

# Evaluation of Argo in the UN Ocean Decade Project SynObs

Argo WS 7  
13 Oct 2022  
In Brussel

Y. Fujii (JMA/MRI), E. Remy (Moi), H. Zuo (ECMWF), P. Oke (CSIRO), L. Cheng(IAP-CAS), Y. Wang (NERSC)



## Synergistic Observing Network for Ocean Prediction



- Endorsed in June 2022 as an Decade project under the UN Ocean Decade Program ForeSea. Period: 2022-2026
- Led by OceanPredict Observing System Evaluation Task Team
- <https://oceanpredict.org/foresea/synobs/#section-overview>

## ★ SynObs Objective and Activities

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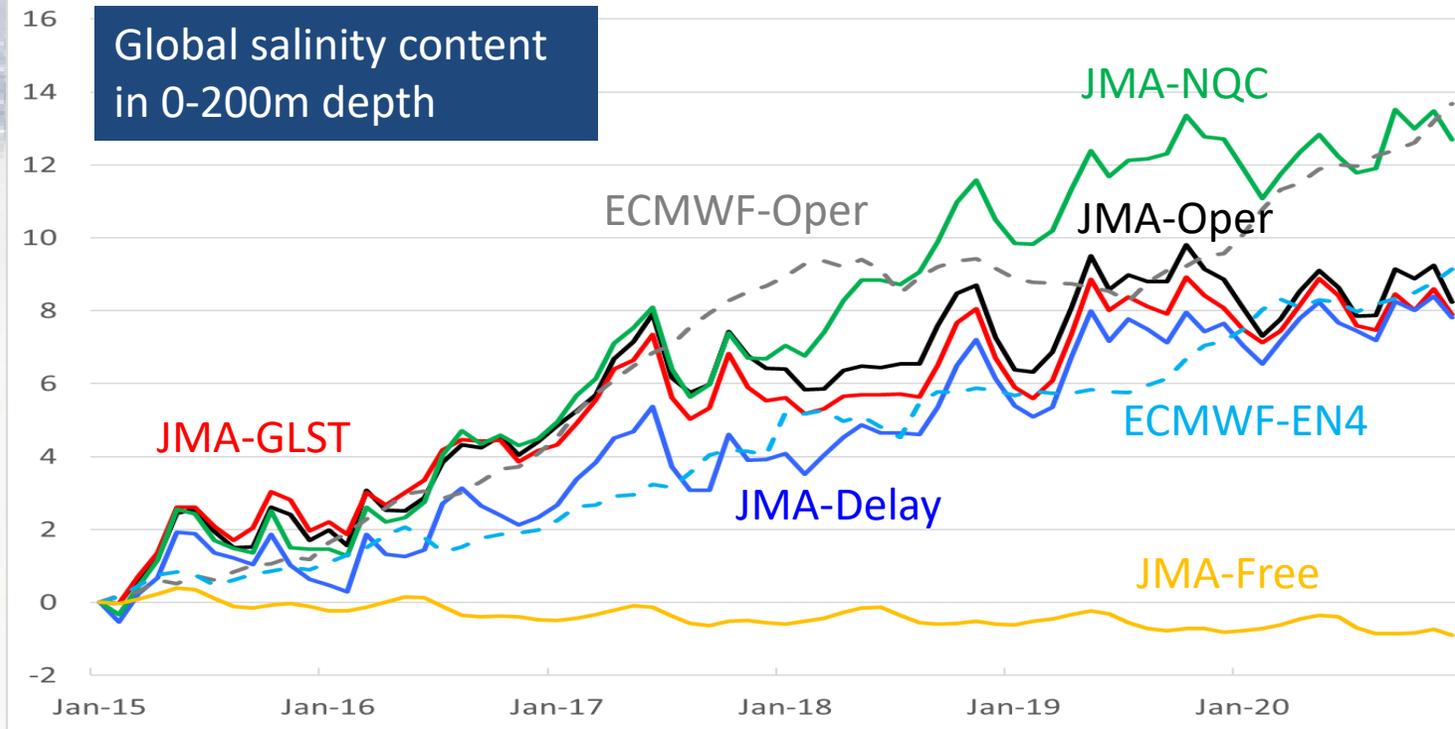
- ◆ **Objective:** **SynObs** will seek the way to extract maximum benefits from the combination among various observation platforms, typically between satellite and in situ observation data, or between coastal and open ocean platforms, in ocean/coastal predictions.
- ◆ **Strategy:** **SynObs** aims to identify the optimal combination of different ocean observation platforms through observing system design/evaluation, and to develop assimilation methods with which we can draw synergistic effects from the combination.
- ◆ **Scope:** Targets of **SynObs** include open-ocean (global, tropical, mid-latitude, polar areas), coastal, and biogeochemical (BGC) observing systems
- ◆ **Collaboration** with Ocean Observing Co-design and Coast Predict
- ◆ **Activities:**
  1. Collaboration for multi-system evaluation/design of observing systems.
  2. Supports data assimilation developments for effective observation data use
  3. Providing the information of QC and impacts of observations in operational ocean prediction
  4. Observing system evaluation showcase and reports
  5. Kickoff workshop on 15-18 Nov. at Tsukuba, Japan and online.

## ★ OSEs for evaluating the impact of the Abrupt Salinity Drifts (ASD)

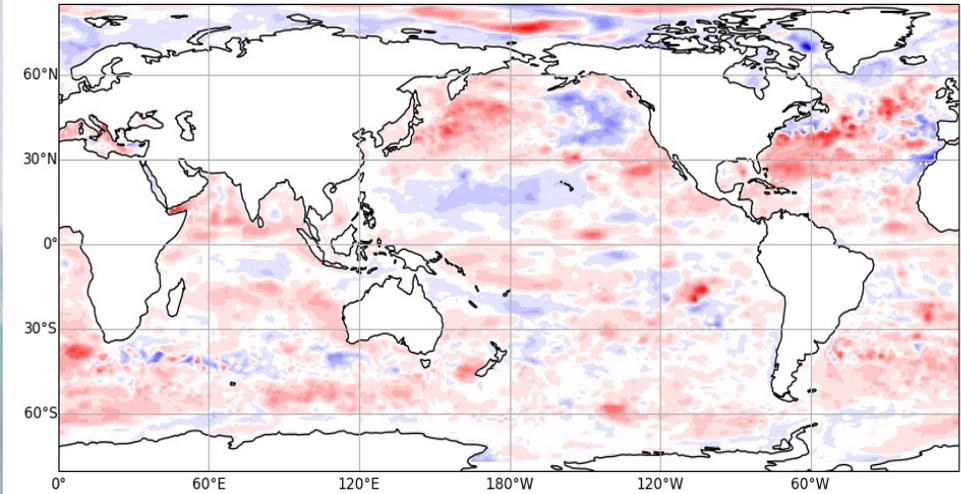
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- ◆ **ASD:** About 15% of Argo floats deployed after 2015 have experienced abrupt large salinity drifts due to break down of the instrument.
- ◆ **QC for ASD:** Argo GDAC listed the floats suffered from ASD in the gray list and attached the bad quality flag with their observation data.
- ◆ **Multi-System Observing System Experiments (OSEs):** OSEs are currently being conducted as a pilot project of SynObs in order to evaluate the impacts of ASD and the QC efforts by GDAC.
- ◆ **OSEs shown here** (Period: 2015-2020)
  - ❑ JMA-Oper: JMA's operational run (Argo data on GTS are used).
  - ❑ **JMA-GLST:** Same as JMA-Oper but the data of Argo floats in the gray list is excluded.
  - ❑ **JMA-Delay:** Same as JMA-GLST but the operational Argo data are replaced by delayed mode data at the Argo GDAC.
  - ❑ **JMA-NQC:** Same as JMA-Oper but the operational Argo data are replaced by the real-time Argo data in the Argo GDAC
  - ❑ **JMA-Free:** Free run of the JMA's system without model field modification
  - ❑ ECMWF-Oper: ECMWF's operational run
  - ❑ **ECMWF-EN4:** ECMWF's run with EN4 (delayed-mode) observation data

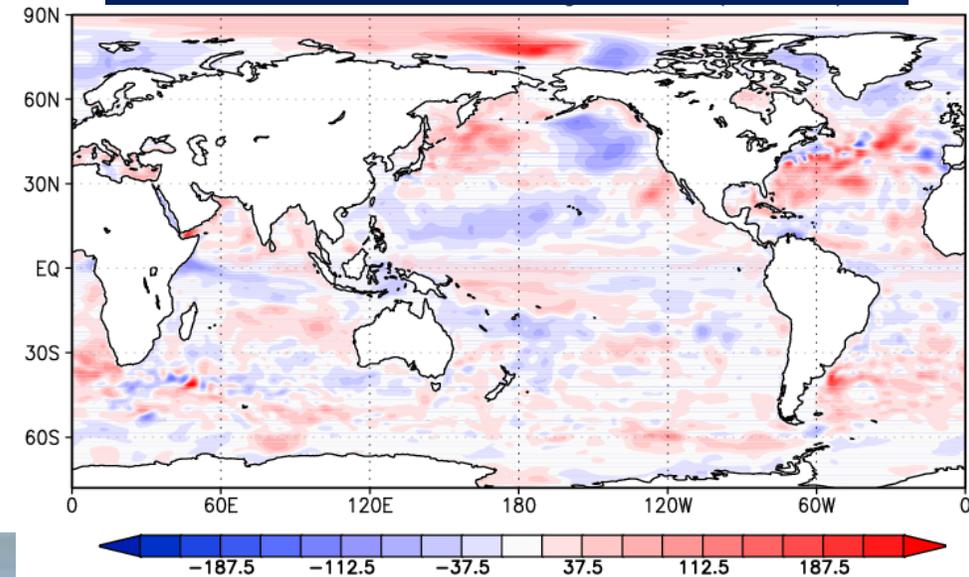
# ★ The OSE Results



## 0-2000m Trend (ECMWF-Oper)



## 0-2000m Trend (JMA-Oper)



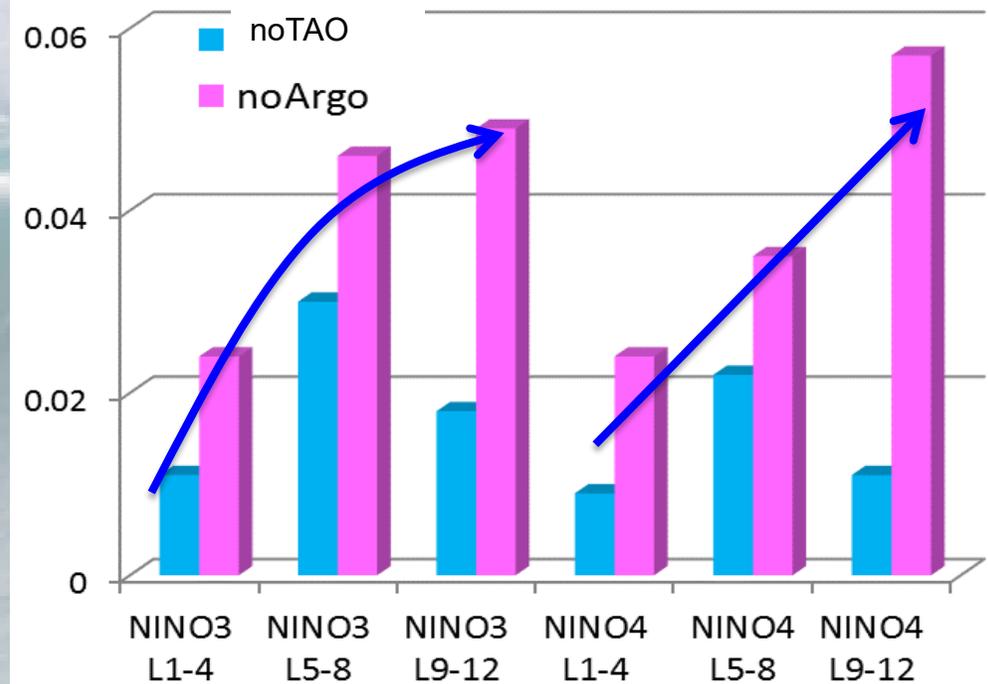
Trend: (2019-2020 Mean) – (2015-2016 Mean)

- Global salinity content is almost conserved in JMA-Free but it has increasing trend in other 4 OSEs in JMA and 2 OSEs in ECMWF.
- Real Time QC by the Argo GDAC effectively mitigate the trend in JMA. The gray list and delayed mode QC by GDAC in JMA, and using EN4 in ECMWF also contribute to reduce the trend.
- Results are consistent between JMA and ECMWF
- **The QC activity by the Argo GDAC contributes to reliable ocean reanalysis.**

## ★ Other Achievement and Future Plan

- To date, OceanPredict OS-Eval TT has made **variety of achievements**, other than the result shown in the previous page, in **assessing the Argo impact** in ocean predictions. (An example is shown on the left.)
- Because the evaluation results have system dependency, multisystem approaches are necessary to get a reliable conclusion. Thus, community collaboration is essential.
- **SynObs is now planning to conduct multi-system OSE/OSSE** for the evaluation of the synergy among in-situ and satellite observations under the international collaboration.
- **Argo is a main target of the evaluation!!**
- In order to make effective evaluation, information on the instruments and observation status are necessary. So, the **collaboration with Argo community** for the multi-system evaluation **is also desirable**.

Reduction of ACC for NINO3/NINO4 SST Forecasts when Argo/TAO are withheld (Old JMA system)



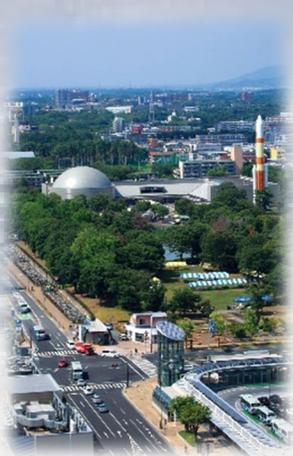
L1-4 indicate the forecasts for 1-4-month lead time.

- This figure indicates that Argo data has significant positive impacts on the ENSO forecasting.
- The longer the lead time, the greater the impact, probably due to improved representation of off-equatorial Rossby waves.

# SynObs Kickoff Workshop

15-18 Nov, 2022

Tsukuba, Japan and Online



- ◆ Presentations on the future vision of ocean observing systems, examples of observing system evaluations, introduction of data assimilation developments, and achievements of coupled predictions.
- ◆ Discussion on the plan of SynObs activities (Collaborative OSE/OSSE etc.)
- ◆ **Please join the discussion! (You can still register.)**

<https://oceanpredict.org/events/joint-os-eval-tt-cp-tt-symposium/#event-invitation>

SynObs  
Contact

SynObs Co-Chairs: Y. Fujii (JMA/MRI), Elisabeth Remy (Moi)

E-Mail: [synobs@mri-jma.go.jp](mailto:synobs@mri-jma.go.jp)

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