KIOST's activities of time series measurements in the open ocean

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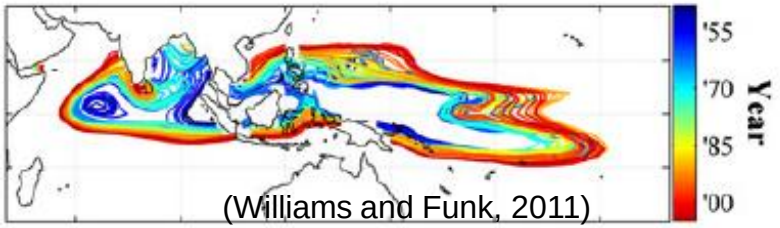
Western equatorial Pacific

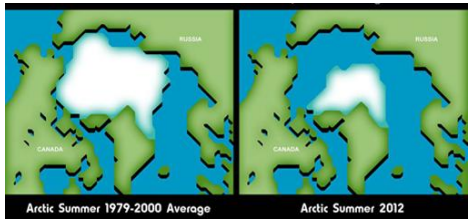
Background

- The ocean plays an important role in oceanic environment, weather and climate around Korea

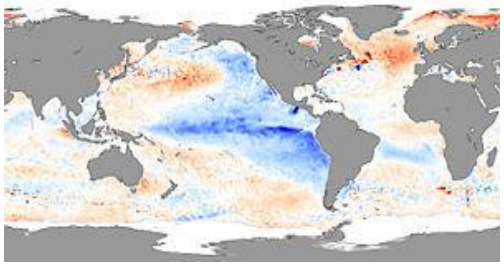
  - Expanding the warm pool area
  - Rapid melting Arctic sea ice



(Williams and Funk, 2011)

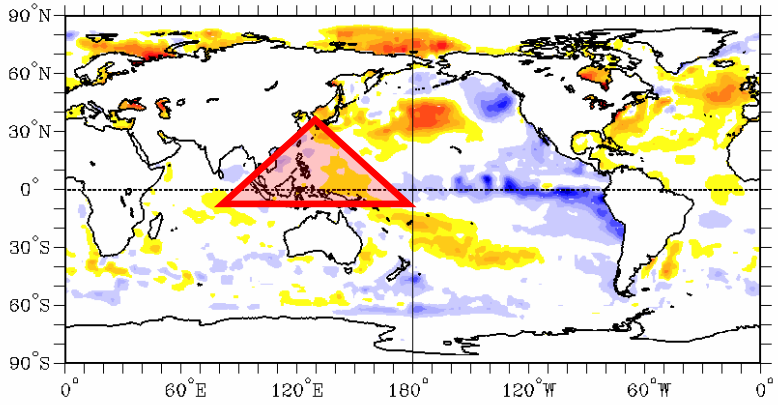


  - Various climate indexes: ENSO, PDO, IOD, AO, …



Background

- GAIA Project (2009 ~ 2019)
  - Development of a high resolution climate model
  - Ocean observation in the western equatorial Pacific



- MOF-NOAA Joint Project Agreement (2012 ~)
  - Ocean Climate Study in the Equatorial Western Pacific

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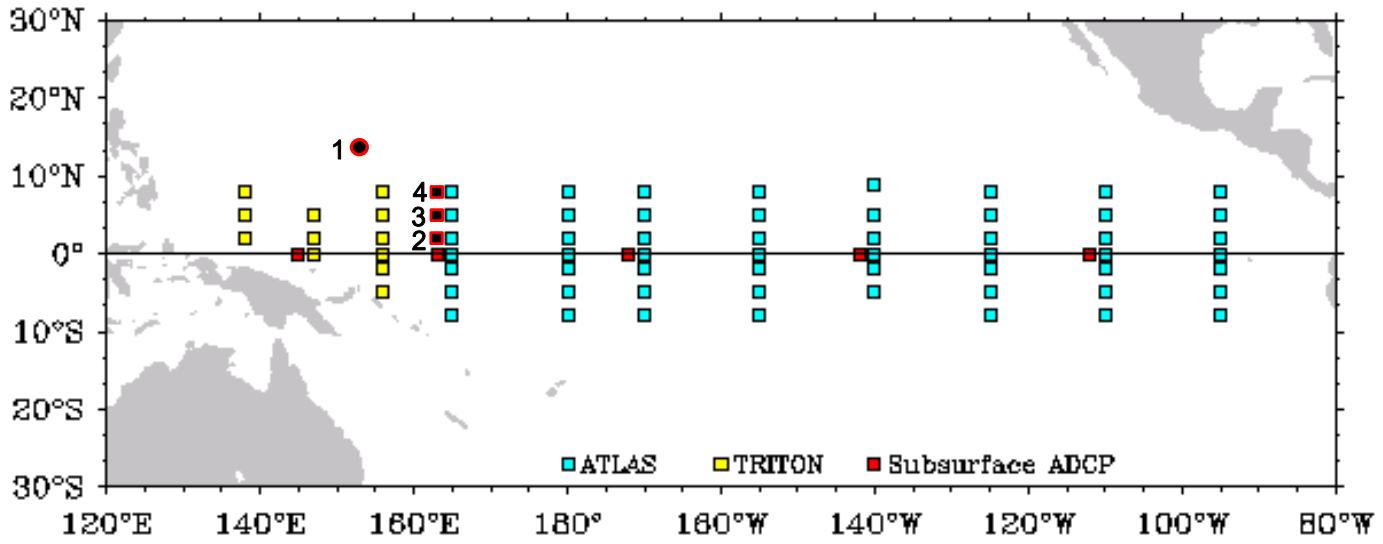
GAIA observation

- Mixing parameterization
  - Sub grid scale phenomena (thermocline mixing)

- Ocean monitoring
  - Upper layer in the equatorial Pacific
    * Science: equatorial currents, CP (WP) El Nino
    * Scope: TAO/TRITON extension
    * Tool: subsurface ADCP mooring
  - Low latitude western boundary currents
  - Indonesian through flow

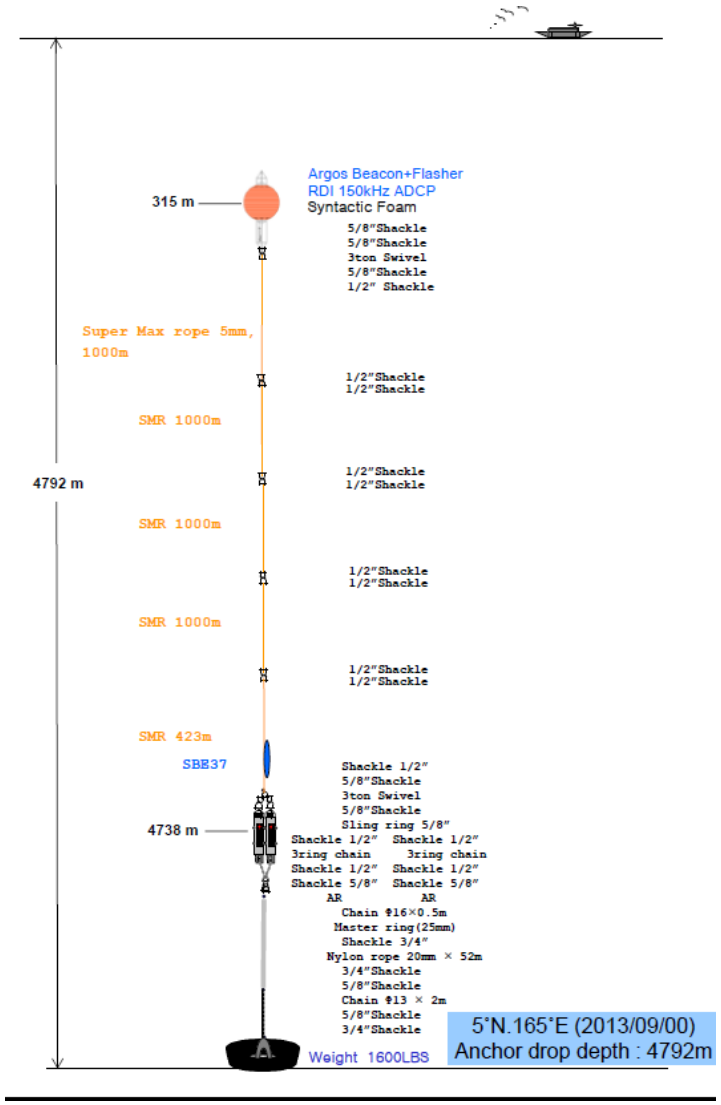
KIOST



	2010	2011	2012	2013	2014	2015	2016		
Buoy (1)	→	→			→	→	→	→	POSEIDON GAIA
ADCP 1 (2)				→	→	→	→	→	GAIA
ADCP 2 (3)				→	→	→	→	→	GAIA
ADCP 3 (4)					→	→	→	→	GAIA

New vessel →

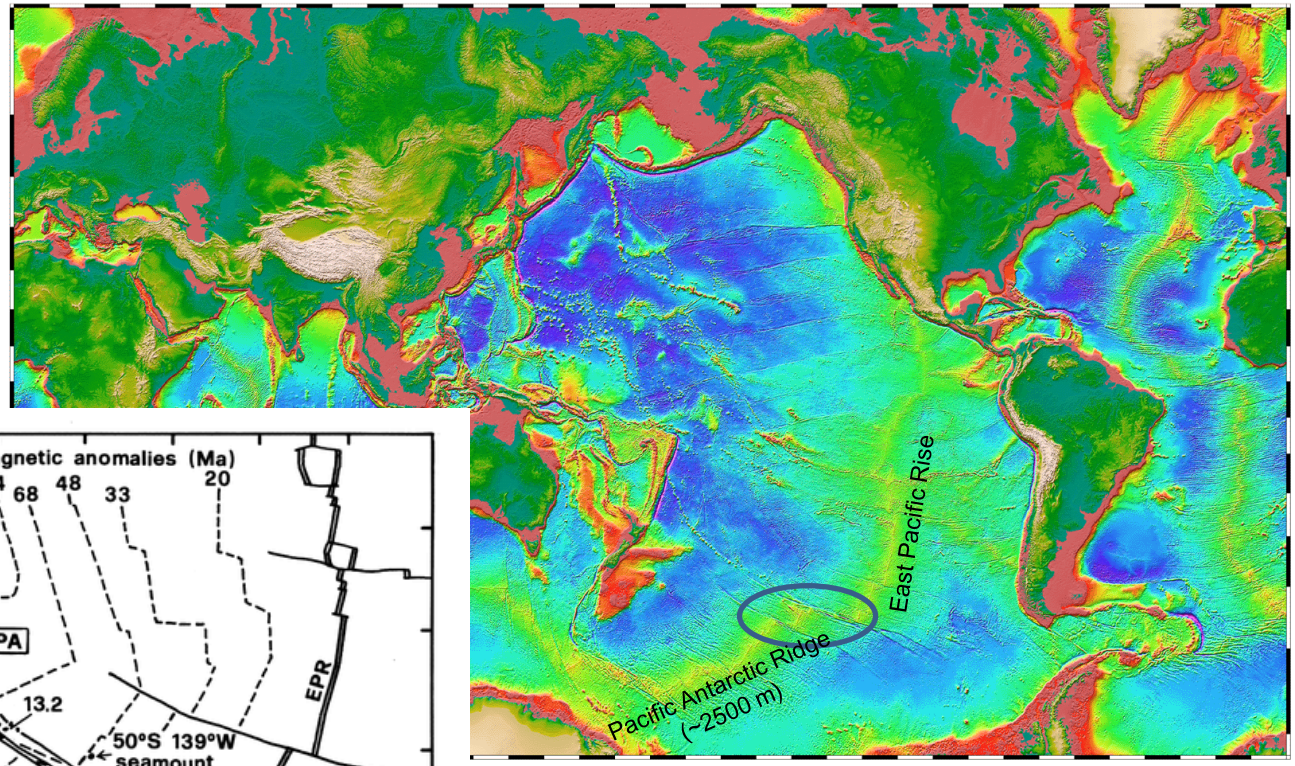
- Subsurface ADCP mooring
  - 2N, 5N, 8N along 165E TAO line (NOAA's ADCP at 0)
  - with deep T/S sensor
  - will be maintained until 2019
  - field campaign / NOAA / MV BlueFin 2013. 8. 3 (Guam) ~ 8. 29 (American Samoa)

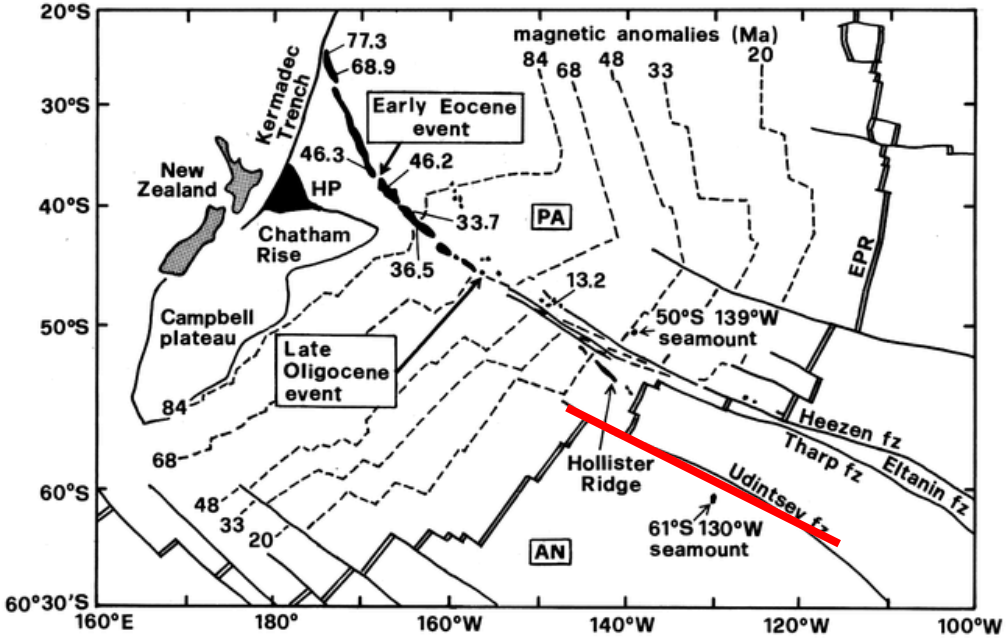


Southern Ocean

(Udintsev Fracture Zone)

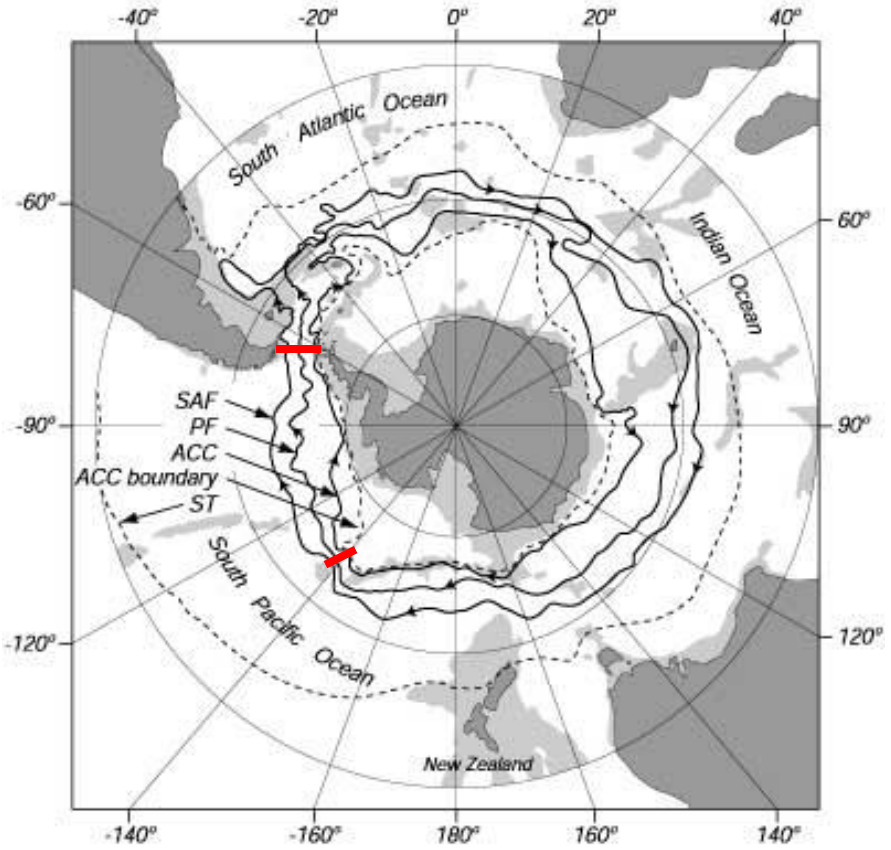
Udintsev Fracture Zone





Udintsev Fracture Zone

- the narrowest pathway of the ACC

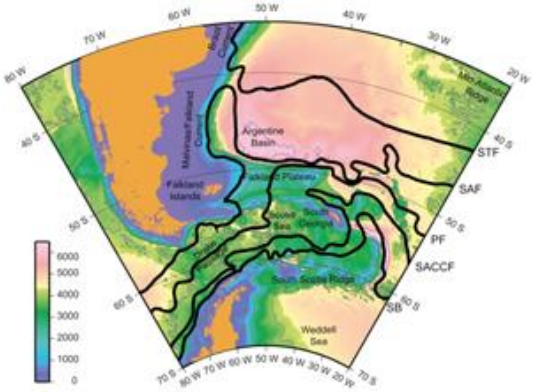


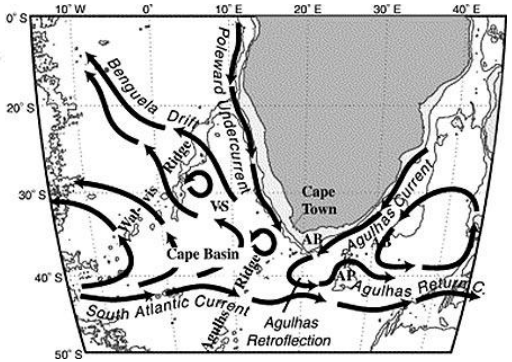
(Orsi et al., 1995)

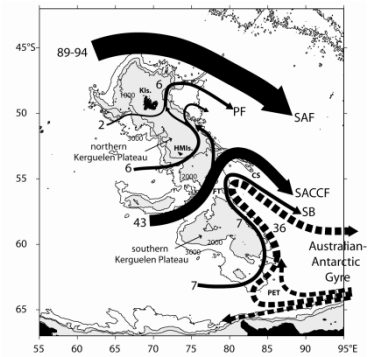
Scientific issues

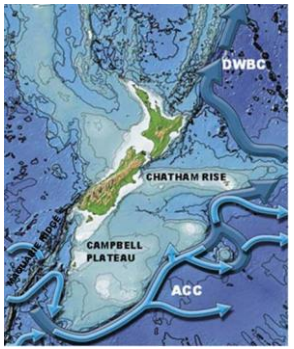
- Surface ACC
- Mechanism of the poleward heat flux
- Variability of the ACC volume transport
- Bottom outflows

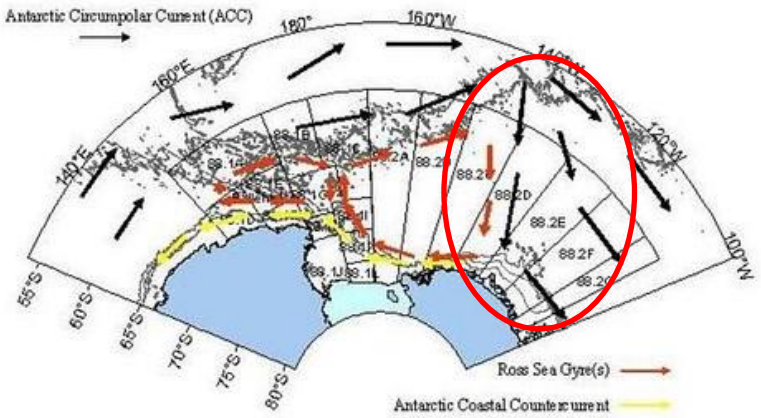
Regional current (or front) pattern



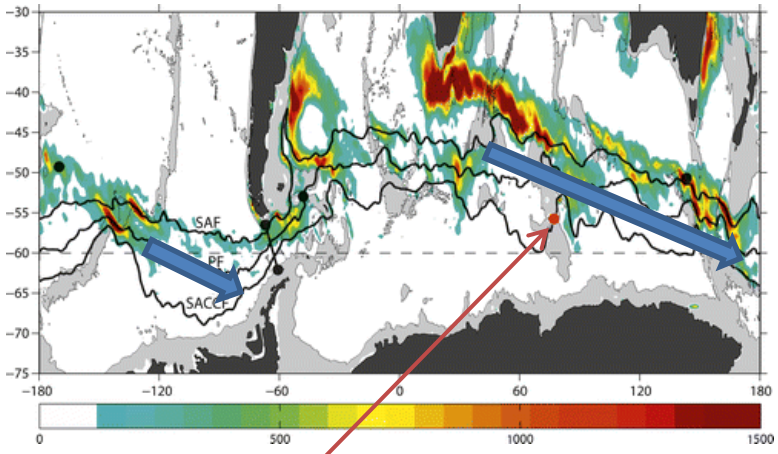


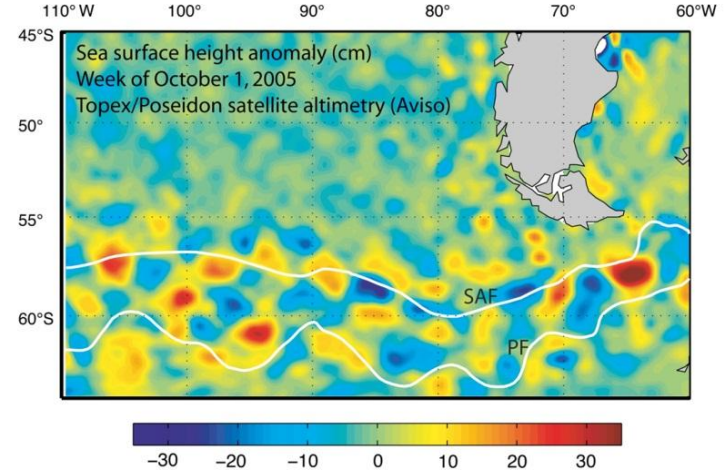


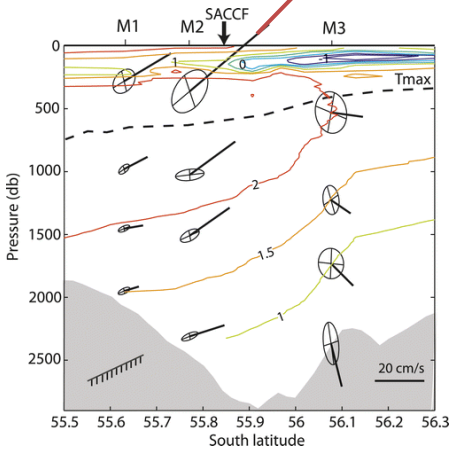




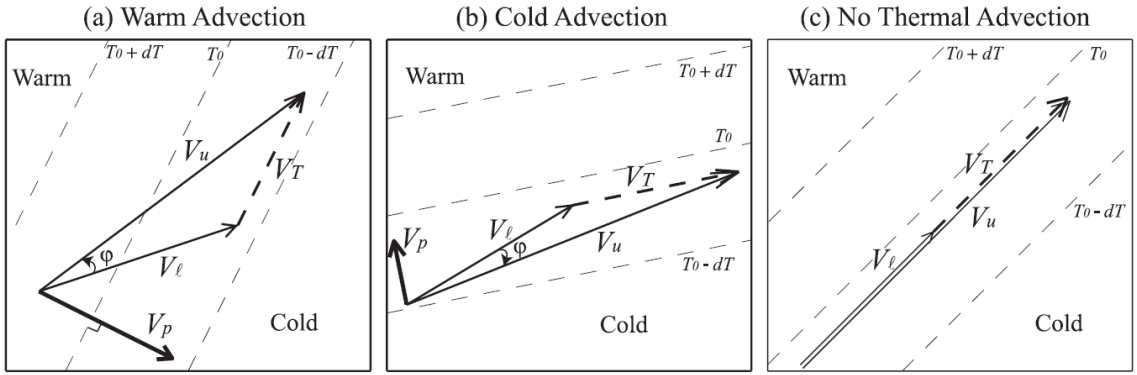
Mechanism of the poleward heat flux



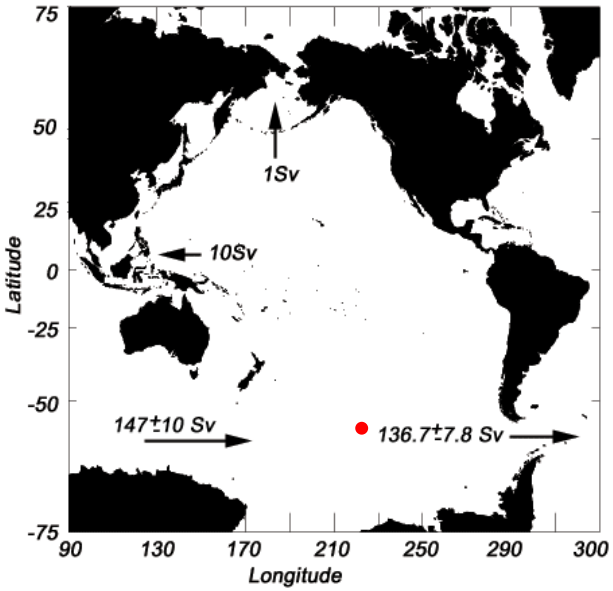




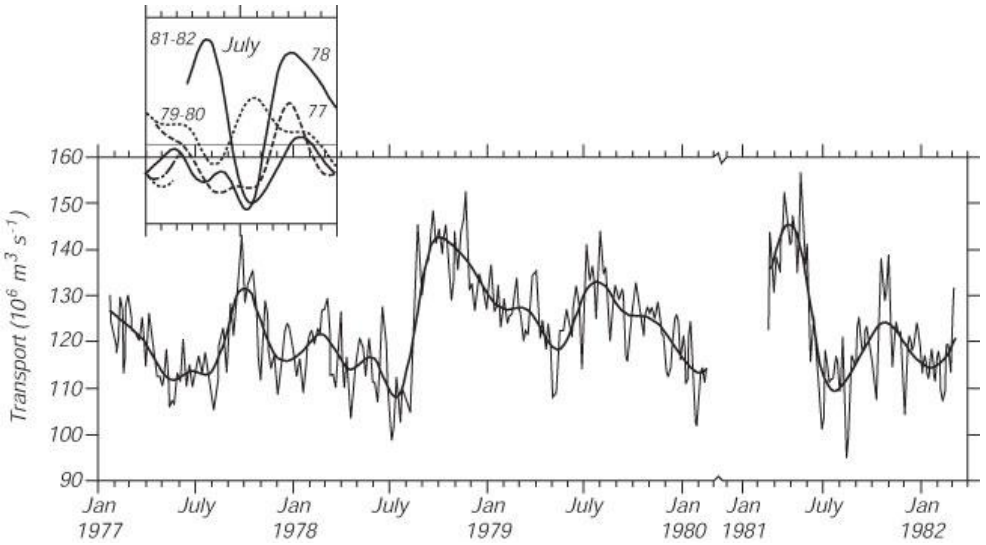
(Sekma et al, 2013)



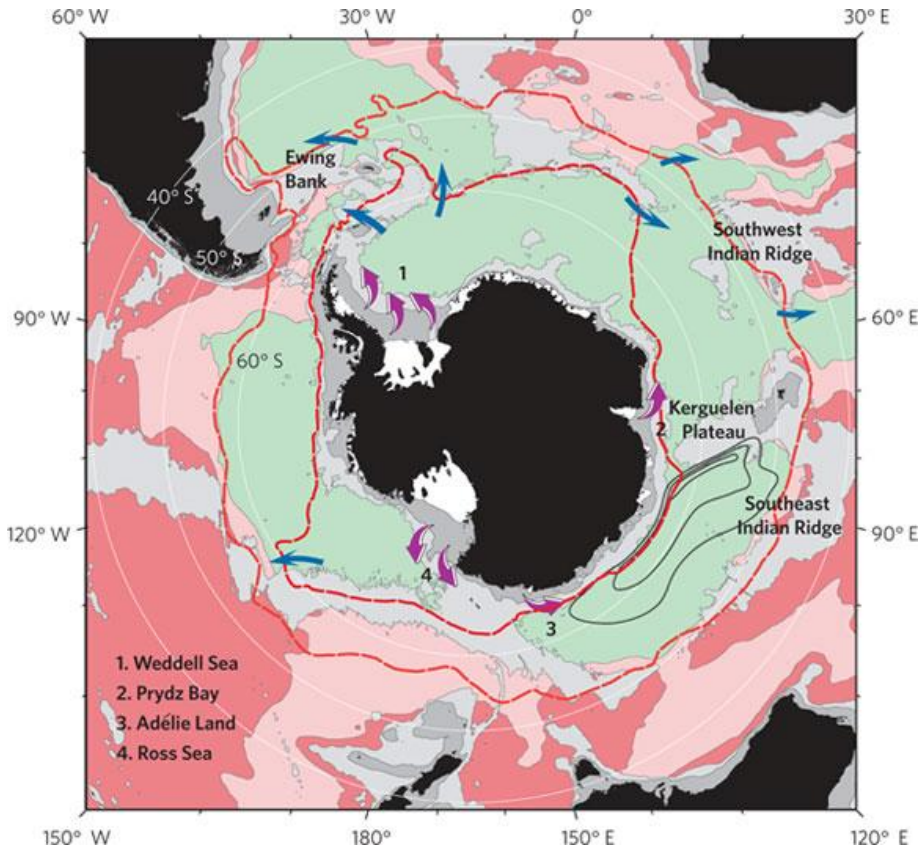
Variability of the ACC volume transport



1 Sv = 10^6 m^3/sec



Bottom outflows



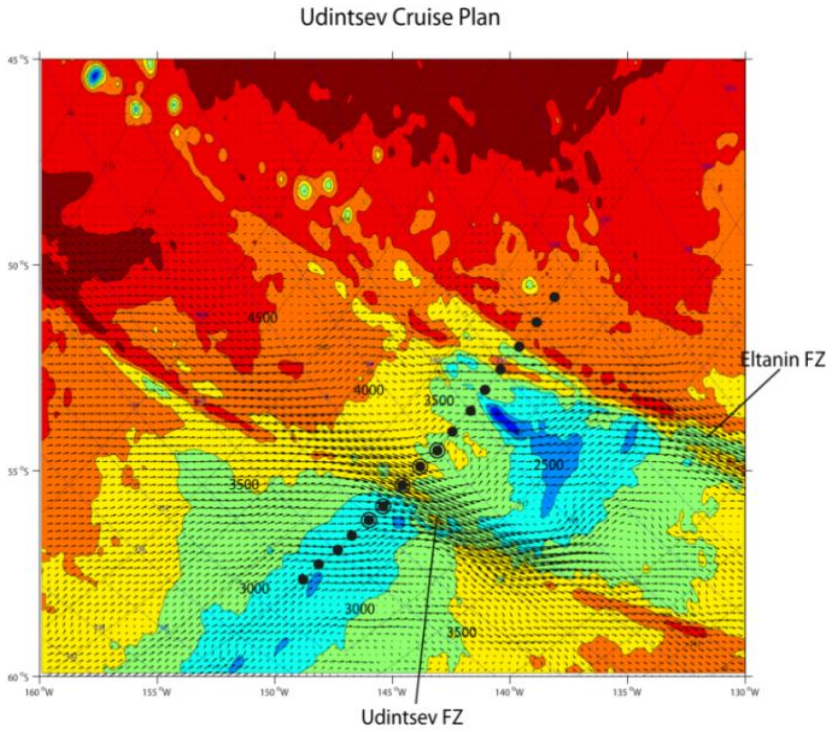
(Orsi, 2010)

Observation components

- CTD/LADCP/XBT casting (KOPRI, KIOST)
- Deployment of moorings
  - Current meters w/ deep T/S sensors (LOCEAN, KIOST)
  - Inverted Echo Sounders (URI, KIOST)
- Deployment of floats
  - (Deep) ARGO (KIOST, LOCEAN)
  - Surface drifters (AOML/NOAA, KIOST, KOPRI)
- Satellite monitoring
  - SSH … (LOCEAN, …)

CTD/LADCP casting and current meter mooring

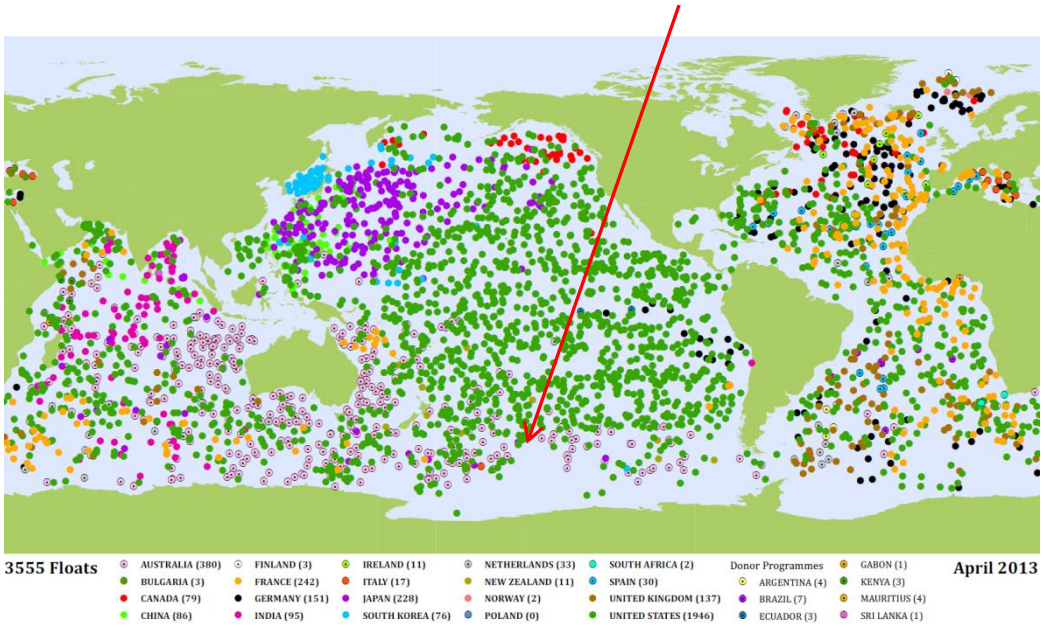
- KOPRI, KIOST (JH Lee), LOCEAN/France (YH Park, C Provost)



Park et al (2012)

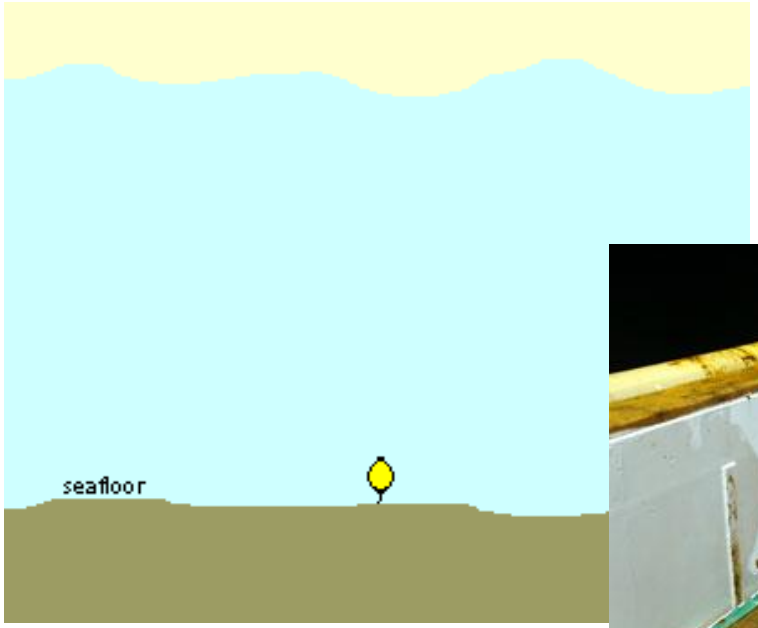
(Deep) ARGO deployment

- KIOST (SK Kang), LOCEAN/France



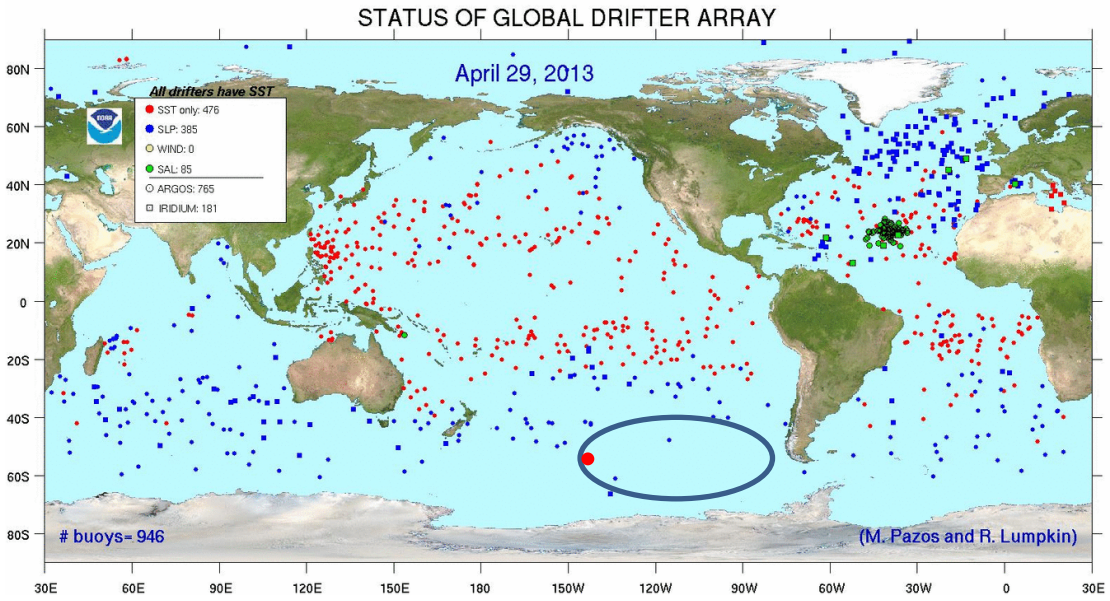
CPIES mooring

- URI/US (R Watts), KIOST (JH Park)
- 10 ~ 15



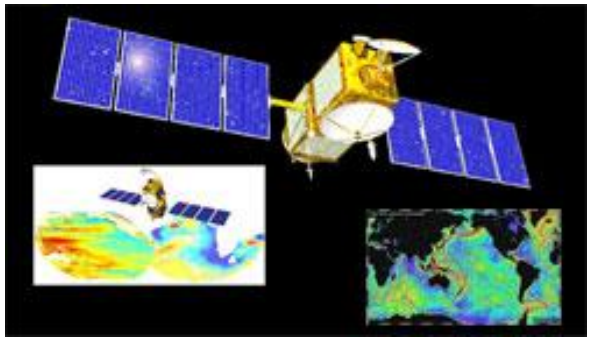
Surface drifter deployment

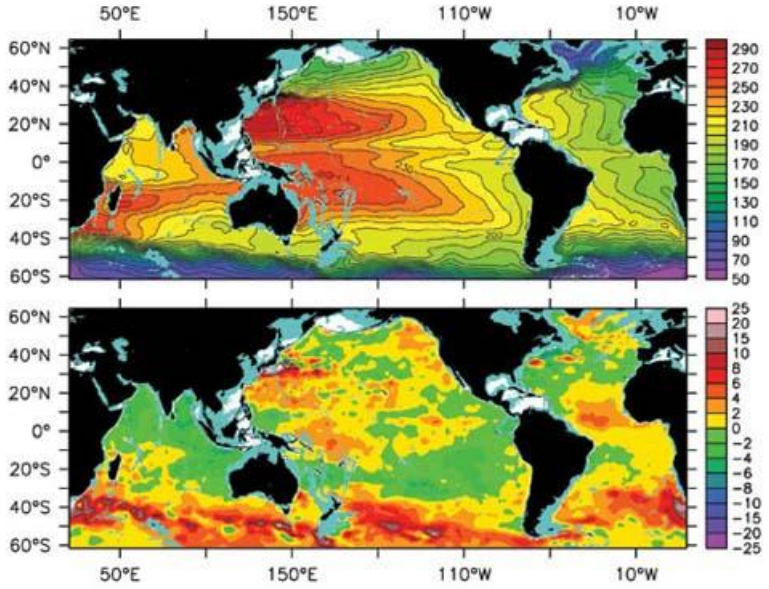
- AOML/NOAA (S Dolk, R Lumpkin), KIOST (JH Lee), KOPRI
- 30 drifters/year



Satellite measurement (SSH)

- AVISO, LOCEAN/France





(Scripps IO)

Roadmap

- 2013-2014: planning
  - Planning meetings (‘13.4/Paris, ‘13.5/Seattle, ‘13.10/Paris, …)
  - Submit proposal by individual group
- 2014-15:
  - 1st target year for deployment of moorings
  - CTD, ARGO, surface drifter
- 2015-16:
  - (CTD), ARGO, surface drifter
- 2016-17:
  - Recovery of moored instruments / re-mooring(?)
  - CTD, surface drifter


Thank you