



June 2016 Monthly Status Report

Monthly Status Report (MSR)

Release Date: July 25, 2016

Summary:

This month every group in the TPOS 2020 Project continued to be highly engaged in the drafting and review of the TPOS 2020 2016 Interim Report (2016-IR). Based on the thoughtful review and comment provided by the expert reviewers, the report lead authors, Steering Committee (SC) Co-chairs and members, and the Task Team (TT) Co-chairs and members restructured the report as well as generated a good deal of additional content to support the requirements for the backbone recommendations and associated TPOS pilot and process studies. The 2nd Order draft will be released for community comment in August.

A brief outline of the report content is provided here: The Report begins with an introductory chapter on the background of the tropical Pacific observing system leading up to the TPOS workshop in 2014, and the initial focus of the TPOS 2020 Project. This is followed by greater detail on the development of the observing system; its socio-economic benefits and phenomenological background of the variables observed. The report then shifts focus to the backbone and its requirements as related to the need for sustained forecasts and monitoring of the state of the coupled system, the preservation and improvement of the climate record, and an increased understanding of critical processes and phenomena. This articulation requires a new consideration in options and features of the observing system that will enhance data integration and assimilation along with a redesign that takes advantage of the optimal observing system, constituting an integrated combination of platforms, each bringing particular values and impacts relative to the need for observations.

The report will then shift to a focus on recommendations and implementation with an emphasis on the complementarity of satellite and in-situ elements of the envisioned backbone to meet the requirements of the sampling, accuracy, and regime coverage, and to address science and societal needs. The report will also contain an overview of experimental observations proposed- typically for a limited period as part of a pilot or process study. The proposals seek to advance knowledge, explore technical innovation, and/or lead to improvements in the effectiveness and efficiency of the TPOS. In some cases the target period is wholly within the timeframe of TPOS 2020, while in other cases the period may go beyond 2020. The report will conclude with an overview of implementation and transition options for the backbone and the system overall, along with a summary of the recommendations contained throughout the report.

Highlights:

NOAA announced \$4.5M in funding for new observing technologies for ENSO research and predictions, (For website and link, see 'Sponsor Contributions' section on page 11 of this report):

- **Enhanced ocean boundary layer observations on the TAO moorings:** William Kessler (PMEL / SC- Co-Chair, Backbone TT), Karen Grissom (NBDC), Meghan Cronin (PMEL, PBL TT Co-Chair)
- **Profiling Rainfall, Wind Speed, and Biogeochemical Sensors for Use in the Tropical Pacific Observing System:** Stephen Riser (University of Washington) and Jie Yang (UW Applied Physics Laboratory)
- **Autonomous Surface Vessels as Low-Cost TPOS Platforms for Observing the Planetary Boundary Layer and Surface Biogeochemistry:** Meghan Cronin (PMEL / PBL TT Co-Chair) and Christian Meinig (PMEL), Dongxiao Zhang (PBL TT), Adrienne Sutton, (Joint Institute for the Study of the Atmosphere and the Oceans (JISAO) at the University of Washington / BGC TT Co-Chair)
- **Development and Testing of Direct (Eddy Covariance) Turbulent Flux Measurements for NDBC TAO Buoys:** J. Thomas Farrar (WHOI / PBL TT Co-Chair, SC Member), James Edson (University of Connecticut), Meghan Cronin (PMEL / PBL TT Co-Chair), and Chris Fairall (ESRL / PBL TT)

The Monthly Status Reports can be found at: www.tpos2020.org/monthly-status-report

Additional Information:

Please visit the website at: www.tpos2020.org
Send comments and questions to: info@tpos2020.org

Monthly Status Report (MSR)

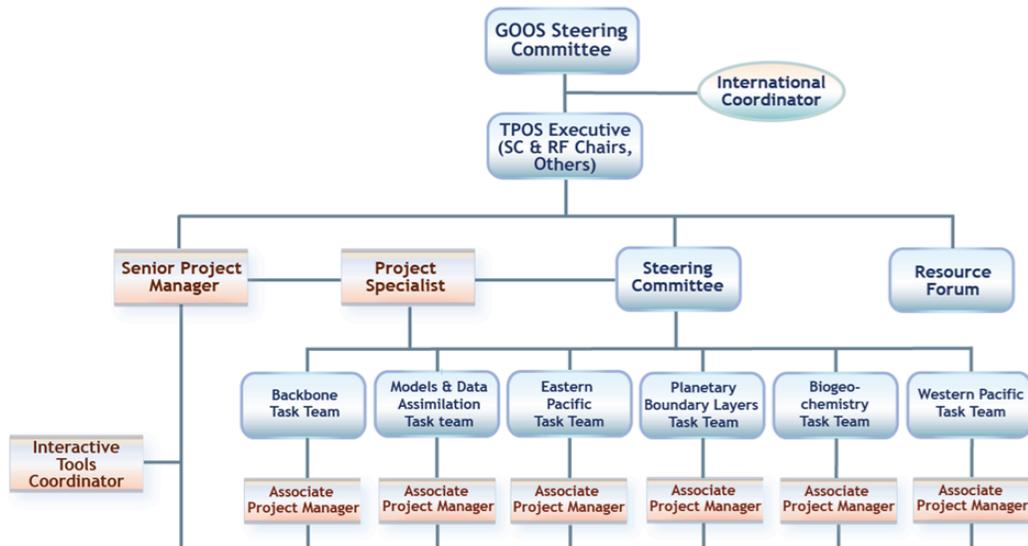
Background: The TPOS 2020 Project will evaluate, and where necessary advocate change in all elements that contribute to the Tropical Pacific Observing System (TPOS), based on a current understanding and technical capability. The project aims for enhanced effectiveness for all TPOS stakeholders, and informed by the development and on-going requirements of the operational prediction models that are primary users of TPOS data. TPOS 2020 embraces the integration of diverse sampling technologies, with a deliberate focus on robustness and sustainability, and will deliver a legacy of improved governance, coordination and supporting arrangements.

The Project will work within the Framework for Ocean Observing developed by the Global Ocean Observing System (GOOS) and use GOOS as a reporting mechanism to other relevant intergovernmental coordination mechanisms. A sustainable TPOS will be the principle outcome and legacy for GOOS. As such, TPOS 2020 will operate primarily as an independent Project and work through its sponsors to ensure all dependencies and links are appropriately managed. Four primary elements are included in the governance of the Project:

- A TPOS 2020 Steering Committee responsible for oversight, coordination, and guidance to the Task Teams, Sub-projects and Working Groups.
- A Resources Forum drawn from sponsors and responsible for coordinating resources.
- An Executive populated from the leadership of the above and responsible for reporting.
- A Distributed Project Office focused on coordination activities, supported and resourced by the sponsors.

It is through its partnerships and governance structure that TPOS 2020 will design a modern, sustained tropical Pacific observing system that meets both science and societal needs.

The project prospectus can be located online at: www.tpos2020.org/prospectus



KEY ACCOMPLISHMENTS AND NEAR-TERM PROJECT MILESTONES

Steering Committee

- Co-Chairs: Dr. Neville Smith, Retired / Dr. William “Billy” Kessler, NOAA PMEL

Current Month Activities:

- Neville Smith presented a GOOS Webinar on the history and state of TPOS 2020 Project
- SC Co-Chairs led this month's significant effort to respond to the expert reviewer comments to the 1st Order Draft and to lead contributed to changes required for the 2nd Order Draft due mid-summer for community review and comment:
 - Co-Chairs reviewed the full set of expert reviewer comments and provided organization and guidance to the Lead Authors, SC, and TTs on major issues
 - Provided input on where additional Report restructuring was required to connect solution choices to requirements and societal motivation
 - Drafted additional text in support of some comments and that required to support the restructuring of the report
 - Billy led an effort to gather figures and needs for graphics needed to support chapter content
 - Led several lead author and SC WebEx sessions to help spear-head the writing of the Second Draft
 - Attended each TT WebEx session to provide input and guidance on writing needs

Upcoming Activities:

- Continue to work with the Lead Authors, Bbone TT Co-chairs, and the SC adjudicating expert review comments along with comments from TT members:
- Continue providing guidance to TTs related to non-Bbone related projects and ideas especially as they relate to needs for the 2016 Interim Report.
 - TT teleconferences are ongoing

Last Month's Activities:

- Created a plan for continued drafting of the 2016 Interim Report
- Plans are designed to assist the Lead Authors and the SC in responding to the expert comments generated from the review of the 1st Order Draft.
- SC and TT Co-chairs along with TT members drafted sections of the report not yet covered by the Lead Authors.

Published/Posted Materials:

- November 2015: TPOS 2020 SC-2 Report
- October 2015: CLIVAR Exchanges Article: *TPOS 2020 Project: The Role of Research and Innovation*
http://www.clivar.org/sites/default/files/documents/Exchanges_OceanObs_No67_0.pdf
- June 2015: The Mercator-Ocean Scientific Newsletter: “TPOS2020: TROPICAL PACIFIC OBSERVING SYSTEM FOR 2020” By S. Cravatte, A. Ganachaud, B. Dewitte, F. Hernandez, Newsletter #52 (<http://goo.gl/rKbvH6>)
- Mar. 2015: Published article in WMO Bulletin: “Progress in Observing and Predicting ENSO”, (Vol 64 (1) – 2015)

- Feb. 2015: US CLIVAR Variations: “ENSO observing system: Past, present, and future”
- Dec. 2014: TPOS 2020 Project Prospectus
- Dec. 2014 TPOS 2020 SC-1 Report
- Mar. 2014: Terms of Reference for TTs

Project Function:

The SC will provide scientific and technical oversight for the planning, system design, and implementation of the TPOS. This group will assess the evolving set of requirements through dialogue with relevant users and stakeholders, and coordinate a set of (pilot) projects designed to test and evaluate options. The SC will assess potential technology options for delivering a more effective and efficient TPOS including relevant scientific/expert panels and bodies. Together with the Resources Forum, the SC will manage communication and reporting.

Point of Contact:

Sr. Project Manager, Andrea McCurdy-> amccurdy@oceanleadership.org

Resources Forum

- Chair: Craig McLean, NOAA Oceanic and Atmospheric Research

Current Month Activities:

- Continued collecting TRF member input related to their interest in a possible meeting of TRF members, and their program and project managers while attending the CLIVAR Open Science Meeting in Qingdao, China.

Upcoming Activities:

- Agree to plans for the ‘round-table’ session in September (18-25) and work with project leadership to confirm details.

Last Month’s Activities:

- Initiated plans to explore a possible meeting of TRF members, and their program and project managers while attending the CLIVAR Open Science Meeting in Qingdao, China.

Published/Posted Materials:

- July 2015: TRF-1 Report (available on the TPOS 2020 website)
- Mar. 2014: Terms of Reference (available on the TPOS 2020 website)

Project Function:

The TPOS 2020 TRF will facilitate and coordinate the provision of resources by member institutions required to advance TPOS 2020 activities based on recommendations from, and in consultation with, the TPOS SC. It will promote and encourage contributions from institutions, Official Development Assistance agencies, participating and non-participating countries, and expand membership of the TRF as necessary; including the exploration of bilateral and multi-lateral partnerships. The TRF will coordinate resources that may be applied to the TPOS, including necessary observing research, technology development/testing, modelling, scientific analysis, infrastructure (e.g., ship resources and/or deployment of observing assets), along with Project Management and travel support.

Point of Contact:

Sr. Project Manager, Andrea McCurdy-> amccurdy@oceanleadership.org

Executive

This Month's Activities:

- No reported outcomes this month

Upcoming Activities:

- No activities planned.

Published/Posted Materials:

- There are no published materials at this time.

Point of Contact:

Sr. Project Manager, Andrea McCurdy-> amccurdy@oceanleadership.org

Backbone Task Team

- Co-Chairs: Susan Wijffels, CSIRO / Sophie Cravatte (SC Member), Centre IRD

This Month's Activities:

- Chairs continue to work with SC Co-chairs and support the ongoing needs of the IR.

Upcoming Activities:

- Support the finalization and release of the 2016 Interim Report Second Order Draft.

Last Month's Activities:

- Conducted a teleconference to discuss Interim Report assignments and actions
- Collated comments from BB TT on the 1st Order Draft and provided them to Lucia Upchurch
- Chairs continue to work with SC Co-chairs and support the ongoing needs of the IR.

Published/Posted Materials:

- Dec. 2014: Terms of Reference (available on the TPOS 2020 website, see: Groups and Outcomes)

Project Function:

Through an integrated approach the Backbone TPOS will achieve its objectives through a combination of in situ and remote sensing approaches, augmented as appropriate with advice from models and data assimilation. Sampling for the Backbone has as its goal to:

- (a) Observe and quantify the state of the ocean, on time scales from weekly to interannual/decadal;
- (b) Provide data in support of, and to validate and improve, forecasting systems;
- (c) Support calibration and validation of satellite measurements;
- (d) Advance understanding of the climate system in the tropical Pacific, including through the provision of observing system infrastructure for process studies; and
- (e) Maintenance and, as appropriate, extension of the tropical Pacific climate record.

Point of Contact:

Associate Project Manager, Ana Lara-Lopez-> Ana.Lara@utas.edu.au

Planetary Boundary Layer Task Team

- Co-Chairs: Meghan Cronin, NOAA PMEL / Tom Farrar (SC Member), WHOI

This Month's Activities:

- Continue to work extensively with the SC Co-Chairs, lead authors, and TTs to complete the 2016-IR 2nd Order Draft
- Continue to work with the WP-TT to explore proposals on the following:
 - YMC Enhancements
 - Barrier Layer Physics
 - Eddy correlation flux measurements and surface waves
 - Diurnal cycle rectification to be integrated to all three of the studies mentioned above
 - Low Level Western Boundary Currents

Upcoming Activities:

- Continue to contribute to the Interim Report as required.
- Continue to work with the WP-TT on pilot and process studies

Last Month's Activities:

- Held a teleconference to determine required actions for the Interim Report. A Plan is now in underway to complete needed writing for the IR.
- Conducted the first WP/PBL joint TT meeting. The TTs agreed to priorities for drafting required IR content and draft Process and Pilot studies:
 - YMC Enhancements
 - Barrier Layer Physics
 - Eddy correlation flux measurements and surface waves
 - Low Level Western Boundary Currents

Published/Posted Materials:

- Dec. 2014: Terms of Reference (available on the TPOS 2020 website, see: Groups and Outcomes)

Project Function:

The observational needs regarding improved monitoring and modelling of ocean surface and near-surface processes are likely to have two components: sustained detailed observations and process studies. It is the role of this Task Team to identify which requirements are best met via a sustained observing effort (> 5 years-11), and which can be addressed with specific short-term process campaigns.

Point of Contact:

Deputy Project Manager, Lucia Upchurch-> lucia.upchurch@noaa.gov

Modelling and Data Assimilation Task Team

- Co-Chairs: Arun Kumar, NOAA / Eric Guilyardi, IRD

This Month's Activities:

- The MDA TT met to establish it 2-4 priorities for “future directions” concerned with the importance and evolution of existing observations, detecting near-term and long-term observing efforts to detect intraseasonal and climate signals.
- The TT is working from two documents designed to guide their input into the 2016 IR:
 - Articulation of MDA priorities
 - Placeholder list of areas in the IR where MDA input and comment is required

Upcoming Activities:

- Continue to work with on the supplying content on MDA priorities and required content for the 2016-IR

Last Month's Activities:

- Conducted two teleconferences in response the need for the drafting and review of content for the IR.
- Have completed some of the work and continue to conduct collaborative sessions in order to meet the needs of the Report for this community.

Published/Posted Materials:

- Dec. 2014: Terms of Reference and Members (available on the TPOS 2020 website, see: Task Teams)

Purpose in Project:

A significant fraction of the observational effort will need to be directed towards improved understanding of processes and mechanisms, which in turn should be coordinated with a program of improved model parameterizations and reduced systematic error; an additional benefit is that such data/model studies also contribute to improved design and reduced inefficiencies of the observing system.

Point of Contact:

Associate Project Manager, Lucia Upchurch, interim-> lucia.upchurch@noaa.gov

Biogeochemistry Task Team

- Co-Chairs: Adrienne Sutton, NOAA PMEL / Pete Strutton (SC Member), Univ. of Tasmania

This Month's Activities:

- Provided IR comments which were collated and provided to Lucia Upchurch
- Further discussed additional content for the report related to the future direction of the observing system

Upcoming Activities:

- Conduct a telecon to finalize contribution to the 2nd Draft of the Report to be released in July.

This Month's Activities:

- Provided IR comments which were collated and provided to Lucia Upchurch
- Further discussed additional content for the report related to the future direction of the observing system

Published/Posted Materials:

- Dec. 2014: Terms of Reference (available on the TPOS 2020 website, see: Groups and Outcomes)

Project Function:

The role of the Biogeochemistry Task Team (BGCTT) is to evaluate and recommend the most promising focii, and to provide advice on possible solutions. The Biogeochemistry Task Team will begin with carbon biogeochemistry as its core scientific concern. Here will be the consideration of the term biogeochemistry to include primary productivity (noting that the Backbone Observing System likely includes ocean color satellites) but not higher trophic levels (zooplankton to fish).

Point of Contact:

Associate Project Manager, Ana Lara-Lopez-> Ana.Lara@utas.edu.au

Eastern Boundary Task Team

- Co-Chairs: Yolande Serra, University of Washington / Ken Takahashi (SC Member), Instituto Geofísico del Perú

This Month's Activities:

- The Co-Chairs provided collated comments on the 2016-IR
- The TT had a telecon to discuss ongoing issues such as:
 - 1) Inventory of observations in the eastern Pacific
 - 2) Process study plan addressing the missing observations realized from the inventory
 - 3) Observational strategy for coastal/Equatorial upwelling monitoring
- The TT is also drafting the following content for the 2016-IR
 - Update the double ITCZ content with references on the gap winds
 - Continue providing input to the data inventory as appropriate
 - Enhance the equatorial wave/coastal upwelling section to make reference to the oxygen minimum zone, water mass transports by zonal (Tsuchiya) jets and mesoscale eddies, including some references specific to the EP.
 - Work with the BGC TT to ensure their comments are provided
 - Prepare text on the EP perspective on the transition/implementation of TPOS2020

Upcoming Activities:

- Continue to focus on IR writing and the SC-2 Actions as they relate to:
 - Engage atmospheric scientists, modellers and specialists in convection, among others in a dialog focused on a possible Eastern Pacific ITCZ/warm pool/cold tongue/stratus system strawman study.
 - Take the Eastern Pacific equatorial-coastal waveguide & upwelling system ideas to the next stage in the form of a Pilot Project that might be used to test technology options and to provide further insights on the eastern Pacific elements of the Backbone and other contributions to TPOS.

Last Month's Activities:

- Compiled comments on the 1st Draft of the IR was provided to Lucia for incorporation into the comment spreadsheet.
- The TT is also focused on pilot and process studies that may need further attention before being added to the IR 2nd Draft.
- Conducted a teleconference to discuss contribution to the 1st Draft of the IR. A second teleconference is being scheduled to discuss final input.

Published/Posted Materials:

- Jul. 2015: Terms of Reference (available on the TPOS 2020 website, see: Groups and Outcomes).

Project Function:

Task Team to focus on the eastern Tropical Pacific boundary region; giving priority to engaging regional experts and institutions. In addition to defining needed observations, goals of the TT could include: (a) Capacity building for improved sustained observing capability; and (b) Facilitation of the development of a regional research project, which may contribute guidance toward a sustained observing system.

Point of Contact:

Associate Project Manager, interim -> Lucia Upchurch, lucia.upchurch@noaa.gov

Western Pacific Task Team

- Co-Chairs: Janet Sprintall, Scripps / Kentaro Ando, (SC Member) JAMSTEC

This Month's Activities:

- Met via WebEx to review and discuss several proposals for inclusion in the 2016 Interim Report of TPOS2020.
- The TT is currently developing three proposals:
 - **Observing Western Boundary Current Systems: A Pilot Study Summary** This project is a pilot study aimed at understanding the space (horizontal and vertical) and time scales necessary to resolve the mass, heat and freshwater transports within the low latitude western boundary currents of the Pacific Ocean.
 - **Air-sea interaction at the eastern edge of Western Pacific Warm Pool** This project is an air-sea interaction process study focused on understanding the role of upper ocean salinity stratification in maintaining the warm SSTs at the eastern edge of the western Pacific warm pool
 - If possible, on the northern (and if possible southern edge) of warm pool
- The TT is also collaborating with the PBL-TT on another three potential proposals (YMC enhancement, MJO, and diurnal cycle)

Upcoming Activities:

- Continue to provide Interim Report content as needed.
- Once Guang has returned from sea, launch the process of researching and publishing regional ship time and availability

Last Month's Activities:

- The TT welcomed two new members: Dr. Oliva Cabrera from University of the Philippines and Dr. Donald Permana from BMKG have joined WP-TT.
- Comments on the Interim Report from TT members were summed up and provided to Lucia Upchurch.
- Conducted a teleconference to discuss the 'Options' and the sections on the Wyrski Challenge contained within the IR.
- The WP-TT also conducted a planning session with the PBL-TT on joint activities (see PBL section, page 5).

Published/Posted Materials:

- Feb. 2016: Terms of Reference (available on the TPOS 2020 website, see: Task Teams).

Project Function:

This group will take advice on a project to be conducted in the Western Pacific. Once underway they will advise on mechanism for the project's development and oversight.

Point of Contact: Guang Yang-> gyang@fio.org.cn

Distributed Project Office

This Month's Activities:

- Worked with the Co-Chairs and lead authors to present the expert reviewer comments for efficient review and adjudication
- Posted the 1st Order Review document and comments for easy access
- Supported Lead Author, EP, MDA, PBL, WP, and SC WebEx session required to review comments and assign writing needs

Upcoming Activities:

- Management and oversight of the 2nd Order Draft Expert Review process, comment adjudication, and writing needs
- Launch planning activities for the SC-3 in late October
- Creation of Project Year Two Annual Work Plan and associate Integrated Master Schedule
- Work with the SC and TRF leadership to coordinate the upcoming 'round-table' session

Last Month's Activities:

- Upchurch worked with the SC Co-chairs and lead authors to create a plan for modifying the drafts/master.
- Collated a master list of the over 1,000 comments provided from expert reviewers, SC, and TT members
- Ongoing effort to put last minute feedback together and organize follow-up teleconferences
 - Consolidated the first three sets of comments.
 - Started a document to track placeholders in the IR to track TT progress.
- Conducted planning and organizing teleconferences among Project Managers
- Dealt with online platform technical issues by initiating a 30 day GotoMeeting account for backup telecom purposes.

Published/Posted Materials:

- Released: Engagement Plan V2
- Released: Project Management Plan V1
- Released: Project Execution Plan V1

Project Function:

The DPO will develop communications, and coordination tools that will facilitate integrated decision making, and provide access to relevant deployment and observing asset decision making tools. The DPO will support the suite of tools and activities required to track the commitments to all aspects of TPOS 2020 and to facilitate integrated decision making across networks, groups, agencies, and nations; during the project and throughout the lifecycle of the observing system beyond TPOS 2020.

Point of Contact:

Senior Project Manager -> Andrea McCurdy, amccurdy@oceanleadership.org

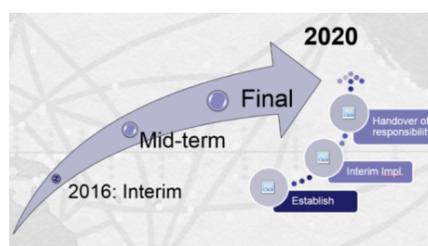
CROSS-PROJECT DEPENDENCIES AND OPPORTUNITIES

The draft timeline for 2016 Interim Report activities are provided below. This highly collaborative endeavor will be led by the Backbone TT with contributions from all project groups along with external authors and reviewers:

1. Selection of Coordinating Lead Authors was completed in January 2016
2. Preparation of 1st draft Interim Report outline was completed in December 2016
3. Formalize the Review Process:
 - First Draft sent to Expert Reviewers, April 13
 - Deadline for comment, May 20
 - Second Draft released, August 1
 - Deadline for comment, Sept 20
4. Preparation of final draft Report, October 2016
5. Acceptance of Report at the 3rd Session of the TPOS 2020 Steering Committee, Released December 2016

PROJECT SCHEDULE

- During the SC-2 the Co-Chairs outlined a staged process, with an initial “Interim Report” published in 2016; a Mid-term Report publish in 2018, and a Final Report with the closure of the Project in.
- The Project has also launched initial efforts toward the articulation of a TPOS 2020 Transition Plan.
- The WP-TT has also launched a ship and cruise availability document that will be posted on the website.



SPONSOR CONTRIBUTIONS

In addition to the in-kind self-support agreed to during the January TPOS Workshop, the following explicit sponsorships have been recorded thus far:

- **June 2016:** NOAA announced \$4.5M in funding for new observing technologies for ENSO research and predictions: <http://cpo.noaa.gov/AboutCPO/AllNews/TabId/315/ArtMID/668/ArticleID/537981/NOAA-announces-45M-in-funding-for-new-observing-technologies-for-ENSO-research-and-predictions.aspx>
- February 2016: The project welcomed Dr. Guang Yang as Associated Project Manager sponsored by the First Institute of Oceanography and hosted by the International CLIVAR office in Qingdao, China.
- October 2015: SC-2, CSIRO as host, IMOS and IMAS providing event support
- October 2015: SC-2 and Backbone TT participant travel assistance provided by NOAA, NASA, and IOC
- August 2015: PACE-NET PLUS is supporting expert speaker and participant travel, and local costs at the Backbone Task Team face to face meeting at IRD in Noumea, New Caledonia.
- August 2015: NOAA COD and NASA providing travel support for Backbone Task Team member travel and DPO support of the face to face meeting in New Caledonia.
- April 2015: Launched DPO Node negotiations with the First Institute of Oceanography (FIO) of China, for possible initiation in late 2015
- Mar. 2015: Integrated Marine Observing System (IMOS), DPO Node (Associate Project Manager and SC-2 Support)
- Dec. 2014: NOAA Climate Office, DPO Support (0.5 FTE DPO Project Manager)
- October 2014: KIOST, SC-1 Hosting
- October 2014: GOOS support for SC-1; GCOS for WMO and IOC briefings
- Aug. 2014: NOAA PMEL – Project Management Support (0.2FTE DPO Deputy Project Manager)
- Aug. 2014: NASA - Interim Project Management Support (0.30 FTE in 2014)
- Jul. 2013: OOPC Project Management and Coordination (Secretariat)