TPOS 2020 Forum 2

Report Recommendations
Response and Roadmap

TPOS 2020 SC (Neville Smith)
Outline

• Recap on 1st Report and its design
• Summary of recommendations and actions
  • Executive Summary and Report as reference
• Introduction to Response & Roadmap
  • Revised 15 May; Following agenda
  • 7 themes picked up in the agenda
• Governance
The First Report: Recap

The Process
- IPCC\(^1\) like assessment
- CLAs, LAs\(^2\), contributing authors
- 1\(^{st}\), 2\(^{nd}\) and Final drafts
- Expert review, Stakeholder review, approval/publication
- 12 months from scoping to in-principle sign off

• Design Principles
  - read with GCOS, WIGOS Principles

• 22 Recommendations
  - Many taking long view

• 15 Actions
  - Things we can and should do now
What is new

• First published OS design following the GOOS Framework for Ocean Observing
  – Distinguishes sustained and experimental observations: single design
  – TPOS as “public goods” and analysis of socio-economic benefit areas
  – Requirements aligned at Essential Climate/Ocean Variable level
What is new

- First published OS design following the GOOS Framework for Ocean Observing
  - Distinguishes sustained and experimental observations: single design
  - TPOS as “public goods” and analysis of socio-economic benefit areas (similar for GCOS/Ocean IP??)
  - Requirements aligned at EOV level
  - Distinguishes variable and observing system requirements from solutions
  - Integrates R&D into design
- Joined consideration of \textit{in situ} and satellite solutions (morning presentation)
  - Evolving, complementary roles
- Elaboration of data record versus/and climate record (morning presentation)
- First steps for BGC integration into single design (morning presentation)
**Subsurface backbone (items 1, 2, 7)**

- Reconfigure the fixed-point moored array:
  - more capable moorings, targeting the equatorial circulation, the mixed layer and its interaction with the atmosphere, and key regimes,
- Double subsurface temperature and salinity profiling throughout the tropics through an enhanced Argo presence, and
- Initiate pilot and process studies to guide the future design, using the most effective combination of platforms and technologies.
Actions (items 1, 2a, 2b)

• Addressing degraded sampling in the West Pacific;
• Staged reconfiguration of the tropical Pacific moored buoy array;
• A step-by-step increase in Argo,
  – beginning in the western Pacific;
• Retargeted flux measurements;
  – series of assessments and sensitivity experiments to better inform future

Precise mooring locations to be determined during the evolution

Warm pool pilots

ITCZ

Precise mooring locations to be determined during the evolution

Near-equatorial moorings (0°-2°S, Eq. 2°N)

Red shading indicates TMA

Blue shading indicates Argo (enhanced 10°S-10°N)
Surface backbone observations (items 2b, 3)

- **(item 2b)** Enhance in situ observations of state variables to estimate surface heat and freshwater fluxes; focus on key climate regimes.
  - Satellite-based estimates remain problematic
  - NWP/Reanalysis biases remain large
    - NWP community has recommended work
  - Primary requirement is to improve understanding, models → key climate regimes

- Maintain space-based broad-scale measurements of the essential ocean surface variables
  - Vector winds, sea surface height, SST, salinity, precipitation

- Maintain in situ measurements to improve the calibration, evaluation and validation of the satellite measurements, and inter-calibrate satellite missions and instruments.
Figure 3-4: Global distribution of flux and flux parameter observation sites.

In general seek enhanced instrumentation.
Surface backbone observations (items 2b, 3)

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- **(Item 3)** Maintain space-based broad-scale measurements of the essential ocean surface variables
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- Maintain in situ measurements to improve the calibration, evaluation and validation of the satellite measurements, and inter-calibrate satellite missions and instruments.
**Actions (item 3)**

- **Tropical Pacific surface winds and wind stress remain a significant issue.**

Rec 1  A constellation of multi-frequency scatterometer missions and complementary wind speed measurements from microwave sensors to ensure broad-scale, all-weather wind retrievals over 90% of the tropical Pacific Ocean every 6 hours for the next decade and beyond with different equatorial crossing times to capture the diurnal cycle.

Action 7 Promote and support sensitivity and impact studies of wind and wind vector data inputs on operational analysis and reanalysis and specialized wind stress products, including their application to climate change detection. The effectiveness of rain metadata flags and various approaches to cross-calibration of scatterometers should also be considered.
Actions (wind: item 3)

- Ocean current effect on wind stress needs to be taken into account
  - NWP/RA will have systematic error, though small (less than 20%)
- Sampling errors → systematic issues in gridded products, e.g. wind stress curl fig 3.3 of Report
- No single SCAT band is without issues
  - Satellite constellation of mixed technology; Solution must include passive microwave
  - Emerging contributors (e.g. SOA) needed encouragement wrt availability, quality
- Satellite issues in rainy/convective regions
- Issues with sampling of diurnal cycling
- Differences across platforms, changing technology
  - Consistent in situ records are vital for detection of change (climate record)
- Significant systematic errors in NWP/RA in equatorial region still
  - … and of course in coupled climate models
CEOS Ocean Vector Surface Winds Virtual Constellation (OSVW-VC) Current status and outlook – NRT data access

Launch

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HY-2B China

CFOSAT China/France

HY-2C China

Meteor-M N3 Russia

Meteor-MP 3 Russia

FY-3E China

FY-3G China

GCOM-W2 Japan/India?

Advanced Scat series India?

Source: WMO OSCAR database and direct interactions with agencies

Courtesy Paul Chang, IOVWST/NOAA
Actions (items 4, 5 and 6)

- **Biogeochemical** (item 4)
  - Existing pCO2 observations should be continued;
  - Important contribution of opportunistic underway biogeochemical measurements
  - Major focus for 2nd Report

- **New technologies for future designs.** (item 5)
  - Important for efficiency and effectiveness

- **Modelling**
  - Note persistent, systematic issues: TPOS 2020 has a role to play
  - Bring observationalists and modellers together – workshop?
    - Assessment of seasonal-to-interannual prediction systems?
  - Modelling focus for the next Report.
Roadmap and Response
Introduce document, process
Roadmap and Response

• The primary purpose of the document is to provide a draft response to the 1st Report
  – It is *your* response; we can provide advice on science but otherwise the response is in your hands
  – Aim to finalise the specifics (the “TRF-2 Response” part of boxes) by the close of the meeting; you may choose to add and subtract
  – Rest of text in section 2 is for background but additional material/examples can be added (e.g., from technology discussion)
  – The Recommendations and Actions are included in Appendix 1 for easy reference.
  – Under the relevant agenda item, the Forum will also be asked to endorse a brief Summary Response Statement, the first draft of which is included at the end of section 4 of this document.
Roadmap and Response

- What do we mean by **endorse**, **support**, **note**, **agree** etc.?
  - We assume this **is not** an intergovernmental meeting; there is no formal binding agreement of the participants
  - It **is** a meeting of like-minded agencies who share interests and aims for the TPOS
  - If **recommendations** are:
    - **Endorsed** then TRF-2 thinks there is good alignment with their individual strategies and goals;
    - **Supported** is similar, but full alignment may not yet be there;
    - **Noted** will be used if the TRF-2 thinks the scientific basis is sound but alignment is uncertain or not yet determined;
    - **Note endorsed/in part** will be used if the basis is not/partly agreed and/or there is poor/part alignment.
  - If **actions** are:
    - **Agreed**, TRF-2 participants are willing in principle to contribute to the action
2. Response by Theme

- The 22 recommendations and 15 actions are broken into 7 themes
  2.1.1 Subsurface backbone (temperature and salinity) [1, 2a]
  2.1.2 Surface Wind, temperature, salinity and surface height [3]
  2.1.3 Surface heat, radiative and freshwater fluxes [2b]
  2.1.4 Biogeochemistry [4]
  2.1.5 New technology [5]
  2.1.6 Modelling [6]
  2.1.7 Pilot projects & process studies [7]

  - The agenda references are in []

- Tried to order in a way that might match your expectations
  - Different order to Report, Exec Summary
  - Not all are discussed in detail
  - Aim to reach as much agreement as we can now
    - Task SC to address any issues with recommendations?
    - Take offline only if critical: use new T&I mechanism?
3 and 4: Governance

• Section 3 focuses on the Steering Committee
  – It provides an outline of their current work program
  – Draft Terms of Reference for the SC for the next TPOS 2020 period
    • Extended scope: severe weather, intraseasonal and coupled NWP
    • Small modifications to preamble

• Section 4 addresses governance
  – TPOS 2020/JCOMM Transition and Implementation Task Team
    • TPOS 2020: WMO Integrated Global Observing System pre-operational
    • Regional coordination mechanism (JCOMM V agenda)
    • Takes the lead (with SC) for following through actions, recommendations (as appropriate)
  – Future of the Resources Forum
    • Executive → Board?
    • Forums associated with major reports (every 2 years)
• Questions?