5th Annual meeting of the

OceanPredict Science Team (OPST)

2021, Dec

Semi-annual

OPST-5 Report

6-8 December 2021

MS Teams meeting

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Content

1. Overview and meeting objectives

Presented by PN Vinayachandran and Fraser Davidson

The meeting took place over 3 days @ 90 min slots per day. The main meeting objective was to learn about progress since the last meeting on improvements of OP communications, closer engagement with OP partners like ETOOFS, updates from the TTs and the national systems, as well as plans for the OP strategy publication. Furthermore, the meeting focused on the OP involvement & support for the UN Decade through ForeSea, CoastPredict and SynObs.

External guests at the meeting were Maria Hood (G7/FSOI) who was informing the science team about plans for the Decade Collaboration Centre to be established at MOI.

The presentation on the "meeting objectives" by Fraser Davidson can be viewed on the OceanPredict website.

2. OceanPredict communications and programme office update

Presented by PN Vinayachandran and Kirsten Wilmer-Becker

At OPST-4 it was decided to ramp up the OP communication as this had been lacking internally as well as externally. The involvement with the UN Decade requires OP to be more vocal about its activities but also show its interest and opportunities for interaction. The main two activities to be taken forwards was to start publishing a regular OP newsletter and set up a list of OP related publications on the website. Both aims are being pursued by the OP communications teams and have resulted in the first newsletter to be published in Dec 2021, while the publication list is growing as well.

A further task not yet addressed will be to develop a communications plan for ForeSea and possibly for SynObs.

The new OP website has proven very useful in providing most of the OP information needed for internal and external use, including

- Future events
- Archived events, giving full details of all OP related meetings and workshops
- National system information, providing good insight into system descriptions, ocean model characteristics, DA, system set-up, products and services, system reports
- ForeSea and SynObs pages
- Newsletters
- Publication list

The programme office will continue to support the revision, review and completion of the OP strategy and governance documents.

The presentation on the "OP communication and OP programme office" by PN Vinayachandran and Kirsten Wilmer-Becker can be viewed on the OceanPredict website.

3. OP Systems and the new Operational Systems Working Group

Presented by OP system representatives and Fraser Davidson

All Operational system reports from OPST-5 can viewed/downloaded from the OP website:

Australia – BLUELink	PN Vinayachandran (for Gary Brassington)	(BoM)	OPST member
Brazil – REMO	Clemente Tanajura	UFBA/REMO	OPST member
Canada – CONCEPTS	Gregory Smith	ECCC	OPST member
China – NMEFC	Dakui Wang (for Guimei Liu)	NMEFC	OPST member
France – MOI	Yann Drillet	MOI	OPST member
India – INDOFOS	Arya Paul	INCOIS	OPST member
Italy – CMCC and OGS	Giovanni Coppini	CMCC	OPST member
Japan – MRI/JMA	Goro Yamanaka	MRI-JMA	OPST member
Norway – TOPAZ	Laurent Bertino	NERSC	OPST member
Republic of Korea – KOOFS and KOOS	PN Vinayachandran (for Do-Seong Byun)	KHOA	OPST member
UK/Europe – ECMWF	Kristian Mogensen	ECMWF	OPST member
UK – FOAM	David Ford	Met Office	OPST member
USA – NOAA/NCEP	Eric Bayler (for Avichal Mehra)	NOAA	OPAS member

At the last OPST-4 meeting in June the decision was made to set up a national systems working group in OceanPredict to enable better interaction between the systems and its representatives who are already all members of the OPST. A first meeting of the national reps was organised in Nov ’21 to discuss the groups’ plans and benefits and it was officially agreed that this new group is needed and will be formed.

- National Reps met Nov 10, 2021
- Membership was discussed
- Benefit of becoming a rep in the new WG:

    - Form a community of practice
    - Exchange on Successes
    - Develop dashboards for overall forecast system advances – Discuss common challenges
    - Address needed standards for accelerated inclusion of new research by OPST
    - Targeted task teams interactions
    - … see https://oceanpredict.org/science/operational-ocean-forecastingsystems/op-national-systems-working-group/#section-meetings
- 80 min National Reps Presentations included:
    - System Status overview (regional and global)
    - System Status plans
    - What TT activities are/could be helpful/beneficial for your system
    - Ideas around defining national working group
- 20 min Discussion covered:
    - Recap on benefits of new working group
    - Group scope/diversity (BGC, Coastal..)
    - How does new WG need to be connected to other groups and task team
- Consideration of WG interaction up to user level (use/uptake).
    - Maybe be better to be covered under ForeSea
    - Would include ETOOFS capacity development
    - Will open up links with GEO Blue Planet

The exchange on progress of the OP operational prediction systems is one of the main topics of this semi-annual meeting. This year we have launched a new working group for the operational systems to provide a better platform for interaction. All systems represented in OPST were invited to a **questionnaire on the structure and objectives** for the new working group. Results from the survey can be viewed in ***Appendix C***.

The presentation on the "national systems" national representative can be viewed on the OceanPredict website.

4. OceanPredict Task Teams – latest progress and UN Decade involvement

OP tasks teams presented on the status of current activities, plans of how to engage with UN Decade programmes and what support and help they might from OceanPredict and/or ForeSea.

The table in **Appendix D** provides a consolidated overview of all TT responses.

4.1 Task Team discussions

Following the TT presentations discussion were held on the involvement of the TT in OP and the Decade. The summaries are listed below:

COSS-TT (Villy)

- What are transformative actions in CoastPredict

    - Either projects like Argo or GHRSTT
    - Or seamless prediction from regional to coastal to rivers/estuaries into urban areas – consideration to make this a joint CP/ForeSea project
    - Linking of activities/projects to socio-economic science, e.g. UN Decade community of practice covering climate and coastal resilience
- How is CP handling projects?
    - Project ideas have been developed within COSS-TT/CP
    - This helped allow to identify 6 focus areas
    - Projects are to be whittled down to 5 or 6 to fit in the focus areas, and therefore CP is currently not accepting projects through the UN Decade, but coordinating projects without an open call
    - In future, other UN Decade projects would be considered

IV-TT (Greg)

- DCC
    - Will support coordination, less likely to be provider of servers
- GODAE server needs?
    - Operational centres maybe able to help host/maintain a new server
    - Would be helpful to have quotable datasets
    - Would be helpful to run the server on a cloud providing more options for handling the data (not only uploads/downloads)
- What are the high-impact events the IV-TT could look into?
    - Example give included storm surges and what other features are relevant when they occur (e.g. warm blob in Pacific), also sargassum predictions
- Transformative aspects could include:
    - Solidified Class 4 endeavour
    - Uncertainty estimations

MEAP-TT (Stefano)

- Assimilation of higher trophic levels?
    - Thinking to include it, in particular consideration of acoustic data as a proxy for high trophic levels could be a way to follow this activity
- Different engagements of countries in the ecosystem prediction efforts?
    - Europe has pushed this more than any other country, although there are good examples also in Canada and the US, where ecosystem models are very advanced. Other countries are focussing more on getting the physical prediction in place and functioning before adopting ecosystem prediction

DA-TT (Matt)

- Projects for the DA-TT?
    - Discussion with different groups on initialising coupled models
    - Could consider working with NOAA their ocean atmosphere sea ice operational model development with specific focus on arctic coupled DA, as more sea ice observations become available. This could be a useful addition to the DA-TT focus.
    - Consider engaging ECOPs

- How does the DA-TT link to the operational systems reps (they are closely link with the DA-efforts). Should it be improved, and should national reps be more involved?
    - TT include members from operational systems as well as research community, so the aspects are not only at implementing DA in operational systems, so there is a lot of cross-fertilisation of ideas.
    - On the infrastructure side, some systems are exploring the use of JEDI and other possible infrastructure and the TT is trying to discuss and report conclusions of those discussions (e.g. at last WS at ECMWF)
    - Implementation of new methods in the operational systems would also require a long adoption and testing process which is done at operational level outside the DA-TT
- How to expand the TT activities into the UN Decade, e.g. working with projects?
    - Suggestion to identify the community needs and expectations for DA systems
    - Could the DA-TT work towards the quantification of the ability of the various DA techniques? Can these be compared in a controlled environment, e.g. within Jedi. Matt mentions that they have done a DA technique comparisons experiment at the Met Office
- Is there a way to link to DAOS (WMO)
    - Andy is a co-chair on the DAOS working group. Sits under the WWRP. Geared towards weather observations and weather data DA. It is unlikely that this group will but into the UN Decade efforts.

OS-Eval TT (Elisabeth)

- Request from SCOR/ SOOS to suggest a member to them.

Action OP-5-1: KWB to speak to Peter Oke to provide Argo survey results on OP website

CP-TT (Santha) – *no presentation provided*

- Update from the CP-TT which will be revive their ToR and membership
- Task Team on ocean modelling?
    - There is no TT on that topic. Would this fit into the CP-TT? Also looking at CP-TT also a group including Ocean modelling.
    - Confirmation the modelling is certainly part of the CP-TT, but needs to be specified what areas can be represented, e.g. air sea interactions,
    - Modelling is a part of all OP TTs, so why CP-TT and how best to share it among TTs? Maybe the CP-TT is the closest TT that can take on that topic
    - Members would need to be involved to decide this.
    - Other items are relevant in the ocean modelling context, like running models in new architectures, specifically in a coupled environment, IO or processing or satellite data for model use
    - There is an overlap of this topic with the Operational Systems working group and so to coordinate that with the new group would be useful

All **presentation corresponding to the TT contribution** to OP and the results from the survey can be viewed/ downloaded from the OP website:

1. COSS-TT presentation by Pierre De Mey-Frémaux and Villy Kourafalou
2. IV-TT presentation by Fabrice Hernandez and Greg Smith
3. MEAP-TT presentation by Stefano Ciavatta and Katja Fennel
4. DA-TT presentation by Matt Martin and Andy Moore
5. OS-Eval TT presentation by Yosuke Fujii and Elisabeth Remy

5. ETOOFS update

Presented by Fraser Davidson

The Expert Team of Operational Ocean Forecasting Systems (ETOOFS), now under the umbrella of GOOS, is an important partner of OceanPredict. The main current activity is focused on the completion of the Guide to Operational Oceanography which will include many contributions from the OP task teams. This effort will provide better understanding of ocean forecast/ prediction systems, should enable emerging groups/countries with setting up ocean predictions systems and increase literacy and capacity in ocean prediction. A number of additional aspects are expected to be supported, for example increasing prediction capacity or improved application of best practices.

Current linkages between OP and ETOOFS include:

- **MEAP-TT:** Contribute to chapters in Guide and participation in training sessions
- **IV-TT:** Proposal to ETOOFS for Class4 endorsement and engagement of national centers for commitment for operational support
- **DA-TT:** No specific plans but could contribute to developing best practices/standards and protocols for DA in operational/real-time systems (in conjunction with DA infrastructure developers)
- **OS-Eval TT:** Until now, there was no collaboration with ETOOFS (focus on the forecasting "Systems" and products).
- **Operational Systems Working Group:** Working with ETOOFS on operational systems set-up and best practice
    - ETOOFS can provide guidance

The presentation on the "ETOOFS" by Fraser Davidson can be viewed on the OceanPredict website.

6. OP and the UN Decade

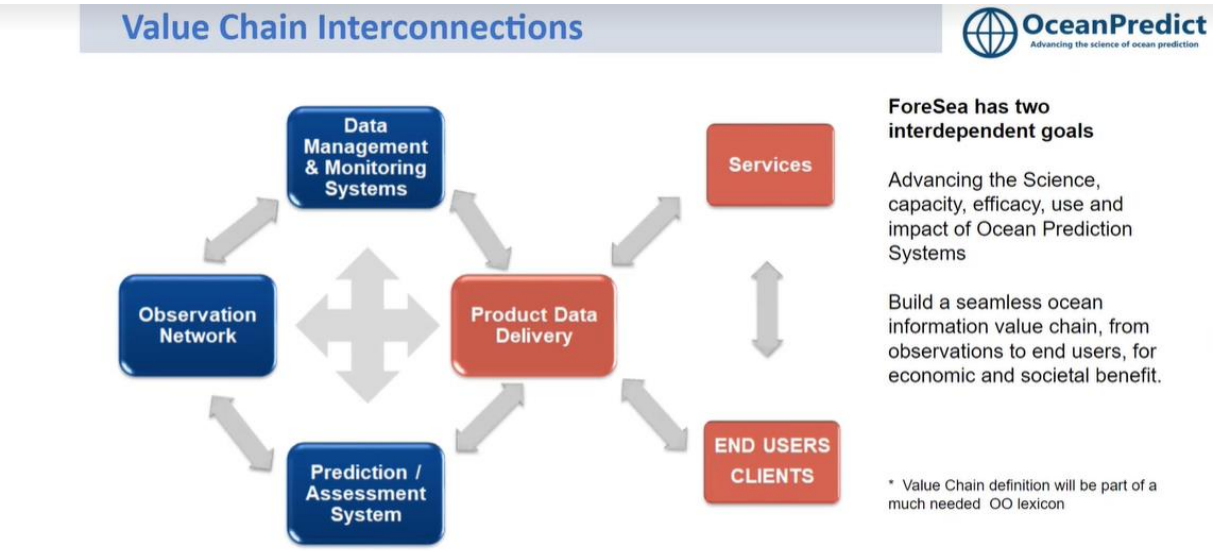
Presented by Fraser Davidson

There are two goals identified for ForeSea

1. Advancing the science, capacity, efficacy, use and impact of ocean prediction systems
2. Building a seamless ocean information value-chain, form observation to end users for economic and societal benefit

In addition, other actions could be considered as a ForeSea task. For example:

- Defining the description of value-chain as part of an operational oceanography lexicon
- Supporting ETOOFS and its guide
- Working closer with DITTO



The presentation on the "ForeSea" by Fraser Davidson can be viewed on the OceanPredict website.

6.1 ForeSea Steering Committee

Steering Team membership was considered to reflect all involvement of ForeSea with OP and its UN Decade partners as well as ECOP engagement. The names of confirmed members are listed below.

Membership	
Eric Chassignet, FSU Santha Akella, NASA Enrique Alvarez Fanjul, Puerto del Estado Eric Bayler, NOAA/NESDIS Stefano Ciavatta, PML Fraser Davidson, DFO Pierre De Mey-Frémaux, CNRS/LEGOS Yosuke Fujii, MRI-JMA	Frank Karger-Muller, Univ. of South Florida Greg Smith, ECCC Ann-Kristin Sperrevick, Met.No Martin Visbeck, GEOMAR Kirsten Wilmer-Becker, Met Office PN Vinayachandran, Indian Institute of Science Peter Oke, CSIRO Afonso Paiva, Univ. of Rio de Janeiro Elisabeth Remy, MOI

At the first ForeSea Steering Committee meeting in Nov 2021 discussions and questions provided a list of considerations for ForeSea to address:

- Consideration to accept GOOS as the ocean information value-chain framework
- Improving connectivity between partners and partner institutions to achieve common aims, and helping each other work together
- Develop plans for aligning the operational oceanography effort by making systems interoperable and sharing access to data, models and products (including ocean source/code sharing)
- Consideration of creating a quality assurance system for reanalysis
- Consideration to encouraging project submissions to explicitly underpin ForeSea programme priorities (as on fact sheet)
- Including best practice as an important aspect of ForeSea and unifying this for modelling and forecasting groups
- Concern about how marine ecosystems is mentioned as part of the Earth system, rather than as ocean
- Requirement to learn more about the Decade supporting structure and their different platforms, centres and communities
- Developing plans for reaching out to our partners on all sides of the value-chain (observing system, services and end users)

A clear concern which needs to be discussed and solutions found is the question of how to fund ForeSea activities. It was agreed that ForeSea should work on

- Outreach to sponsors
- Call on the support from the operational centres
- Work on value-added proposition

The presentation on the "ForeSea Steering Committee" by Fraser Davidson can be viewed on the OceanPredict website.

6.2 UN Decade projects

Presented by Fraser Davidson

Another important aspect of setting up and running ForeSea concerns the initiation or adoption of projects. It is not yet clear how ForeSea will address this and should be discussed at the next ForeSea ST meeting.

The UN Decade 2nd call for projects is ending in Jan 2022 and ForeSea agreed to take part, considering accepting UN Decade endorsed projects. The main aspect was to allow SynObs to register as a project under the UN Decade (2nd call) to be assigned to ForeSea as its main programme. Whether these will be accepted will be decided once the call is completed.

TT contributions for the UN Decade: A brief brainstorming discussion on OP/TT project ideas and their implementation

- Project ideas could be shared among TTs. On proposal was a project on seamless prediction from regional to coastal to rivers as proposed by COSS-TT/CoastPredict
- Approaches to organising projects would need to look at the organisational and technical part separately
    - Suggestion for a technical challenge: Some efforts are underway at NOAA to go from the deep ocean to the coast in a unified model approach (Hendrik), including working on a two-way coupling between river models and coastal ocean models. This could be taken forward as a government mandated project to assess, for example, post hurricane landfall, assessment of damage, etc.
    - Reassessment of social science part in possible UN Decade projects
    - Organisational part of projects could be harder to achieve, but it needs to be in place to make progress. Such project would need the financial and structural background to function, which is particularly difficult when it includes more than once country, which we like to go for. We have to be smart to influence changing people's mindsets that international projects are good to invest in.
    - A possible path would be to develop a prototype project in one country that engages with many different groups to explore for example a project around many US coastal cities (using the idea Hendrik presented earlier).
    - This can also leverage external community efforts for the TTs, focussing on the opportunities and needs in the community. We need to be open and work together in- and outside of OP.

Action OP-5-2:	ForeSea ST to discuss plans for ForeSea project at the next ForeSea Steering Team meeting

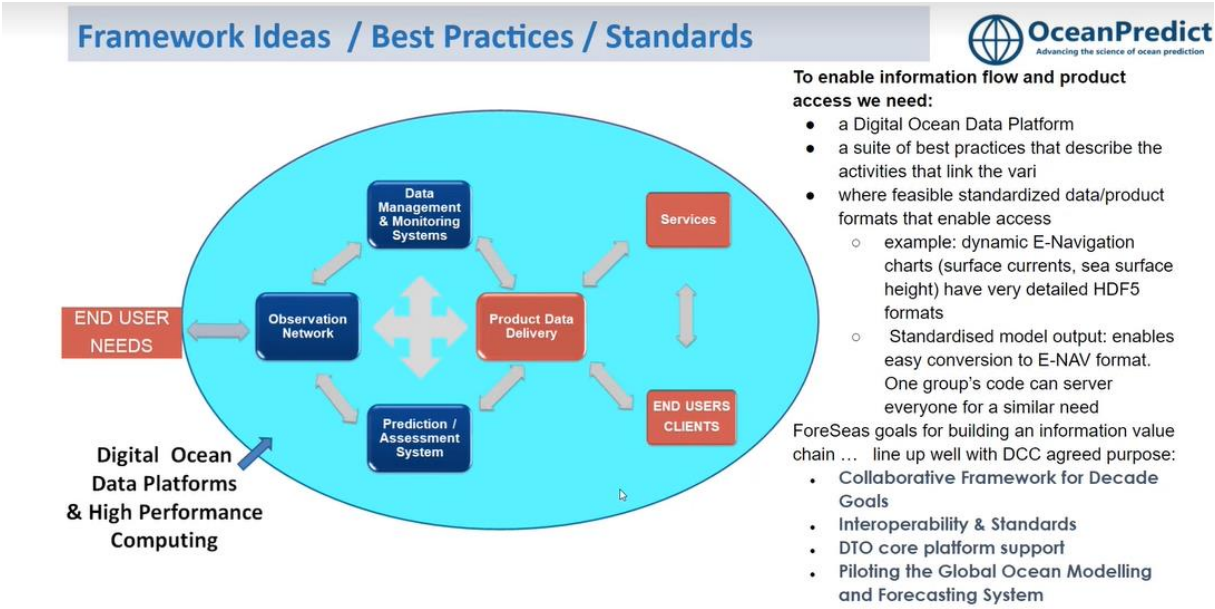
6.3 Setting up a framework /standards

Idea for a lexicon of terms

- Operational oceanography
- Value-chain
- Also considering being more inclusive in removing global and making clear an ocean forecasting system also include coastal areas (could be considered at DCC level)

Need to develop the framework of the value-chain and identify

- What are the interconnections?
- Whos' producing what/ in charge of what (information and/or knowledge) within the chain?
- How to get access to information and/or knowledge?
- Value-chain structure should be matched to various programmes and projects so interactions within the chain become apparent (e.g. SynObs looking at the interplay between predictions and observations)



a. Could the ForeSea framework act as a precursor to what the WMO calls the Rolling review of requirements, were user requirements for observations are compared with the capabilities of present and planned observing systems.
b. It will be sensible to seek out projects to develop synergies between value-chain components, and at the same time enable information flow and product access

Action OP-5-3:	OP co-chairs/ForeSea ST to develop plans for the 2-way knowledge transfer and interdependencies
Action OP-5-4:	Fraser to contact Jay Pearlman to discuss possible interaction of ForeSea with the Ocean Best Practise initiative.

A suggestion was made to set up a slot on the OP website to feature relevant non-UN Decade national efforts in support for OP, representing e.g. the US effort, leveraging interests, capabilities, users, integration. This would need to be discussed by the communication committee.

6.4 Decade Collaboration Center

Presented by Maria Hood

The proposal to set up a Decade Collaboration Center for ocean prediction was recently submitted by MOI. This was welcomed by the OPST, as it is anticipated that it will well support building the full value chain framework. The presentation provided an overview of the plans and progress of the DCC-OP

- It has taken several months to develop the DCC-OP (for Ocean prediction) plans before submission to the IOC
    - Bilateral discussion with OP, ForeSea, CoastPredict, DITTO, GOOS and others, as well as UNECSO/IOC, WMO, UNEP and the international science council
    - An open Community dialogue with the UN Decade programmes was arranged agreeing on the DCC-role
        - Collaborative framework for Decade goals
        - Interoperability and standards
        - DTO core platform support
        - Piloting the Global Ocean Modelling and forecasting System

- Organisational structure
    - DCC will overseen by the Decade Coordination Unit (which sits under the IOC/UNESCO) and hosted by MOI

- Proposal process and timeline
    - Dec 2021 – DCC proposal is submitted
    - Dec/Jan 2022 – feasibility study is commissioned
    - By 31 March 2022
        - final decision by IOC executive secretary
        - signature agreement between MOI and UNESCO

- Phased implementation as staff will increase over the years
- Finances will be provided by France to start with

The presentation on the "DCC-OP" by Maria Hood can be viewed on the OceanPredict website.

Q&A session:

- Will DCC have senior scientist as advisor (maybe in collaboration with a coordinator)?
    - Could have a group of scientific advisors from representatives of each of the partner programmes, structures to be decided by IOC
- How can DCC help to find resources for the programmes and projects?
    - Initially the DCC will help to raise visibility of activities at high level, raising the profile of the efforts put in by the programmes and awareness of their benefit to possible sponsors; the DCC will have a strong lobbying function
- Is the DCC-OP in charge of running the digital twin ocean?
    - DCC-OP will support the DITTO programme coordinating and communication their efforts but are not in charge of the digital ocean
- What communication support can DCC-OP provide to the UN Decade programme communication?

- DCC-OP would provide a one-stop shop type web portal where information of the related UN Decade programmes can be represented through news service, awareness raising, capacity development activities, etc.
- Outreach to ECOPs, users or society will be supported by the DCC-OP through help with coordination, but but the outreach plans are to be decided at programme level. The UN Decade recommends for the DCC to employ a communication and engagement specialist to support this effort. A model to follow could be the Copernicus marine Service structure already in place at MOI.
- The DCC service to all DCC-OP programmes includes supporting them in their communication with the Decade on reporting, defining indicators, metrics, supporting tracking and monitoring. The DCC will help aggregate reports from each programme and help to keep them consistent and clear.

6.5 UN programmes joint advisory board

It is planned to set up a Joint Advisory Committee for several UN Decade programmes to allow for a coordinated advisory process.

The discussions are ongoing with ObsCoDe, CoastPredict and ForeSea. The joint advisory committee would allow to look at the plans for all involved programmes comprehensively and allow for informed advice and direction. Membership of the joint committee should be kept at manageable level; it was suggested to keep numbers at 10-20. It is anticipated for the joint committee to be in place by January 2022.

- A join/co-advisory committee for Decade programmes CoastPredict, Ocean Observing Co-Design, and ForeSea useful due to strong connections
- ToR are being developed on Ann Christine Zinkann (goggle drive)
- Benefits:
    - Programmes will seek many elements of common and coherent advice
    - Similar and often the same people
    - Time efficiency for the advisors
    - Increased ability in structuring the future overall framework
    - Could support funding requests

- Goals for the joint advisory committee
    - Advising, reflection on core program activities, developing synergies between programmes and activities
    - Working with/advising the Decade Collaboration Center

The presentation on the "Advisory Board" by Fraser Davidson can be viewed on the OceanPredict website.

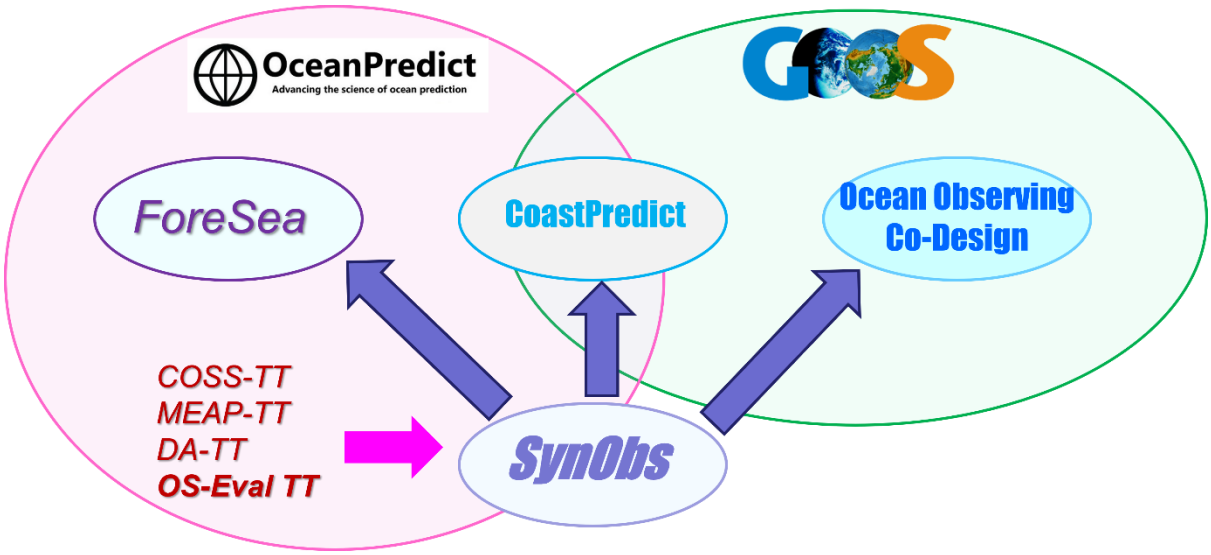
6.6 Science plans

SynObs

Presented by Yosuke Fujii

Yosuke provided an overview of the current status of SynObs (Synergistic Observing Network for Ocean Prediction). SynObs is a common comprehensive project supported by the three UN Decade programmes, ForeSea, CoastPredict, and Ocean Observing Co-Design *(graphic below is showing its partners and relationships within the Decade).* ForeSea and CoastPredict will collaborate with observational agencies and communities to support building a better ocean observing systems which are effective for predictions. The GOOS Decade programme Ocean Observing Co-Design (or ObsCoDe) plan to optimise the ocean observing network for various purposes.

SynObs is proposed as a UN Decade Project under the collaboration of OceanPredict task teams in generate transformative collaboration among the three UN Decade Programmes.



SynObs seeks to extract maximum benefits from the combination of various observation platforms, typically satellite and in-situ observation data, or coastal and open ocean platforms, in ocean/coastal predictions through observing system design/evaluation, and to develop assimilation methods through which synergistic effects from the combination can be drawn. It is planned to include open-ocean (global, tropical, mid-latitude, polar areas), coastal, and biogeochemical (BGC) observing systems.

SynObs will be submitted for endorsement, is now in the process of setting up its members and is exploring what partner organisation it will work with. The SynObs kick-off is planned to take place during the joint OS-Eval TT & CP-TT symposium in Tsukuba/Tokyo, 15-18 Nov 2022

SynObs links with partner programmes

- Are there plans to make SynObs or a coastal part of SynObs part of CoastPredict?
    - SynObs has been submitted as a project to more projects than just ForeSea. It is also submitted to work with CoastPredict, but it is not clear how it could work
    - In communication with CoastPredict (FA1) SynObs could develop a more coastal oriented SynObs or be part of an integrated core project. SynObs could get in touch with the CP co-leads to develop these plans.

Action OP-5-5: Survey on OS-Eval / SynObs input to be shared with the whole of the OPST (KWB)

The presentation on the "SynObs" by Yosuke Fujii can be viewed on the OceanPredict website.

ForeSea links with partner programmes

ForeSea participated in the September UN Decade Laboratory on "A predicted ocean" joining its partner programmes ObsCoDe and CoastPredict.

7. OP strategy update

Post OPST-4, OPST/OPAS has approved secretarially the present strategy. The next step for sending out to OP partners is under hold:

- Awaiting the Joint Decade Program Advisory Board, we will proceed with ToR
- Goal is to have strategy and ToR finalized at OPST -6 or before

7.1 Draft of the terms of reference

The draft ToR for OceanPredict already exist, but needs revisions to streamline it, but also to codify various OP relationships with other groups.

The ToR for the operational systems working group would be a subset of OP ToR, and relationships of OP with other groups now has to include ForeSea SC, Decade Programmes, Joint Advisory Board, etc.

OPST co-chair rotation

- Fraser to suggest stepping down in 6 months steps
- Eric within one year
- Vinay after 18 months
- Need to consider new co-chairs and it would be good to have a European representative
- Consideration to present the ToR at the next OPAS meeting

It was suggested to run the next OP Symposium in 204 or later, considering all circumstances

8. Next OPST meeting

This section provides an overview of the options we have for the next OPST in person in Busan, Republic of Korea. For details please refer to the Busan presentation *(status Dec 2021).*

Covid: The current Covid rules allow a meeting indoors, but requires visitors to quarantine for 10 days before engaging in meetings

Travel: The meeting would be at Hotel Aqua Palace at the Busan Ocean promenade, with access to the airport by train of taxi (70 minutes transfer).

Weather and time of meeting: Avoiding hot weather and holiday season, late spring and autumn are best time for visiting Korea.

Customs and tourist attraction: Please don't tip in restaurants, water is free and side dishes can be freely refilled.

Various tourist attractions listed n Busan presentation.

Remote participation may be possible but would need to be explored**.**

It was agreed to allow us 6-month lead-time before making decisions for an in person meeting.

For now, it was decided to have the next OPST meeting set up as a remote event in June 2022.

Action OP-5-6:	KWB to touch base with Do-Seong Byun in March 2022 to check the timing for the next f2f meeting

Appendices

Appendix A: Attendance list (collated from all meeting days)

Co-chairs (3):	Eric Chassignet, FSU, USA	(EC)
	Fraser Davidson, DFO, Canada	(FD)
	PN Vinayachandran	(PNV)
OPST members (28):	Santha Akella, NASA, USA	(SA)
	Laurent Bertino, NERSC, Norway	(LB)
	Do-Seong Byun, KHOA, South Korea	(DSB)
	Stefano Ciavatta, PML, UK	(SC)
	Giovanni Coppini, CMCC, Italy	(CC)
	Pierre De Mey-Frémaux, CNRS/LEGOS, France	(PDM)
	Yann Drillet, Mercator Ocean international, France	(YD)
	David Ford, Met Office, UK	(DF)
	Yosuke Fujii, MRI/JMA, Japan	(YF)
	Chris Harris, Met Office, UK	(CH)
	Patrick Heimbach, MIT, USA	(PHE)
	Fabrice Hernandez, Mercator Ocean, France	(FH)
	Pat Hogan, NRL, USA	(PHO)
	Villy Kourafalou, University of Miami, USA	(VK)
	Matt Martin, Met Office, UK	(MM)
	Simona Masina, CMCC, Italy	(SM)
	Avichal Mehra, NOAA, USA	(AM)
	Kristian Mogensen, ECMWF, UK	(KM)
	Andrew Moore, UCSC, USA	(AM)
	Arya Paul, INCOIS, India	(AP)
	Elisabeth Remy, Mercator Ocean, France	(ER)
	Hal Ritchie, ECCC, Canada	(HR)
	Andreas Schiller, CSIRO, Australia	(AS)
	Gregory Smith, ECCC, Canada	(GS)
	Clemente Tanajura, UFBA, Brazil	(CT)
	Dakui Wang, NMEFC, China	(DW)
	Kirsten Wilmer-Becker, Met Office, UK	(KWB)
	Goro Yamanaka, MRI-JMA, Japan	(GY)
OPAS members (6):	Eric Bayler, NOAA/NESDIS, USA	(EB)
	Paul DiGiacomo, NOAA/NESDIS, USA	(PDG)
	Mikhail Entel, BoM, Australia	(ME)
	Isabelle Gaboury, DFO, Canada	(IG)
	Pierre-Yves Le Traon, MOi, France	(PYLT)
	Hendrik Tolman, NOAA/NCEP, USA	(HT)
Guests (1):	Maria Hood, MOi/G7-FSOI	(MH)

Total participation – 38 attendees over 3 days

Appendix B: Meeting agenda

Meeting overview & topics

Topics	Specifics	Length	Day
Meeting objectives	Objectives and actions	10 min	Day 1
National Systems	National Systems presentations and discussion, new NG working group	105 min	Day 1
ETOOFS and TASK Teams	Project plans in Decade, Interdependencies (presentation and discussion)	120 min	Day 2
ForeSea and Decade	Advancing the interconnections in the value chain in the decade	45 min	Day 3
ForeSea and Decade	Advancing Ocean Prediction Science in Decade	45 min	Day 3
OP strategy	Status	10 min	Day 3
Next OPST meeting	Location introduction	5 min	Day 3

Meeting dates & times

The meeting will take place on **three days: 6, 7 & 8th of December 2021,** in 2-hour slots each day, using MS Teams, starting at the same time every day.

Times are as:

West Coast US (PDT):	*5:00 am*
Washington DC (EST):	*8:00 am*
Montreal/Ottawa (EDT, Canada):	*8:00 am*
St John's (NDT, Canada):	*9:30 am*
Brazil (BRT):	*10:00 am*
UK (BST, Europe):	*13:00 pm*
Europe (CEST, continent):	*14:00 pm*
India (IST):	*18:30 pm*
China (Beijing):	*21:00 pm*
South Korea	*22:00 pm*
Japan (Tokyo):	*22:00 pm*
Australia (Sydney, Hobart, ..)	*0:00 pm*

Day 1 – Monday 6th of December (MS Teams) – 120 min

Participants can join up to 15 min before the meeting. Chat is open to everyone and the meeting will be recorded.

Time	Description	Meeting chair and presenters	Shared material, comments
10 min	**Welcome, recap OPST 4, meeting objectives**	**Co-chairs**	
5 min	**Intro and evolution of the new National Rep Group**	**Fraser Davidson**	Presentation on National Rep Group, circulated ahead of time
80 min	**National Reps Presentations*** • System Status overview (regional and global) • System Status plans • What TT activities are/could be helpful/beneficial for your system • Ideas around defining national working group	**Vinay** **National Reps – 5 min presentations**	National Representatives will have a power point template and should provide it at end of week before OPST-5
20 min	**Recap discussion of National Systems** • Recap on benefits of new working group • How does new WG need to be connected to other groups and task teams • Questions / discussion	**Eric**	
5 min	**Adjourn / feedback next day's meeting**	**Co-Chairs**	

* A power point template is provided

Day 2 – Tuesday 7th December (MS Teams) – 120 min

Participants can join up to 15 min before the meeting. Chat is open to everyone and the meeting will be recorded.

Time	Description	Meeting chair and presenters	Shared material, comments (see TT pres template)
100 min	**ETOOFS and OP TT reporting and plans including *** ▪ **ETOOFS** ▪ **COSS-TT** ▪ **IV-TT** ▪ **MEAP-TT** ▪ **DA-TT** ▪ **CP-TT** ▪ **OS-Eval TT**	**TT co-chairs and ETOOFS chairs** **10 min max per group presentation PLUS 4-5 min discussion**	TT co-chairs will have a power point template and should provide it at end of week before OPST-5 ▪ **TT status of current activities** ▪ What are your project plans within the Decade? ○ Where do you need participation from other TT/Groups? ○ ECOP related plans ▪ What coordination do you need from OP and ForeSea? ○ Ambitions you would like to see out of Decade Programs
20 min	**Discussion / cross TT collaborations**	**Vinay**	

* A power point template with the questions listed under comments is provided

Day 3 – Wednesday 8th December (MS Teams) – 120 min

Participants can join up to 15 min before the meeting. Chat is open to everyone and the meeting will be recorded.

Time	Description	Meeting chair and presenters	Shared material, comments
5 min	**Welcome and Recap of Previous 2 days** **Intro for ForeSea discussion and Decade**	**Co-chairs**	Brief overview of outcomes and plans for the day
45 min	**Advancing the ocean prediction value chain interconnection – organisational setup** ▪ ForeSea Steering Committee introduction ▪ Decade Collaboration Center ▪ UN programmes joint advisory panel ▪ Framework ideas/standards Interdependencies / 2-way knowledge transfers	**Co-chairs and ForeSea steering team members, Maria Hood**	
45 min	**Advancing the Science discussion** ▪ ForeSea objectives ▪ Plan for the implementation of ForeSea objectives ▪ SynObs status/plans ▪ Science links with partner programmes	**Co-chairs and ForeSea steering team members, as well as Yosuke and Elisabeth**	
10 min	**Strategy / ToR**	**Fraser Davidson**	
5 min	**Next OPST meeting**	**Do-Seong Byun**	
5 min	**AOB and meeting close**	**Co-chairs**	

Appendix C: Results from the Operational Systems Working Group survey

A survey was sent to all national system representative to provide input on the structure and objectives for the new working group.

	Organising the new working group					Collaboration and information sharing				
OP Nat system	**Ideas for the ToR of the NSWG**	**Benefits of becoming a member of the NSWG**	**Group interaction & meeting frequency?**	**Internal and external outreach?**	**Regional - and ecosystem inclusive?**	**Share issue regarding your operational system?**	**Develop best practices for tech transfer procedures?**	**Share information about system upgrades?**	**Develop common process for implementing class-4 / intercomparison at your system?**	**Contribute to updating/improving the current Nat system reports? What is missing?**
Australia / Gary Brassington, BoM	→Performance reporting and performance target setting →Application impact statements →Observational requirements →Operationalisation (full operationalisation of dependent systems)	→Collective international voice for shared national goals →Visibility of the systems →Sharing improvements and application impact →Driving future requirements	→Face-to-face when permitted (operational centre visits) →6 monthly (minimum) - Joint meetings with other TT's	→OPST advocacy with other international groups →OPST and ETOOFS coordination →Challenge setting for TT's →Joint meetings with TT's	→Regional share many common issues and form part of the value chain to impact so makes sense to include →Ecosystem does not share as many issues and is not as mature. Less clear this fits in this group at present.	→If it is reciprocated certainly. Few groups appear to be open to this →Perhaps best done focusing on aspects rather than whole system	→Of interest to some. Some issues are platform dependent and less common. Should this be performed under ETOOFS?	→Mandatory for this group to function well	→Operationalisation of the mature parts of this →Improve the statistical robustness of the analysis/interpretation →Class-1 intercomparisons/Poor-man ensemble/Consensus forecast	→TT assistance for routine system reporting (observational impact, system performance, intercomparisons) →Template for Service Impact reporting and use cases →Future requirements
Brazil/ Clemente Tanajura, UFBA/REMO	→Improve the synergy among OP Nat Centers; share regional data not available in GTS	→better understanding of the details employed in the assimilation and modelling systems →facilitate the realization of short-visits for information exchange, if possible	→2 meetings per year (1 virtual) →email and calls depending on collaboration strength	→the group could identify specific needs of each OP Nat Center and disseminate them among OPST – TTs – external groups to try to fulfil these needs, such as local data, pieces of code.	→Yes	→Yes	→Yes	→Yes	→No	→Yes, maybe more references to internal tech reports.

Canada / Greg Smith, ECCC	→Greater coordination and sharing of challenges and issues to enhance efficiency of operational efforts and supporting research/development functions to strengthen national services	→More efficient problem solving when encountering operational issues →Coordinated approach to address common problems - E.g. Lobbying for changes in observational products	→Recorded video-conference monthly (or bi-monthly). A standing-committee on operational issues could be assembled as required.	→Could help to provide a link from OPST to operational and user needs →Extend reach of OPST within "operational" groups in national centres	→Yes. Could provide additional context, perspective and detailed assessments to observational (and other) issues arising.	→for impacts of unplanned changes to observing system (SLA, in situ…)	→for how to address different timescales in atmospheric and oceanic systems and impacts for coupled prediction	→Via a webinar (recorded ?) to community on highlights (suggestion)	→Sharing of tools, methodologies and best practices is always beneficial.	→Greater implication of "operations" groups? And development Groups? Not just Research people. Would help to highlight common technical issues
France / Yann Drillet, MOI	→Provide guidance in operational system development and evolution cycle →Review process for transition into operation →Tools to manage code, test …	→The most obvious benefit is the exchange of experience, methods, and discussions about the behaviour of the different systems with respect to the chosen options.	→Perhaps a semi-annual meeting in which there would be exchanges about the behaviour of each system on a few common areas.	→The behaviour of the systems with respect to observed events could be used as guidelines for studies within the different TTs and as topics for further study/discussion within OPST.	→Yes, it is often at the regional level that some of the issues arise. Biogeochemical models, for example, are also a good tracer of the physics that forces them.	→Yes. And interested in sharing successes as well...	→Yes	→Yes	→Yes	→Yes
India / Arya Paul, INCOIS	→Connect similar operational systems. →Knowledge and Technology Transfer. →Troubleshooting issues in existing systems.	→INDOFOS will learn about new system upgrades, new scientific developments and technological developments occurring at other centers.	→6 months	→There will likely be some overlaps and boundaries may be defined. The group may select one representative to deal with all other teams/groups.	→Yes	→Yes	→Yes	→Yes	→Yes	→Yes
Italy / Giovanni Coppini, CMCC and OGS	→Implement actions decided at the annual meetings →Facilitate the exchange of information among the nationals systems →Facilitate the uptake of the finding of the	→Consolidate and facilitate the exchange of information →Increase the understanding of the characteristics of our national systems by the	→Bi-monthly webconf and forum	→Every six month or yearly the group should invite the chairs of the TTs to present the latest results. This group should include the OPST team members	→Yes of course	→Yes	→Yes	→Yes	→Yes	→Yes, include authors name, assign DOI, add figures; homogenise the format through provision of instructions

	different TT into the National systems	other members and vice versa		and ocean experts.						
Japan / Goro Yamanaka, MRI-JMA	→The groups' purpose would be to build international cooperation and to share best practice in the operational system.	→We could know about the latest information in each national centre.	→By online meeting or e-mail. Perhaps every six months.	→We think the role of this group is to communicate to OPST, TTs and external groups activities to the domestic community	→Unfortunately, JMA is not directly related to ecosystem model efforts in Japan.	→Yes	→No	→Yes	→No	→Yes. Unification of description style may be desirable.
Norway / Laurent Bertino, NERSC	→Reaction to travel bans	→Compensate for the missing coffee breaks →Exchange of information in an informal settings	→Quarterly zoom meetings, variable time slot. →One presentation from one of the national teams	N/A	→Yes (Norway does not run a global system).	→Yes	→Yes	→Yes. But I already do that all the time.	→Interested but not confident (lack of resources)	→No glaring omissions in my view.
Republic of Korea / Do-Seong Byun, KHOA & KIOST	***We do not have any particular interest in a new working group at this moment***	N/A	N/A	N/A	N/A	→Yes, we are interested in this.	→Yes, we are interested in this.	→Yes, we are confident in this area	→Yes, we are interested in this. Intercomparison of regional model products would help to improve regional/coastal/shelf seas prediction systems.	→Yes, we are interested in this. As an example, ideally the best Nat system reports can be recommended
ECMWF / Kristian Mogensen	→A place to discuss the whole operational systems whereas the other TT are more the individual parts	→Exchange of ideas and concerns about whole systems	→Online meetings every 6 months (or maybe every 3 months at the most)	→The current TT's should cover the details of the components (e.g. DA system, coupled model) whereas this TT should cover the integration of the components into one system	→I don't want to exclude anybody, but we are not doing either of these	→In principle yes, but some times issues are very system specific	→We would be happy to exchange information about e.g. research to operations procedures	→Yes	→In principle yes, but I don't think we have the human resources to commit to this	→I would like to see a more unified report with easier system to system comparison
Met Office / David Ford	→Improve dialogue between national systems and with TTs	→Increased visibility of international developments and knowledge sharing	→Semi-regular (6-monthly?) video meeting with talks and discussion?	→Help with coordinating research efforts and operational systems	→I think they should be included, even if core focus is on global physics	→Yes, but 1/12° global system is for defence, so restrictions on	→Yes	→Yes	→Yes	→Yes

					→Can link to COSS-TT and MEAP-TT where appropriate	data sharing →Also, though resourcing requirements would need to be discussed				
NOAA-NCEP / Avichal Mehra	→Co-ordination with Task Teams and external groups →Emphasize operational nature/targets of OceanPredict Science →Roles should be distinct from ETOOFS	→Leveraging mature TT activities for potential operational use →Increase operational relevance of OP →Provide connections to other operational activities	→During regular OPST and TT meetings	N/A	→Yes	→Science issues; Evaluation Tools and Data	→Unsure because of diverse procedures in use. Operational tech transfer procedures/rules are unique for every op centre.	→Yes	→Already in place. *Caveat -- At NCEP/EMC, V&V is handled by a separate Branch/Group which is distinct from model development/operations.*	→List of observations assimilated, coupling strategies (for coupled systems)

Appendix D: Task Team plans for on the UN Decade contributions

	Plans			**ForeSea/OP support for TT**		
	TT plans for projects	**Working with other TTs**	**ECOP plans**	**Ambitions for the TT in the Decade**	**Working with ETOOFS**	**Needs from OP/ForeSea**
COSS-TT	16 potential project were reviewed early 2021) SynObs will be one UN Decade project working with CoastPredict Attention on foundational "core" projects	OS-Eval-TT: coastl link with SynObs IV-TT: assessment of system in coastal regions and also DA-TT, MEAP-TT and CP-TT	TT members to nominate ECOPs to join CoastPredict	Focus on a few well-identified transformative actions Legacy: promotion of good practices, training, capacity building	Contribution to ET-OOFS Guide in 2021, open to more to promote “good coastal ocean forecasting practices”	Vision and leadership on fruitful overarching objectives Guidance through the “maze” of endeavors at different levels Coordination to get “core” projects funded
CP-TT						
DA-TT	▪ Will liaise closely with SynObs as required ▪ The generally accepted priorities of the TT over the next decade include: hybrid DA; reanalyses at higher resolution; coupled DA; advance DA community infrastructures (i.e. OOPS, JEDI, DART, etc); nonGaussian DA; utilization of new and novel obs (e.g. SWOT)	▪ More collaboration is always good; will continue with joint TT workshops (MEAP & OSEVal so far). ▪ To advance coupled DA, closer ties with CP-TT will be established	▪ Aim to include more early career scientists as members of the DA-TT ▪ Next co-chair(s) could be early career? the TT workshop could ▪ Include some invited junior DA researchers	▪ Advances in coupled DA (with CP-TT) ▪ More wide-spread adoption of community DA infrastructure such as JEDI ▪ Routine assessment of observation impacts and improved observing system design (within SynObs, OSEVal-TT and IV-TT) ▪ Advances in DA methodologies and use of new data such as SWOT ▪ Advances in coastal DA and linkages between global and coastal systems (with COSS-TT) ▪ exploration of ML in DA and other aspects of model analysis	▪ No specific plans, but thought should be given to developing best practices/standards and protocols for DA in operational/real-time systems (in conjunction with DA infrastructure developers)	Vision and leadership on fruitful overarching objectives Guidance through the “maze” of endeavors at different levels Coordination to get “core” projects funded

IV-TT	▪ Project 1: Class4 on Wekeo ▪ Project 2: Uncertainty estimation and drift ▪ Project 3: User-relevant and process-based metrics ▪ Project 4: Regional/Coastal verification with adapted observing system, including ensemble approaches	Connection with projcets (see elft) COSS-TT(1,2,3,4), DA-TT(2), CP-TT (2,3), OSEVAL-TT (2), MEAP (3) ▪ Liaise with JWGFVR	TBC	▪ Greater community engagement with OceanPredict and increase in people involved (including Early Career Scientists) ▪ Liaise with regional/coastal operational, and society-needs oriented demonstrations	▪ Proposal to ETOOFS for Class4 endorsement ▪ Engage national centers for commitment for operational support.	Do we need to consider a greater focus on high-impact events?
MEAP-TT	**ForeSea activities** • Biogeochemical (BGC) nowcasts and ecological forecasting as area for transformative progress addressing from stakeholder needs ranging from carbon accounting to ecosystem health (Theme 1 and 2) • We are part of the ForeSea steering committee **Marine Life 2030** - Frank Muller-Karger Marine Life 2030 is a UN Ocean Decade Endorsed Programme that seeks to transform the observation and forecasting of marine life for the future for the benefit of all people. **India participation in UN Ocean Decade**. Focus: Early Warning Systems as adaptation tools for Indian Ocean rim countries. The forecasts include potential fisheries zones, waves, inundation, storm surge, tsunamis. Training provided for many countries and many courses are run under IOC umbrella.	OS-Eval TT and SynObs Evaluating linking existing and in-the-pipeline projects to Ocean Decade & ForeSea	N/A	▪ Ecosystem indicator predictions as vital components of the operational value chain to support food-security and healthy oceans	▪ We contributed to the BGC chapter of the ETOOFS manual ▪ Participation to training sessions on BGC?	▪ MEAP-TT : Q&A meeting with the ForeSea chairs

OS-Eval TT	The OS-Eval TT is strongly involved with the SynObs project, together with other TTs.	The participation/support from other TTs is discussed. SynObs includes evaluation of synergy of observing systems for physical and BGC observations, at global scale and in coastal regions, with coupled ocean-atmosphere systems…	N/A	To establish a secure framework through which OceanPredict community makes feedbacks to observational agencies.	Until now, there was no collaboration with ET-OOFS (focus on the forecasting "Systems" and products).	We already get a very strong and helpful support from Kirsten on communication, meeting organization, for the TT webpages… SynObs will be endorsed by IOC as an UN Decade project under ForeSea We get often external solicitations that are broader than the scope of the TT or even if relevant, we cannot answer them. - OSE/OSSE/FSOI are heavy, - their outcomes are limited even if they seem appealing to advocate for "new/improved" observations, … More and more requests for involvement of the "modeling" community in observing system design and requirements, especially for in situ observations: -> getting organized to answer them. The Southern Ocean Observing System Design working group is looking for members.

Appendix E: List of presentations

Day 1 – 6 December 2021

Introduction to meeting and focus on the OP national operational centres

Title	Presenter	Affiliation	Role
Introduction and overview	Fraser Davidson	DFO	OPST co-chair
National system presentation – overview of critical updates and plans for a new national systems working group	Various (national system representatives) – ***see below***	Various	OPST members
Australia – BLUELink	PN Vinayachandran (for Gary Brassington)	(BoM)	OPST member
Brazil – REMO	Clemente Tanajura	UFBA/REMO	OPST member
Canada – CONCEPTS	Gregory Smith	ECCC	OPST member
China – NMEFC	Dakui Wang (for Guimei Liu)	NMEFC	OPST member
France – MOI	Yann Drillet	MOI	OPST member
India – INDOFOS	Arya Paul	INCOIS	OPST member
Italy – CMCC and OGS	Giovanni Coppini	CMCC	OPST member
Japan – MRI/JMA	Goro Yamanaka	MRI-JMA	OPST member
Norway – TOPAZ	Laurent Bertino	NERSC	OPST member
Republic of Korea – KOOFS and KOOS	PN Vinayachandran (for Do-Seong Byun)	KHOA	OPST member
UK/Europe – ECMWF	Kristian Mogensen	ECMWF	OPST member
UK – FOAM	David Ford	Met Office	OPST member
USA – NOAA/NCEP	Eric Bayler (for Avichal Mehra)	NOAA	OPAS member

Day 2 – 7 December 2021

OceanPredict Task Teams reports

Title	Presenter	Affiliation	Role
Task Team presentations – latest activities and support for ForeSea and SynObs	Various (Task Team co-chairs) – see below	Various	OPST members
COSS-TT	Villy Kourafalou	University of Miami/RSMAS	COSS-TT co-chair
IV-TT	Greg Smith	ECCC	IV-TT co-chair
DA-TT	Matt Martin	Met Office	DA-TT co-chair
MEAP-TT	Stefano Ciavatta	PML	MEAP-TT co-chair
OS-Eval TT	Elisabeth Remy	Mercator Ocean international	OS-Eval TT co-chair
ETOOFS overview	Fraser Davidson	DFO	OPST co-chair and ETOOFS member
TT presentations recap	Fraser Davidson	DFO	OPST co-chair

Day 3 – 8 December 2021

Title	Presenter	Affiliation	Role
Introduction to the ForeSea and SynObs plans for the Decade	Fraser Davidson	DFO	OPST co-chair
Decade Collaboration Center	Maria Hood	Mercator Ocean International	Invited speaker
SynObs status	Yosuke Fujii	MRI-JMA	OS-Eval TT co-chair

OPST-6 meeting venue – Busan, Republic of Korea	Do-Seng Byun	KHOA	OPST member

Appendix F: Decisions and new Actions

Action OP-5-1: KWB to speak to Peter Oke to provide Argo survey results on OP website

Action OP-5-2: ForeSea ST to discuss plans for ForeSea project at the next ForeSea Steering Team meeting

Action OP-5-3: OP co-chairs/ForeSea ST to develop plans for the 2-way knowledge transfer and interdependencies

Action OP-5-4: Fraser to contact Jay Pearlman to discuss possible interaction of ForeSea with the Ocean Best Practise initiative.

Action OP-5-5: Survey on OS-Eval / SynObs input to be shared with the whole of the OPST (KWB)

Action OP-5-6: KWB to touch base with Do-Seong Byun in March 2022 to check the timing for the next f2f meeting

Appendix G: Feedback on old Actions

OPST4-1: **KWB** to set up an online form by end of July 2021 to provide a mechanism for OPST members to endorse the new OP strategy. - **DONE**

OPST4-2: **OP co-chairs** to arrange for OP strategy document to be sent to OP partners for comments and feedback in the next few months. – **DONE in parts**. Circulation to partners is awaiting addition of OP governance doc.

OPST4-3: **OPST co-chairs** to prepare and provide response to UN Decade on ForeSea endorsement - **DONE**

OPST4-4: **ForeSea SC** to arrange setting up a ECOP group within ForeSea (Audrey Hasson (GBP) could provide information on an ECOP meeting should was taking part in). - **DONE in parts.** ECOP rep has been confirmed for ForeSea but ForeSea does not have an ECOP group (yet).

OPST4-5: **ForeSea SC** to develop ForeSea implementation in collaboration with associated UN Decade programmers, e.g. DITTO, CoastPredict, and ObsCoDe. **In progress**

OPST4-6: **ForeSea SC** to develop the UN Decade **project** identification, acceptance, funding and endorsement process with the help of UNDOS and programme partners. **In progress**

OPST4-7: The **OP communication committee** to extend its scope to also develop **ForeSea communication** plan including covering projects. **Not yet done**

OPST4-8: **OceanPredict** to invite ETOOFS leads as members of the OPST **- DONE**

OPST4-9: **ForeSea/ OP** in collaboration with partners to map out the UN Decade programme linkages **Not yet done**

OPST4-10: **Fraser** to set up regular interaction between OP (ForeSea) and ETOOFS addressing:

- Support co-design of OO framework
- Develop plans for close collaboration btw ETOOFS and ForeSea – **in progress**
- Develop a prospectus/presentation highlighting OP/ETOOFS role in UNDOS to be given at IOC-WMO-JCB level – **Proposal made but JCB had not met since June 2021**
- Consideration of engaging WMO-IOC to set up OO framework
- Plan to involve IV-TT and ETOOFS in discussion of guide/best proactive for the OO framework

OPST4-11: **Eric C** to organise the setting-up of a "**ForeSea Steering Committee"** by mid Aug. - **DONE**

OPST4-12: **Eric, Vinay and Fraser** to take part in UN Laboratory on Predicted Ocean in Sep 2021 representing ForeSea **- DONE**

OPST4-13: **OS-Eval TT co-chairs** to organise web meeting with all other TT co-chairs in order to discuss ways to support and manage activities of SynObs. **- DONE**