



# The Tropical Pacific Observing System (TPOS) 2020 Project

**Weidong Yu, Katy Hill**

**With contributions from TPOS SC Co-Chairs and members**

*OOPC-18, 14-17 April 2015, Sendai, Japan*

# ENSO drove the original Observing System

## TOGA Observing System

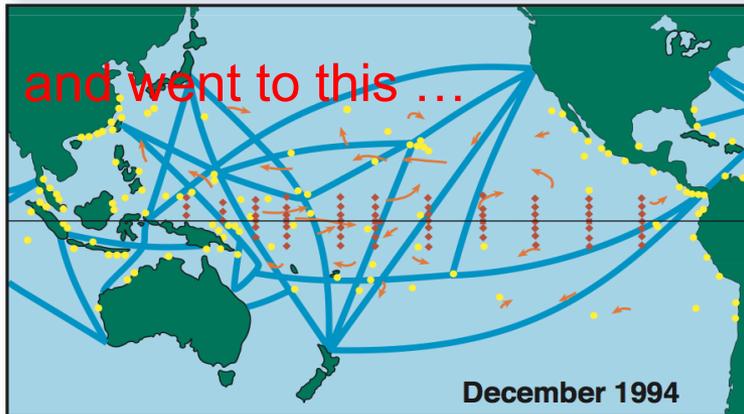
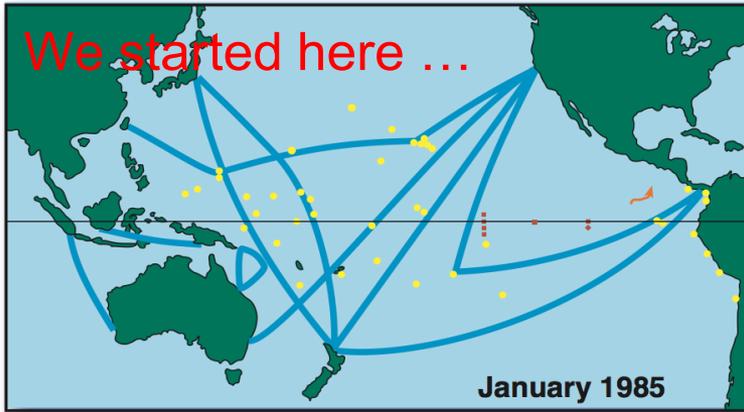


Figure 2. In situ components of the Tropical Ocean Global Atmosphere (TOGA) observing system at (top) the start of TOGA in January 1985 and (bottom) the end of TOGA in December 1994. Color coding indicates the moorings (red symbols), drifting buoys (orange arrows, one for approximately every 10 drifters), ship-of-opportunity lines (blue), and tide gauges (yellow). After McPhaden et al., 1998

## nature

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### El Niño monitoring system in failure mode

US budget woes cripple a key mooring array in the tropical Pacific Ocean.

Jeff Tollefson

23 January 2014

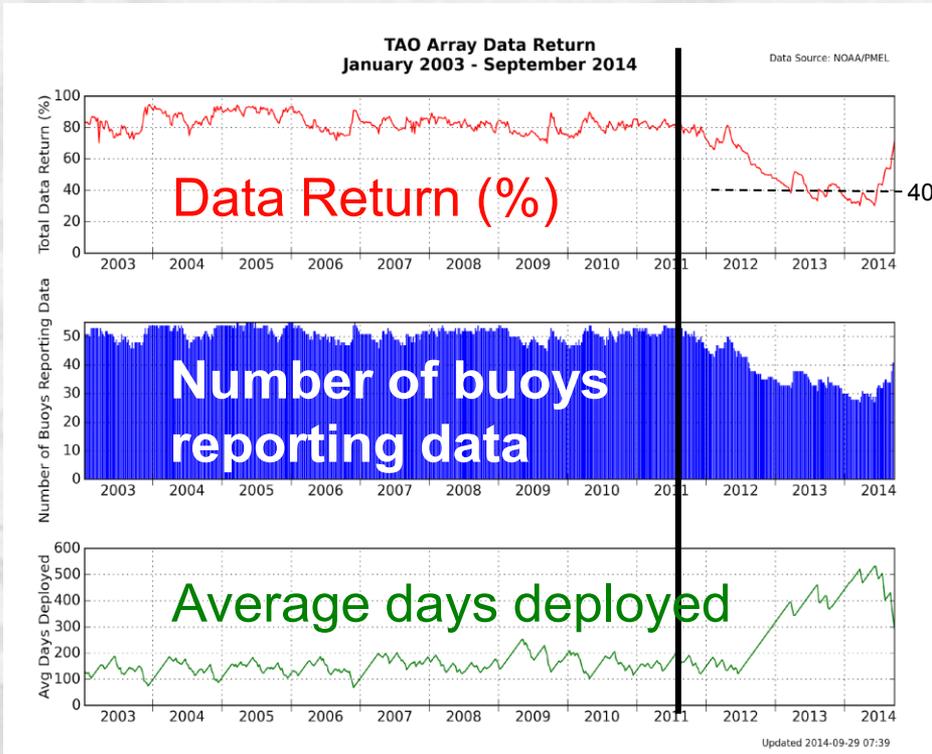
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But recently ...

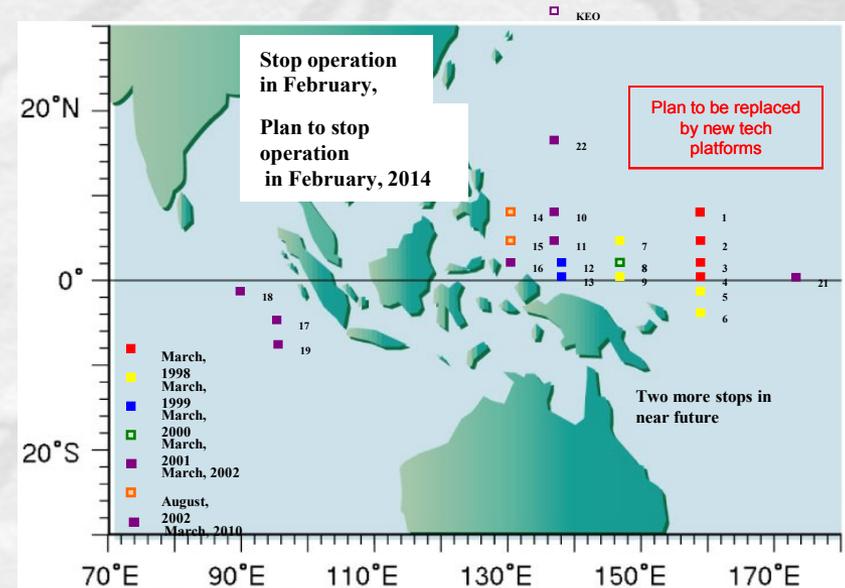


# The TOGA-era system is vulnerable ...

## Ka'imimoana Mothballed



McPhaden, PMEL



Ando, JAMSTEC

- TAO data return fell below 40% in early 2014; since returned to 80%, for now.
- An opportunity to rethink and reframe a better, more robust TPOS.

# TPOS 2020 Workshop

27-30 January, 2014, Scripps Institution of Oceanography



- Review of observing system requirements and implementation
- The Review recommended the creation of a focussed

## **TPOS 2020 Project**

- Transition from a loosely coordinated set of activities in the tropical Pacific to a systematic and sustainable TPOS by 2020.
- A project for change, for tomorrow's TPOS

# TPOS 2020 Governance and Project Structure

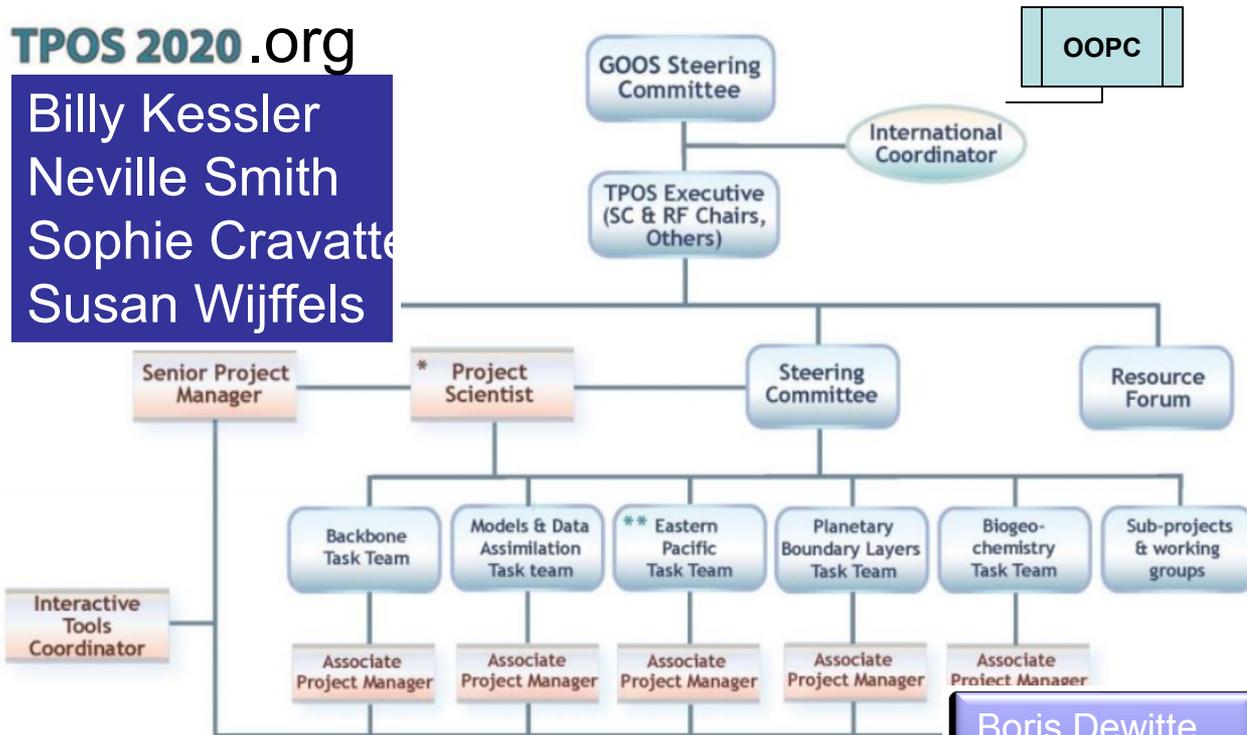
Project is in the mode of GODAE,

Argo, GHRSSST, OceanSites – all borne out of OOPC

- Formed out of common sponsor and scientific partner interests;
- Reporting line through GOOS

TPOS 2020.org

Billy Kessler  
Neville Smith  
Sophie Cravatte  
Susan Wijffels



Boris Dewitte  
Elisabeth Rémy  
Alex Ganachaud

\* This role is currently being explored and developed

\*\* This Task Team and its role are still under consideration

# Key points on governance

- Communications through GOOS SC, to interact with international observing networks
- Major sponsors (NOAA (USA), SOA (China) and IMOS (Australia) are also engaged in GOOS.

# Snapshot of actions thus far ...



**TPOS 2020 SC-1 KIOST**  
**6-9 October, 2014**  
**Ansan, Korea**

# Backbone Task Team

## Co-chairs:

Sophie Cravatte and Susan Wijffels

The term “broadscale” was adopted in La Jolla following WOCE and GOOS/GCOS. However, the Steering Committee concluded, the term ‘backbone’ was preferred, reflecting that we are referring to **cornerstone/fundamental contributions to the overall system.**

Monitor Ocean State crossing broad scale

Provide data to support/validate/improve forecasting systems

Support satellite observation (val/cal)

Advance climate understanding

Maintain/extend climate records

## Timeline

Oct-2011 (SC\_1)

Interim report

Oct-2015 (SC\_2)

Preliminary conclusion report

Mid-2016 (SC\_3)

# PBL Task Team

Co-chairs:

Tom Farrar, Meghan Cronin

- Support satellite
- Improve parameterization
- Diurnal coupling
- Surface flux

Formulate observing strategy and sampling requirement

Recommendations on high resolution measurements (diurnal cycle)

Evaluate direct eddy-correlation approaches

Liaise with satellite/modelling community

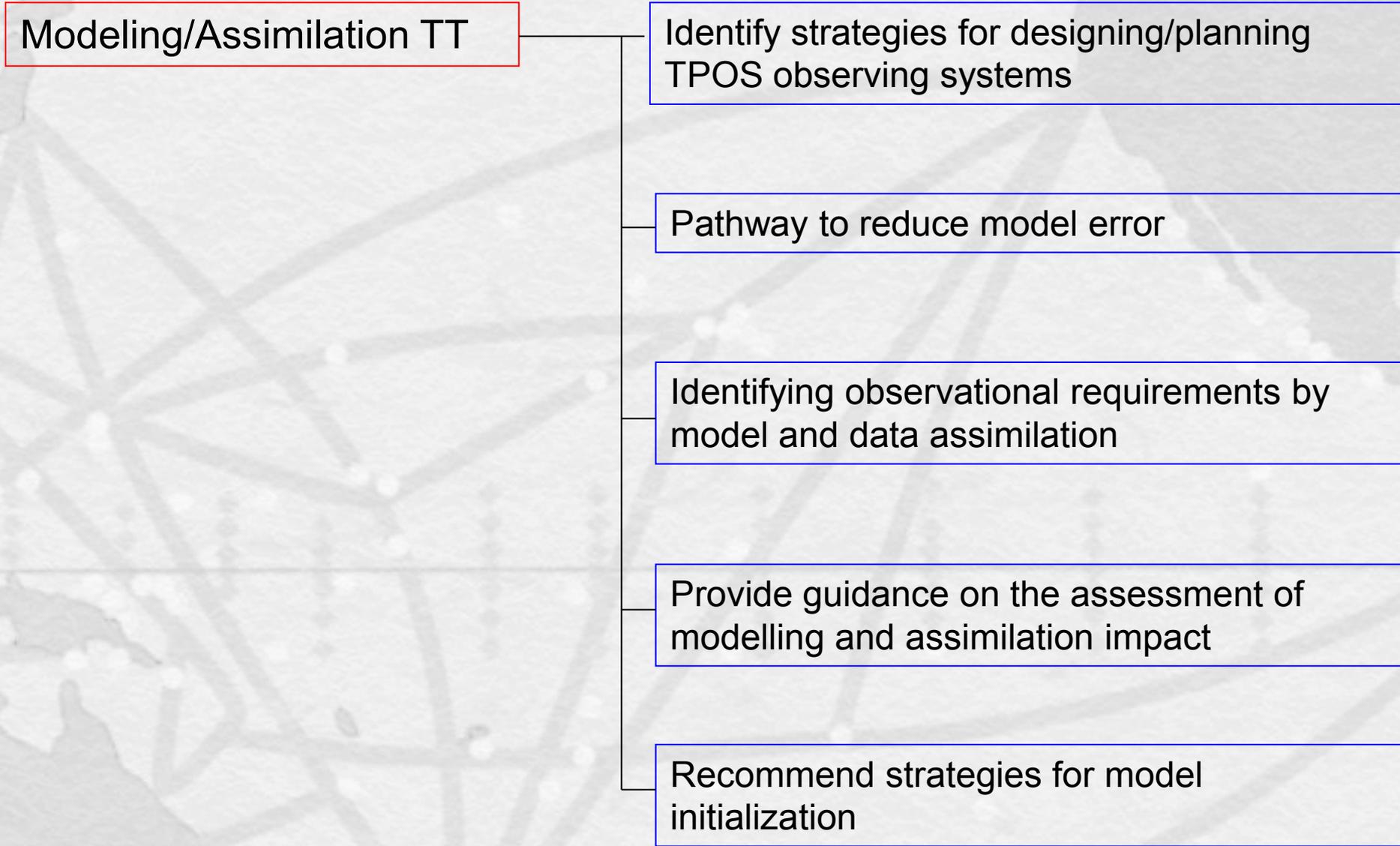
Extend to gas exchange

Initial report (goal, plan, key questions)

Timeline

Oct-2011 (SC\_1)

Oct-2015 (SC\_2)



Timeline



## Biogeochemistry TT

Develop strategies and plans for TPOS BGC measurements

Provide a prioritized list of BGC variables

Determine BGC measurement requirements

Guide implementation, including new technologies and process studies

Interact with GOOS Biogeochemistry and Biology Panels

## Eastern Pacific TT

Co-chairs:

Ken Takahashi (IGP, Peru), Billy Kessler (NOAA/PMEL, USA)

Confirmed members:

Y. Serra, S. de Szoeki, Y. Xue (USA), E. Alfaro (Costa Rica), E. Rodríguez-Rubio (Colombia), R. Martínez, W. Rentería (Ecuador), D. Gutiérrez (Peru), W. Schneider (Chile), **B. Dewitte (France)**

- Scope and terms of reference in preparation
- First videoconference to be scheduled

Focus on the eastern Tropical Pacific boundary region

Priority to engaging regional experts and institutions

Capacity building for improved sustained observing capability

Facilitation of the development of a regional research project(s), which may contribute guidance toward a sustained observing system

Science topics (TPOS2020 White Paper 8a):

- ENSO diversity physics, prediction and impacts
- Connection between the surface and equatorial thermocline
- Equatorial Kelvin wave propagation and dissipation
- Coastal dynamical and BGC processes
- ITCZ dynamics (ENSO feedbacks, double ITCZ bias)
- Decadal variability in the SE Pacific

## Time series WG

“A **climate record** is (observed) evidence about climate, usually in some permanent form, with sufficient extent, quality, integrity and consistency to detect climate variability and change.” In WMO the definition of climate includes a period (30 years) but in a world where we sometimes have shorter but more comprehensive data sets (eg, Argo, TAO/TRITON) it seems sensible to be more general.

Representativeness

Continuity, homogeneity and length

Coverage and quality and accuracy

Suite of measurements, complementarity

Resources and logistics

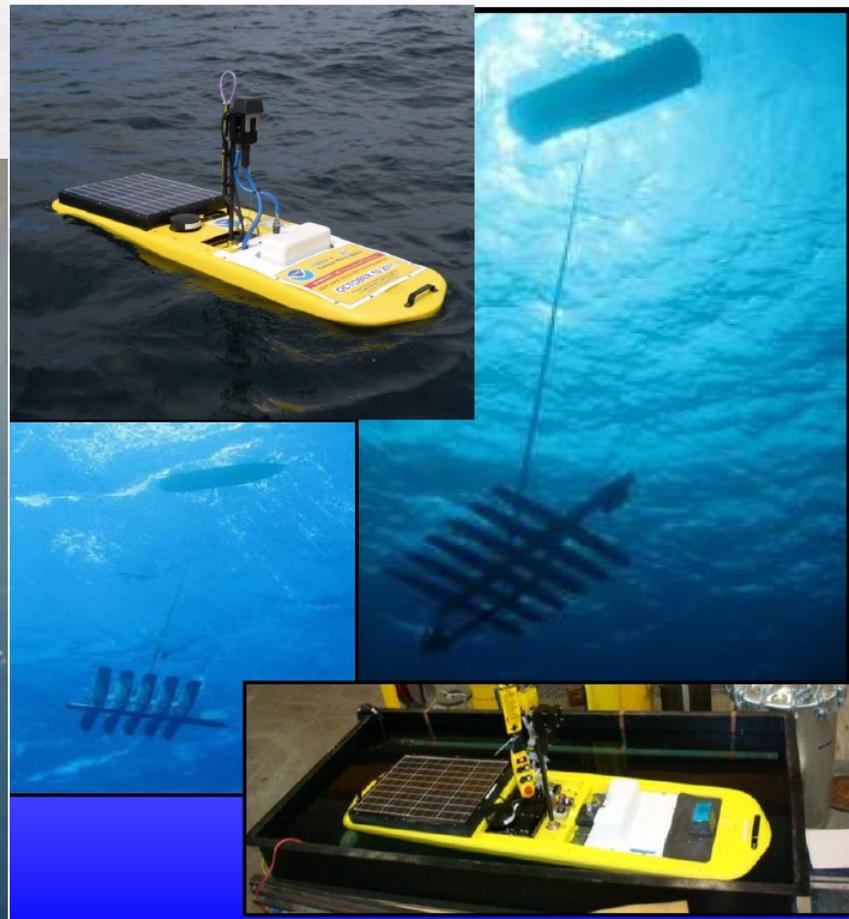
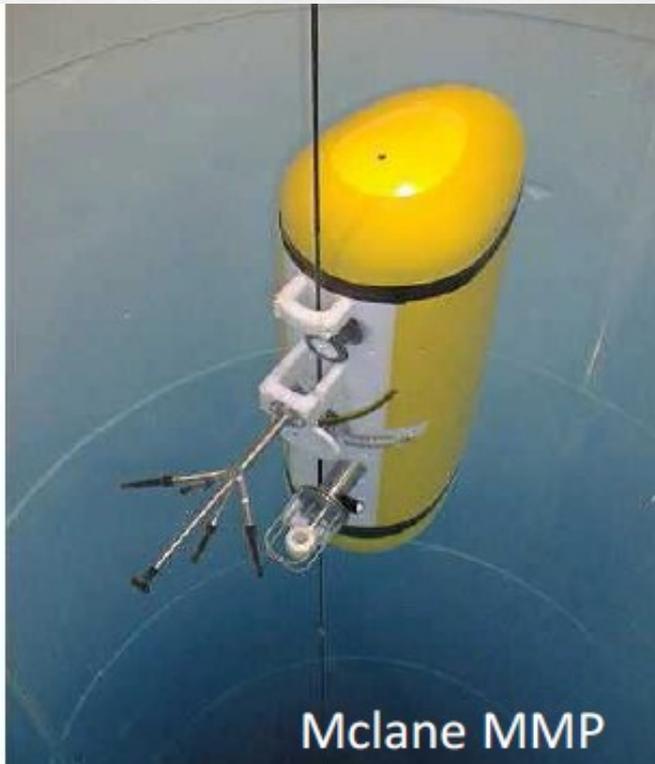
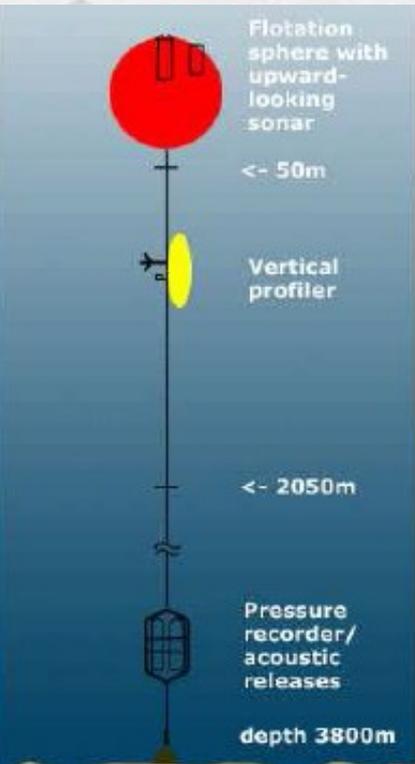
Modes of data delivery

Availability of adjacent

Test-beds/prototypes for the tech development

**Actions:** Criteria test at 110W, interact with OOPC/OceanSITE, identify highest ranking sites and further locations

# New Technologies...



- To close gaps
- To address new requirements
- To reduce costs for observation
- To improve resilience.

# French contribution



- **Volontarisme** dans les Task Teams, notamment Assimilation?
- **Lettre d'intention GMMC 2014: Impact des observations dans les océans tropicaux**
  - Concerne toute la ceinture tropicale: PIRATA, RAMA, TPOS
  - Objectif de coordination des actions françaises
  - Idée initiale de monter un PPR
- **Réunion du 12/12/2014** (Jouanno, Garric, Dewitte, Hernandez, Bourdallé-Badie, Eldin, Hill, Ganachaud)
  - Objectifs visés:
    - Evaluer le système d'assimilation Mercator dans l'océan tropical
    - Améliorer le système d'assimilation Mercator sur la bande tropicale sur les trois bassins océaniques
    - Evaluer l'impact du réseaux des observations tropicales dans le système Mercator et faire des recommandations sur son évolution/utilisation
  - Discussions (rapport de réunion):
    - Processus clé, eg ondes océaniques; dynamique diurne...
    - Métriques de performances
    - Approches
  - Etat des lieux:
    - Projet en maturation (F. Hernandez, S. Cravatte, B. Dewitte, E. Rémy)
    - Coordination/information par rapport à TPOS2020
    - Opportunité de développements sur l'Atlantique avec AtlantOS
    - Possibilités récentes de développements sur le Pacifique (leaders S. Cravatte, S. Guinehut, B. Dewitte, ...)
    - Collaborations actives avec le Pérou/Chili (IRD)
  - Le terrain est là: il reste à semer des graines – et trouver l'engrais!