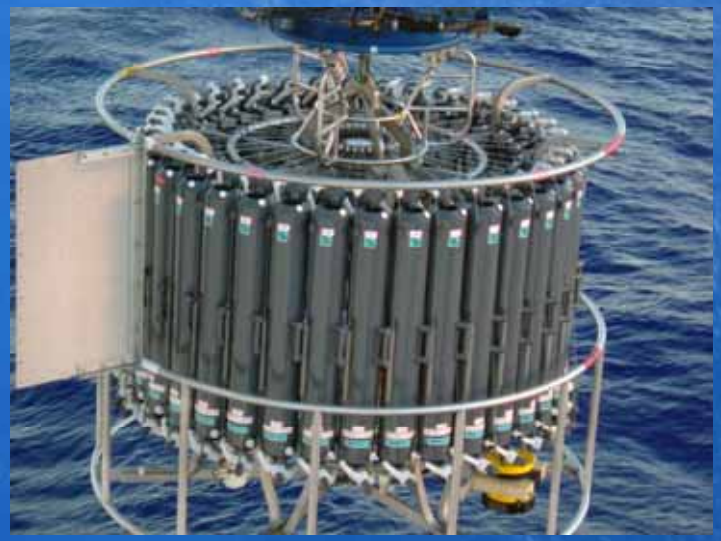
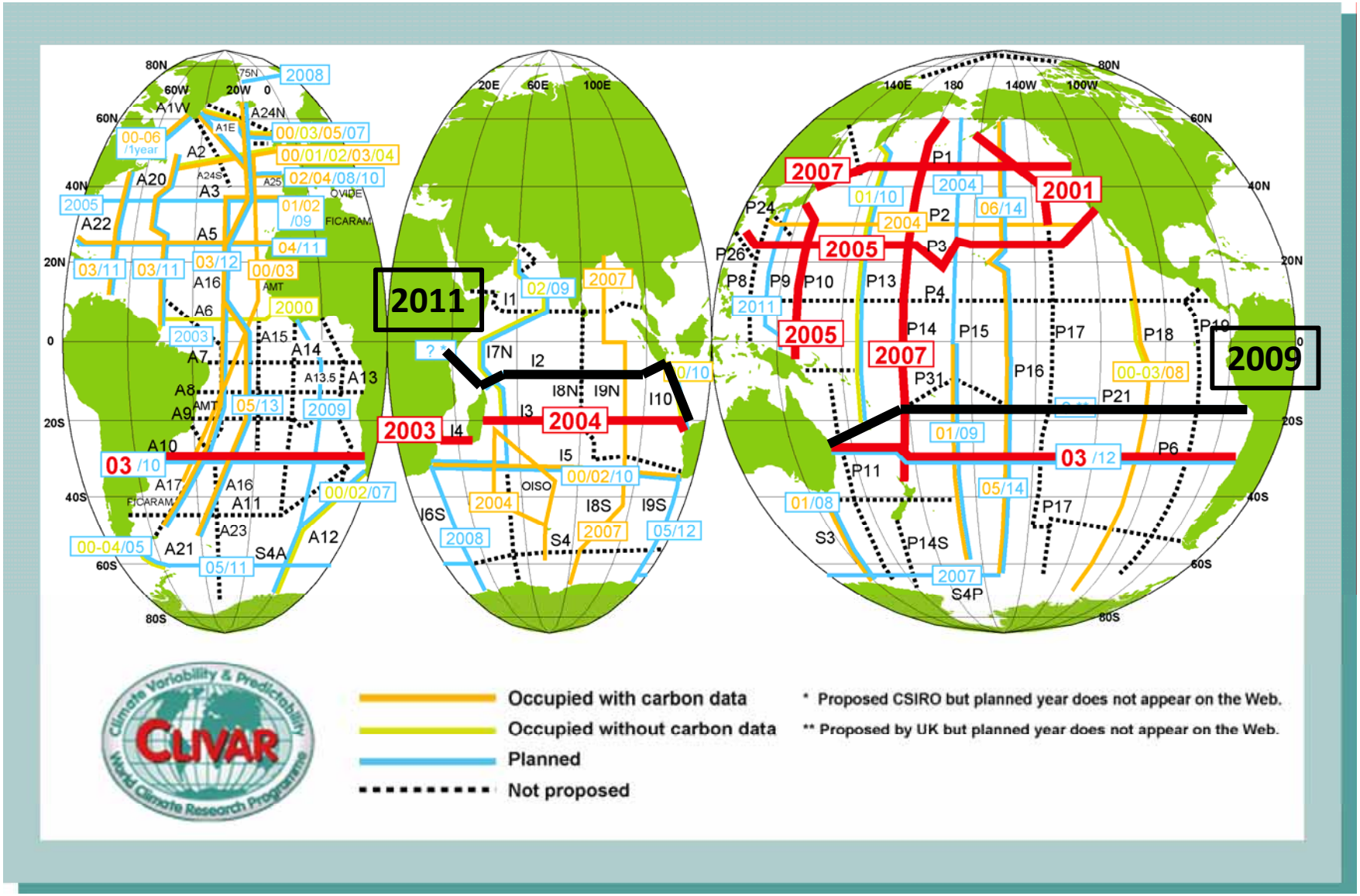
Repeat Hydrography/Carbon observations in the Indian Ocean by JAMSTEC

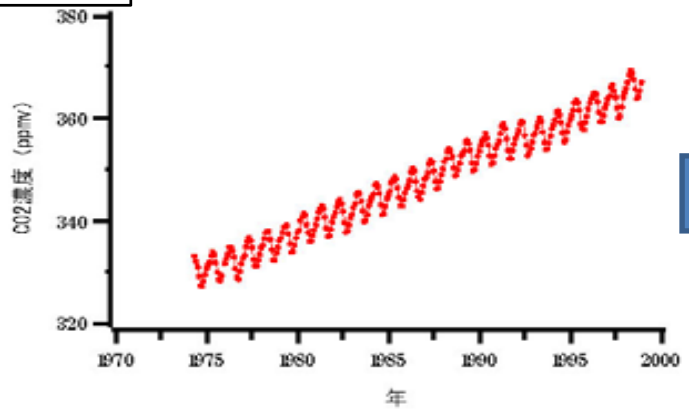
Akihiko Murata and others
(IORGC/JAMSTEC)

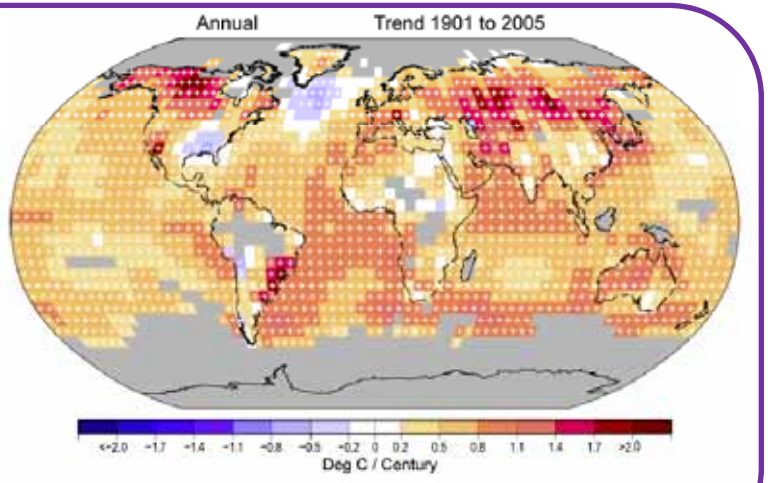


Repeat hydrography under CLIVAR/CO_2



Background





Elevated CO_2 **Global warming**

The ocean uptakes heat and anthropogenic CO_2

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Moderation of global warming

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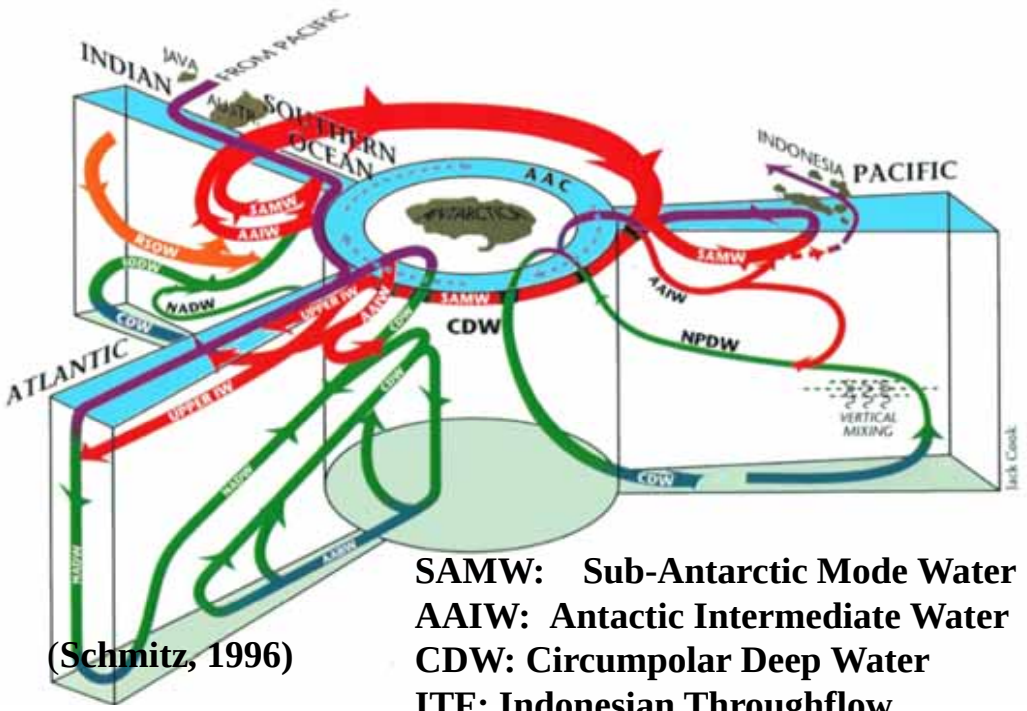
Evaluation of storages of heat and anthropogenic CO_2 in the ocean interior



(Schmitz, 1996)

SAMW: Sub-Antarctic Mode Water
AAIW: Antactic Intermediate Water
CDW: Circumpolar Deep Water
ITF: Indonesian Throughflow

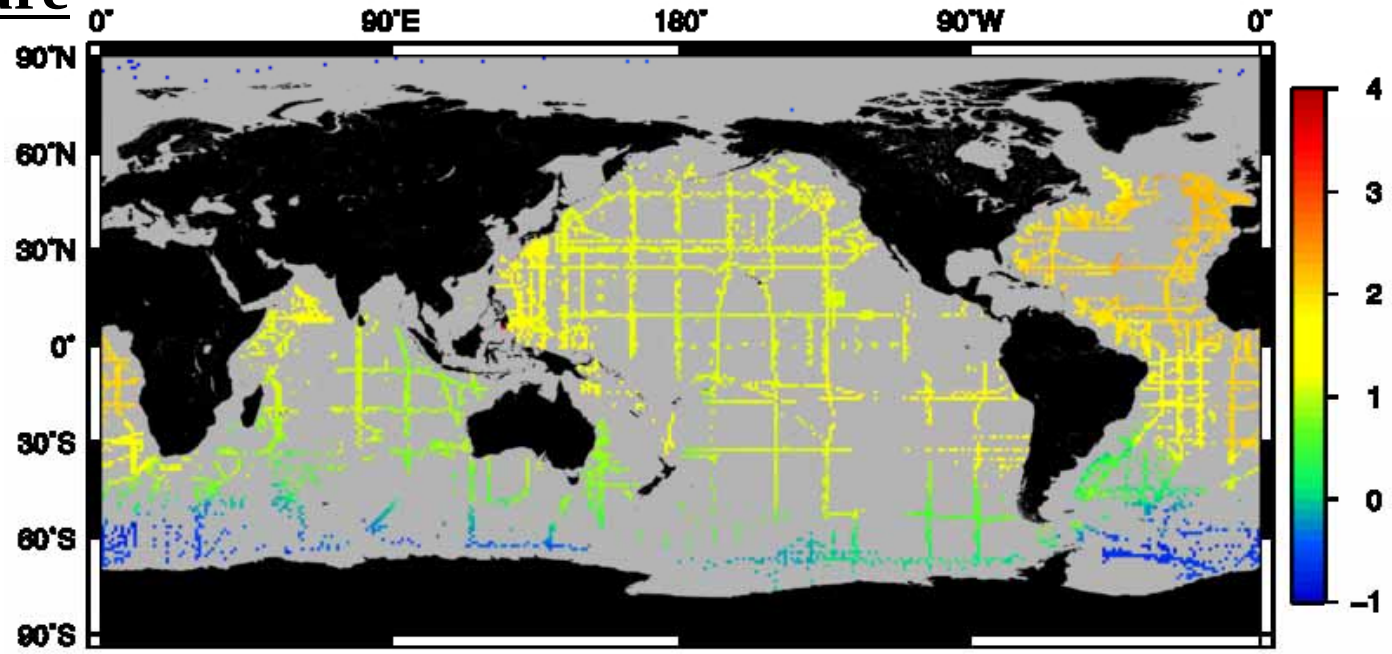
Why P21 and I2/I10 lines?

- **Sparse high-accurate data, especially in the Southern Hemisphere.**

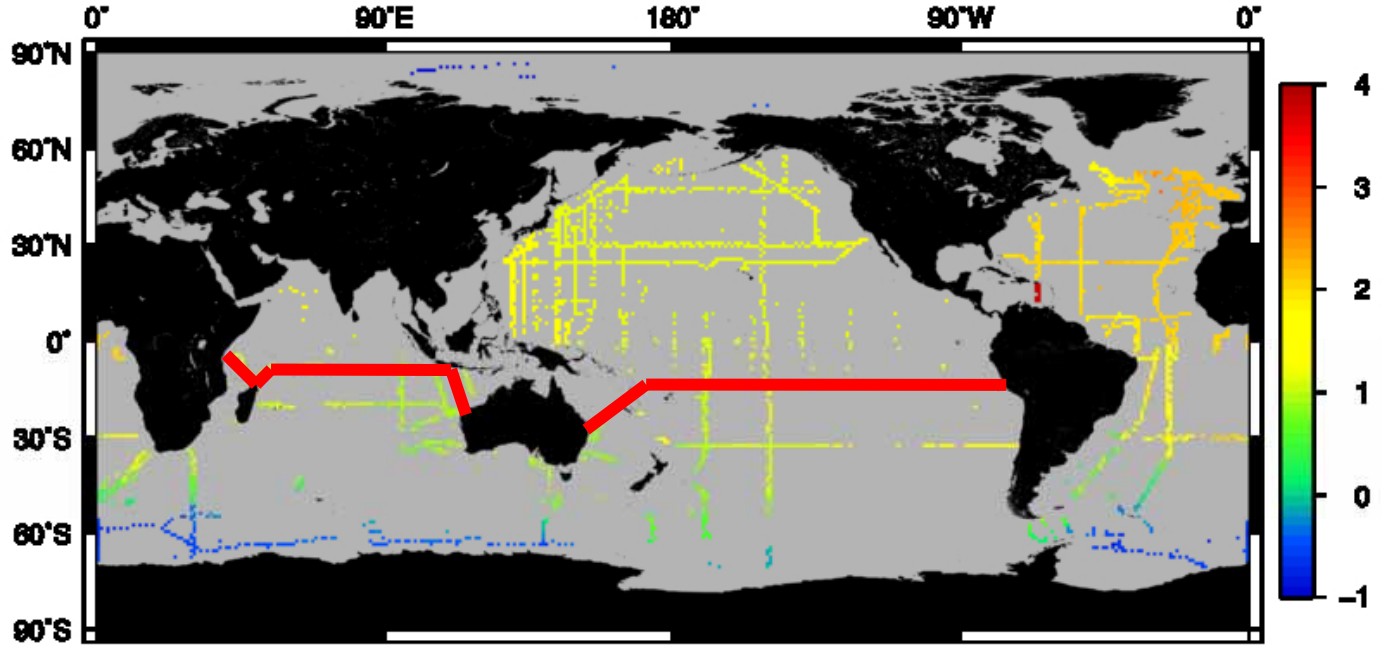
Water temperature

1985-1995

WOCE period



1996-2006



Why P21 and I2/I10 lines?

- Data shortage of high-accurate data, especially in the Southern Hemisphere.

- **High rate of accumulation of anthropogenic CO_2 in the South Pacific and South India.**

Rates of accumulation of anthropogenic CO_2

Uptake of 2.2GtC yr^{-1} by the ocean

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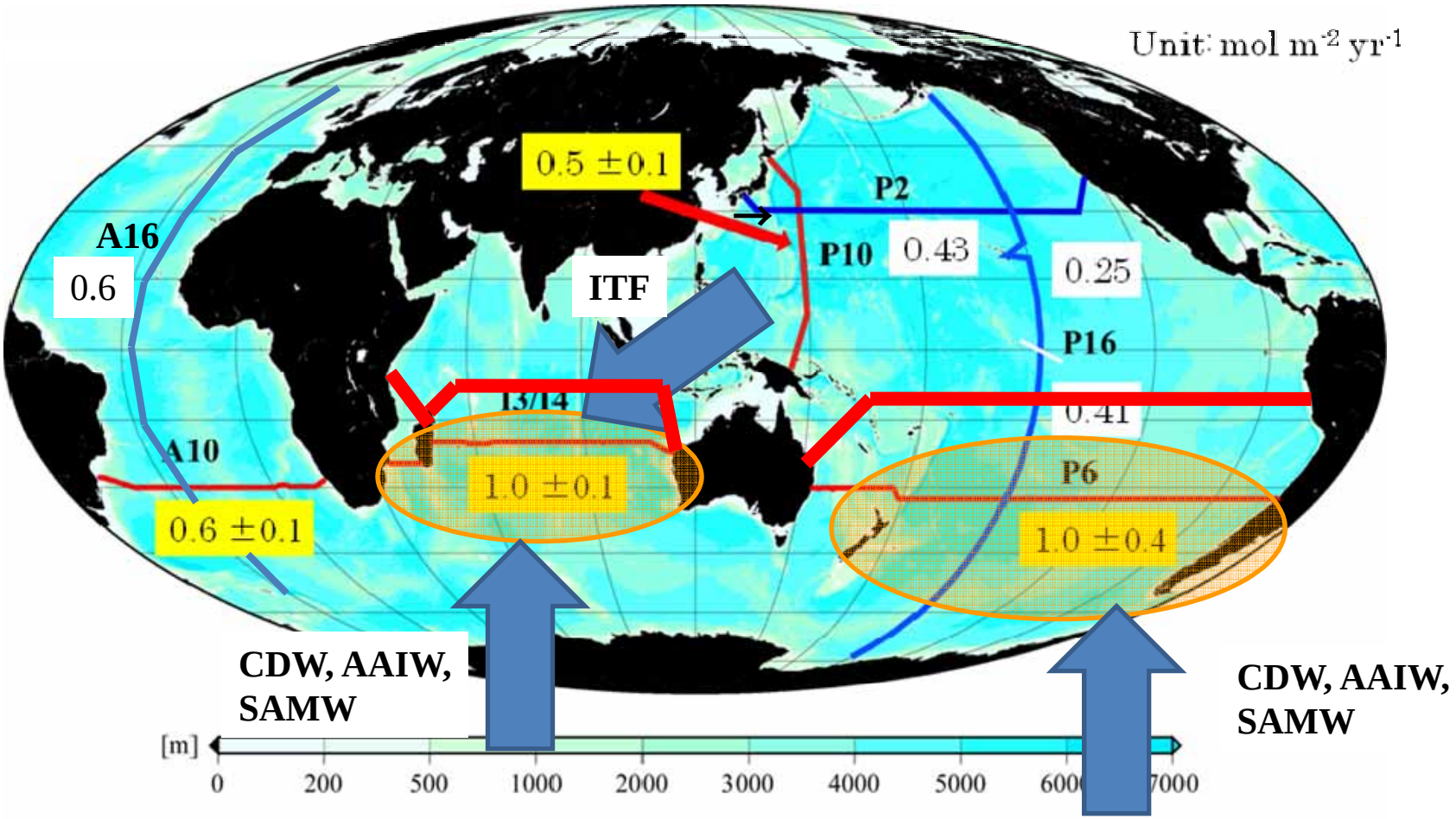
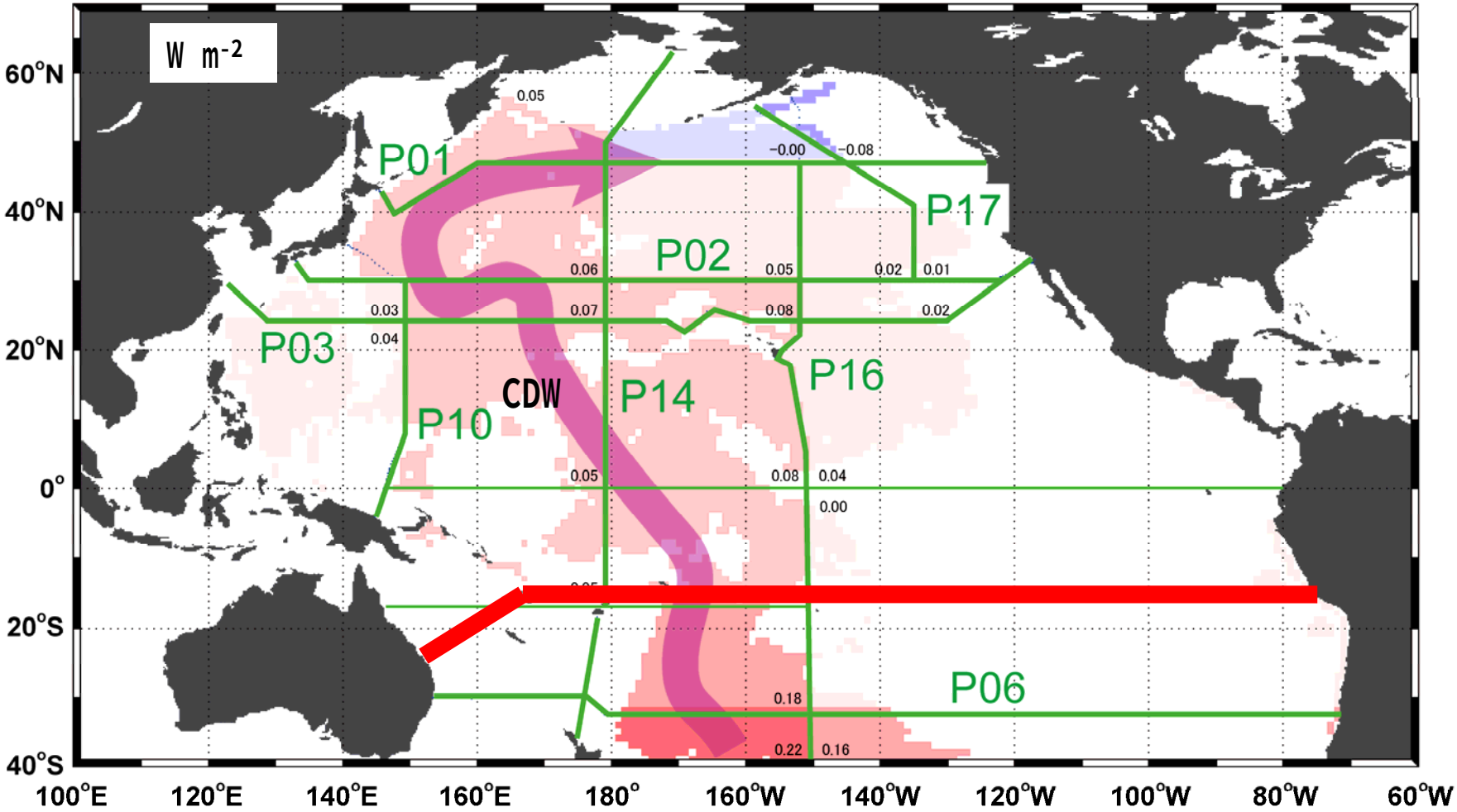
Divided by the global ocean surface, 0.55 mol m^{-2} yr^{-1}

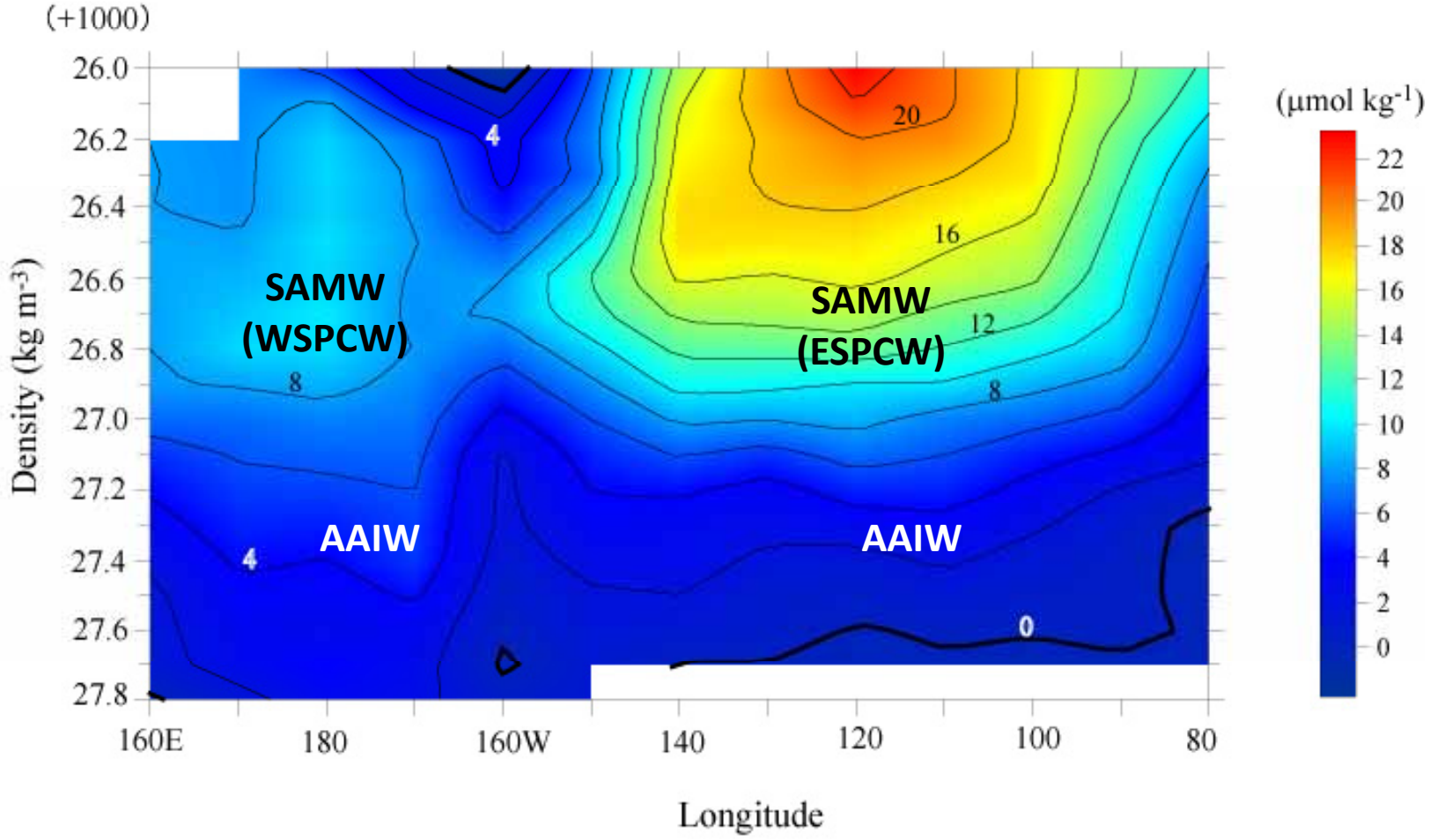


Bottom-layer warming

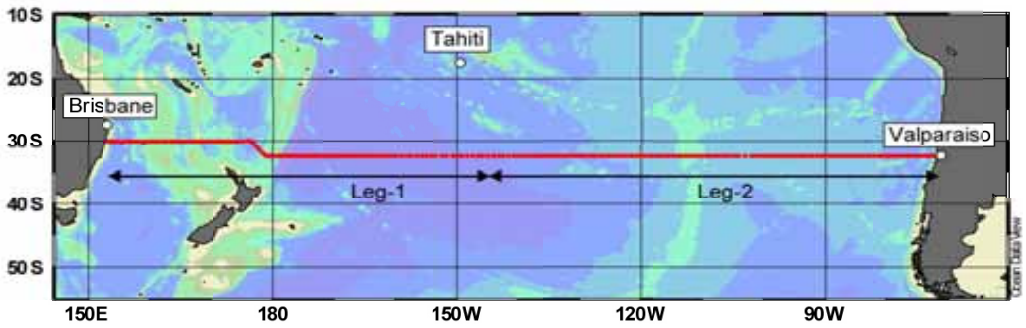
High heat storage along Circumpolar Deep Water (CDW)



Increases of anthropogenic CO_2 along the P6 section between 2003 and 1992



SAMW: Sub-antarctic mode water
AAIW: Antarctic intermediate water
WSPCW: Western South Pacific Central Water
ESPCW: Eastern South Pacific Central Water



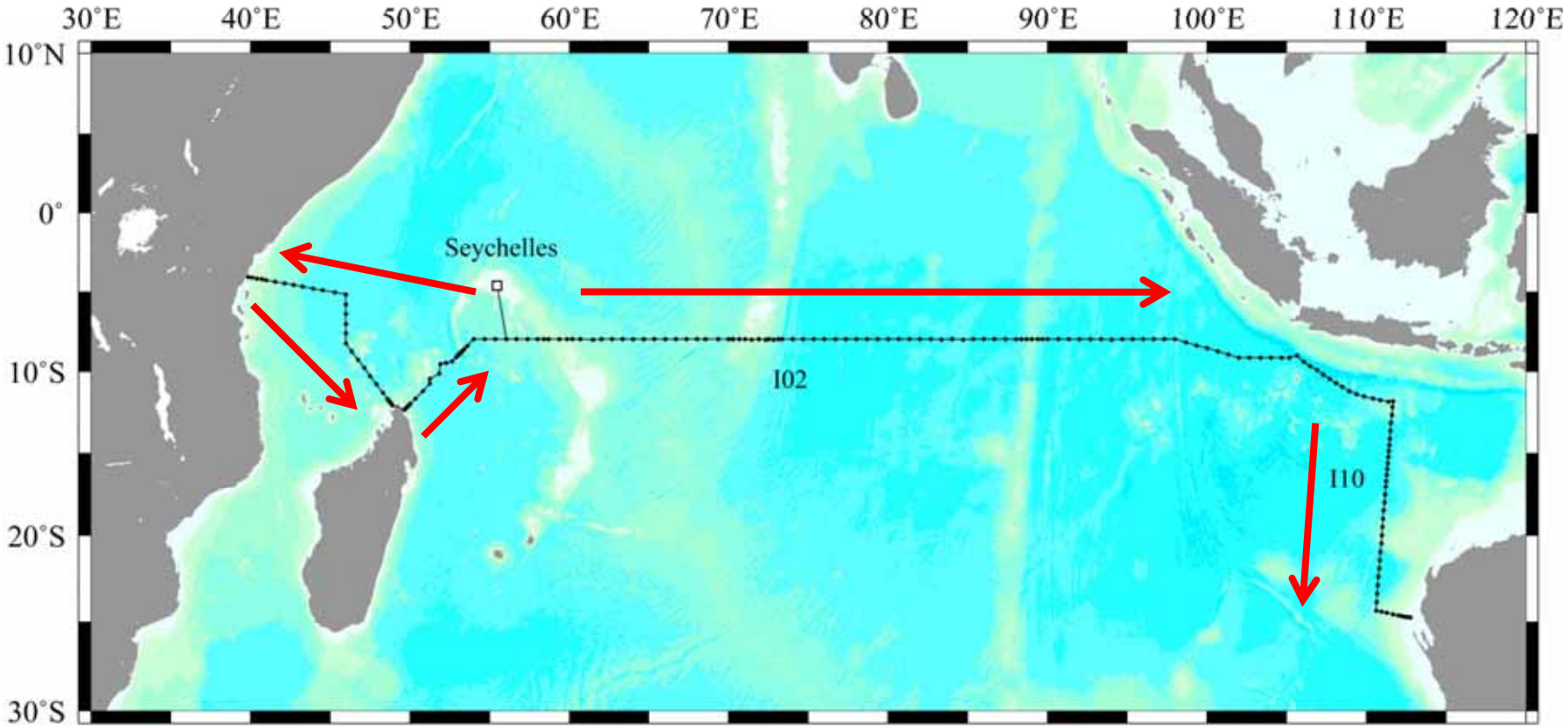
R/V *MIRAI*

Length: 129 m
Breadth: 19 m
Gross tonnage: 8,687t

Scientists: 46
Crews: 34

Revisit cruise for WHP I02 and I10 lines:

Period: from late 2011 to early 2012
Ship time: 55 days
Onboard scientists: 34 (max. 46)



Measured properties

Underway: SST, SSS, ADCP, atmospheric and surface water pCO_2, etc.

Sensors: CTD, LADCP, oxygen, fluorescence, turbidity

Water samples for: salinity, dissolved oxygen, nutrients, dissolved inorganic carbons, total alkalinity, pH, and chlorofluorocarbons, ^{14}C, ^{13}C, etc.

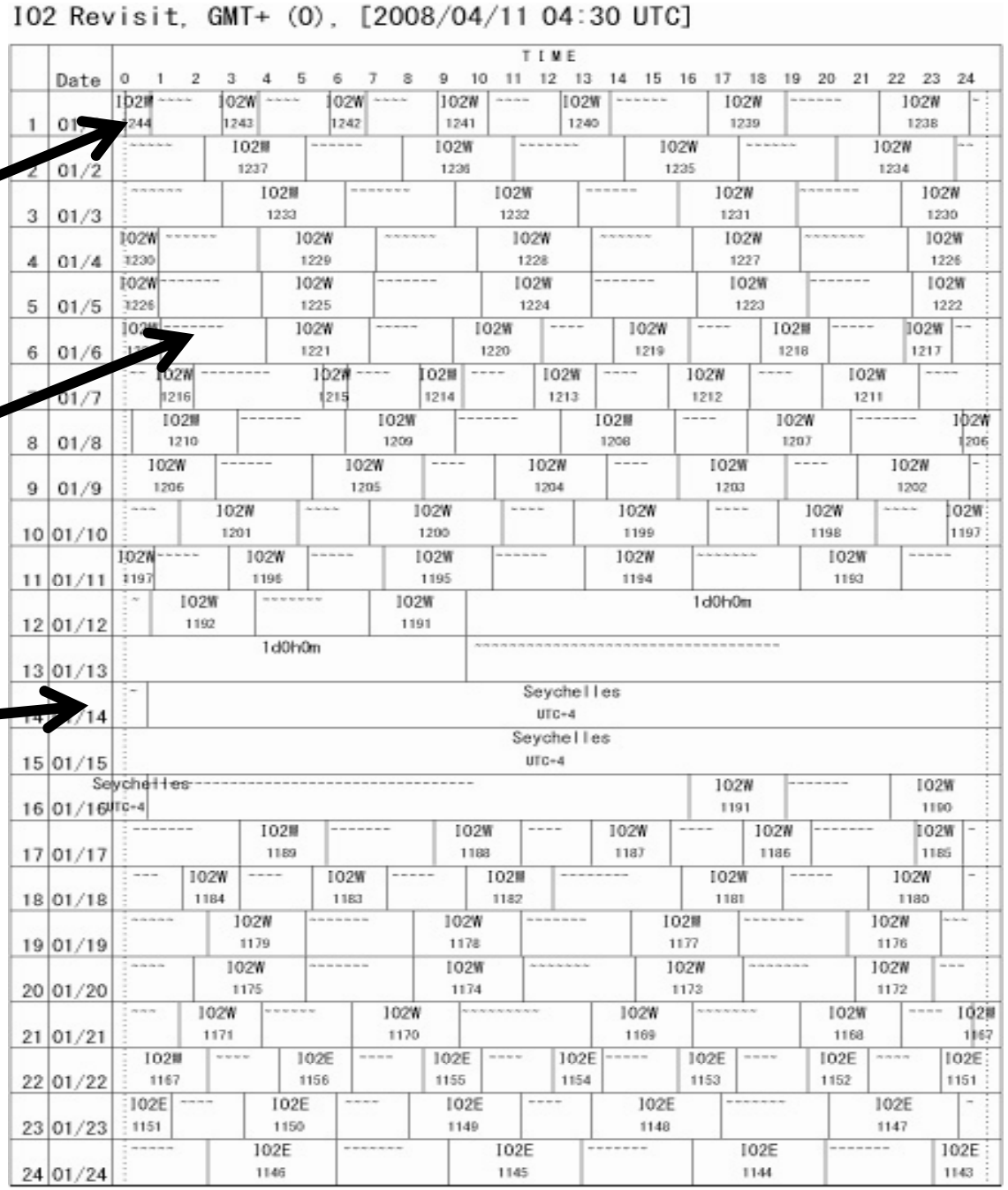
at hydrocast stations

Time schedule

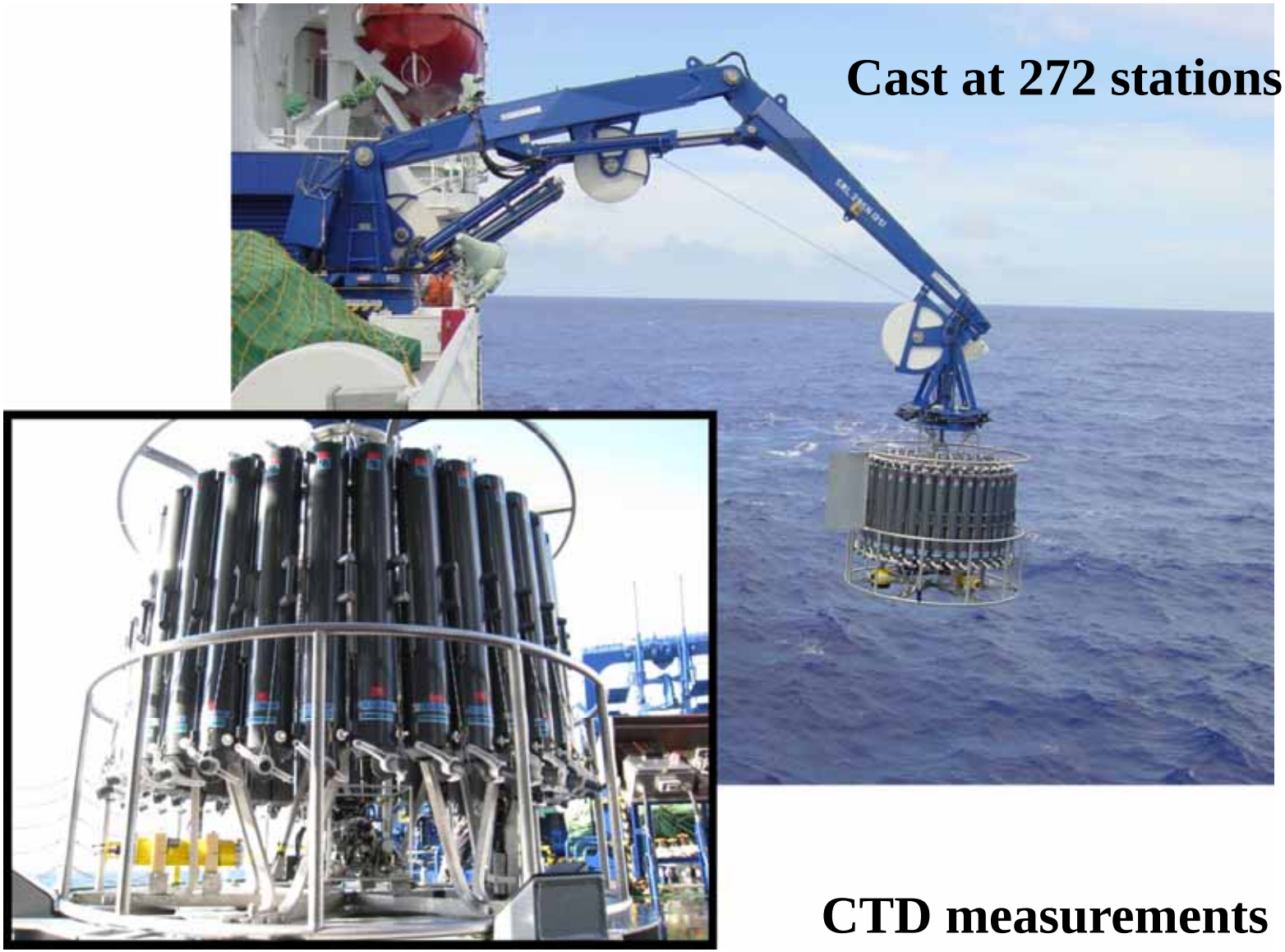
Start of observation

Sailing to the next station

Port call



Our cruise (MR11-??)



Cast at 272 stations

CTD measurements

Preparation for water sampling

Water sampling

Chemical analysis

Data obtained

Data obtained in MR11-?? (CLIVAR/CO_2) cruise in the Indian Ocean are open to public within a few years through the Data Management Office in JAMSTEC, and also submitted to international data centers.

Related poster presentations:

K. Katsumata (IORGC): Water property changes observed along WHP lines I03 and I04 between 1995 and 2003.

S. Kouketsu (IORGC): Changes at intermediate depths in the Indian Ocean using repeat hydrography and Argo data.

Y. Kumamoto (IORGC): Chemical tracers in the Indian Ocean.