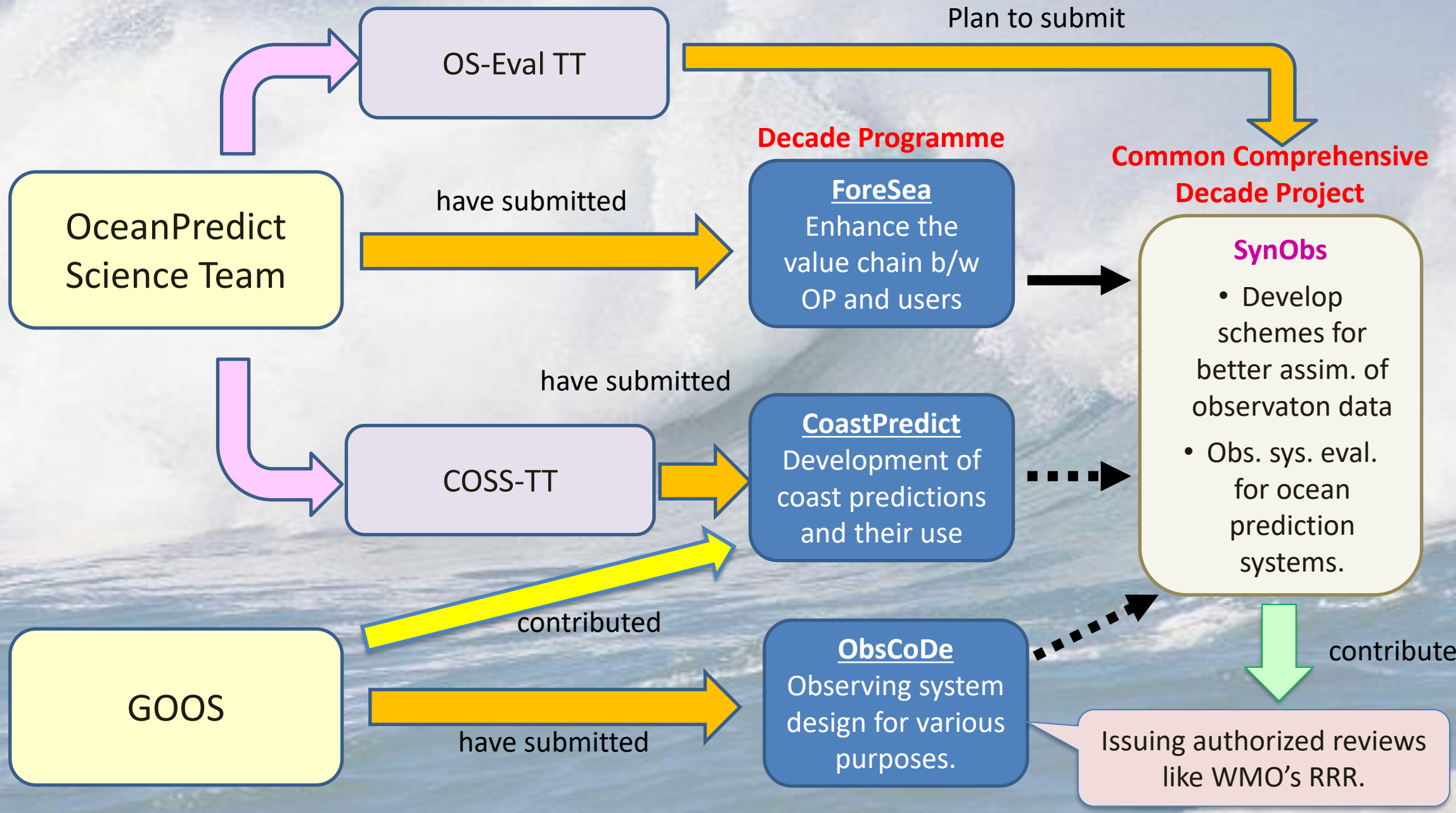
COSS-TT Meeting, June 9th, 2021, Online

# *Synergistic Observing Network for Impactful and Relevant Ocean Predictions (SynObs)*

Yosuke Fujii (JMA/MRI, Co-chair of OceanPredict OS-Eval TT)
Elisabeth Rémy (MOI, Co-chair of OceanPredict OS-Eval TT)

# ★ OceanPredict contributions to the UN Decade of Ocean Science



# ★ Decade Project to be submitted by the OS-Eval TT

- **Title**

  Synergistic Observing Network for Impactful and Relevant Ocean Predictions (SynObs)

- **Objective**

  SynObs will seek the way to extract the maximum benefit from the combination among various observation platforms, typically between satellite and in situ observation data, or between coastal and open ocean platforms, in ocean (and earth system) predictions.

- **Strategy**

  SynObs aim to identify the optimal combination of different ocean observation platforms through observing system design/evaluation, and develop assimilation methods with which we can draw synergistic effects from the combination.

- **Scope**

  Targets of SynObs include open-ocean, coastal, and biogeochemical (BGC) observing systems (collaboration with DA-TT, COSS-TT, and MEAP-TT）

# ★ Targeted Combination of Observing Systems

1. Satellite altimeters (including conventional and wide-swath altimeters), satellite ocean current observations (SKIM) and Argo floats
2. Satellite radiometers (for SST observations), near surface in situ observations (from Mooring buoys and Argo floats, etc.), and sea surface atmospheric parameters
3. Satellite Sea Surface Salinity (SSS) observations and near surface in situ observations
4. Satellite ocean colour observations and in-situ (Argo) observations
5. Observations of sea ice concentrations and sea ice thickness
6. Coastal ocean radars and sensors, gliders, drones, satellite remote sensing, and Argo floats

# ★ Expected Activity in SynObs

1. Multi-system evaluation, including Multi-System OSE, OSSE, and evaluation using various diagnostic based on ensemble statistics or adjoint models.
2. Development of data assimilation schemes for synergy
   - ✓ Assimilating low-level processed satellite data (direct assimilation)
   - ✓ incorporate background  error covariance between atmospheric and oceanic elements.
3. Collocated satellite-in situ observation campaigns (e.g., Argo and InfraRed satellite)
4. Development of best-practices for evaluating the performance of ocean observing networks composed of various observing platforms
5. Construction of a real-time ocean observation impact monitoring framework
6. Publishing the Observation Impact Annual Report ⇒ Contribute to ObsCode

# ★ Scientific Outcomes

1. Synergistic ocean observing network.
2. Advance of data assimilation capacity for extracting the synergy
3. Improved ocean and earth system predictions
4. Several useful tools for managing the ocean observing systems
   - ✓ Justification to sustain in situ ocean observation networks and satellite missions
   - ✓ Guideline for the future evolution of in situ and satellite observation networks
5. Systematic mechanism to make a feedback on the observation data impacts from ocean prediction centers to observational communities
6. Understanding on which ocean phenomena are observable by different observations and which are controllable via data assimilation
7. Capacity building to train a continuing generation of scientists from developing and developed nations that will continue observing system monitoring and design

# ★ How can we collaborate for coastal predictions in SynObs?

1. Make a big voice to appeal necessity of the development and maintenance of coastal observing systems as a part of the global ocean observing network

   ✓ Showcase of costal observation impacts

   ✓ Collaboration for multi-system evaluation of widely-used observation platforms, such as, ocean gliders, HF radars, etc.

   ✓ Appeal importance of coastal observations to international communities under the collaboration in OceanPredict family.

   ⇒ Contribute to the authorized observation requirement report by ObsCode

# ★ How can we collaborate for coastal predictions in SynObs? (continue)

## 2. Exploit open-ocean and BGC observing systems effectively

- ✓ Open-ocean platforms, such as satellite altimeters and Argo floats, can also contribute to coastal predictions. BGC observations are also essential for predictions of coastal marine ecosystems.
- ✓ Develop DA methods to get synergy from those observations in coastal predictions
- ✓ Reflect the requirements for coastal predictions on the designs of open-ocean and BGC observing systems.

◆ The collaboration also brings benefits to open-ocean communities

- Coastal observations can have impacts on open ocean.
- High-frequency phenome related to tides and sea level pressure forcing is already treated in a DA framework in costal systems. Those knowledge can be used for further development of global systems.

# ★ How can we collaborate for coastal predictions in SynObs? (continue)

## 3. Establish a best practice strategy of observing system evaluation for costal seas

- ✓ Exchange the knowledge on observing system evaluation methodologies among coastal and open-ocean communities, and find feasible and practical ways for various ocean prediction systems
- ✓ Make it possible to conduct fair and reliable evaluation promptly to support developments of coastal observing systems
- ✓ Make it easy to train new scientists who can conduct the evaluation.

# *Symposium toward Synergistic Observation Networks for Ocean and Earth System Predictions*

~~*10-13 Nov, 2020*~~*, Tsukuba Japan*

**30 Nov – 3 Dec, 2021**

- Held as the regular face-to-face meeting of OS-Eval Task Team, but jointed with the coupled prediction task team.
- Open for all researchers who are interested in evaluation and effective use of ocean observations in ocean and earth system predictions.
- Also, having a role as the kick-off meeting of SynObs.
- Having a presentation about the evaluation/design of ocean observation networks, DA development for effective use of observations, and earth system predictions.
- It can be postponed again if the pandemic is not enough suppressed.


Thank you