

How can KIOST contribute to TAO-TRITON array ?

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Over 30 Years of Operating Data Buoys in the Tropical Pacific Ocean

- **Data recovery rate** since 2012 was low (< 50%)
- NOAA and JAMSTEC want to **reform** the Tropical Pacific Ocean Moored Array System.
- NDBC(NOAA) needs more **ship-time** to operate TAO array.
- JAMSTEC is about to give up 3 (+2) TRITON Stn, and replace them into **wave/underwater gliders**.
- Both feel difficulty to gather data from the buoys, and need to change the **method of data** gathering.

What have we got from the array?

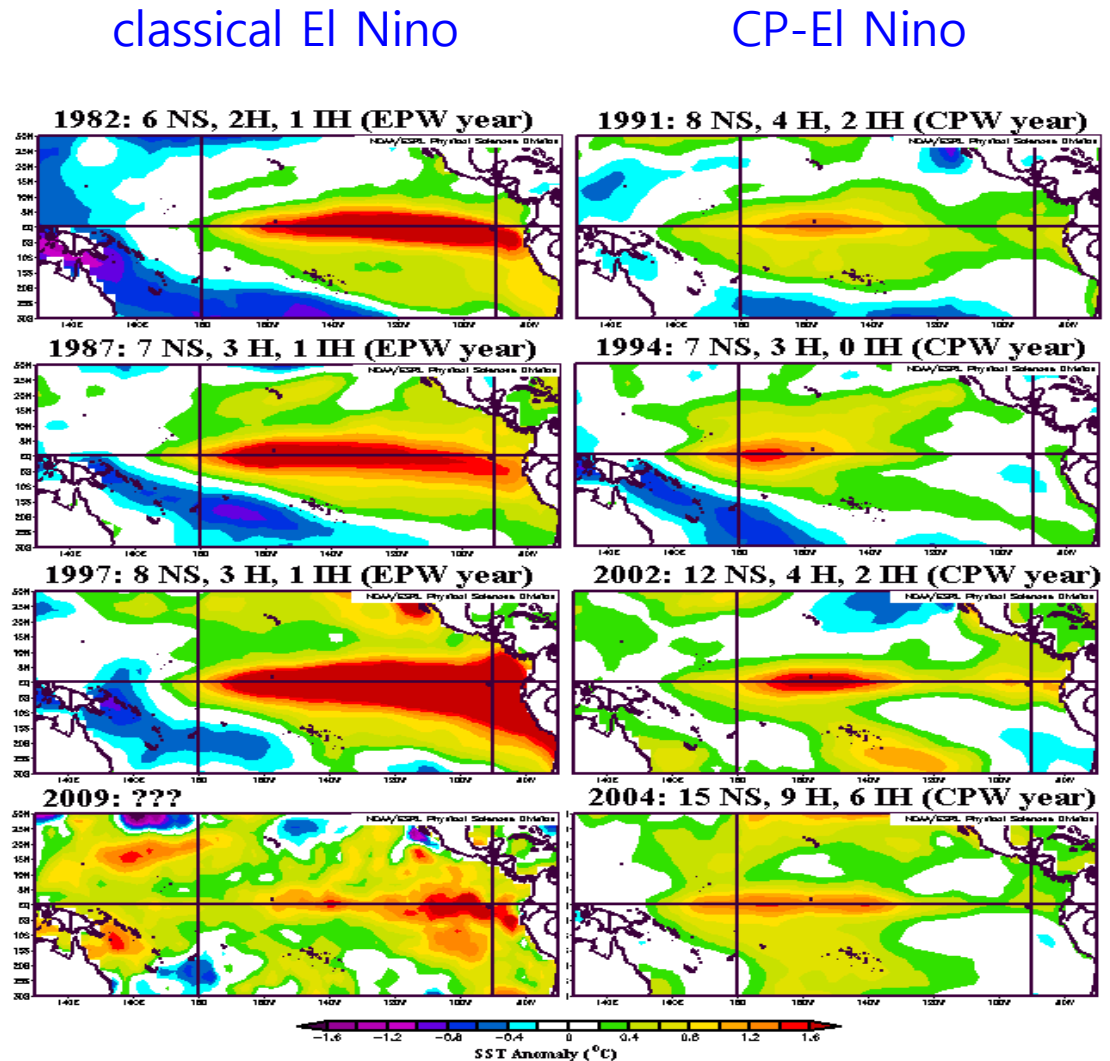
- Climate-related Research (ENSO, PDO, ITCZ, WWB...)
- Thermocline Mixing, Eq. Curr. (EKW, NEC, SEC, EUC, NECC)
- Tropical Pacific Network of Air-Sea Monitoring
- Real-time Data for ENSO Prediction Models

Should we continue to do the array?

- New Scientific Issues ?
- Shift of El Nino pattern (SST_{\max} : E.P. \rightarrow C.P.)
- Mechanism & Variability (WB) of CP-EL Nino
- Direct current measurements of NEUC and STCC, and WBUC
- New Geostationary Ocean Color Imager
 - (GOCI-I : 2012 ~): limited (2500km x 2500km)
 - (**GOCI-II** : 2018 ~): W. Pacific

El Nino in a changing climate

- Central Pacific El Nino is more often in late 20th century



(from Yeh *et al.*, 2009, *Nature*)

KIOST's New Research Vessel



Weight : 5,400 tons, Length : ~110m

KIOST's New Research Vessel

- KNRV will be launched in Dec. 2015
- Ship-time in the Pacific (50%), Indian (40%), others (10%)?
- in the Pacific Ocean
 - W.B. (Mindanao Curr., transport by ITF)
 - W.P. (NEC/NEUC/NESC, mixing process, Acidification)
 - C.P. (**TAO array** ?? → CP-El Nino)
 - E.P. (Mn-mining project)
 - E.B. (upwelling, Eq. front)
- in the Indian Ocean
 - coastal (Indonesian TF, upwelling, KW)
 - E.I. (RAMA array, Hydrothermal vents)

Can KIOST take over 1 TAO line ?

- KIOST's technicians joined TAO cruises for a few years.
- Research proposal must be accepted by MOF, Korea.
- Budget can be variable, and continuous support by NDBC.

-165°E

2 ADCP moorings at 5°N, 2°N since 2013

NDBC keeps 1 ADCP mooring at EQ.

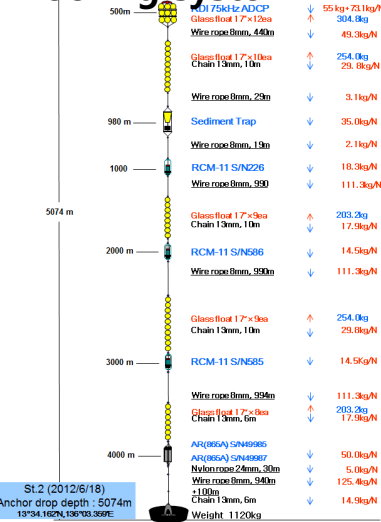
more ADCP moorings at 5°S, 2°S ??

underwater gliders

(repeated survey, if budget is available)

2006-2013 POSEIDON CRUISES

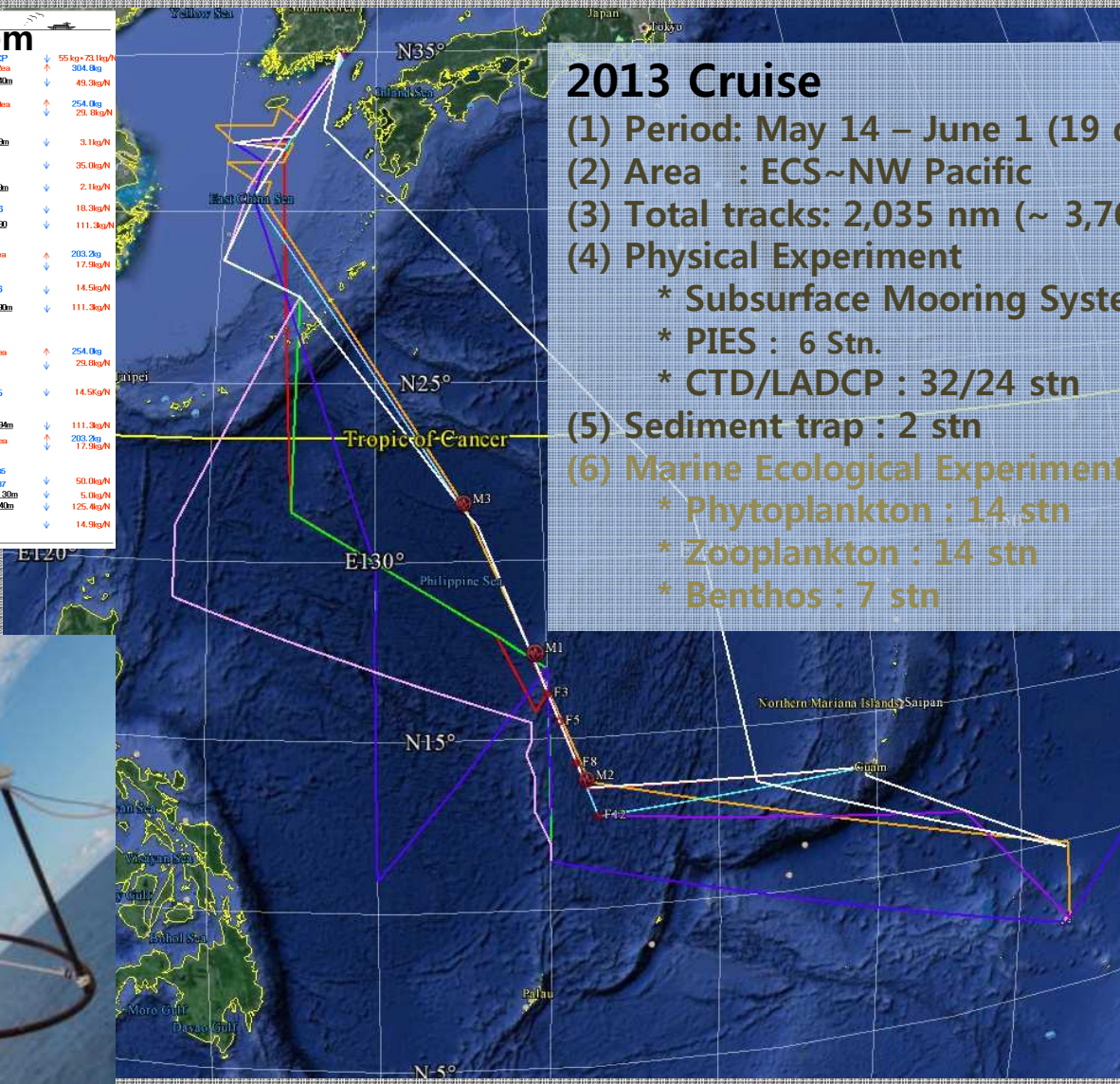
Mooring system



2013 Cruise

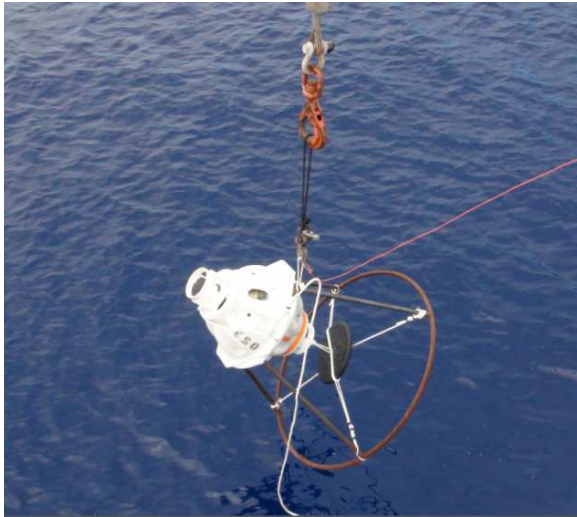
- (1) Period: May 14 – June 1 (19 days)
- (2) Area : ECS~NW Pacific
- (3) Total tracks: 2,035 nm (~ 3,769 km)
- (4) Physical Experiment
 - * Subsurface Mooring System: 3 Stn.
 - * PIES : 6 Stn.
 - * CTD/LADCP : 32/24 stn
- (5) Sediment trap : 2 stn
- (6) Marine Ecological Experiment
 - * Phytoplankton : 14 stn
 - * Zooplankton : 14 stn
 - * Benthos : 7 stn

PIES



In situ Deployments in 2012

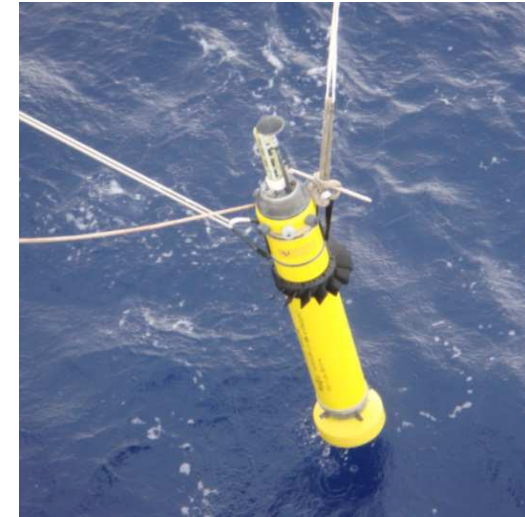
PIES mooring



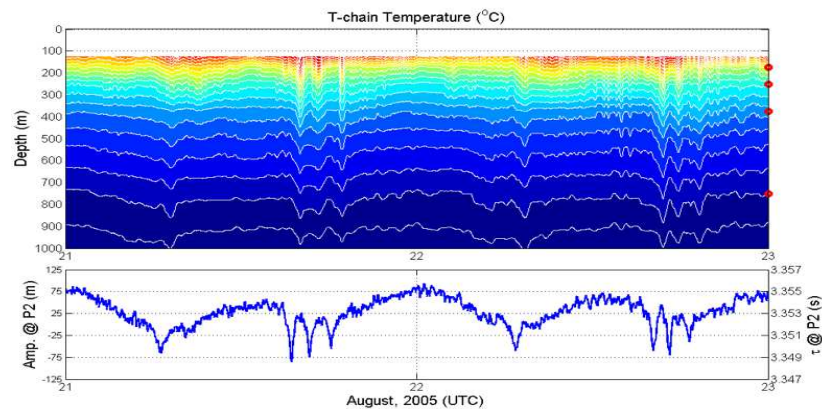
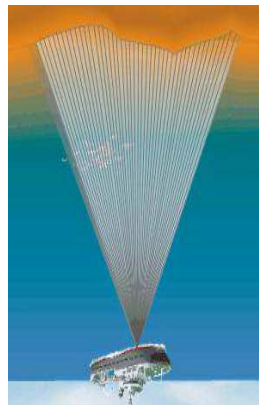
Surface Drifter



ARGO float



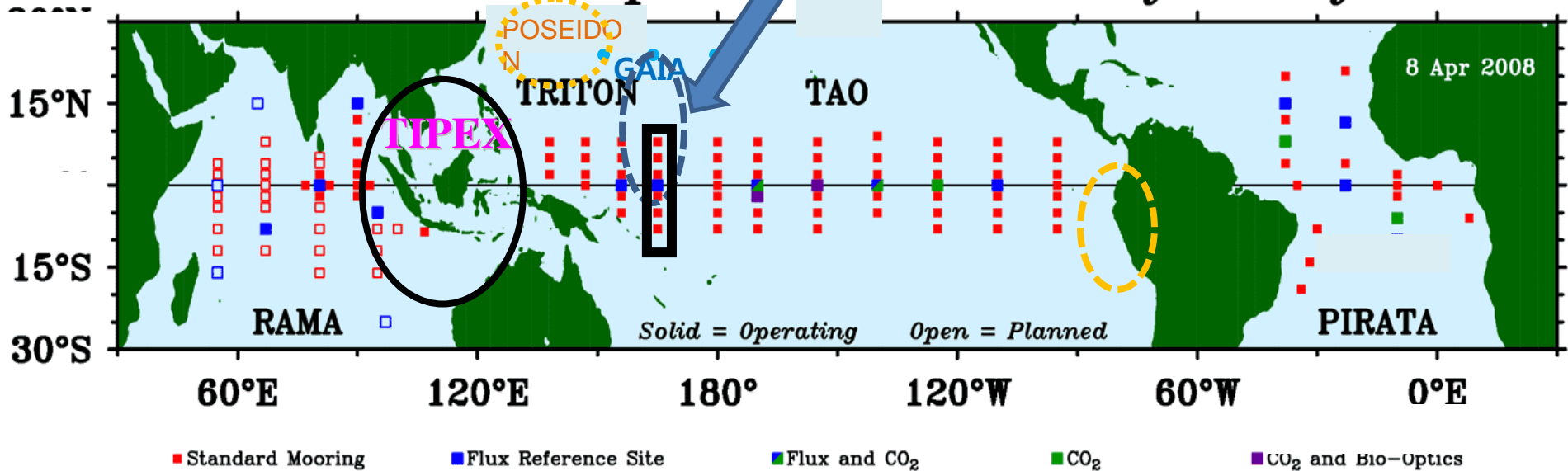
URI (USA) – mooring **5 PIES** in the NW Pacific
UW (USA) – deploying **9 ARGO (EM-APEX)** floats
NOAA (USA) – deploying **19 surface drifters (Argos)**



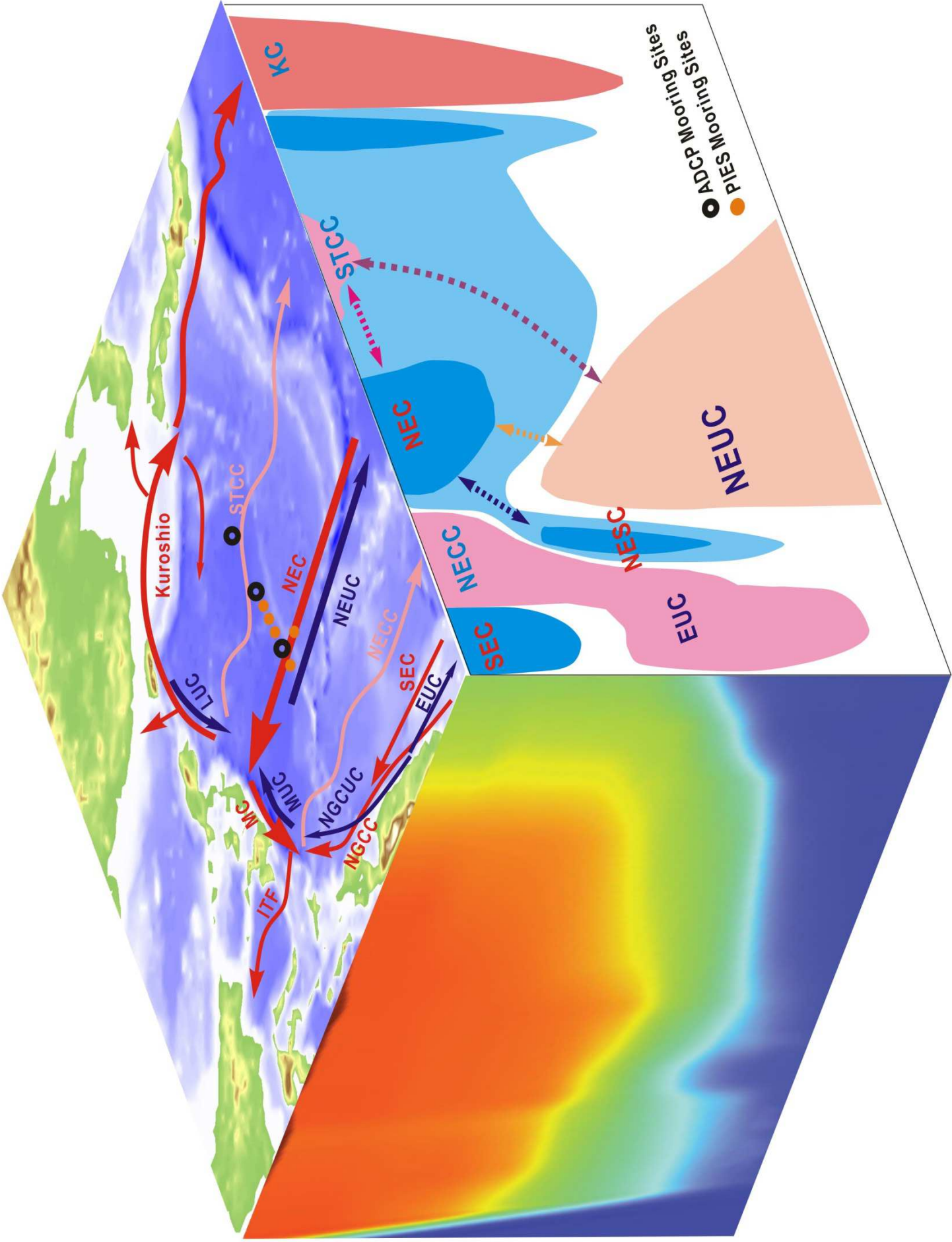
KIOST Programs with moored buoys

- **Pacific:** TAO-WPM-TRITON(NOAA-KIOST-JAMSTEC)
- **Indian:** joining RAMA array (?)
- **Chuuk (WP):** CO₂ flux buoy
- **ITF region:** Subsfc. Buoys
- **EP coastal:** Subsfc. Buoys

Global Tropical Moored Buoy Array



TAO Project Office, NOAA/PMEL



Under a new frame of TAO-TRITON array

- Interoperability of Data
- KIOST's new R/V may cover her zonal cruise for several projects from WP to EP along the latitude $10^{\circ}\text{N} \sim 15^{\circ}\text{N}$
- KIOST and JAMSTEC may collaborate for the WP monitoring with data buoys, gliders/drifters
- NDBC should supply all the buoys and sensors to KIOST.
- To be operational, scientific issues are "must".
- Need suggestions for KIOST to contribute to TPOS.