The Global Ocean Observing System
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TPOS 2020
Tropical Pacific Observing System

Reports from GOOS projects

TPOS2020 (2014-2021)

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and all other members of the TPOS2020 project

1- IRD, LEGOS, Toulouse, FRANCE 2-NOAA/PMEL, Seattle, USA 3- China

GOOS 10th Steering Committee meeting [online], April 2021

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Outline

TPOS2020 project is an International effort to rethink the T.P.O.S.
It started in 2014: opportunity to build a more integrated,
modern and robust observing system,
taking advantage of new science and technology

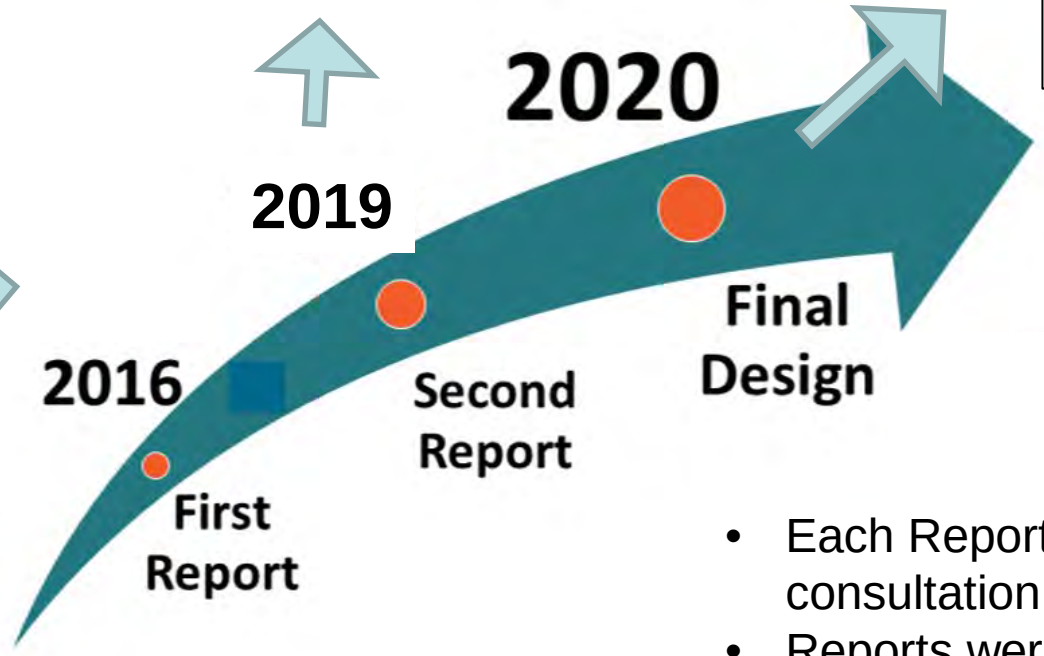
- TPOS2020 goals and organization
- Main outcomes from the project
- Successes, challenges

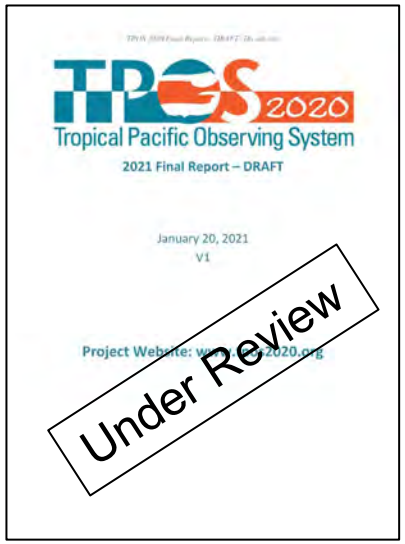
What did we achieve?

- Requirements, gaps, and solutions for the sustained T.P.O.S, following the GOOS Framework

- Suggestions for pilot and process studies

- Revise the recommendations
- Focus on models and prediction systems
- Biogeochemistry
- Eastern Pacific
- Evaluation of the pilots





- Specify missing elements
- Provide guidance for the future

- Each Report cycle involves extensive consultation, analysis work
- Reports were externally reviewed

Main outcomes from the **First Report**

- **Pilot studies**

to test sampling strategy

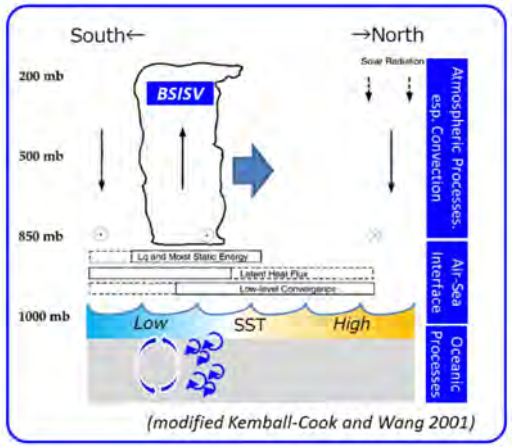
- **Process studies**

to understand critical phenomena

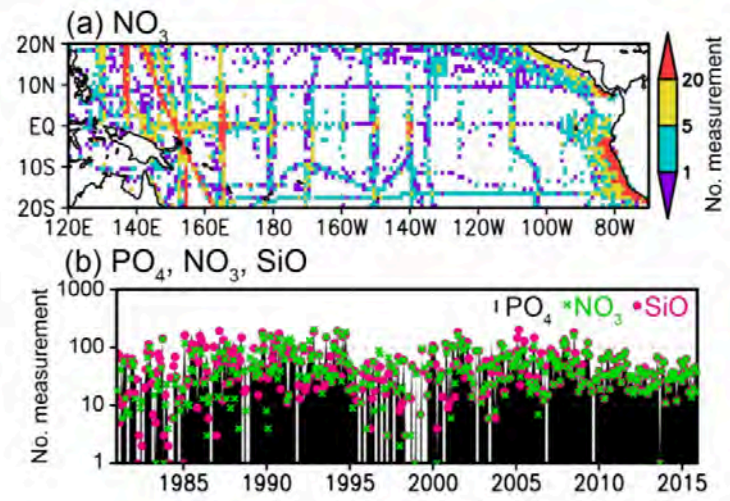
- **Modeling studies**

on impact and uptake

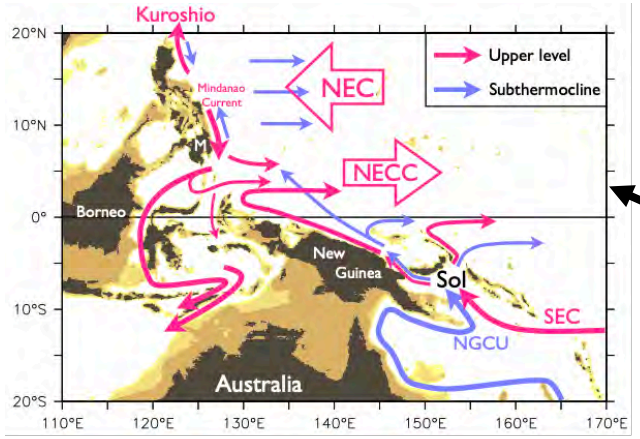
Process: Air-sea interaction at the edges of the Warm pool



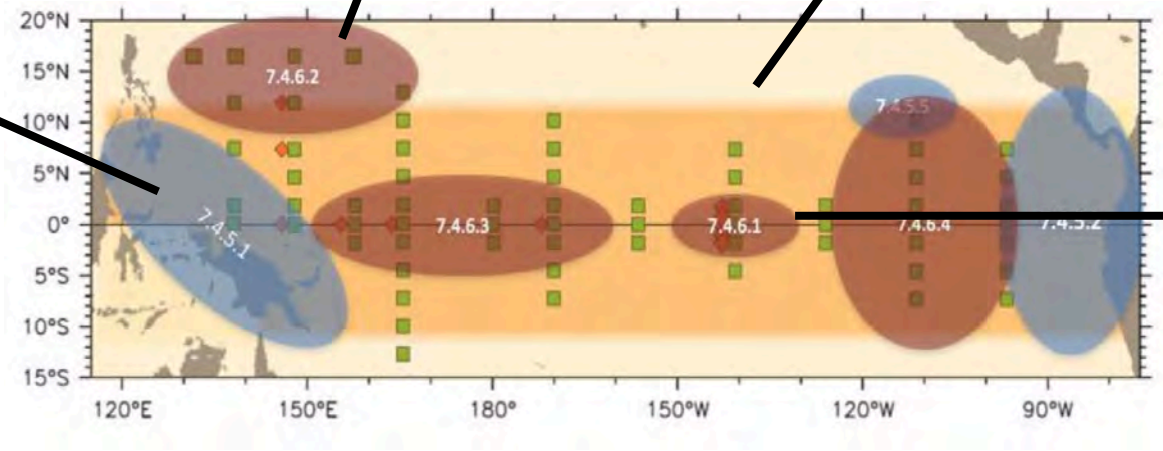
Pilot: determining the space/time scales for BGC



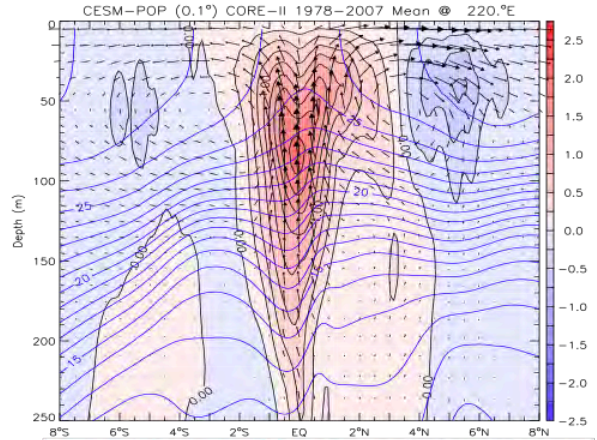
Pilot: Low-latitude WBCs



Low-latitude western boundary currents and the Indonesian Throughflow are principal conduits of tropical-subtropical interaction.



Process: Equatorial upwelling

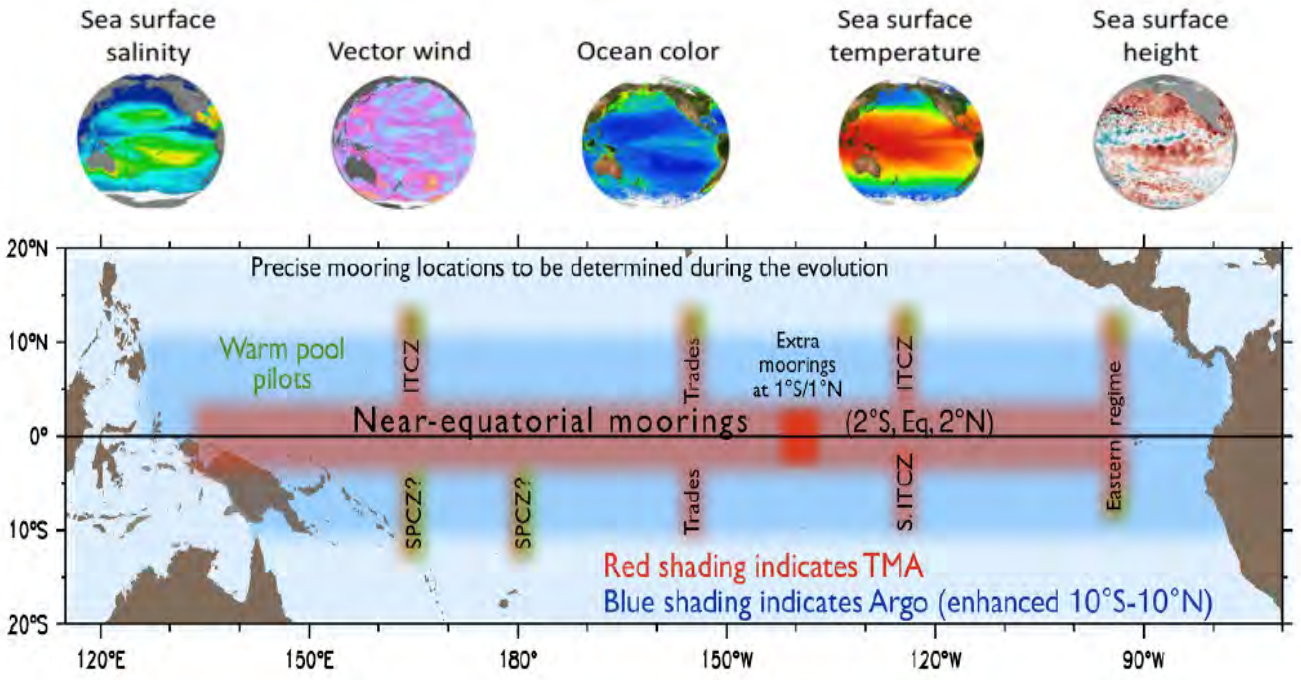


Equatorial upwelling is fundamental but poorly known; its modeling is uncertain.

Main outcomes from the **First Report**

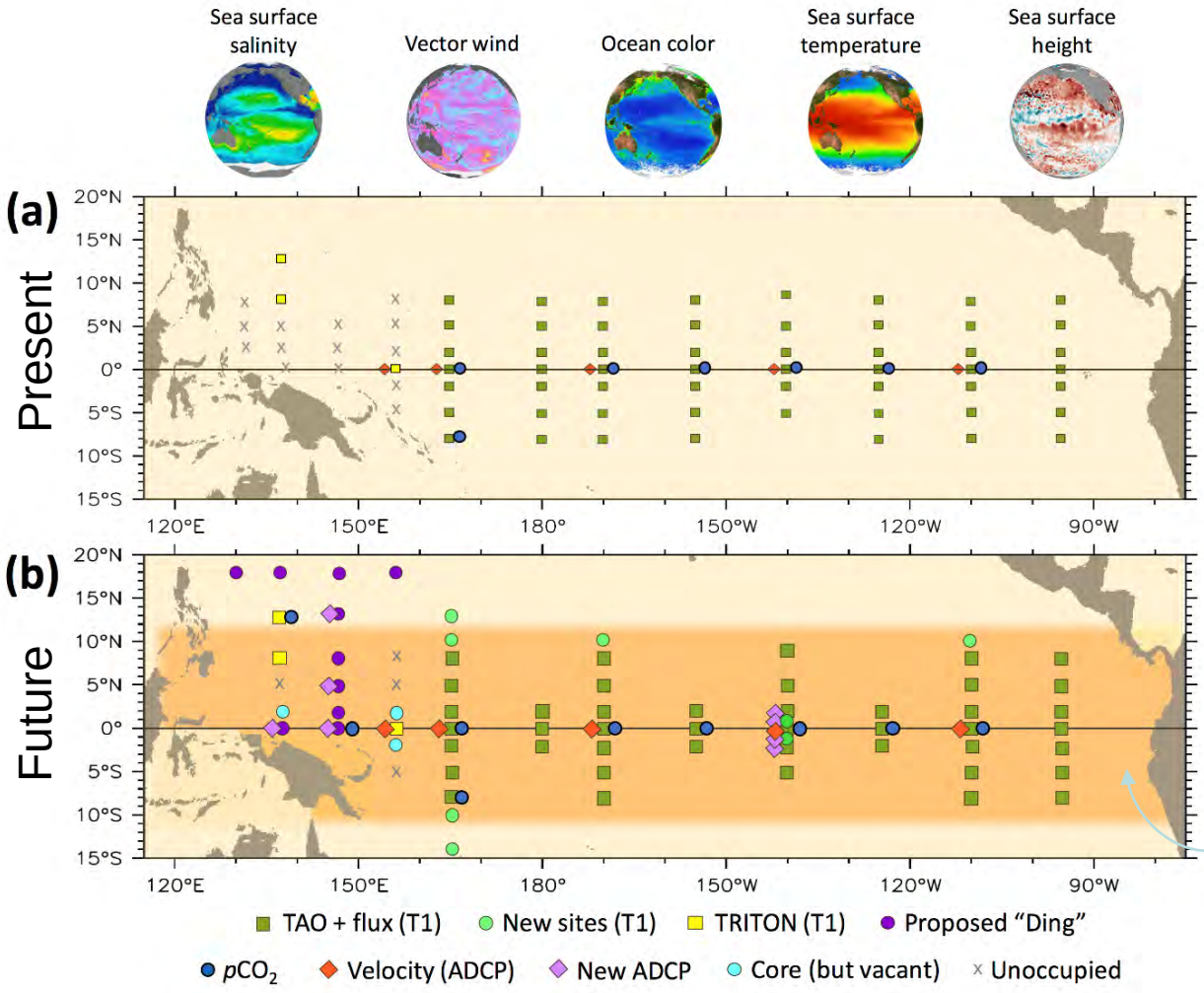
FOR THE BACKBONE: Integrated in situ and satellite approach.

- Maintain space-based broad-scale measurements of the essential ocean surface variables
  - Strengthen satellite vector wind sampling
  - Advocate for follow on SSS missions, and maintain SST, SLA, colour
- Enhance in situ obs of state variables in key climate regimes
  - Reconfigure the moored array to sample more regimes and focus on near surface/short timescales
  - Enhance Argo (10ºN-10ºS) to increase subsurface T/S vertical/spatial resolution



Main outcomes from the Second Report

FOR THE BACKBONE: revised, detailed design, integrating Biogeochemistry

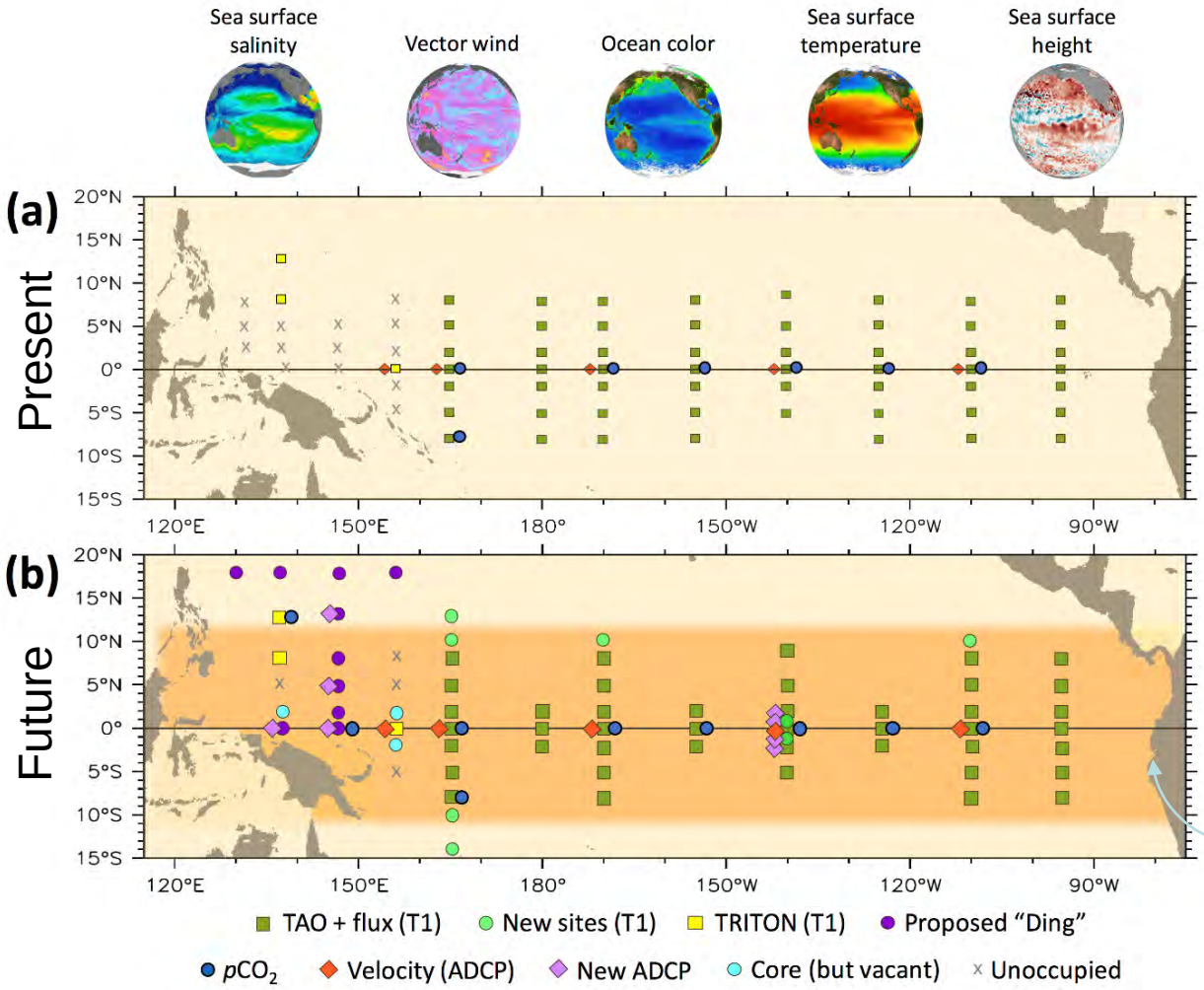


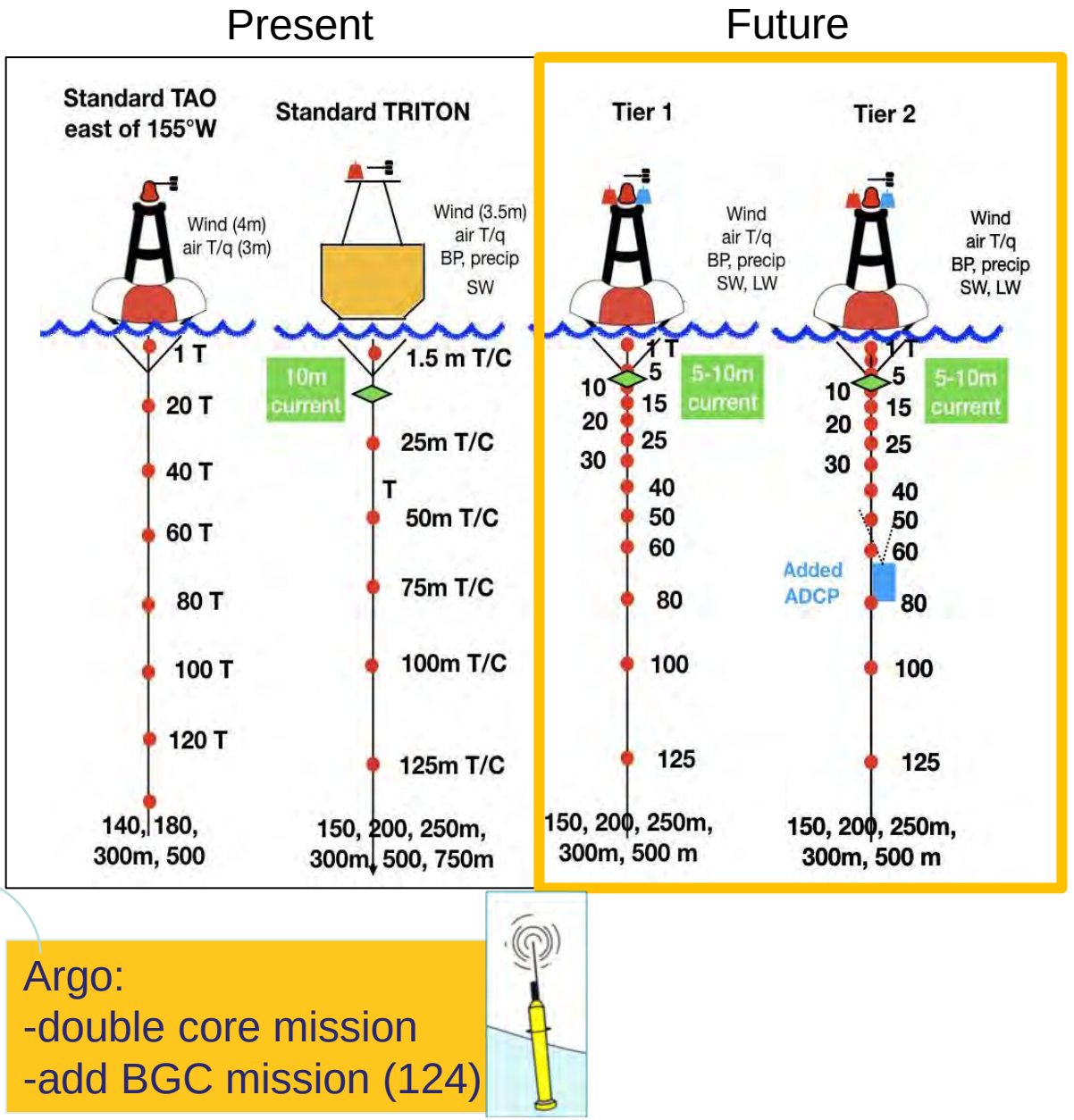
Other key in situ elements of GOOS remain **essential** elements of TPOS

Ships are essential:
- CTDs with a BGC suite along moorings servicing lines
- Underway pCO_2

Argo:
-double core mission
-add BGC mission (124)

Main outcomes from the Second Report





Argo:
-double core mission
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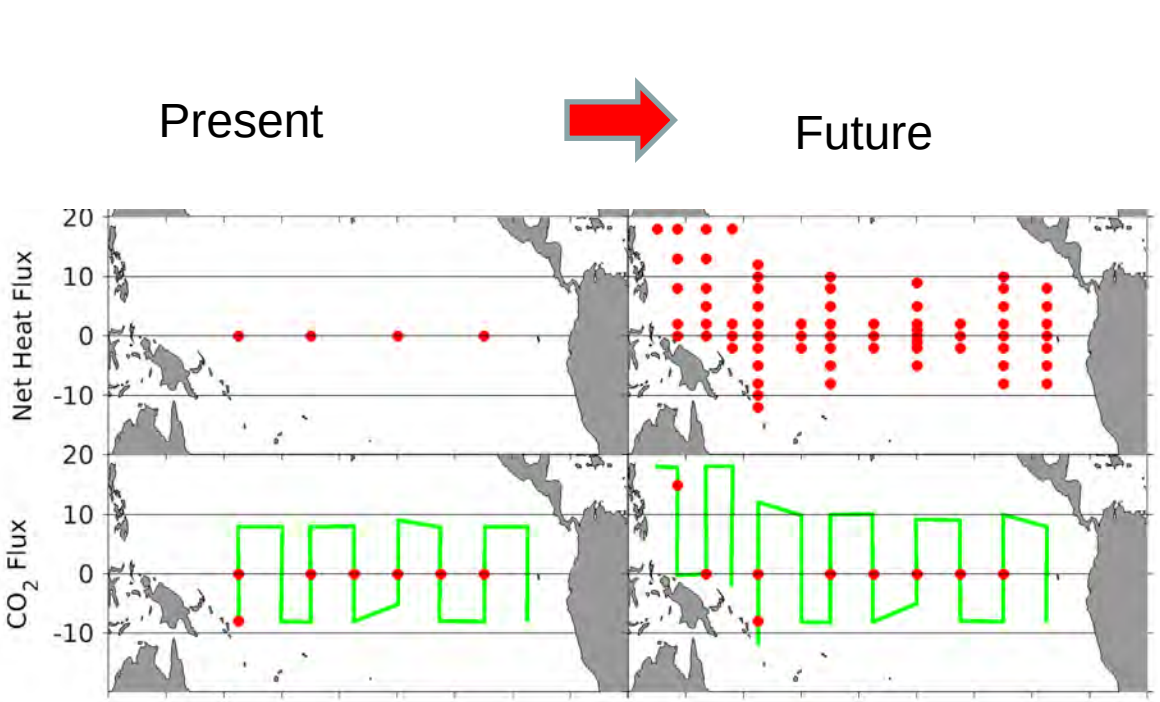
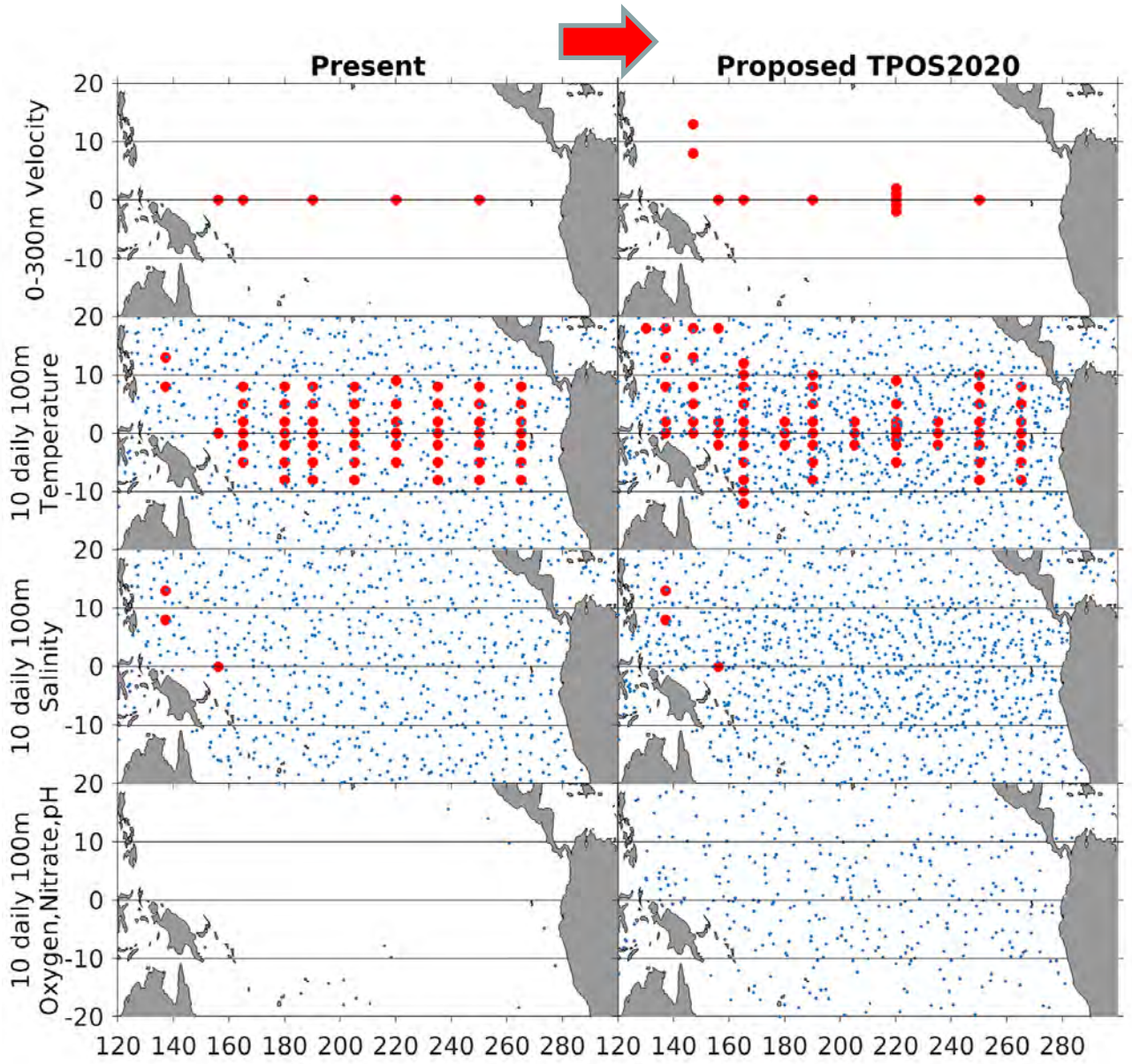
Gains for surface and subsurface variables

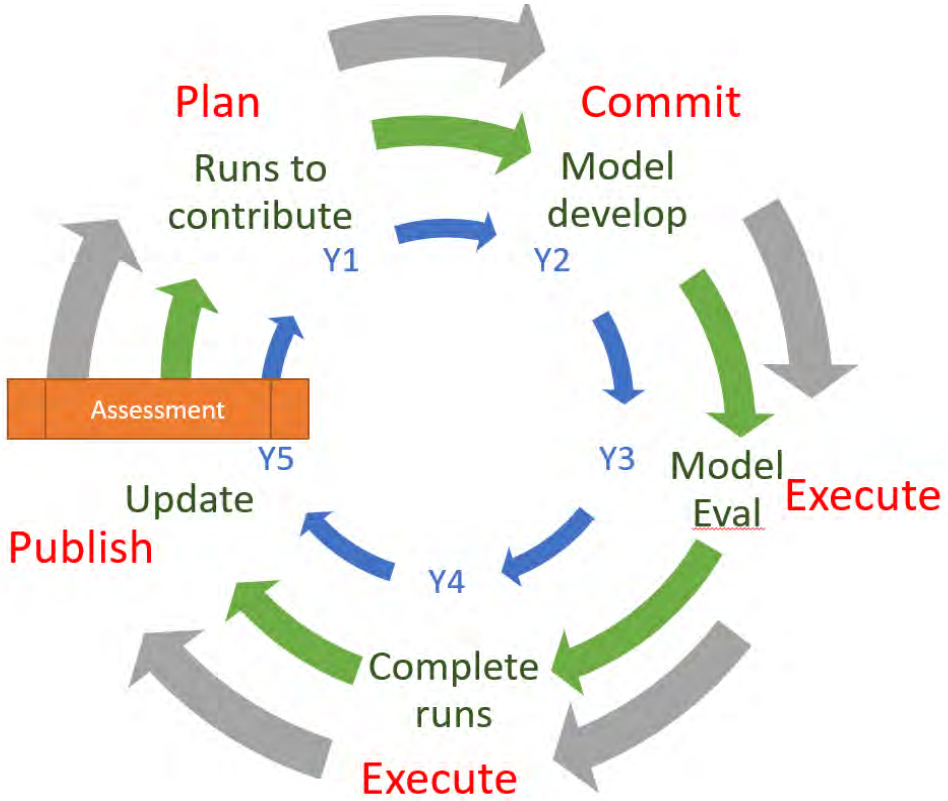




Modelling engagement crucial to get the full value of the O.S

Systematic approach for S2I prediction systems,
Planned cycle of experiments, assessment of model biases and prediction skill

Standard set of metrics



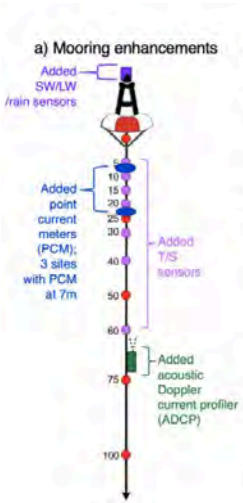
Essential for model and data assimilation improvements

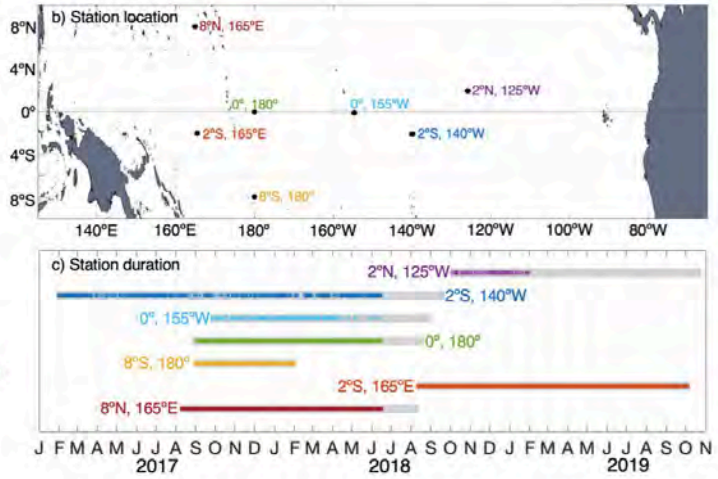
New Technology pilots

Test new technology, assessing their potential for TPOS

Autonomous platforms

Moored instrumentation





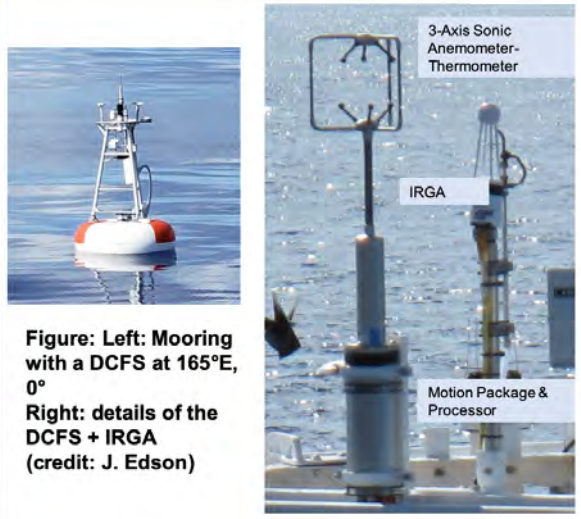
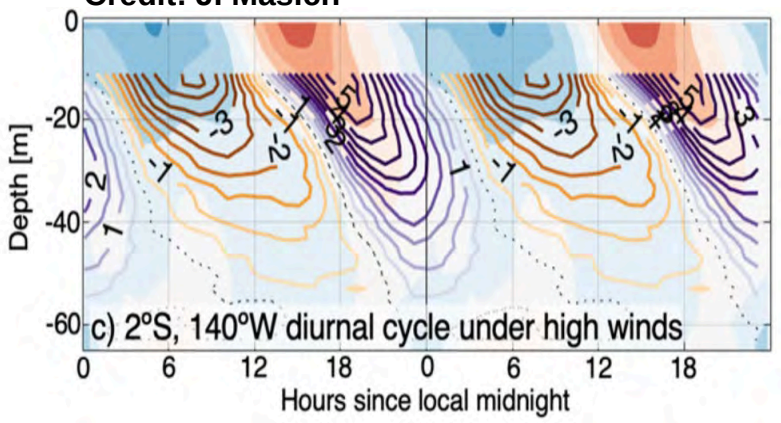


Figure: Left: Mooring with a DCFS at 165°E, 0°
Right: details of the DCFS + IRGA (credit: J. Edson)

Credit: J. Masich



Success, challenges and issues

- The aim was to design a refreshed, integrated TPOS, to meet multiple needs

The three reports fully responded to this (satellite/in situ, mature/new technology, integrated biogeochemical sampling, and models)

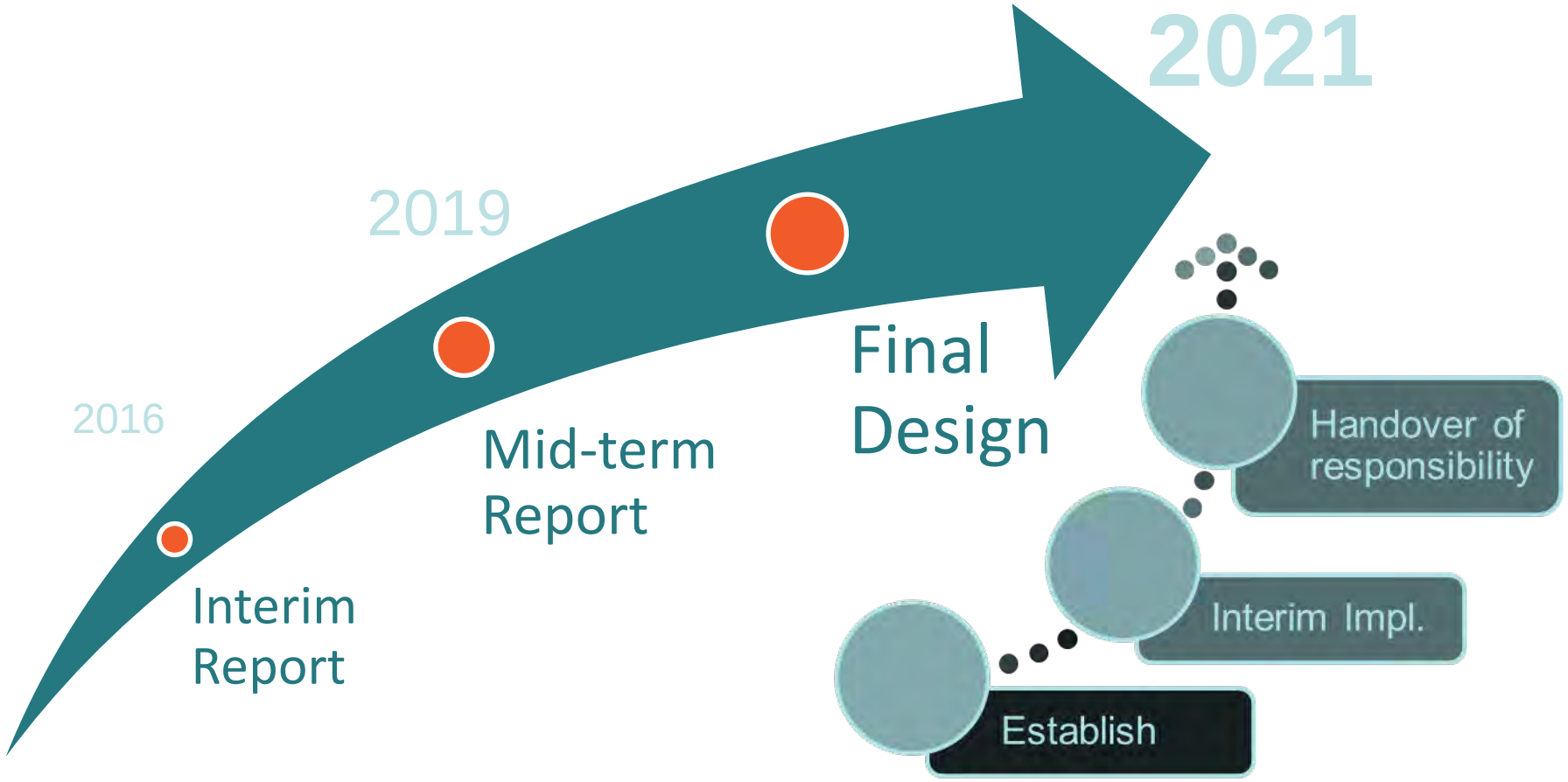
- TPOS2020 reinvigorated agency interest, funding of many pilots and process studies.

- Implementation on the way: transition planned and is happening

- Limited to BGC sampling: biological and ecosystem aspects are left for the future

- The aim was to build **greater cooperation and coordination among the international sponsors** to the TPOS, for reduced risk and greater robustness.

The future: toward implementation



TPOS 2020 Transition Team → Permanent Coordination Mechanism

Thanks to the many contributors to the TPOS2020 effort!

Steering Committee meeting, Seattle, 2017

Backbone Task Team meeting, WHOI, 2018