The Tropical Pacific Observing System (TPOS) 2020 Project

Background and Terms of Reference

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Rationale behind TPOS

- Tropical Pacific has singular importance
  - Around 25% by area and volume for GOOS
  - Around 25% nations directly impacted; ALL indirectly

- Arguably the birth place of the modern observing system
  (Honourable mention for North Atlantic!)
  - TOGA 1985-1994 → TAO array, systematic SOOP, sea level
    (GLOSS)
  - Major focus during WOCE, JGOFS, etc.
    - WOCE legacies include ALT, Argo, data systems, ..

- The heart and soul of El Nino/ENSO
  - Major impacts on land and in the ocean (fisheries)
  - Core contribution to Global Framework for Climate Services
Third CLIVAR Workshop on the Evaluation of ENSO Processes in Climate Models

CSIRO, Hobart, 21-23 January 2013

TAO/TRITON

- The TAO/TRITON array is in disarray:
  - Drastic reduction in data return in 2012
  - Lack of institutional commitment

- Research community is concerned about the future:

  TAO/TRITON has been the cornerstone of ENSO research for 25 years
- Plummeting Data Return Since June 2012

McPhaden, NOAA
TPOS 2020 Workshop
27-30th January, 2014, Scripps Institution of Oceanography, La Jolla, USA.

- Review of observing system requirements and implementation
- Presentations on status of all aspects of system
- Presentations on potential new science and contributions

Sponsors:

Chaired by: David Anderson and Toshio Suga
Report: Published April 2014 (search “TPOS 2020 Workshop Report”)
KEY RECOMMENDATION: A TPOS 2020 Project

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
  - Not business as usual; targeted goals, players, time
  - Of the sponsors; contribution to GOOS/GCOS, CLIVAR, …
  - Managed like a major Project
Urgent actions for improving resilience in the near-term

• **Strongly endorsed** NOAA’s offer to return TAO to 80% data return.

• **Urgent need** to explore strategies to mitigate the impact of the reduction in the TRITON component of the Array.

• **Communication and coordination** among existing partners needed urgent attention.

• **Initiate discussions** to broaden engagement in supporting the TPOS, enabling new partners.

• **Ensure sufficient redundancy** to enable cross platform quality checks, and mitigate the risk of platform bias.

• **New technology** ...
Reinforcing key priorities:

- Identify and sustain critical long climate records as a priority.
  - Unique contribution of TAO/TRITON long time series recognized
- Maintain and improve broad scale sampling, taking into account all observing networks. *TT
- Encourage integration of Biogeochemistry and Biology (?? *TT)

Identifying new requirements *TT

- Observing Eastern, Western, Equatorial Boundary Regions.
- Observing Diurnal Variability, Air Sea Fluxes.

Strengthening connection to modelling.

- Multisystem analysis activities, observing system design, targeted process studies. *TT
Integration: Complementarity between satellite and in-situ observing systems

- Altimeters and SST measurements provide spatial coverage and detail.
- Combined altimetry & in-situ data bolster knowledge on sea level, heat content, and mass changes.
- High-frequency mooring data help de-alias diurnal signal in satellite data.
- In-situ data are used in satellite cal/val.
- Blended satellite and in situ data deliver higher-level valued-added products (e.g., Reynolds SST).
- Integrate scientific surveys into plan.
- Integrated data and information approaches: Around 10% of the total Observing System effect should be directed towards data and information management.
TPOS Issues and Risks

• Challenges sustaining the TAO/TRITON Mooring Array.
• Risks are not being actively monitored and assessed
  – Need to spread risk
• Requirements and applications have evolved since TOGA
  – Science has evolved
  – Increased focus on biogeochemical and biological systems
  – Multi-disciplinary approaches
• Modeling and observing technology have evolved
  – Argo, ALT, ensembles, reanalysis, …

• Timely for a systems-based evaluation of the requirements, implementation and delivery of observations
  – Across all elements of the OS
Further information

- Workshop Report Volumes 1 and 2
- White papers, presentations
- See TPOS 2020 SC web site

- Next: Project outline, scope; Terms of Reference
KEY RECOMMENDATION: A TPOS 2020 Project

The Review recommended the creation of a focussed

TPOS 2020 Project

1. To monitor, observe, define the state of ENSO, and improve scientific understanding;

2. To support observation and prediction systems for ocean and weather and climate services, including underpinning research;

3. Advance/refine knowledge of tropical Pacific predictability (physical and biogeochemical) and its climate impacts; and

4. To relate ocean/climate variability and change to marine biogeochemistry and biology and carbon budgets, food security and biodiversity
Remarks

• The previous slide tries to capture in shorthand the outline and scope of the Project.
• 1 and 2 we might see as business as usual; similar to goals of TOGA.
• ENSO is identified explicitly, but this does not mean other modes of climate variability are not of importance.
• 3 and 4 also borrow a little from the TOGA approach, but introduce non-physical aspects and encourage a deeper understanding of predictability (variability).

• For better or worse, this was the consolidated view of the sponsors and constitutes our abbreviated statement of scope.
  – We will measure success against these objectives.
  – We have freedom to elaborate, focus.
  – The “tropical Pacific” has not been defined explicitly.
Why a Project?

- Requires **change**; not business as usual
- Defined objectives and finite term; not on-going
- Encourages targeted delivery versus incremental progress
- Can be shut down as easily as it was created
- The deliverables at the top level are broad, but we will seek short-, near- and long term deliverables from sub-projects
  - Might be revised broadscale requirements and implementation plan
  - Might be a coherent organised international group overseeing and promoting a particular aspect
  - Might be improved efficiency
  - Might be improved model skill
Recommendations: Governance Needs

• **Ongoing scientific oversight** of the design, implementation and evaluation of TPOS and its components

• **Routine communication** between all nations and parties involved in developing/implementing TPOS.

• **A long term plan** is needed for dedicated servicing support for TPOS.

• **Assessment of risks** to the observing system and associated mitigation efforts/options, e.g. redundancy, sensor diversity, etc.
Proposed TPOS 2020 Governance and Project Structure (Draft).

GOOS SC.

TPOS Exec
(chairs of SC, RF + Staffer)

TPOS SC.

TPOS RF
Agency Reps.

Focused Task Teams and Pilot Projects, overseen by the TPOS SC. Initial priorities identified here.

Broad-scale TT
Diurnal & Fluxes TT
Boundary Regions TT
BGC/Bio TT (TBC)

Models, Forecasts & Data Assimilation TT.

(All to be confirmed by SC)
Role of Resources Forum

- It is the sponsor counterpart of the scientific coordination
  - Similar to TOGA Board but on a multi-lateral basis rather than with an intergovernmental mandate
  - Similar mechanisms have been used for the Indian Ocean and elsewhere

- SC and TRF sit side by side; TRF provides advocacy as well as coordinating resource commitments
- First teleconference Friday 10 October

- NEXT: SC Terms of Reference
The Steering Committee will:

• Provide scientific and technical oversight for the planning, system design, and implementation of the TPOS.
• Assess the evolving set of requirements through dialogue with relevant users and stakeholders.
• Coordinate a set of (pilot) projects designed to test and evaluate options, which initially may include:
  – Studies of potential broad-scale sampling strategies.
  – Investigation of potential sustained requirements for air-sea interaction and circulations and interactions in the upper ocean.
  – Studies of potential approaches in the tropical Pacific boundary current regions and the equatorial wave guide.
  – Assess potential technology options for delivering a more effective and efficient TPOS;
• (cont. next page)
TPOS 2020 SC Terms of Reference

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  - Coordinate with other relevant scientific/expert panels and bodies, including those responsible for GOOS information systems and services.
  - Together with the Resources Forum, manage communication and reporting.

- The TPOS 2020 Project will report to the GOOS SC.
Discussion of ToR

- Respect the wisdom of the scientists and sponsors who prepared the La Jolla Report and these ToR;
- However, we (everyone here) must share an understanding of what this Committee is charged with.
- Being a member of this SC has responsibilities – the work will not be trivial, nor involve just attending a meeting once per year.

- Discussion