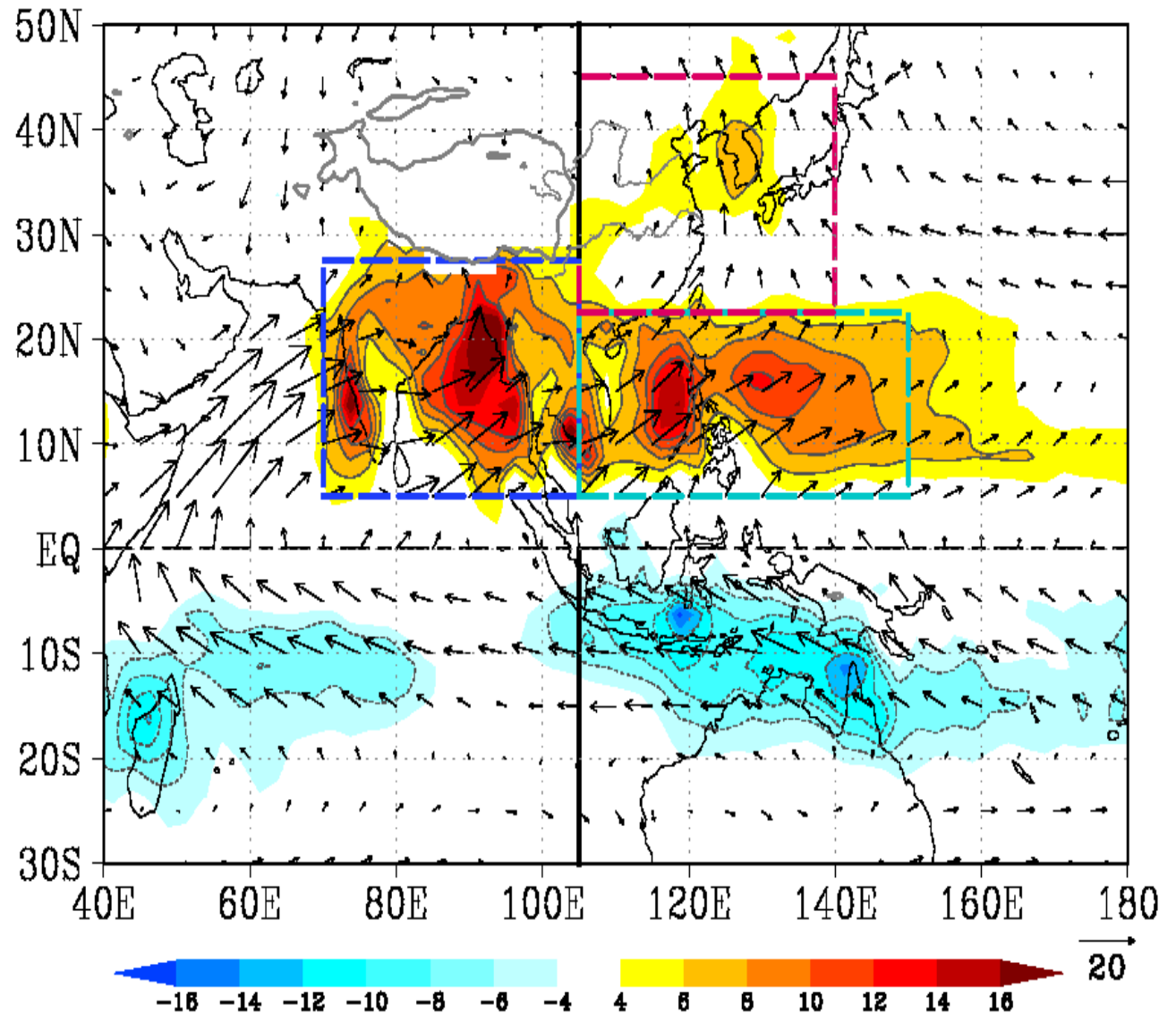
**2013 - 2016**



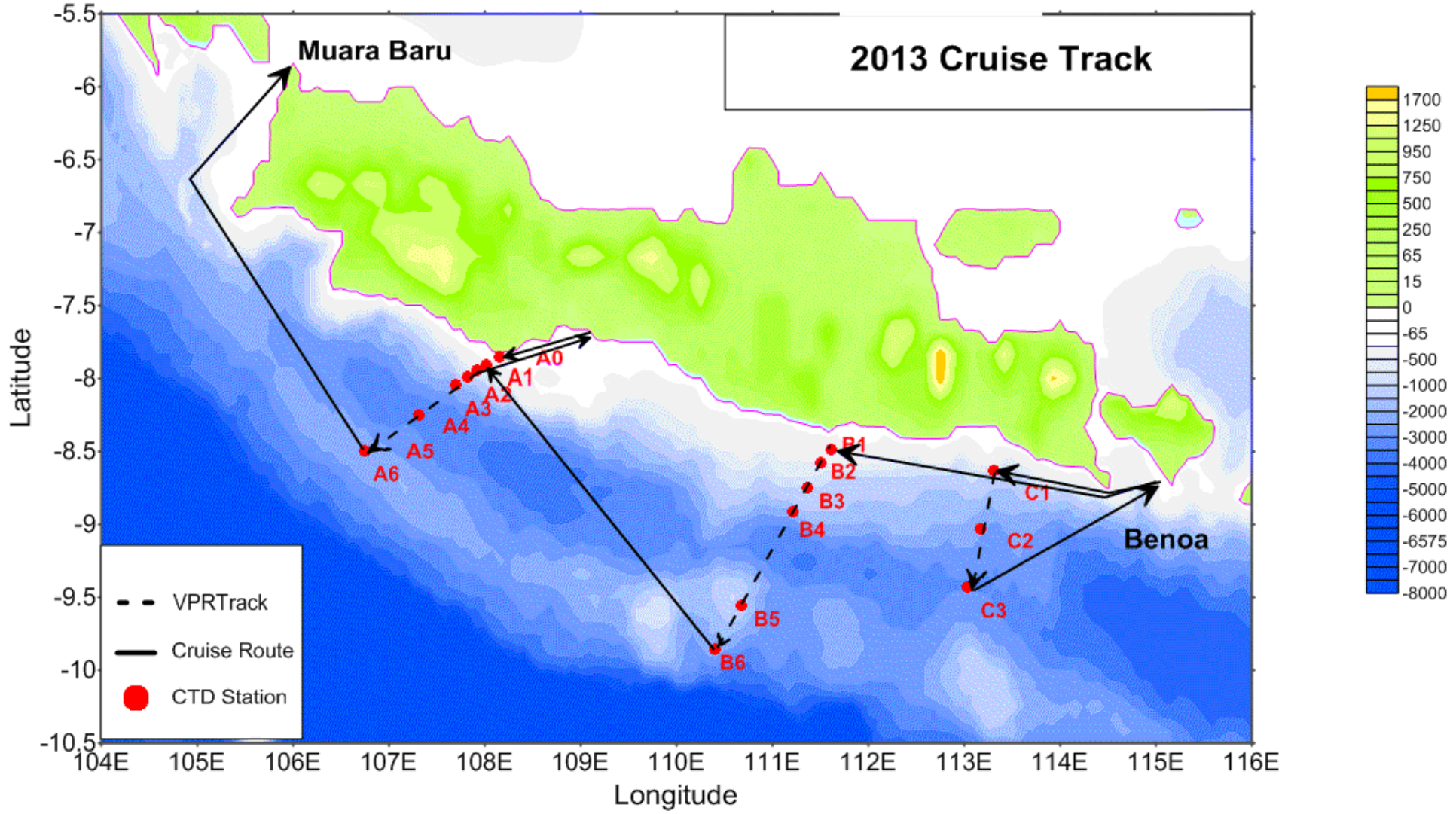
# Monsoon circulation and rainfall over Indo-Pacific

The typical character of monsoon:

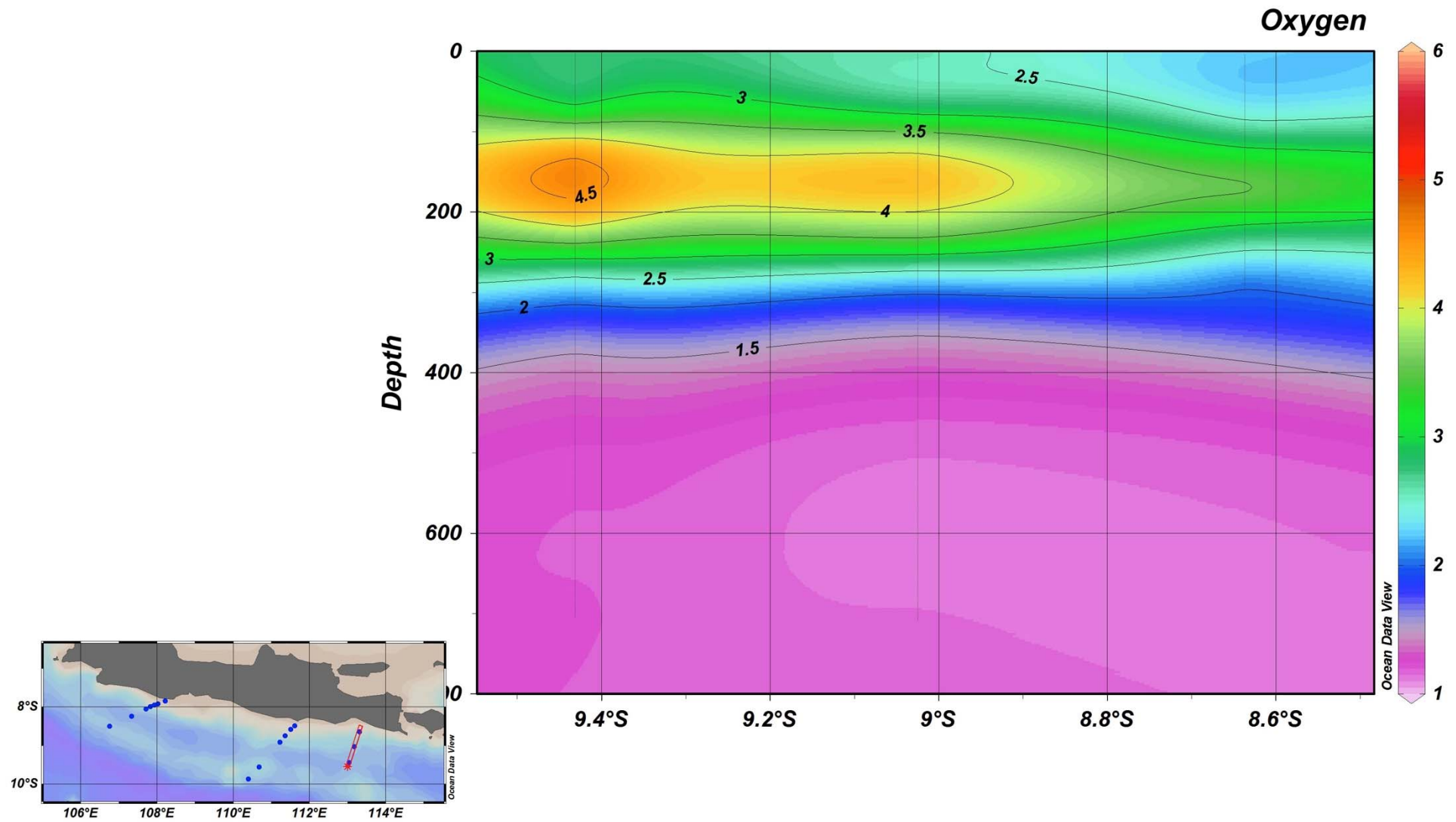
1. Reversal of wind in contrasting seasons
2. Dry-wet transition



# 1<sup>st</sup> MOMSEI Cruise, 22 Sept – 1 Oct 2013



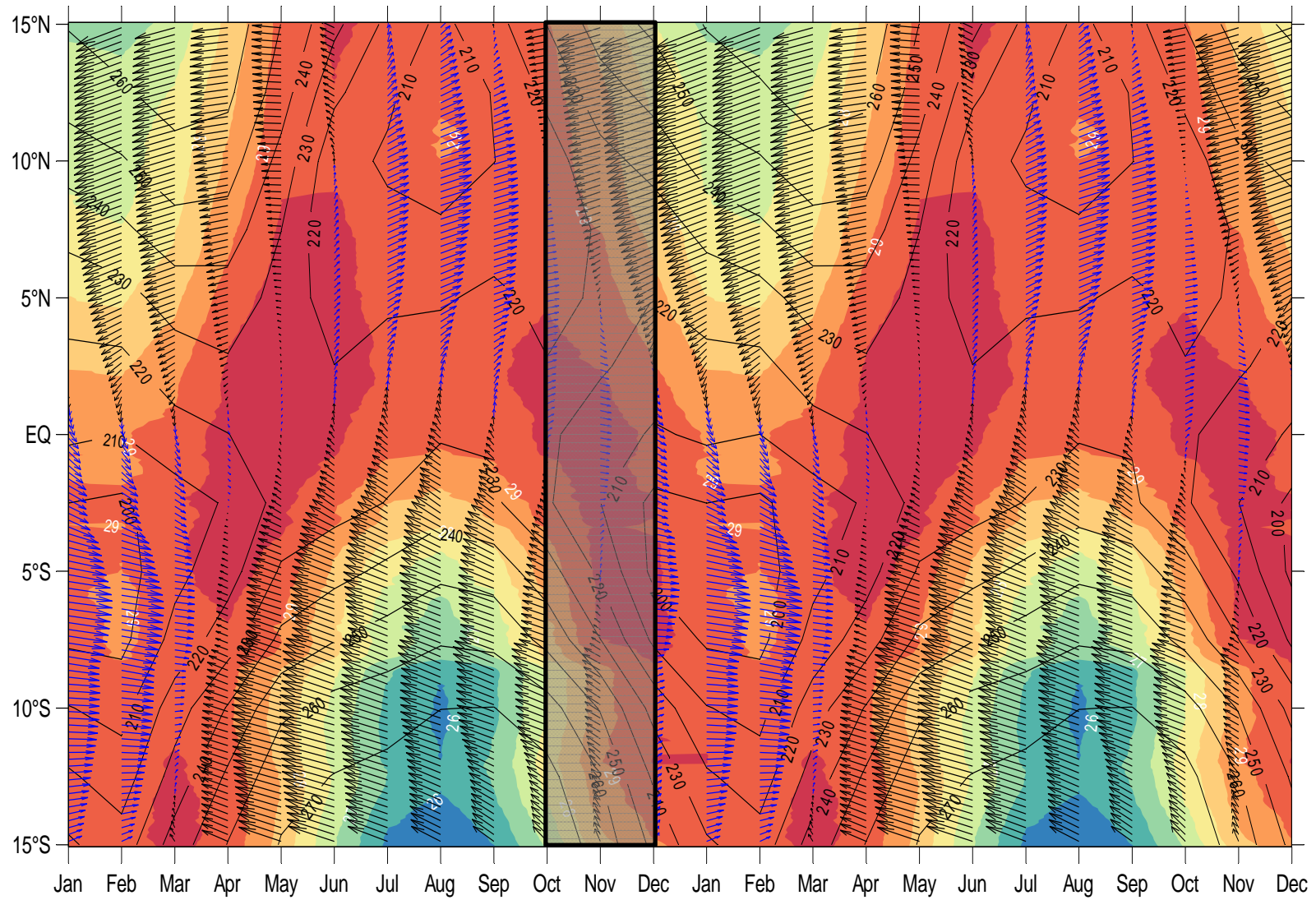
# Oxygen Profile, Section C



# Indo – Australia Monsoon (JOURDAIN et al, 2013):

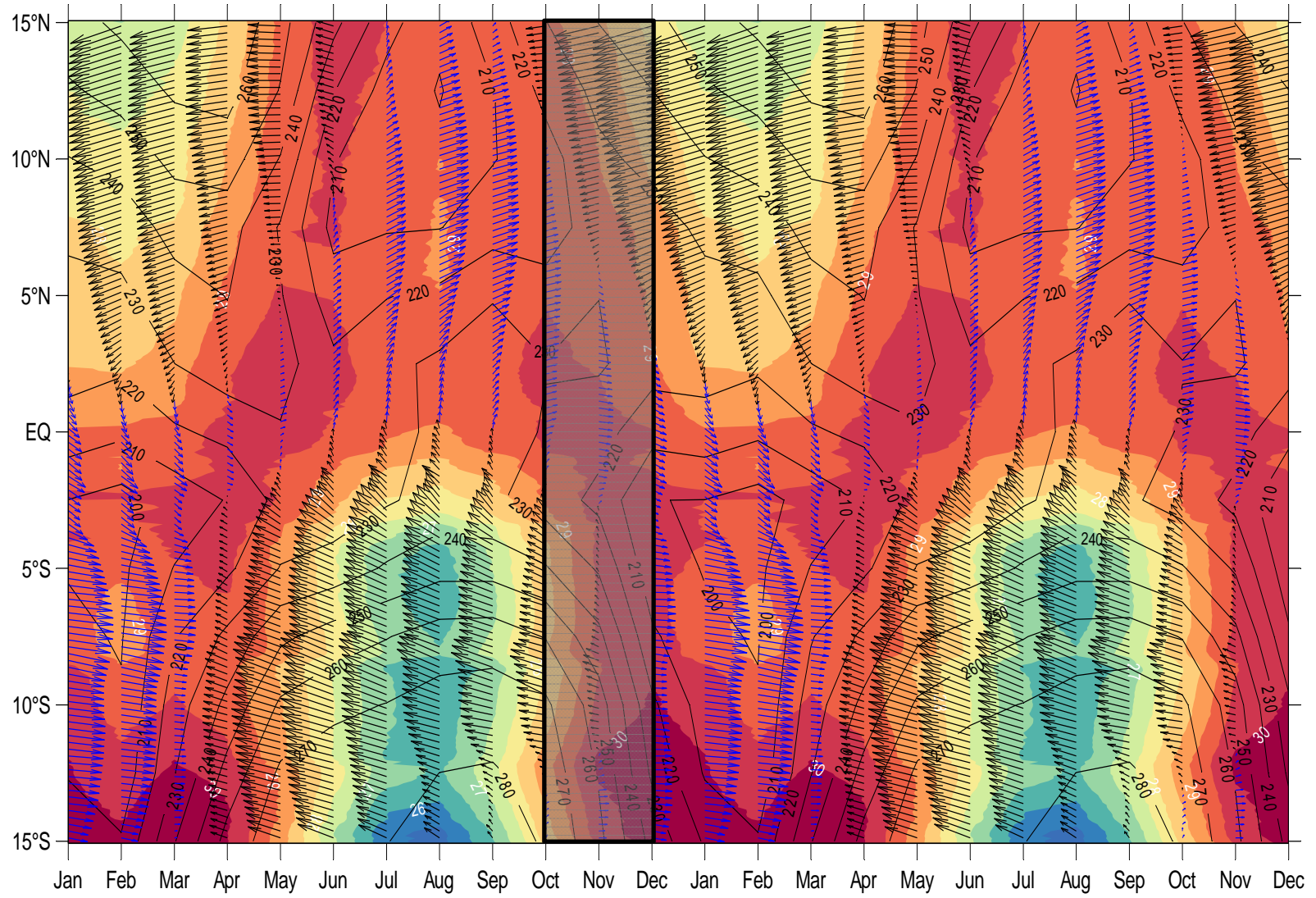
1. Indian and Southeast Asian summer monsoon : June to September (JJAS)
2. Australian and Maritime Continent summer monsoon : Dec to March (DJFM)

AVHRR SST+NOAA OLR+QuikSCAT wind (105-150E)

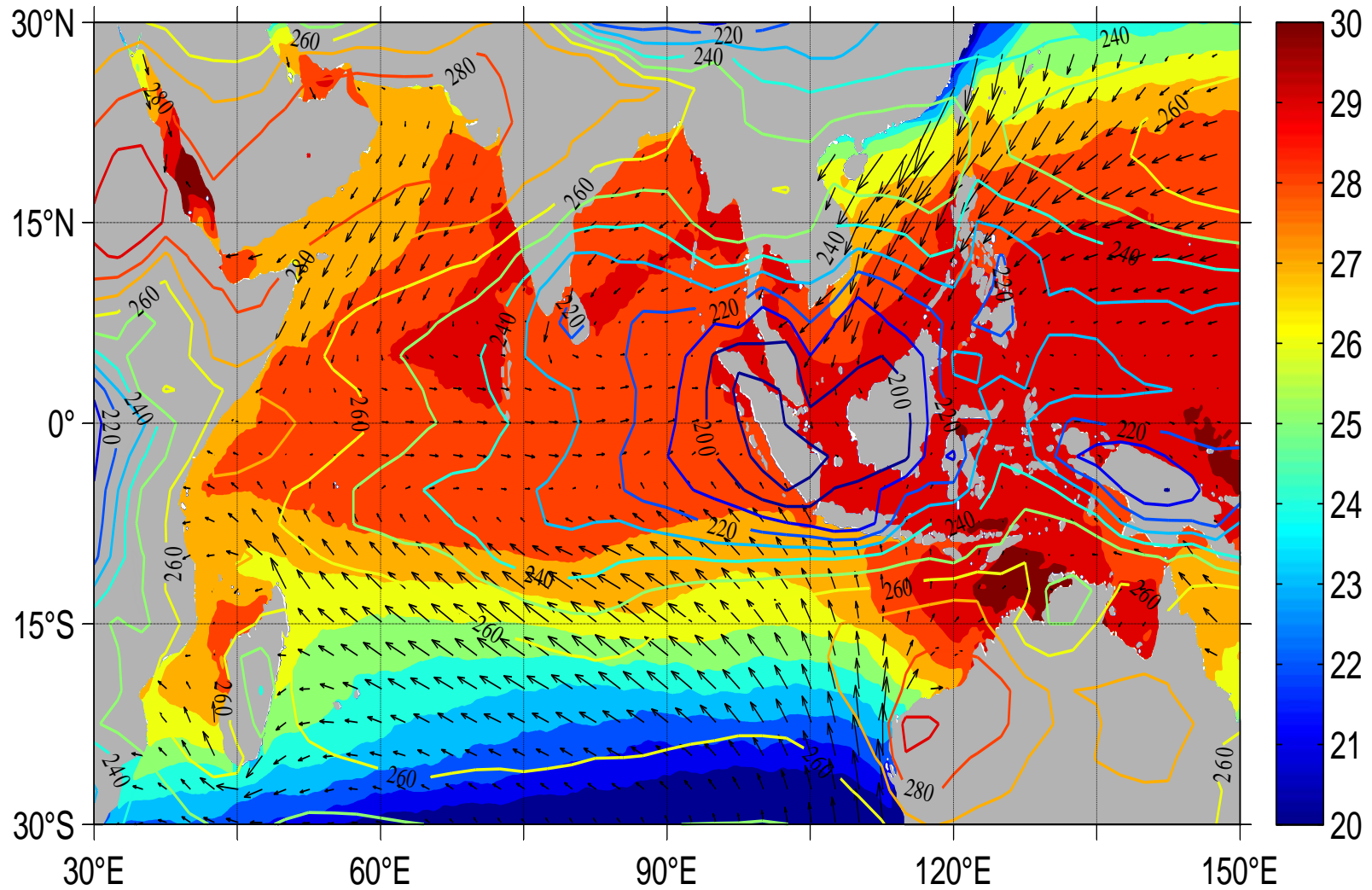


November is the monsoon transition period: **weak**  
**wind, high SST**

AVHRR SST+NOAA OLR+QuikSCAT wind (120-140E)



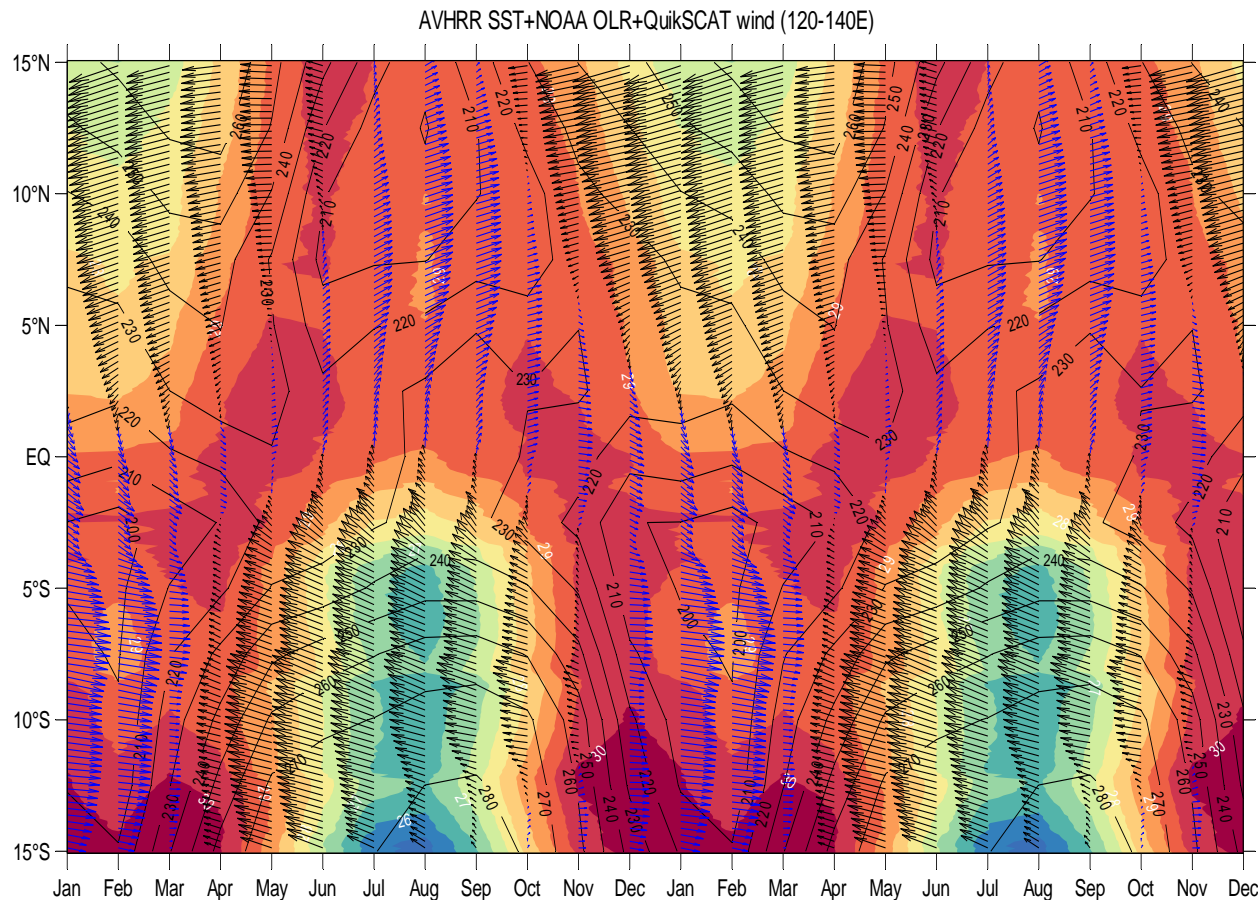
Climatology in Nov.



Note: SST between Indonesia and Australia peaks before austral summer monsoon onsets.

## Proposed Work towards YMC

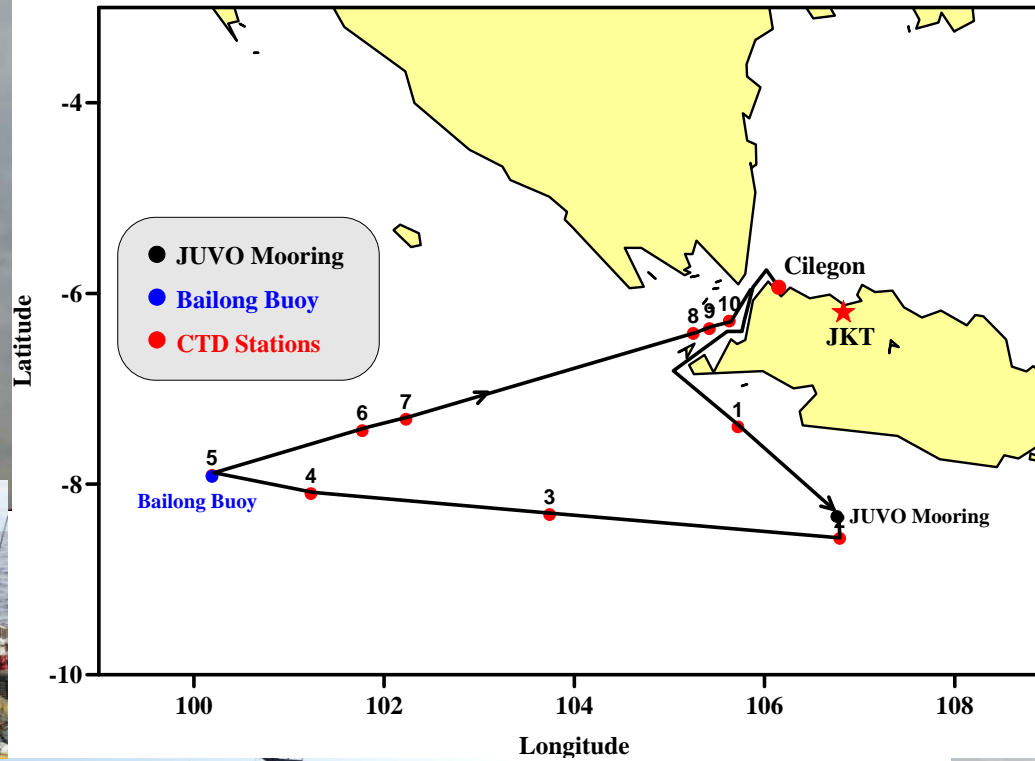
To understand the air-sea process, particularly SST-convection-circulation relationship, associated austral summer monsoon onset, which will be done through diagnosis, modeling and in-situ observation (to deploy one buoy to capture this process).



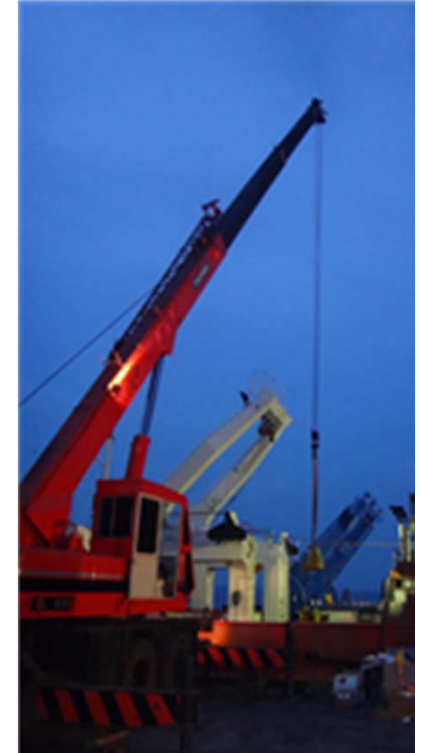
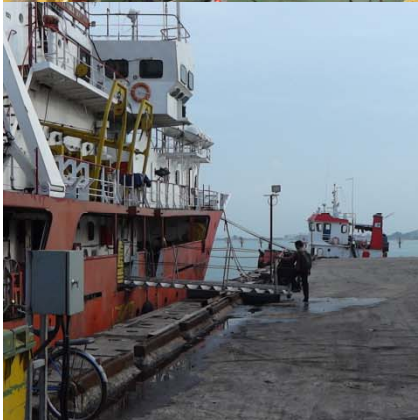


# JUVO

## Java Upwelling Variation Observation



1. 7 years joint research : 2007 – 2014
2. Extended joint research 2015 - ???



# (The South-China Sea-Indonesian Seas Transport/Exchange )

1. 8 years joint research : 2006 – 2014
2. Extended for 2-3 more years (2015 – 2017 ?)

