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**Virtual Session for the 23rd Session of the
Ocean Observations Panel for Climate
(the GOOS Physics and Climate
Panel)(OOPC-23 *Virtual*)**

5 May 2020

The Ocean Observations Panel for Climate is an expert panel of the Global Climate Observing System the Global Ocean Observing System and the World Climate Research Program. OOPC provides scientific advice and guidance on observations to the Joint Commission for Oceanography and Marine Meteorology.

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I. INTRODUCTION

Following the cancellation of the OOPC-23 meeting in Cape Town because of the COVID crisis, it was agreed to hold a series of smaller video meeting sessions targeted to specific work items on the OOPC agenda.

On May 5th, the OOPC held a 2-hour video conference to focus principally on the progress of the 3 working groups, and to discuss the way forward with some community proposals and needs for OOPC guidance. The agenda of the meeting is given in Annex 1.

The meeting was also an opportunity for outgoing Chair Bernadette Sloyan to address the Panel members and to introduce the two incoming Co-Chairs, Weidong Yu and Sabrina Speich. The Panel warmly thanked Bernadette for her years of strong leadership and expressed their strong wish for her to stay involved in OOPC actions through global and regional activities. The meeting was addressed by the Chairs of the three OOPC sponsors to inform the Panel of their plans to meet together over the coming weeks to provide some coherent guidance to the Panel. The List of Participants is given in Annex 2.

Because some Panel members could not attend because of time zone issues, it was agreed to record the session and presentations, and to make a draft report and presentations available to all Panel members for their input on the discussion items and proposed actions. Depending on the feedback from those members, a second virtual session may be held. All Panel members will be consulted before the report is finalized.

The video recording of the meeting can be viewed at:

<https://transcripts.gotomeeting.com/#/s/674fbaf946dc14792becf211babb21f10dedaacb4bd54840736b8a0f71b8a>

II. WORKING GROUPS OVERVIEWS

1. Heat and Freshwater Group

Matt Palmer presented an overview of progress in developing the workshop "Ocean Heat and Freshwater Transport and Storage in Observations and Climate Models" His presentation is available on the GOOS web at:

https://www.goosocean.org/index.php?option=com_oe&task=viewDocumentRecord&docID=26816

For more information, see the workshop web-site at: www.goosocean.org/Hfworkshop.

He noted that 6 of 9 invited speakers had confirmed their participation and the other 3 had expressed their interest to participate but had scheduling conflicts that may or may not prevent them from participating depending on how the global transportation restrictions develop.

Matt highlighted the main issue facing the workshop is disruption from the COVID-19 situation. He presented three options for moving forward:

Option 1. proceed with virtual or "mixed" meeting, with some UK participants meeting inperson and the rest connected virtually.

Option 2. postpone to 2021 for in-person meeting.

Option 3. proceed with smaller virtual meeting, followed by an in-person meeting in 2021.

He noted that it would not be ideal to proceed with only a virtual meeting because we want to work directly with members of the modelling community that may be new to many of the OOPC members, and the goal is for the results of this workshop to feed into the CMIP7 protocol, so there will need to be working sessions, not just information and discussion sessions.

He asked the Panel for their guidance on how to best move forward with the workshop, noting that he would take the OOPC Panel input back to the organizing committee for discussions, and that it will also be important to discuss options with the invited speakers and participants. The deadline for abstracts is the 22nd of May.

Karina, who had proposed option 3, said that if we postpone the meeting, we will have to restart the process and repeat a lot of the work we have already done. She also pointed out that this is an ongoing activity that will last perhaps a couple of years and is not a one-off event, so having a smaller targeted virtual session now can feed into and support a more robust in-person workshop later.

Matt agreed that option 3 was a good choice and had lots of advantages, and since we do not know what 2021 will look like in terms of travel restrictions, it may be best to choose this option to keep momentum going.

Ben asked what the timeline for deciding was, pointing out that we could move forward with the idea that it will be an in-person meeting and see how things evolve in the coming months. Falling back to the Option 3 would still be possible if the decision will be made in June.

Matt and Karina both mentioned that they are involved as lead authors in the IPCC AR6 process and the goal is also to coordinate this workshop with the CMIP7, so we need to keep those dates and targets in mind as well moving forward. All of this argues for moving ahead with a meeting sooner rather than later or we may miss the opportunity to link into these processes.

The Panel agreed that the likelihood of an in-person meeting for this year is small and that we should clearly state our preference for Option 3 to the workshop organizing committee. Through discussions with the organizing committee we can work out how to tailor those virtual meetings with a follow-up for an in-person meeting when it becomes possible. Bernadette mentioned that this would also allow each session to spin up its own virtual session for more concentrated effort on each of the themes. The Panel agreed that any decision should be made after the 22 May abstract deadline and discussed with people who have submitted abstracts.

Action 1: Matt, Karina, and the OOPC Secretariat will draft a summary of the OOPC discussions about the Heat and Freshwater Workshop and outline the Panel preference for Option 3 (virtual meeting 26-30 October with 2nd in-person meeting later) to take to the workshop organizing committee. After the 22 May deadline for abstracts, the executive committee will contact speakers and participants with the suggestion for an Option 3 meeting. Based on agreements for a way forward, a new workshop announcement will be drafted and circulated.

2. OASIS and OOPC-AOPC air-sea flux task team

Meghan Cronin presented an overview of the Observing Air-Sea Interactions Strategy (OASIS) that began as the OOPC-AOPC air-sea flux task team and grew into a much larger integrated project following OO19. Her presentation is available on the GOOS web at: https://www.goosocean.org/index.php?option=com_oe&task=viewDocumentRecord&docID=26817

She explained that many of the OO19 strategy papers for air-sea fluxes and their state

variables (e.g. Cronin et al. for air-sea heat and momentum fluxes, Wanninkhof et al. for air-sea carbon fluxes, Centurioni et al., for marine weather, subseasonal-interannual climate forecasts, etc.) have similar recommendations, even though they might be for different types of fluxes and were written by separate communities. As the lead of the OOPC Air-Sea Flux team, she realized that focusing only on physical climate issues would be missing an important opportunity for collaboration and leveraging that could come from a multi-disciplinary, integrated system approach, and reached out to the authors of the other CWPs to develop a strategy that includes physics, carbon and biogeochemistry, and biology and ecosystems.

She described three steps the group are currently taking to advance this initiative:

1. Developing a proposal for a SCOR working group (Deadline is 8 May).
2. Developing a GOOS cross-panel task team.
3. Working with the US Interagency Ocean Observations Committee, who are interested to see this initiative move forward. They have potentially offered some staff support (still in discussion) for the development phase of the project.

She described the process of developing a SCOR working group with its criteria for geographical and age diversity, gender considerations, disciplinary balance, and including capacity development issues. She has now developed a strong group of members to take this forward and asked OOPC Panel members for input on remaining slots for expertise.

The Panel members thanked Meghan for her strong leadership and huge effort in pulling this together. Matt offered his guidance on developing SCOR working groups based on their successful experience with IQuOD.

Action 2: The Panel members will provide assistance to Meghan as requested to suggest nominees for the remaining slots on the SCOR Working Group for OASIS, to contact the modeling community leads to have someone join the working group, and to move forward with getting the GOOS cross-panels task team established to develop it as a contribution to GOOS. Han Dolman, Chair of GCOS, also expressed interest in re-examining the issue of GCOS involvement in this activity.

3. Boundary Currents Task Team

Marjolaine Krug presented a discussion about the Boundary Currents Task Team, noting that little progress had been made because all the planning meetings that had been scheduled were cancelled owing to the current COVID-19 crisis. She noted that Maria had launched a new round of discussions about this earlier in the year and the team agreed to a tighter focus on shelf to deep ocean transports and developing best practices for observing system designs. She noted that it is not possible to make a "template" for how to develop strategies for observing the coastal oceans since each zone and boundary current is different. She further noted that boundary currents are very poorly resolved in global models and essential for understanding volume and heat transport and cross-shelf boundary forcing and exchange. She proposed that one approach would be to come back to the main mandate of the OOPC which is to develop / coordinate and evolve the observing system for the Boundary Currents regions. A way forward would be to focus on one of the actions identified in the Boundary Current communique, namely *"Using modelling systems to inform sampling resolution requirements for EOVS, devise and operate multi-platform observing systems, and contribute to the synthesis of inter-disciplinary observations in creating coastal ocean information products."* The objective of this work would be to eventually come out with recommendations for Boundary Current observing systems with a focus on better resolving volume and heat transport as well as cross-shelf structure. This would be useful both for regions where no observations are undertaken as well as for evolving existing systems. An improved strategy for boundary current observations would lead to a better representation of these regions in global domain with positive impacts for representation in both climate and

operational models.

She noted that the organizers would be keen to put in place a regular monthly meeting and accommodate time zones as needed to take this initiative forward. She and the team would like to organize a meeting within one month to keep this moving.

Bernadette and Maria stated that the uncoordinated workload issues created by the lack of communication between the OOPC sponsors has hampered OOPC's ability to do its job and this task team has suffered for lack of Panel support. Bernadette and Maria also took this opportunity to thank Marjolaine for her incredible efforts to organize the OOPC-23 meeting in Cape Town that had to be cancelled, and expressed the Panel's hope to be able to reconvene in Cape Town.

Action 3: The OOPC Secretariat to work with Marjolaine, Maria Paz, and Lisa to set up a Boundary Currents team meeting in the next month and come up with a way to take this forward.

Action 4: Marjolaine, Maria Paz, Lisa, and the OOPC Secretariat to begin collating OceanObs19 papers relevant to the Boundary System Task Team.

III. OBSERVING SYSTEM PRIORITIES FOR THE NEXT DECADE

1. OOPC's role in leading the post-OO19 Community Plan of Action

Sabrina presented this discussion, reminding the Panel that OO19 brought together 1500 participants and produced 135 Community White Papers (<https://www.frontiersin.org/research-topics/8224/oceanobs19-an-ocean-of-opportunity#articles>) around observing system priorities to meet science and society requirements. She noted that developing global, internationally agreed observing priorities is the role of the OOPC and proposed that the OOPC takes the lead in this area of the OO19 Living Action Plan, as well as in identifying agreed priorities for the Decade. She explained that we have an opportunity to use the momentum from OO19 and the developing Decade to bring about a step-change in the ocean observing system. She highlighted the incredible effort that has been produced by the global community to produce the CWPs and said that OOPC must harness this energy and enthusiasm now to make progress on development plans. OOPC is key to this, directly leading in physics and physical climate, but also in working across the other GOOS panels in integrated observing and to provide the underpinning in ocean physics required for the ocean health delivery area of GOOS.

She suggested that OOPC develops an action plan for how to take all of this forward urgently to not lose momentum. This issue was meant to be the focus of the OOPC-23 meeting in Cape Town, with leads of all the major global platforms and regional observing systems attending the meeting. She proposed organizing a virtual meeting over 2-3 days with all of these representatives to determine the best way to take things forward over the next year that would lead to internationally agreed priorities and actions. She proposed setting a target of July for this first virtual workshop.

Panel members agreed that the large effort by 1500 members of the community should not be wasted and that it was OOPC's role to take forward the job of integrating and harmonizing plans. Eitarou noted that OO19 was very broad and that OOPC should focus on building the observing system. The Panel agreed, noting that while many observing system components presented their CWPs, there was no follow-up at the meeting to take this forward in a concerted way. The Panel pointed to Meghan's OASIS work and Marjolaine's presentation on the Boundary Current task team issues as good examples of how OOPC can concretely make big contributions to global system development. Panel members also agreed that a thematic approach such as those used by the OOPC task teams was perhaps the best way forward to

get different groups to come together with integrated and coordinated plans.

Weidong also agreed that OOPC should play a leading role in coordinating this activity. He mentioned that the OceanObs organizing committee will be organizing regular reviews of actions to keep momentum going, and that while we hear a lot of recommendations and there were many CWPs, we need an analysis of the plans to consolidate all the different recommendations into threads of actions with trackable progress. This is a very important task for the ocean observing system community and OOPC must take the initiative to push this.

Ben asked about how the Plan of Action will be developed. Maria noted that the first step was this consolidation of forward plans across all the CWPs and identifying the synergies and opportunities for collaboration and leveraging. Marjolaine mentioned that this exercise needs to be done with a focus on boundary currents for the preparation of the work of the task team, and Karina also said that this would be useful for the heat and freshwater storage and transports issues.

The Panel asked Sabrina about the OO Living Action Plan, and she noted that this is the larger framework in which OOPC can contribute. The OOPC should concentrate on physics and climate issues, with the recognition that systems will be developed through an interdisciplinary and integrated approach that will require us to work across the GOOS panels and will also benefit from a closer link to WCRP. Sabrina suggested that the best way forward would be to begin the effort and connect with other panels and groups as the ideas develop, but that we must start somewhere. Bernadette agreed, noting that OOPC-23 was supposed to be the place to bring all these groups together following OO19 and to be the vehicle that pulls the groups together and moves coordinated plans forward. She noted that we need to engage with the full ocean community, including WCRP and CLIVAR but also science organizations like IAPSO.

The Panel members asked when a meeting might be held. Sabrina noted that the enthusiasm for the work to be carried out at OOPC-23 was enormous and that we should move forward with a virtual meeting as soon as possible. Albert Fischer, GOOS Director, reiterated that this effort needs to move forward and that OOPC is the appropriate group to lead this. He suggested thinking of ways to divide the task into smaller more manageable parts.

Action 5: Sabrina, Weidong, and the OOPC Secretariat will develop a proposal for the Panel to consider, outlining ways to take a workshop forward that reproduces as possible the work scheduled for OOPC-23 on system integration and planning building on OO19. The Panel should aim to have clear workshop plans by July.

2. Global to Coastal OOPC-CLIVAR workshop proposal

Weidong presented an overview of the workshop proposal "From Global to Local – Cultivating new solutions and partnerships for an enhanced ocean observing System in a decade of accelerating change" on behalf of the OOPC organizing team including Maria Paz, Lisa, and Bernadette. (Note: The workshop has now been renamed Global to Coastal", etc.) His presentation is available on the GOOS web at:

https://www.goosocean.org/index.php?option=com_oe&task=viewDocumentRecord&docID=26812

Weidong explained that the workshop would be an effort to engage the user community by discussing the most important societal and scientific drivers for regional / coastal systems specifically from the point of view of sustainable development in the coastal zone. It will address the following key issues:

- How the global ocean observing system can address coastal needs where human interactions with the ocean are felt most intensively, and
- Discuss opportunities for developing rim countries to increase their oceanographic

capabilities and improve regional forecasting in partnership with the various regional ocean observing systems.

He highlighted several drivers for the workshop. Firstly, there have been several major reviews of Ocean Observing Systems over recent years that recognize the need for expansion of long-term observations into the coastal zone, where humans interact with the ocean, and for multi-disciplinary observing systems that better track, for example, oxygen minimum zones, the carbon cycle, and productivity. These efforts have been largely independent until now and yet each panel is met with similar challenges: identifying drivers, optimizing design, funding expansion, developing new resources, testing new platforms and sensors, building partnerships with rim nations, capacity building, data sharing etc. The objective of this workshop is to bring the panels of regional observing systems and other relevant groups together for an exchange of problems, ideas, and solutions, enriching the efforts of each and adding up to a global perspective worth more than the sum of its parts. Another major objective of this workshop is to discuss and develop opportunities for developing rim countries to increase their oceanographic capabilities and improve regional forecasting in partnership with the various regional ocean observing systems.

The workshop will bring observing system scientists and leaders together with invited speakers from developing rim nations to discuss priorities and cross-cutting strategies as well as explore new partnerships for the expansion of the regional ocean observing systems.

Weidong further noted that the Decade offers an exciting chance to focus attention on these issues and the challenges of moving from a global perspective to regional and coastal, with more engagement of coastal communities as well as developing countries.

The meeting is scheduled for 3-5 May 2021 at the UNESCO – IAEA Abdus Salam International Centre for Theoretical Physics (ICTP) in Italy.

He asked the Panel what role OOPC should play in the workshop to provide guidance on global integration of these efforts, and most importantly, the follow-up actions that will be identified at the workshop that will lay the foundations for a more engaged and integrated coastal observing network.

The Panel members thanked Weidong, Lisa, and Maria Paz for their strong leadership in this exciting development. Via email, Lisa provided information about the scientific steering committee, which includes:

- Lisa Beal (co-chair CLIVAR/IOC-GOOS Indian Ocean Region Panel. University of Miami, USA)
- Antonietta Capotondi (co-chair CLIVAR Pacific Region Panel. NOAA-ESRL, USA)
- María Paz Chidichimo (member CLIVAR Atlantic Region Panel, member GOOS Ocean Observations Physics and Climate (OOPC) panel. CONICET and SHN, Argentina)
- Riccardo Farneti (member CLIVAR/CliC/SCAR Southern Ocean Region Panel. Abdus Salam ICTP, Italy)
- Weidong Yu (Co-chair GOOS Ocean Observations Physics and Climate panel, former co-chair of CLIVAR/IOC-GOOS Indian Ocean Region Panel. Sun Yat-Sen University, China)

Following the meeting OOPC member Benjamin Rabe expressed his interest to join this committee and has now been added as a member. Lisa informed the group that they will be submitting a proposal to US CLIVAR for workshop funds. The group will work this summer and fall to develop the agenda and key speakers.

John Wilkin noted that there is a complimentary initiative called Coasts Predict (<https://www.coastspredict.org>) growing out of OceanPredict (OP) led by Nadia Pinardi and the OP Coastal and Shelf Sea Task Team Chairs, Villy Kourafalou and Pierre De Mey. He informed the Panel that this group has made a submission to be considered as a project for the UN Decade, and that the project vision is focussed on information creation for societal

needs and takes a more expansive view than the focus of CLIVAR. He suggested that this group should be invited to collaborate and participate in this workshop and any follow-up activities developed.

John further reminded the Panel that this is an activity where engagement with GOOS Regional Alliance would be key to co-develop ideas for global coordination, best practises, and capacity development, and also to seek input on what emerging ocean observing nations require to meet their needs. John suggested that the GRA Chair should be contacted to offer advice on what role OOPC should play in the workshop that can build on the existing GRA framework.

Weidong concluded by pointing out that the OOPC working groups on Boundary Currents and Air- Sea Fluxes also have needs to move closer into the coastal zones, and the existing and developing climate and ocean indicators focus strongly on coastal zone issues such as coral bleaching that require a robust observing system.

Eitarou noted that it was very important to engage developing countries in this project, pointing out that OO19 did not involve many developing countries. He asked what the plans were for identifying the relevant groups and engaging them in the workshop. Weidong agreed that this was a big challenge and that there should be an effort to explain and demonstrate the value of coastal observational data to meeting coastal societal needs. Maria mentioned the work being developed by outgoing Panel member John Wilkin initially as part of the Boundary Currents task team to develop low-tech solutions for coastal observations that can be used both by developing countries and for citizen science projects. Karina mentioned the strong interest by some developing countries to be involved in the definition of the framework for ocean indicators to ensure that their needs are addressed and recognized at the international level, emphasizing that they need to be invited to participate in the development of the workshop and follow-up actions. Sabrina related her experience from the TAOS review, where several scientists from developing African countries were invited to participate and explained to the group that they saw little direct value for them in the Pirata mooring array when their major concerns were focused on fishing, ecosystems, acidification, and impacts of marine heat waves. She noted that engagement directly with them in the co-design of the workshop is critical, and further pointed out that the ICTP, co-sponsored by UNESCO and IAEA, had a mandate specifically to work with developing countries, so those strong links are fundamental to the workshop. Sabrina noted that all the regional observing systems always have a mandate to take the efforts towards the coast where societal needs are greatest but all struggle with how to do that.

The Panel agreed that this was an important project to take forward and that the OOPC is the right group to provide guidance for international coordination of this effort.

Action 6: The Panel and secretariat will provide support to the scientific organizing committee for the workshop (3 of 5 organizing committee members are OOPC Panel members) and will assist the committee to develop and circulate a new announcement about the workshop to ensure engagement of all relevant groups. The OOPC will be prepared to work with other relevant groups to take the workshop actions forward to develop strategies for extending the global and regional systems into the coastal zone.

Action 7: The workshop committee and Panel secretariat will contact Coasts Predict leaders and invite them to collaborate and participate in this workshop and any follow-up activities developed. The workshop committee and the Panel secretariat will contact the GOOS Regional Alliance Chair to seek advice on how the OOPC-CLIVAR activity can build on the existing GRA framework.

3. Global Ocean Indicator Framework

Karina presented "A new Ocean Indicator Framework? A proposal for a concerted international initiative." Her presentation is available on the GOOS web at:

https://www.goosocean.org/index.php?option=com_oe&task=viewDocumentRecord&docID=26814

She explained what she meant by "indicator":

- they provide clues to matters of larger significance or make perceptible a trend or phenomenon that is not immediately detectable,
- their significance extends beyond what is actually measured to a larger phenomenon of interest,
- they provide information in a simpler, more readily understood form than complex statistics or other kinds of scientific data, and
- they imply a model or set of assumptions that relates the indicator to more complex phenomena.

She described the different sets of indicators that existing at the global and U.N. level and how they are used, specifically that they are key elements that link the 3 pillars of sustainable development: the environment, society, and the economy; that they play a central role for engagement between observing systems, services, science and stakeholders; and that underpinning them are state-of-the-art products and science knowledge, together with reliable uncertainty information.

She further provided examples of how U.N. organizations use them to communicate climate issues to the public and policy makers, with examples from the WMO state of climate report. Beyond communications issues, she explained that indicators also were used in concerted international scientific collaborations to focus attention on key phenomena of societal interest.

With this background, she then outlined what an ocean indicator framework could do:

- Foster international collaborations across multiple disciplines
- Foster the identification of key research priority areas
- Support the quantification and identification of limitations for observing system capabilities, models and predictions, and assessments (product & information, e.g. IPCC)
- Be a useful tool for international product assessments, quality control, validation and verification
- Be an effective communication tool
- Guide planners and policy makers on the most effective way to use ocean information and scientific state-of-the-art knowledge to support decision making, which are ready for application and most relevant for their needs (e.g. SDGs).

She concluded with a draft description of ocean indicators that would include themes around climate change, ocean health, marine diversity, and extremes and hazards. She proposed that OOPC assist to establish a concerted international and multi-disciplinary working group to develop this ocean indicator framework.

The Panel thanked her for her presentation and noted that this was an important and timely issue that needed to be addressed. Several members signalled that they had mandates through their institutions to work on developing indicators and that they would be eager to work in an international collaboration on this. Toste Tanhua, Chair of GOOS, encouraged the OOPC to propose this as a GOOS joint panels activity to draw on the other expert panels across biology and ecosystems, and carbon and biogeochemistry as well. Albert Fischer, Director of GOOS, commented that the Ocean Decade is discussing the need to develop a regular report on the state of the ocean and that it will rely heavily on indicators. He also encouraged this activity to be developed as a GOOS joint panels project.

Sabrina, Marjolaine, and Maria Paz offered to join Karina in taking this forward.

Action 8: Karina, Sabrina, Marjolaine, and the OOPC Secretariat will develop a prospectus about the OIF proposal to circulate to the other GOOS panels for consultations and to set up a working group to take this forward.

4. OOPC and OSEs

Because of time constraints, this item was not discussed at the meeting. Karina, Matt, and Maria discussed this issue in the framework of the Heat and Freshwater workshop and prepared a presentation for the OOPC meeting:

https://www.goosocean.org/index.php?option=com_oe&task=viewDocumentRecord&docID=26818

Several weeks ago, Panel member Tony Lee was contacted by Magdalena Balsameda (ECMWF) about sharing their experimental data from some Atlantic Observing System Experiments with anyone who is interested in participating in the analysis, or for any activity that could benefit from the results of these analyses. Karina's presentation provides the background information about the ECMWF experiments:

- OSEs withdrawing observing system elements: No Argo, All Moorings, No in situ, All in situ for the Atlantic. Ocean Reanalyses (ORA OSEs)
- Ocean Reanalyses OSES (ORA OSEs): 1993-2015 with different observing systems.
- Seasonal Forecast OSES (SF OSEs): Set of seasonal reforecasts (May-Nov starts, 15 ensembles for each initial date, same period), initialized from the ORA OSEs.
- Subseasonal Forecast OSEs (S2S OSEs): Set of extended range (subseasonal reforecasts), initialized from ORA OSEs above.

In her presentation, she explains the context for the proposal of Magdalena. Currently, ECMWF is analysing and publishing; however, it is impossible to cover different aspects of the analysis. ECMWF would be keen to share the experiment data for somebody to analyse them. Magdalena noted that a dedicated database for data sharing does not exist, but that this can be done on an ad-hoc manner. Magdalena contacted the OOPC to find out if there were scientists interested in analysing these results, and if so, asked that they coordinate their interest in participating in this through the OOPC panel.

Karina provided a broader perspective of the need for OOPC to begin establishing closer links with OSEs, which are essential for strengthening the link between the ocean observing community and the monitoring and forecasting centres by defining suitable observation products for operational oceanography, ensuring the best use of the observations assimilated routinely in model analysis, informing the design of observing system evolution to improve analysis and forecasts, and advocating for the observation network sustainability.

She explained that GODAE OceanView is transitioning to OceanPredict, with full integration of GOV achievements and expertise into an "Observation to End-user" value chain and suggested that OOPC needs to engage with OceanPredict during this transition. Besides OSEs, two of the aims of OceanPredict that are also important to OOPC and GOOS are to promote the use and impact of observations and ocean predictions for societal benefit, and to increase visibility of operational oceanography advances. OceanPredict is working to increase its partnerships with GOOS, ET- OOFs and GEO Blue Planet in order to contribute to a value chain from observations, data and information systems, and predictions and scientific assessments, to end users.

Karina provided information about The OceanPredict Observing System Evaluation (OSEval) Task Team, whose role is to:

- Collect, synthesize and perform impact studies of GOOS and Regional Observing Systems on OceanPredict reanalysis and forecasts. Impact assessment is performed using OSE, OSSE and alternative methods.
- Produce and disseminate Observation Impact Statements (OIS) based on OSEval evidence.
- Provide consistent and scientifically-justified requirements and feedbacks to agencies in charge of Global and Regional Ocean Observing Systems.

Karina concluded by asking OOPC what role it should play in this activity, such as:

- Expertise / information exchange with the ECMWF group
- Synthetic profile studies?
- Recommendations for OSE / OSSE topical targets?
- Other?

By email, Tony pointed out that the OSE experiments that ECMWF has performed would provide useful products for investigating the impacts of various observing platforms in constraining the estimates of heat and freshwater contents in the Atlantic Ocean, which is within the scope of one of OOPC's focused areas "adequacy of the observing system for studying regional heat and freshwater contents", noting that this is especially the case for the "No in situ" experiment included the assimilation of satellite measurements, altimetry-based sea level anomaly, in particular.

Through email discussions, Panel members noted that this was also an excellent opportunity to follow up on some of the discussions from the December 2019 WMO scoping workshop on observing system impacts on Earth system prediction and several OceanObs19 Community White Papers, namely:

Observing System Evaluation Based on Ocean Data Assimilation and Prediction Systems: On-Going Challenges and a Future Vision for Designing and Supporting Ocean Observational Networks:

<https://www.frontiersin.org/articles/10.3389/fmars.2019.00417/full>

Requirements for an Integrated *in situ* Atlantic Ocean Observing System From Coordinated Observing System Simulation Experiments:

<https://www.frontiersin.org/articles/10.3389/fmars.2019.00083/full>

Maria informed the Panel that she was contacted through by NOAA / AOML who expressed interest in the ECMWF data to assess the impact of ocean observations on subseasonal to seasonal (S2S) forecast of ocean properties (e.g., sea level, MOC, upper ocean heat content), as well as extreme weather events, including hurricanes and tornadoes over the US. They have been put in contact with Magdalena's group.

Action 9: Panel members are encouraged to review the presentation of Karina et al., and the OOPC Secretariat will organize a Panel discussion around this issue to determine how the Panel would like to take this forward.

IV. CO-SPONSORS ADDRESS

Bernadette announced that this would be her last meeting. She explained that she had tendered her resignation letter to the co-sponsors last week, effective immediately, saying that it was a hard decision and solely due to frustrations at the long-standing and on-going competing and often contradictory demands of GOOS and GCOS on the secretariat of OOPC. She told the Panel that it had been a pleasure to work with such a pro-active committee and told them that the OOPC provides an outstanding service to the community. She thanked

Sabrina and Weidong for accepting to serve as co-chairs and wished the Panel well for the future.

Incoming Chairs Sabrina and Weidong expressed their regret, noting that Bernadette's leaving and the inability to move forward with nominating new Panel members would make taking forward the OOPC work very difficult. They also thanked her for her strong leadership and promised to work hard to keep up the momentum built from Bernadette's years of leadership in the community.

The Chairs of GOOS, GCOS, and WCRP addressed the panel to discuss their recent dialogues that aim to build a common and workable set of expectations for OOPC that is aligned with the work plan of the panel and the support available.

The following text has been approved by each of the speakers.

Toste Tanhua (GOOS) provided a short overview of the role of OOPC in GOOS and its work across the GOOS panels in the 2030 strategy. His presentation is available on the GOOS web at:

https://www.goosocean.org/index.php?option=com_oe&task=viewDocumentRecord&docID=26815

He noted that within GOOS there are on-going discussions about how to organize the work of the 3 expert panels to address the delivery areas of Climate, Ocean Health, and Operational Services. He noted that the Terms of Reference for the OOPC needed to be re-evaluated to support the implementation of the GOOS 2030 strategy, specifically to:

- Support the Framework of Ocean Observing concepts
- Be the custodians of Physical Essential Ocean Variables (EOVs)
- Provide guidance on ocean observing system design
- Provide advice on requirements for physical ocean EOVs
- Assess technologies for physical EOVs
- Lead in supporting delivery for Climate
- Support delivery for operational services and ocean health
- Support Ocean Observing Reviews and evaluations

Detlef Stammer (WCRP) noted that WCRP interacted most directly with the OOPC through the CLIVAR basin panels. He noted that GOOS has a much broader mandate than physical climate, where WCRP and CLIVAR's interests mostly lie, and expressed his concern that the OOPC has been overwhelmed by too many topics over last few years. He noted that WCRP itself was in transition but that its core activities and interests in OOPC would not change. He emphasized the work of WCRP in linking to the atmospheric and land observing panels of GCOS and stressed the need for a clear strong link to the data community. He also pointed out that the observing systems should be working more directly with WCRP to examine the scientific basis for climate observations and system design, and pointed out that there are often several groups addressing the same or similar issues that should be better coordinated. He suggested that better bi-lateral communication between WCRP and the panels would be important in carrying out the work of the newly restructured WCRP.

Han Dolman (GCOS) explained that his status as GCOS Chair is still pending formal approval. He noted that there has been much misunderstanding and miscommunication about the status of GCOS in last year, mostly related to WMO's restructuring the secretariat. He stated that GCOS as program is standing firm, that WMO had re-iterated its interest that GCOS should continue, and noted that there is an IOC-WMO Study Group to look at future governance of GCOS, which will be very important for the future direction and functioning of the program. He explained that GCOS has traditionally had a strong link towards a Met Service perspective and said that it is time to include other stakeholder perspectives from other domains on the GCOS steering committee. One of the key things GCOS does is reporting to UNFCCC, and that reporting cycle includes an Implementation Plan and Status reports to assess the climate observing systems. He also stated that GCOS will take a broader

perspective on the Essential Climate Variables, based on the recognition that we need to close global climate budgets. This may involve defining new essential variables that are not yet truly global or operational. He concluded by telling the Panel that he accepted to Chair GCOS with the understanding that WMO will support GCOS in the future and will keep up the GCOS secretariat. He stated that he was committed to engaging with the other sponsors of OOPC to determine how to develop a work plan that was doable with existing human and financial resources. He noted that the list of OOPC activities outlined by Toste for GOOS were also good for GCOS and stated that he looked forward to re-defining the Terms of Reference for OOPC to avoid the problems of the past.

Sabrina and Weidong thanked the sponsors for their comments and for their attention to these issues that are preventing the Panel from doing its work and leading to the loss of good scientists from the Panel. Han emphasized that bureaucracy should never hold back science and that any specific blockages put forward by the GCOS secretariat or WMO should be brought to the steering committee. Detlef also stressed the need for increased regular communications via telecons as needed to ensure that the Panel's work is moving forward as efficiently as possible. Toste added his support to this, saying that there should be a good working relationship between the Panel and the sponsors.

Weidong pointed out that OOPC has a very large and important workload ahead as shown during this short 2-hour session, and that it is important to keep moving forward while the sponsors agree on a coherent work plan. He noted that OOPC is a small panel for the amount of work to be done and that we urgently need to replace our 3 panel members who are rotating off in June. He asked the sponsors for a clear timetable of when the OOPC Terms of Reference would be revised so that we could proceed with nominations and recruitment.

Karina suggested that it may be of interest to organize OOPC's support for GCOS around specific topics, such as the global cycles, rather than reducing OOPC to a reporting mechanism for ECVs. Han agreed and said that we would pick up this discussion soon.

Maria reminded the sponsors of Weidong's request for a timeline. Han informed the Panel that the sponsors would be organizing a series of consultations next week and that they understood the urgency of the situation. Detlef agreed, stating that July should be the latest deadline to get all of this settled. He asked about the procedure for changing Terms of Reference. Maria noted that the directors of the three sponsors will also need to agree on this, since there has been considerable disagreement about procedures in the recent past.

The meeting was closed by Sabrina and Weidong.

ANNEX 1. AGENDA

| Time | Agenda Item | Lead |
|-----------|---|--|
| 0900-0930 | Working groups overviews <ul style="list-style-type: none"> • HF Workshop (Matt) • OASIS and OOPC-AOPC air-sea flux task team (Meghan) • Boundary Currents (Maria Paz and Marjolaine, Lisa?) | Matt Meghan Maria Paz et al. |
| | <i>Expected outcome: actions required of OOPC to assist OASIS and Boundary current task team move forward.</i> | |
| 0930-1000 | Obs Priorities for the Next Decade <ul style="list-style-type: none"> • OOPC's role in leading the community plan of action around key science and society requirements based on OO19, the Decade, and other developments. • Regional to Global OOPC-CLIVAR workshop proposal (Weidong, Maria Paz, Lisa) | Sabrina Weidong |
| | <i>Expected outcome: an agreed way forward on developing ocean physics / climate priorities for the next 10 years based on OO19.</i> | |
| 1000-1015 | OOPC and OSEs <ul style="list-style-type: none"> • Recent request by Magdalena Balsameda to engage groups interested in analysing data from their OSE experiments, and the role OOPC should play in this area | Matt / Karina ? |
| | <i>Expected outcome: decision on if OOPC needs to frame the discussion on what is needed for OSEs to design and evaluate the system.</i> | |
| 1015-1030 | Global Ocean Indicator Framework <ul style="list-style-type: none"> • A proposal on a new initiative to develop an Ocean Indicator Framework | Karina |
| | <i>Expected outcome: decision on if and how OOPC can develop this initiative.</i> | |
| 1030-1050 | Co-Sponsors Address The Chairs of GOOS, GCOS, and WCRP will address the panel to discuss their recent dialogues that aim to build a common and workable set of expectations for OOPC that is aligned with the work plan of the panel and the support available. | Toste Tanhua Han Dolman Detlef Stammer |
| | <i>Expected outcomes: the Panel will be invited to comment on this activity, and to agree to postpone discussions of new Panel members until the co-sponsors develop an agreed coherent work plan and appropriate resources to implement it.</i> | |
| 1050-1100 | Summary of Decisions and Plans for Next Session | Maria |

ANNEX 2. LIST OF PARTICIPANTS

I. Panel Members

Bernadette Sloyan (Outgoing
Chair) Sabrina Speich (Incoming
Co-Chair) Weidong Yu
(Incoming Co-Chair)\
Marjolaine Krug
Matthew
Palmer
Meghan
Cronin
Eitarou Oka
Karina Von
Schuckmann
Benjamin Rabe
Maria Hood (OOPC Officer)

II. Guests

Toste Tanhua (Chair,
GOOS) Han Dolman (Chair,
GCOS) Detlef Stammer
(Chair, WCRP) Albert
Fischer (GOOS Director)
Lars Peter Riishojgaard (WMO, Earth System Monitoring
Division) Anthony Rea (WMO, Director Infrastructure, Acting
Director GCOS)

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