OPST- 5: **Collection of National Group presentations**

UN Decade plans and/or critical updates

Systems represented (in black):

Australia (BoM)
Brazil (REMO)
Canada (CONCEPTS)
China (NEMFC)
France (MOI)
India (INCOIS)
Italy (CMCC and OGS)
Japan (MRI-JMA)
Norway (TOPAZ)
Republic of Korea (KIOST)
UK/Europe (ECMWF)
UK (FOAM)
US (ECCO)
US (HYCOM)
USA (NCEP)

Australia (BoM)
Gary Brassington or replacement (tbc)

OceanMAPS

- **OceanMAPSv3.4**
  - **FGAT**
  - **Multiscale EnOI (additional low-mode assimilation stage)**
- **Tables on OceanPredict.org not up to date (edits provided)**
- **6 months plan**
  - **OceanMAPSv4.0i**
    - **Ocean model unchanged – OFAM3**
    - **Data assimilation upgrade – Hybrid-EnKF**
  - **Sentinel-6a**
  - **OceanMAPSv4.0 forecast demonstration**
    - **Ocean model – ACCESS-OM2-01 (MOM5+CIC5)**
    - **Full global ocean-sea-ice**
    - **75 vertical levels**

OceanMAPS

- **What TT activities are/could be beneficial for your system?**
  - **IV-TT**
    - Current verification – Eulerian and Lagrangian
    - Sea-ice verification
    - Ensemble forecast verification

  - **OS-Eval TT**
    - Observation impact comparisons (EnKF vs Var methods)

  - **DA-TT**
    - Assimilation of new platforms (e.g., SWOT/SKIM)
    - Method comparisons (EnKF vs VAR vs hybrid)
    - Initialisation

  - **COSS-TT**
    - Downscaling methods

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- **Ideas for the terms of reference (what should be the groups' purpose?)**
  - Performance reporting and performance target setting
  - Application impact statements
  - Observational requirements
  - Operationalisation (full operationalisation of dependent systems)

- **What benefit do you see for you/your system in becoming a member of this group?**
  - Collective international voice for shared national goals
  - Visibility of the systems
  - Sharing improvements and application impact
  - Driving future requirements

- **What would be the ideal mechanism & frequency of group interactions?**
  - Face-to-face when permitted (operational centre visits)
  - 6 monthly (minimum)
    - Joint meetings with other TT's

- **How do you see this group working with OPST, the TTs and external groups?**
  - OPST advocacy with other international groups
  - OPST and ETOOFS coordination
  - Challenge setting for TT's
  - Joint meetings with TT's

- **Should regional and ecosystem model efforts be represented in the group?**
  - 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.

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Would you be confident / interested to

- **Sharing issues among group members regarding issues with your** operational system?
  - If it is reciprocated certainly. Few groups appear to be open to this
  - Perhaps best done focusing on aspects rather than whole system

- **Develop best practices for tech transfer procedures?**
  - Of interest to some. Some issues are platform dependent and less common. Should this be performed under ETOOFS?

- **Sharing information about your system upgrades ?**
  - Mandatory for this group to function well

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Would you be confident / interested to

- **Develop common process for implementing class-4 / intercomparison at your system?**
  - Operationalisation of the mature parts of this
  - Improve the statistical robustness of the analysis/interpretation
  - Class-1 intercomparisons/Poor-man ensemble/Consensus forecast

Would you be confident / interested to

- **Contribute to updating/improving the current Nat system reports? What is missing?**
  - TT assistance for routine system reporting
    - Observational impact
    - System performance
    - Intercomparisons
  - Template for Service Impact reporting and use cases
  - Future requirements

Brazil (REMO)
Clemente Tanajura -UFBA

REMO – Oceanographic Modeling and Observation Network

- **Latest system upgrades and achievements in last 6 months**
  - No major updates were implemented in the Brazilian Navy Hydrography Center (CHM) operational system based on HYCOM and the REMO Ocean Data Assimilation System (RODAS) (HYCOM+RODAS)
  - HYCOM+RODAS is running for 2 different nested grid systems one with $1/4^o$ – $1/12^o$ – $1/24^o$ L21 available in the CHM site, and another with $1/12^o$ - $1/24^o$ L32 not available in the internet
    - Deep Argo has been assimilated (all the profile)

- **Are the tables for your system on OceanPredict.org up to date?**
  - Information offered in the table are only related to the system that is made available in the CHM site and it is up to date

- **What are the plans for the next 6 months?**

    - Interrupt the $1/4^o$ – $1/12^o$ – $1/24^o$ L21 nested system

    - work in collaboration with universities to develop a detection/forecasting system of trajectories of oil in the sea for the so-called Metarea V (34^oS-7^oN, west of 20^oW) in an effort that should last about 2 yr.

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REMO – Oceanographic Modeling and Observation Network

- **What TT activities are/could be beneficial for your system?**
  - OSSEs with SWOT synthetic data (OSEval-TT)
  - OSEs with SSS (OSEval-TT)
  - Experiments comparing strategies to produce ocean ensemble forecasts (DA-TT) since effort is under way to have an operational EnKF in a small regional domain in about 2 years

OP National reps – Organising a NEW Working Group

- **Ideas for the terms of reference (what should be the groups' purpose?)**
  - improve the synergy among OP Nat Centers; share regional data not available in GTS

- **What benefit do you see for you/your system in becoming a member of this group?**
  - better understanding of the details employed in the assimilation and modelling systems
  - facilitate the realization of short-visits for information exchange, if possible

- **What would be the ideal mechanism & frequency of group interactions?**
  - 2 meetings per year (1 virtual)
  - email and calls depending on collaboration strength

- **How do you see this group working with OPST, the TTs and external groups?**
  - 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.

- **Should regional and ecosystem model efforts be represented in the group?**
  - yes

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Would you be confident / interested to

- **Sharing issues among group members regarding issues with your operational system?**
  Yes

- **Develop best practices for tech transfer procedures?**
  Yes

- **Sharing information about your system upgrades ?**
  Yes

- **Develop common process for implementing class-4 / intercomparison at your system?**
  No

- **Contribute to updating/improving the current Nat system reports?**
  Yes.

- **What is missing?**
  Maybe, more references to internal tech reports.

Canada (CONCEPTS)
Greg Smith (ECCC)

OP National reps – latest system status updates

CONCEPTS

- **A major implementation (innovation cycle 3) was made on Dec. 1, 2021**
    - Details @ **Environment and Climate Change Canada's** MSC open data website
- **Innovation Cycle 3 highlights:**
    - **Atmospheric systems**
        - Various assimilation and model upgrades… + ice roughness improvements
        - Upgrade to GEM5 in Global ensemble system
            - Large improvement in 16d/32d ensemble ocean forecasts
    - **Ocean Systems**
        - GIOPS: Improved ice drift speed and diurnal SST variability
        - RIOPS: Bias correction for T/S profile data, improved diurnal SST variability and ice drift speed
        - WCPS: Combined with Gulf of St. Lawrence; Great lakes resolution increased to 1km
        - CIOPS-E: Improved tides, wave-current interactions
        - CIOPS-W: Inclusion of grid-refinement to 500m over Salish Seas
    - **Wave systems:**
        - Global deterministic and ensemble systems
        - Finite-element system for West coast
    - **Storm Surge systems**
        - Global deterministic system

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CONCEPTS

- **Plans for next 6 months:**
  - Implementation of 3 Port Prediction Systems in Development Best Effort routine mode with experimental E-navigation file production and distribution
    - Saint John (100 m), Vancouver Harbour (20 m), Fraser River (30 m)
    - Other ports to be included shortly after
 - HPC migration (operational and science computers)
  - Various active R&D projects…
    - Ensemble data assimilation
    - Arctic OSEs
    - SWOT OSSE
    - Improvement of surface flux formulation and balance in coupled systems
  - Ongoing use and improvement of accessibility tools Ocean Navigator and GeoMET data services

- **Are the tables for your system on OceanPredict.org up to date?**
  - **No. coming soon…**

Saint John NB

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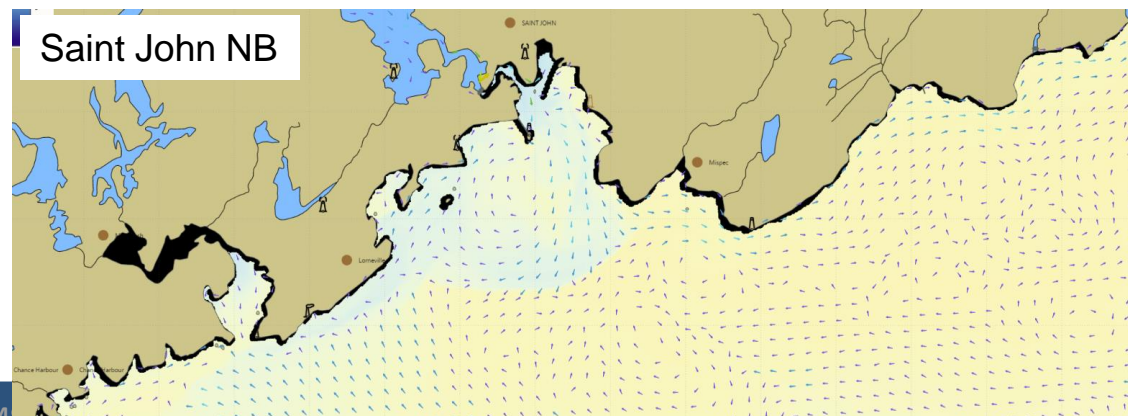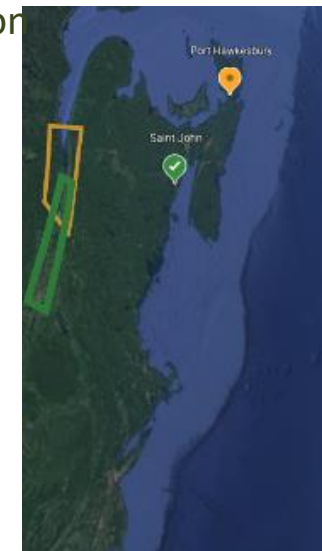
CONCEPTS

- **What TT activities are/could be beneficial for your system?**
  - **DA-TT**
    - Guidance on ensemble methods, assimilation of new observational datasets, multi-scale methods
  - **OSEVal-TT**
    - Keen for guidance and knowledge from others to apply limited resources we have for OSEs and OSSE's. Could benefit from coordinated or common OSEs
  - **COSS-TT**
    - Connection with hydrology, assimilation of different data types
    - Coastal/near shore/Port prediction and modelling
  - **CP-TT**
    - Detailed assessment of impacts of coupling and justification of coupling requirements an ongoing issue
  - **IV-TT**
    - Strong interest in surface drift (e.g. new Class4) and user/process based metrics and verification of probabilistic predictions
  - **MEAP-TT**
    - Development of CONCEPTS BGC would benefit from MEAP interaction

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- **Ideas for the terms of reference (what should be the groups' purpose?)**
  - Greater coordination and sharing of challenges and issues to enhance efficiency of operational efforts and supporting research/development functions to strengthen national services

- **What benefit do you see for you/your system in becoming a member of this group?**
  - More efficient problem solving when encountering operational issues
  - Coordinated approach to address common problems
    - E.g. Lobbying for changes in observational products

- **What would be the ideal mechanism & frequency of group interactions?**
  - Recorded video-conference monthly (or bi-monthly). A standing-committee on operational issues could be assembled as required.

- **How do you see this group working with OPST, the TTs and external groups?**
  - Could help to provide a link from OPST to operational and user needs
  - Extend reach of OPST within "operational" groups in national centres

- **Should regional and ecosystem model efforts be represented in the group?**
  - Yes. Could provide additional context, perspective and detailed assessments to observational (and other) issues arising.

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Would you be confident / interested to

- **Sharing issues among group members regarding issues with your operational system? YES**
  - for impacts of unplanned changes to observing system (SLA, in situ…)

- **Develop best practices for tech transfer procedures? YES**
  - for how to address different timescales in atmospheric and oceanic systems and impacts for coupled prediction

- **Sharing information about your system upgrades ? YES**
  - Via a webinar (recorded ?) to community on highlights (suggestion)

- **Develop common process for implementing class-4 / intercomparison at your system? YES**
  - Sharing of tools, methodologies and best practices is always beneficial.

- **Contribute to updating/improving the current Nat system reports? What is missing?**
  - Greater implication of "operations" groups? And development Groups? Not just Research people. Would help to highlight common technical issues

TO be removed，just for Greg's info purpose on what is plotted
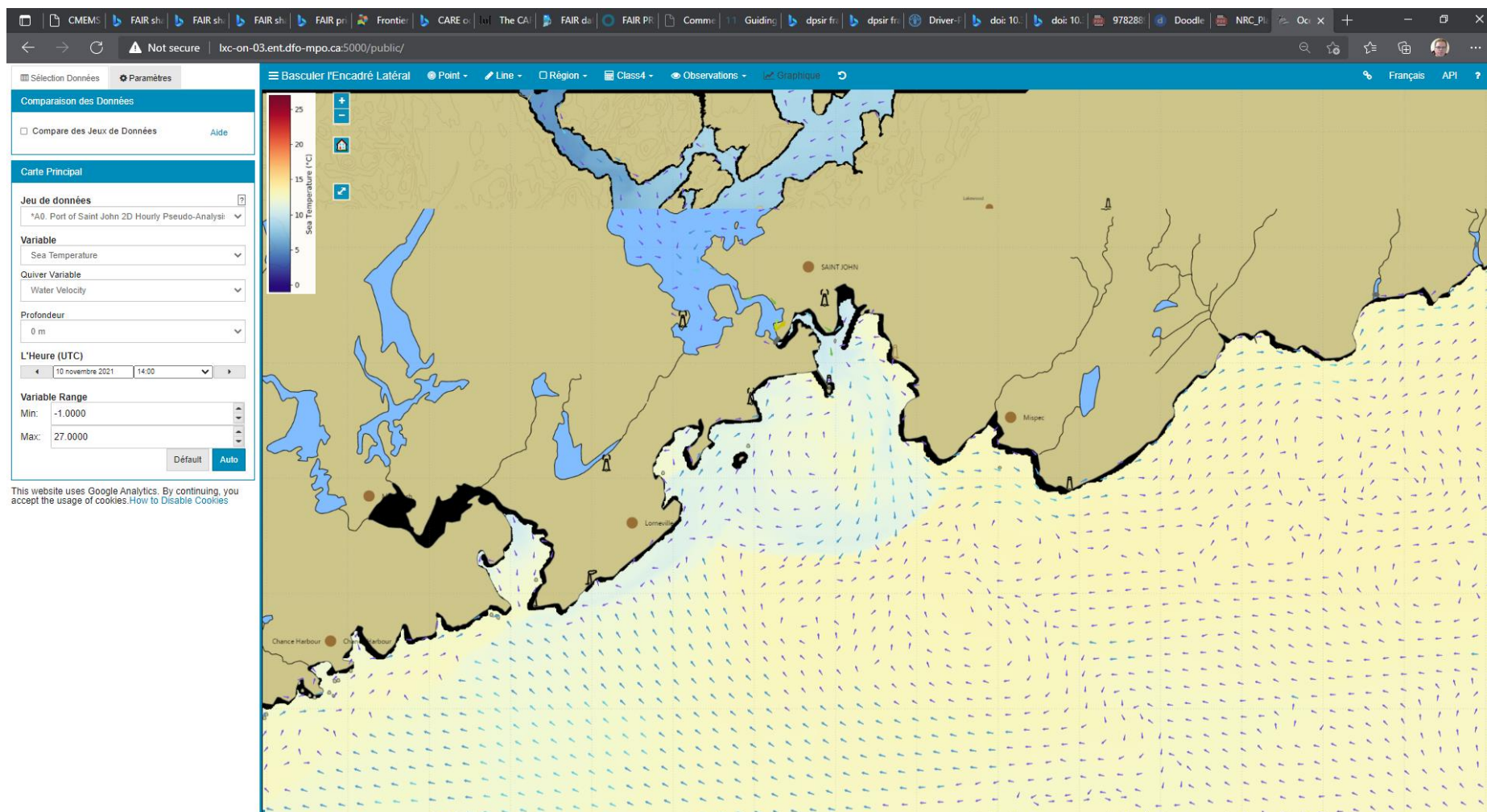
Latest system upgrades and achievements in last 6 months-CGOFS

- The Indian Ocean forecasting system is updated with 1/24° horizontal resolution based on NEMO v4.0,   which is qusi-opertional running.

- China Argo Real-time data Center have arrayed 40 floats in Northwest Pacific and the Indian Ocean. All the ARGOs data is operational transfered to NMEFC directly by China Argo Real-time data Center, which provied to the users by Data Cloud Service Platform.

- Global reanalysis system has been set-up by National Marine Data and Information Service with horizontal resolution is 1/12° cover the period from 1989 to 2020.

Are the tables for your system on OceanPredict.org up to date

Products:

- Based on the depth learning method of ConvLSTM, a 10km grid prediction product of SST is developed, which can provide SST prediction of the Northwest Pacific for the next 5day. The SST intelligent forecasting system uses meteorological forecast data, such as air temperature, air pressure, radiation flux, humidity and so on, and SST remote sensing observation to predict SST. The average absolute error of 24-hour SST prediction is less than 0.2 ℃.

What are the plans for the next 6 months?

- Intercomparison and Validation for the new Indian Ocean forecasting System by IVTT class4.

- We are develeping a new global ocean model which named Mass Conservation Ocean Model (MaCOM).

What TT activities are/could be beneficial for your system?

- Our global operational forecasting products have been uploaded the IVTT special data management system, NMEFC is one of the comparison member of IVTT.

-

France (MOI)
Yann Drillet

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Mercator Ocean : Forecasting systems

	system	model	Data assimilation	observations	forcing	forecast	products
MOi	GLO12v3 (PSY4V3R1)	NEMO3.1, 1/12°, orca grid, 50L	SAM2, 3Dvar bias correction	MDT,SLA,T/S,SST,SIC	IFS ECMWF 3h	Daily 10-d forecast	001_024 Regular 1/12° daily, monthly, surface hourly, 3D 6-hourly
MOi	BIO4v2	PISCES3.6 ¼°	SAM2V1	Ocean Color L4	GLO12v3	Weekly 10-d forecast	001_028 Regular ¼° daily

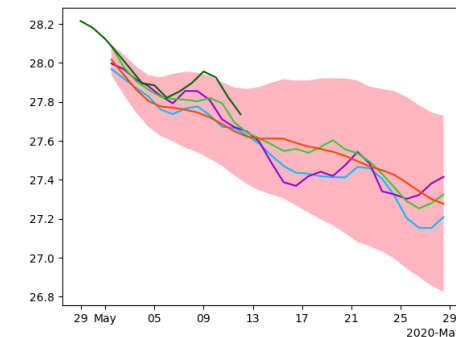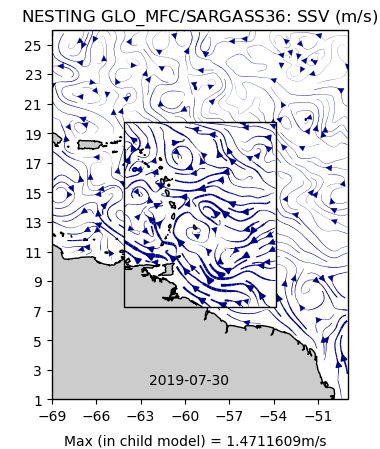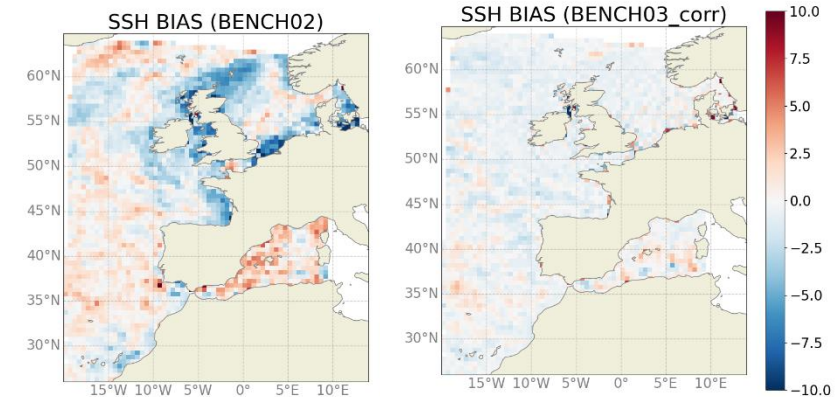|	system	model	Data assimilation	observations	forcing	forecast	products
NoLogin	IBI36	NEMO3.6, 1/36°, orca grid, 50L	SAM2, 3Dvar bias correction	MDT,SLA,T/S,SST	IFS ECMWF 3h	Daily 5-d forecast	005_001 Regular 1/36° daily, monthly, surface hourly, 3D hourly (some areas)
NoLogin	IBIBIO36	PISCES3.6 1/36°	NO	NO	Online coupled	Daily 5-d forecast	005_004 Regular 1/36°

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Mercator Ocean : Reanalysis systems

	system	model	Data assimilation	observations	forcing	period	products
MOi	GLORYS12v1	NEMO3.1 1/12°, 50L	SAM2 Bias corr	MDT,SLA,T/S,SST,SIC	ERAinterim/ERA5 3h	1993-2020 …	001_030 1/12° day, month
MOi	GREPv1&v2	NEMO 1/4°, 75L	4 systems	MDT,SLA,T/S,SST,SIC	ERAinterim/ERA5 3h	1993-2020 …	001_026 & 031 1° & ¼° day, month
MOi	BIORYS4v4	PISCES3.6 ¼°	NO	NO	freeGLORYS2v4 offline	1993-2020 …	001_029 ¼° month
CLS	MICRORYSv1	Seapodym	NO	NO	GLORYS	1993-2020 …	001_033 ¼° week
MOi	WAVERYSv1	MFWAM 1/5°	OI	SIW	ERA5 GLORYS12v1	1993-2020	001_032 1/4°, 3 hour
MOi	IBIRYS12	NEMO3.6 1/12°, 75L	SAM2 Bias corr	MDT,SLA,T/S,SST	ERAinterim/ERA5 3h	1993-2020 …	005_002 1/12° day
MOi	IBIBIORYS12	PISCES3.6 1/12°	NO	NO	online	1993-2020 …	005_003 1/12° day

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Mercator Ocean : systems under development, operational integration planned in 2022

- **Global** 1/12° forecasting system: new NEMO version (3.6 with GLS), new atmospheric forcing (1h/10km), new data assimilation scheme (4D analysis, use of superobs concept) and new observations (SST HR). Improvement of coupling with biogeochemistry

- **Ensemble** forecast: global ¼°, 50 members using ECMWF ensemble forecast in demo mode

- **IBI36** forecasting system: improvement of data assimilation on the shelf (SLA model equivalent and MDT)

- **GLORYS12**, **BIORYS4**, **MICRORYS12**: updated version and production in Interim mode close to real time

- **IBIRYS36**: physics and biogeochemistry reanalysis at high resolution

- **ARCAN36**: physical forcasting system in the Carribbean Sea

SSH BIAS (BENCH02)

SSH BIAS (BENCH03_corr)

NESTING GLO_MFC/SARGASS36: SSV (m/s)

2019-07-30

Max (in child model) = 1.4711609m/s

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Mercator Ocean

- **What TT activities are/could be beneficial for your system?**
- **IV-TT**
  - Systematic intercomparison
  - Definition of new common metrics
- **COSS-TT**
  - better understanding of the needs of coastal forecasters
  - share assessment methods and metrics dedicated for coastal process
  - Share information as system information table update
  - links with other communities thanks to joint meetings (ARCOM altimetry meeting for instance)
- **MEAP-TT**
  - Large diversity of ocean biogeochemistry models in the community, exchange on state of the art developments and impact of parametrisation and/or choice on the solution
- **OS-Eval-TT**
  - Better understanding on how different types of ocean observations are constraining the forecasts and analysis -> improve/adapt the assimilation scheme, assimilated data sets and QC procedures.

- **Ideas for the terms of reference (what should be the groups' purpose?)**

Provide guidance in operational system development and evolution cycle

Review process for transition into operation

Tools to manage code, test …

- **What benefit do you see for you/your system in becoming a member of this group?**

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.

- **What would be the ideal mechanism & frequency of group interactions?**

Perhaps a semi-annual meeting in which there would be exchanges about the behaviour of each system on a few common areas.

- **How do you see this group working with OPST, the TTs and external groups?**

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.

- **Should regional and ecosystem model efforts be represented in the group?**

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.

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Would you be confident / interested to

- **Sharing issues among group members regarding issues with your operational system?**

Yes. And interested in sharing successes as well...

- **Develop best practices for tech transfer procedures?**

Yes

- **Sharing information about your system upgrades ?**

Yes

- **Develop common process for implementing class-4 / intercomparison at your system?**

Yes

- **Contribute to updating/improving the current Nat system reports? What is missing?**

Yes

India (INCOIS)

Arya Paul

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INDOFOS

- **Latest system upgrades and achievements in last 6 months**
  Sea Level Anomaly Assimilation test runs are completed in the regional basin-wide Indian Ocean ROMS (~ 9 km resolution).
- **Are the tables for your system on OceanPredict.org up to date?**
  Yes
- **What are the plans for the next 6 months?**
  The operational ocean forecasting system is undergoing a change and is scheduled to be operational in 2027.
  Proposed Ocean Modeling Framework:
  1) MOM6 for global to regional level applications.
  2) LETKF DA system in MOM6.
  3) FVCOM for coastal, shelf sea and estuary applications.

INDOFOS

- **What TT activities are/could be beneficial for your system?**

  1) Coastal Ocean and Shelf Seas TT
  2) Data Assimilation TT
  3) Intercomparison and Validation TT
  4) Marine Ecosystem Analysis and Prediction TT
  5) Observing System Evaluation TT

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- **Ideas for the terms of reference (what should be the groups' purpose?)**
  1) Connect similar operational systems.
  2) Knowledge and Technology Transfer.
  3) Troubleshooting issues in existing systems.
- **What benefit do you see for you/your system in becoming a member of this group?**
  INDOFOS will learn about new system upgrades, new scientific developments and technological developments occurring at other centers.
- **What would be the ideal mechanism & frequency of group interactions?**
  6 months.
- **How do you see this group working with OPST, the TTs and external groups?**
  There will likely be some overlaps and boundaries may be defined. The group may select one representative to deal with all other teams/groups.
- **Should regional and ecosystem model efforts be represented in the group?**
  Yes

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Would you be confident / interested to

- Sharing issues among group members regarding issues with your operational system?

  Yes

- Develop best practices for tech transfer procedures?

  Yes

- Sharing information about your system upgrades ?

  Yes

- Develop common process for implementing class-4 / intercomparison at your system?

  Yes

- Contribute to updating/improving the current Nat system reports? What is missing?

  Yes

Italy (CMCC and OGS)
Giovanni Coppini

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CMCC GLOBAL OCEAN EDDYING FORECASTING SYSTEM AT 1/16 (GOFS16)

▪ **Latest system upgrades and achievements in last 6 months**

✔ The system entered the OceanPredict ensemble in 2021 for the comparison of T,S,SLA.

✔ Minor updates were included in the last 6 months about the validation and upload system (daily statistics on the ftp GODAE server)

▪ **Are the tables for your system on OceanPredict.org up to date**

  ▪ **Oceanpredict webpage is not updated for GOFS16:**

  • miss the description of the global system in
https://oceanpredict.org/science/operational-ocean-forecasting-systems/system-descriptions

  • wrong link and naming in
https://oceanpredict.org/science/operational-ocean-forecasting-systems/ocean-models/#section-model-characteristics

▪ **What are the plans for the next 6 months?**

  • Test with new atmospheric forcing

  • Test with new mixing schemes

  • Test on inclusion of sea-ice categories

  • Test on improved sea-ice DA
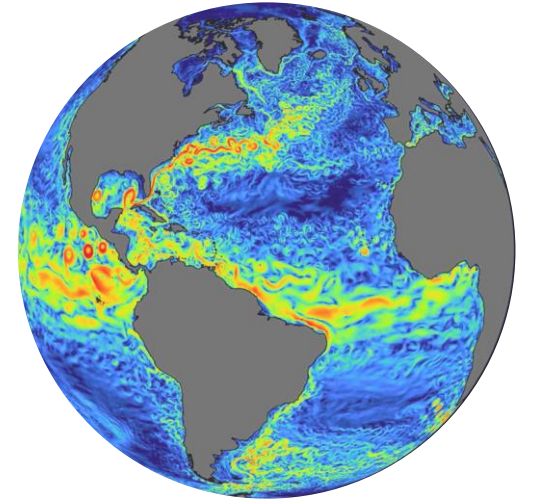
CMCC Mediterranean Forecasting System (MedFS)

▪ **Latest system upgrades and achievements in last 6 months**

From the May 2021 MedFS system includes tides

✔ 8 tidal components are explicitly represented (tidal potential)
✔ Tidal BDY in the Atlantic
✔ Assimilation of tidal signal from SLA satellite data

From Dec 2021 MedFS system will be forced using daily Po river runoff obs

✔ 38 river runoff daily climatologies
✔ Po river observed daily runoff (persistence for the forecast)

▪ **Are the tables for your system on OceanPredict.org up to date**

Tables need some updates and corrections (a separate document is provided)

▪ **What are the plans for the next 6 months?**

Jan 2022: entering the 2nd phase of Copernicus Marine
The operational system will be updated at the end of 2022 by including:

- Improved tidal representation (GB modified bathy + wave drag)
- Use higher frequency and forecast river data (according data availability)
- Assimilation in the Atlantic-box
- Unfiltered 7km SLA + HY-2B + S6
- Use a new MDT
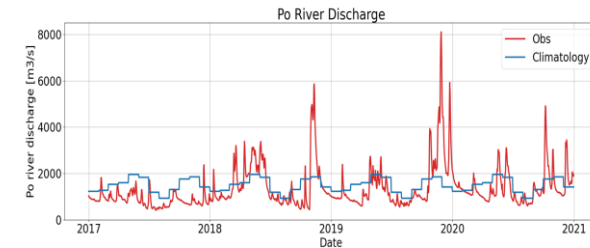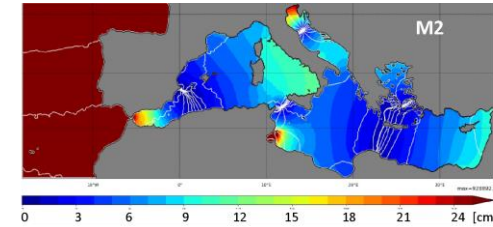
OGS Mediterranean Biogeochemical Forecasting System (MedBFM)

▪ **Latest system upgrades and achievements in last 6 months**

From Dec 2021 MedBFM system will include daily discharge of nutrient, alkalinity and DIC for the Po river (Adriatic Sea) using daily runoff obs

✔ 38 river: nutrients, alkalinity and DIC discharge from climatologies

✔ Po river: daily discharges from observed daily runoff (persistence for the forecast) and reference concentration in river water

Phosphate discharges [mmolPO4/day]

▪ **Are the tables for your system on OceanPredict.org up to date**

Tables need some updates and corrections (a separate document is provided)

▪ **What are the plans for the next 6 months?**

Jan 2022: entering the 2nd phase of Copernicus Marine
The operational system will be updated at the end of 2022 by including:

• Coupling BFM with OASIM and bio-optical module for multispectral light formulation

• Use higher frequency and forecast river data for nutrient discharges (according data availability)

• Assimilation of oxygen from BGC-Argo

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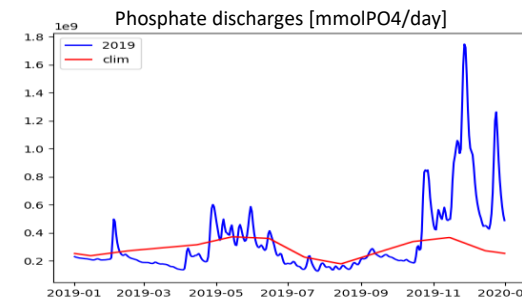
Italian Participation

- **What TT activities are/could be beneficial for your system?**

GOFS16 is part of the IV-TT since 2021: beneficial activities concern the definition of new metrics that avoid the "double penalty effect", common validation tool for currents

MedFS is part of the IV-TT: delivery of metrics were stopped in the last years and will be re-activated during 2022. Benefits from intercomparison with global models in the Mediterranean basin using standardized metrics and a reference observational dataset

MedFS is part of the DA-TT. It benefits from the monthly technical seminars held in the TT.

CMCC Coastal Models expertise is part of COSS-TT: beneficial activities from scientific and technical exchanges with the group.

MedBFM is part of the DA-TT and DA-MEAP. It benefits from the monthly technical seminars held in the TT and the periodic seminars held in the MEAP.

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- **Ideas for the terms of reference (what should be the groups' purpose?)**
  - Implement actions decided at the annual meetings
  - Facilitate the exchange of information among the nationals systems
  - Facilitate the uptake of the finding of the different TT into the National systems

- **What benefit do you see for you/your system in becoming a member of this group?**
  - Consolidate and facilitate the exchange of information
  - Increase the understanding of the characteristics of our national systems by the other members and vice versa

- **What would be the ideal mechanism & frequency of group interactions?**
  - Bi-monthly webconf and forum

- **How do you see this group working with OPST, the TTs and external groups?**
  - 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 and ocean experts.

- **Should regional and ecosystem model efforts be represented in the group?**
  - Yes of course

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Would you be confident / interested to

- **Sharing issues among group members regarding issues with your operational system?**
  - yes
- **Develop best practices for tech transfer procedures?**
  - yes

- **Sharing information about your system upgrades ?**
  - yes
- **Develop common process for implementing class-4 / intercomparison at your system?**

  - yes

- **Contribute to updating/improving the current Nat system reports? What is missing?**

  - Yes, include authors name, assign DOI, add figures; homogenise the format through provision of instructions

Japan (MRI-JMA)

Goro Yamanaka

OP National reps – latest system status updates

MOVE/MRI.COM

- **Latest system upgrades and achievements in last 6 months**
  - JMA provided information on pumice drifting prediction using the regional operational system. The pumice, which originated from a submarine volcano around the Ogasawara Islands in Aug. 2021 and were advected westward, caused severe damage on aquaculture and shipping around the Okinawa Islands during Oct. 2021.

- **Are the tables for your system on OceanPredict.org up to date**
  - Yes.

- **What are the plans for the next 6 months?**
  - JMA will upgrade the global system for seasonal forecasting in Feb. 2022. In the new system (CPS3), the horizontal resolution of the forecast ocean model is increased from one degree to one quarter degree. The assimilation method is also upgraded from 3DVAR to 4DVAR scheme.

OP National reps – latest system status updates

MOVE/MRI.COM

- **What TT activities are/could be beneficial for your system?**

  - Although all TT activities could be beneficial for our system, we are particularly interested in the following TT activities.

  - **Observing System Evaluation TT**: we need useful information about the impact of observation data on the operational system.

  - **Coastal Ocean and Shelf Seas TT**: we need useful information about the large-scale model assessment and improvement in coastal regions.

  - **Coupled prediction TT**: we have a plan to develop high resolution coupled prediction for general weather and ocean weather in the future.

OP National reps – Organising a NEW Working Group

- **Ideas for the terms of reference (what should be the groups' purpose?)**
  - The groups' purpose would be to build international cooperation and to share best practice in the operational system.

- **What benefit do you see for you/your system in becoming a member of this group?**
  - We could know about the latest information in each national centre.

- **What would be the ideal mechanism & frequency of group interactions?**
  - By online meeting or e-mail. Perhaps every six months.

- **How do you see this group working with OPST, the TTs and external groups?**
  - We think the role of this group is to communicate the OPST, TTs and external groups activities to the domestic community.

- **Should regional and ecosystem model efforts be represented in the group?**
  - Unfortunately, JMA is not directly related to ecosystem model efforts in Japan.

OP National reps – Working Group information sharing

Would you be confident / interested to

- **Sharing issues among group members regarding issues with your operational system?**
  - Yes.

- **Develop best practices for tech transfer procedures?**
  - No.

- **Sharing information about your system upgrades ?**
  - Yes.

- **Develop common process for implementing class-4 / intercomparison at your system?**
  - No.

- **Contribute to updating/improving the current Nat system reports? What is missing?**
  - Yes. Unification of description style may be desirable.

Norway (TOPAZ)
Laurent Bertino (NERSC)

TOPAZ Arctic MFC – NERSC & MET Norway

- **Last 6 months:**
  - May 2021: New ECOSMO biogeochemical forecast at 6 km resolution with assimilation of Ocean Colour and carbon cycle.
  - Dec 2021: Updated TOPAZ4b reanalysis: from 28 to 50 hybrid layers.
  - Dec 2021: 3km wave hindcast 1993-2020.
  - Dec 2021: neXtSIM-F covers Can. Archipelago

- **TOPAZ tables should be up to date on OceanPredict.org**

- **Next 6 months:**
  - Assimilation of ice charts in neXtSIM
  - Updated biogeochemical reanalysis (ECOSMO with EnKS, assimilating surface chlorophyll and nutrient profiles)
  - Provision of monthly climatologies from reanalyses

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- **What TT activities are/could be beneficial for your system?**
- **MEAP**
  - Valuable exchange of information
  - Good network of a small community
  - Productive networking (SEAMLESS consortium)

- **DA-TT**
  - Interesting plans.
  - We have been too busy to participate recently.

- **OSEVAL-TT**
  - Good network of a small community
  - We have been too busy to participate recently.

- **COSS-TT**
  - Valuable networking
- **IV-TT**
  - Very beneficial in principle
  - Differences with CMEMS procedures makes it demotivating.

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- **Ideas for the terms of reference (what should be the groups' purpose?)**
    - Reaction to travel bans

- **What benefit do you see for you/your system in becoming a member of this group?**
    - Compensate for the missing coffee breaks
    - Exchange of information in an informal settings

- **What would be the ideal mechanism & frequency of group interactions?**
    - Quarterly zoom meetings, variable time slot.
    - One presentation from one of the national teams

- **How do you see this group working with OPST, the TTs and external groups?**
    - N/A

- **Should regional and ecosystem model efforts be represented in the group?**
    - Yes (Norway does not run a global system).

Would you be confident / interested to

- **Sharing issues among group members regarding issues with your operational system?**
  - Yes

- **Develop best practices for tech transfer procedures?**
  - Yes

- **Sharing information about your system upgrades ?**
  - Yes. But I already do that all the time.

- **Develop common process for implementing class-4 / intercomparison at your system?**

  - Interested but not confident (lack of resources)

- **Contribute to updating/improving the current Nat system reports? What is missing?**

  - No glaring omissions in my view.

Republic of Korea (KHOA & KIOST)
Do-Seung Byun

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KHOA's KOOFS (Korea Ocean Observing and Forecasting System)

▪ **Latest system upgrades and achievements in last 6 months**

- *The Ulleungdo-Dokdo (UD) sub-coastal model, nested through an off-line technique within the East Korea Coastal Zone (EKCZ) model began operating.*
- *UD was coupled with the East Sea sub-regional forecasting system using data assimilation of the ensemble Kalman filter.*

- *Reanalysis data were produced for the Yellow and East China Seas (YES) and the East Sea for 10 years (2001- 2010).*
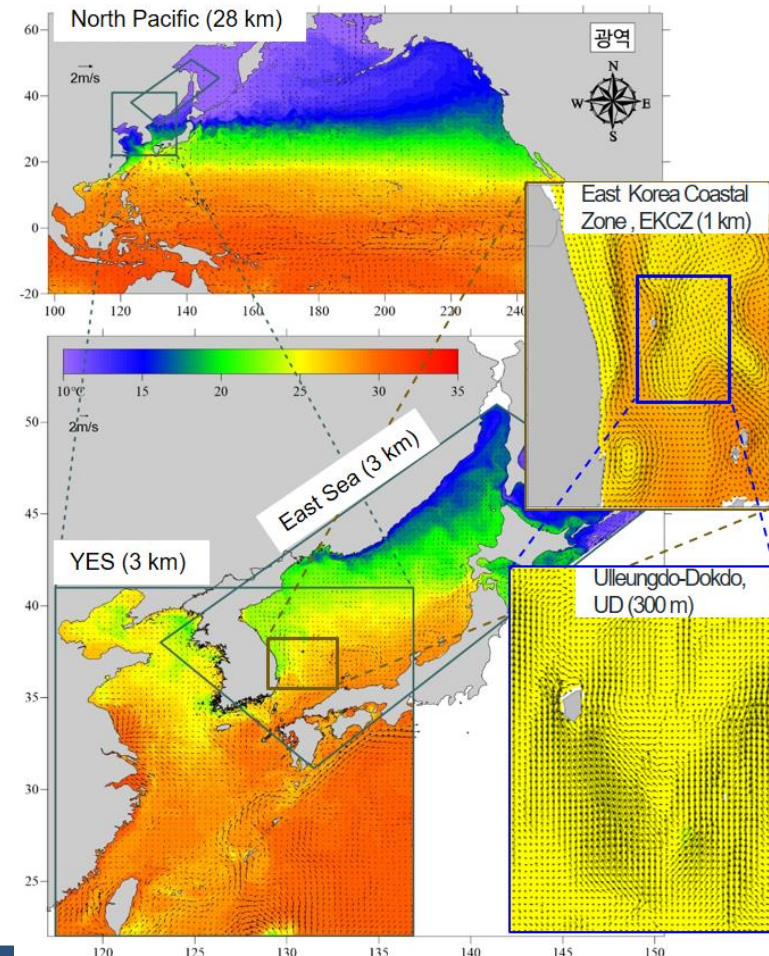
- **Are the tables for your system on OceanPredict.org up to date?**
- *No, they need to be changed.*

Republic of Korea

South Korea – operational ocean forecasting systems – updated Nov 2020					
Name	MODEL	Area	Resolution	Level	Forcing Data
KOOFS_NPACIFIC	ROMS	North Pacific (NPACIFIC)	0.25°	30 σ-level	NCEP GFS (NOAA)
KOOFS_YES	ROMS	Yellow Sea & East China Sea (YES)	3 km	41 σ-level	Hourly surface fluxes from WRF
KOOFS_East Sea	ROMS	East Sea	3 km	41 σ-level	Hourly surface fluxes from WRF
KOOFS_EKCZ	ROMS	East Korea Coastal Zone (EKCZ)	1 km	41 σ-level	Hourly surface fluxes from WRF
KOOFS_UD	ROMS	Ulleungdo & Dokdo (UD)	0.3 km	41 σ-level	Hourly surface fluxes from WRF

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KHOA's KOOFS (Korea Ocean Observing and Forecasting System)

▪ **What are the plans for the next 6 months?**

- *Establishment of a new sub-regional model, including the Yellow and East China Seas (YES) and the East Sea, will begin in 2022.*

- *Reanalysis data will be produced for the Yellow and East China Seas (YES) and the East Sea over 10 more years (2011- 2020).*
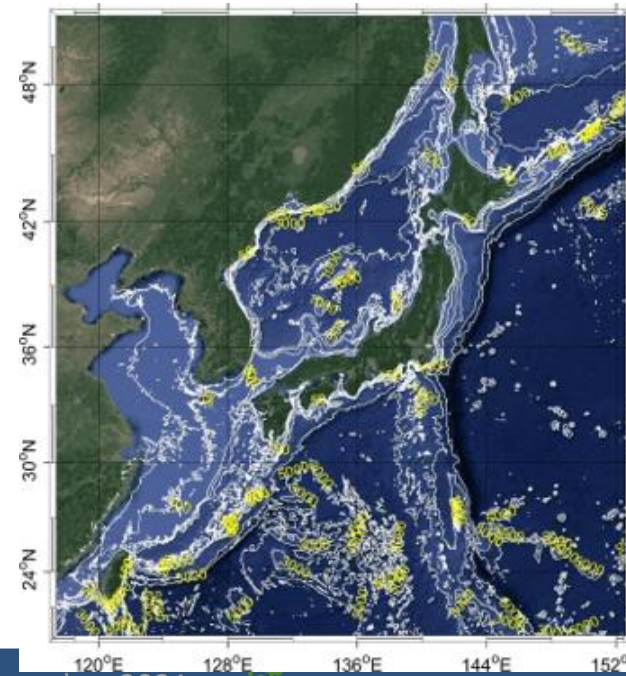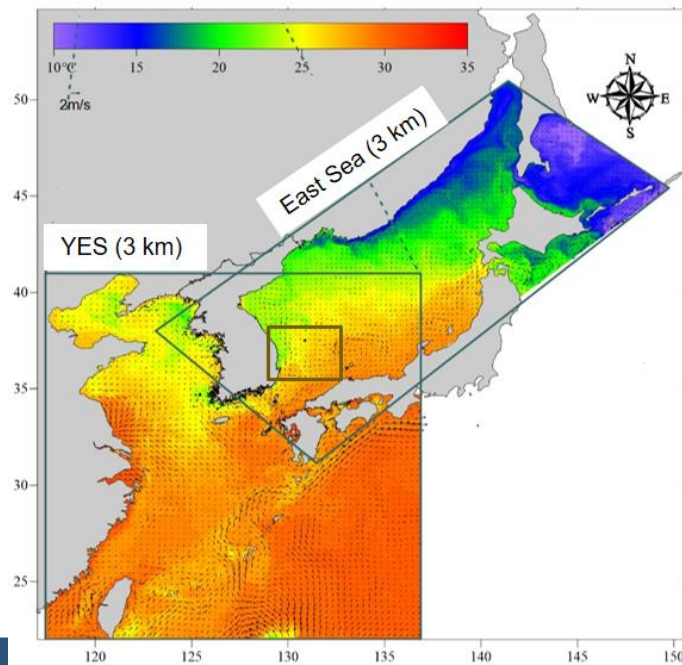
**KIOST's KOOS (Korea Operational Oceanographic System)**

▪ **Latest system upgrades and achievements in last 6 months**

- *The Coastal KOOS was transferred to a shipbuilding company, Korea Shipbuilding & Offshore Engineering (KSOE), the global leader in shipbuilding and offshore business. This is the 4th outcome of research to business (R2B) transfer for KOOS.*
- *Now the KSOE is operating the Coastal KOOS for checking the safe commissioning of new vessels.*

2020 → **2021**

▪ **Are the tables for your system on OceanPredict.org up to date**

- *Yes, they are up to date but the Coastal KOOS's model domain (L2) has expanded over the entire East Sea.*
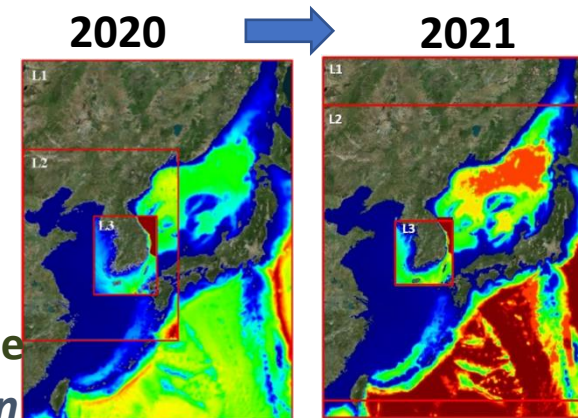
KOOFS_OPEM	GFDL-MOM5	Northwest Pacific	1/24°	51 layers (z-star coordinate)	6-hourly surface fluxes from ECMWF ERA INTERIM data (201501-201702)/KMA GDAPS (201703-)
Coastal KOOS	MOHID	**Yellow Sea, East China Sea, and East Sea**	1/48° (L2) and 1/288° (L3)	40 layers (8 sigma-levels and 32 z-levels)	Hourly surface fluxes from the WRF (Weather Research and Forecasting) model, with 3D-VAR cycling

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KIOST's KOOS

▪ **What are the plans for the next 6 months?**

- *New Coastal KOOS, a triangular unstructured grid forecasting system, will be established though testing and calibration to more precisely simulate the complex coastlines and many islands around the Korean Peninsula.*
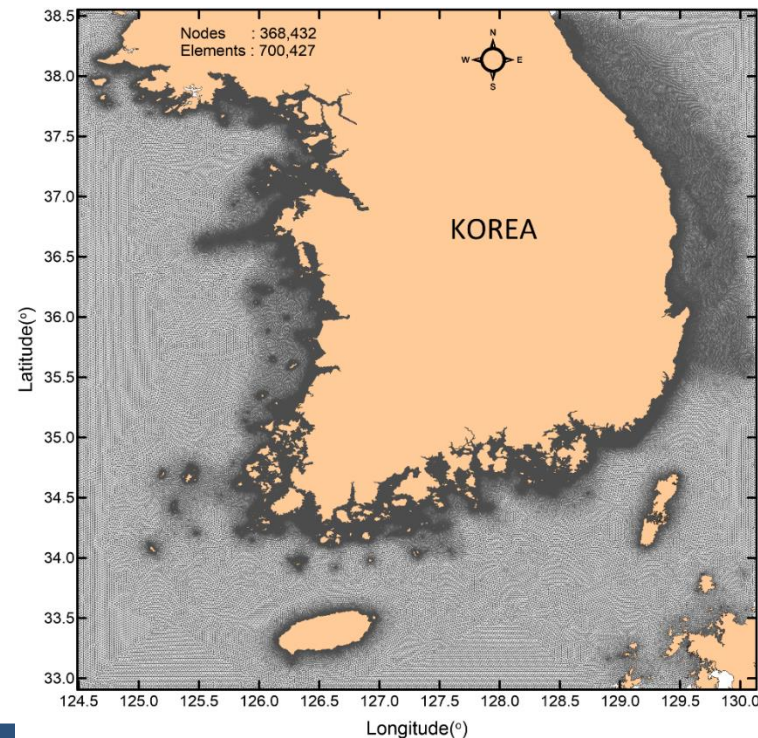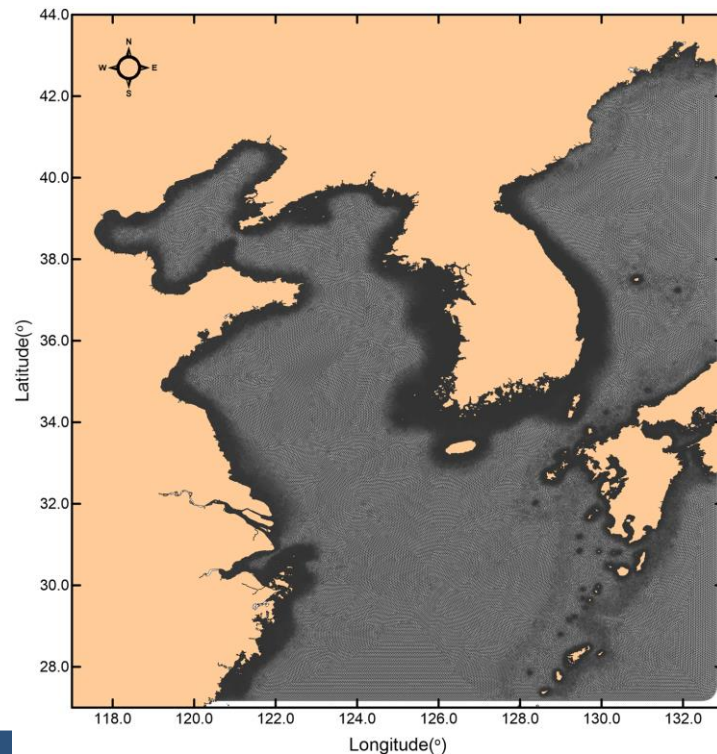
KHOA's KOOFS and KIOST's KOOS

- **What TT activities are/could be beneficial for your system?**
  - *Coastal Ocean and Shelf Seas (COSS-TT); Data Assimilation TT (DA-TT); Intercomparison and Validation (IV-TT); Observing System Evaluation (OS-Eval TT)*

  - *Generally, it is very useful to be able to share the various issues faced in establishing prediction systems in order to discuss possible solutions.*

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We do not have any particular interest in a new working group at this moment.

- Ideas for the terms of reference (what should be the groups' purpose?)

- What benefit do you see for you/your system in becoming a member of this group?

- What would be the ideal mechanism & frequency of group interactions?

- How do you see this group working with OPST, the TTs and external groups?

- Should regional and ecosystem model efforts be represented in the group?

Would you be confident / interested to

- **Sharing issues among group members regarding issues with your operational system?**

  - Yes, we are interested in this.

- **Develop best practices for tech transfer procedures?**

  - Yes, we are interested in this.

- **Sharing information about your system upgrades ?**

  - Yes, we are confident in this area.

- **Develop common process for implementing class-4 / intercomparison at your system?**

  - Yes, we are interested in this: intercomparison of regional model products would help to improve regional/coastal/shelf seas prediction systems.

- **Contribute to updating/improving the current Nat system reports? What is missing?**

  - Yes, we are interested in this: as an example, ideally the best Nat system reports can be recommended.

UK/Europe (ECMWF)
Kristian Mogensen

ECMWF

- **Latest system upgrades and achievements in last 6 months**
  - No upgrade to the ocean model and assimilation system

- **Are the tables for your system on OceanPredict.org up to date**
  - Yes

- **What are the plans for the next 6 months?**
  - We will continue to work on upgrade the NEMO model to version 4.0 and NEMOVAR system to a later versions
  - We are planning to start the production of reanalysis in second half of 2022 with coupled model upgrade in 2023

ECMWF

- **What TT activities are/could be beneficial for your system?**
  - **DA-TT:**
    - Coupled DA workshop at ECMWF

  - **CP-TT:**
    - We have good intention to contribute more to this TT, but haven't really followed through on that

  - **IV-TT:**
    - We should do more here, but we don't have the human resources

  - **OS-Eval-TT:**
    - Links closely to our DA work

Would you be confident / interested to

- **Sharing issues among group members regarding issues with your operational system?**
  - In principle yes, but some times issues are very system specific

- **Develop best practices for tech transfer procedures?**
  - We would be happy to exchange information about e.g. research to operations procedures

- **Sharing information about your system upgrades ?**
  - Yes

- **Develop common process for implementing class-4 / intercomparison at your system?**
  - In principle yes, but I don't think we have the human resources to commit to this

- **Contribute to updating/improving the current Nat system reports? What is missing?**
  - I would like to see a more unified report with easier system to system comparison

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FOAM (UK)

- **Latest system upgrades and achievements in last 6 months**
- **Are the tables for your system on OceanPredict.org up to date**
- **What are the plans for the next 6 months?**

- **Currently being trialled for operational implementation in February 2022:**
  - Global weather forecasts to come from coupled ocean-atmosphere system with 1/4° ocean and 6-hourly cycling
  - UK weather forecasts to use forecast SST from 1.5 km regional model
  - Updated mean dynamic topography and observation processing for global and regional models
  - Wave models upgraded to WAVEWATCH III v7.12
  - Regional surge model now uses 2D varying bottom friction
  - Major postprocessing improvements
  - Retire legacy 1/12° basin-scale systems now global 1/12° operational
  - Technical updates in preparation for new supercomputer in 2022

FOAM (UK)

- **What TT activities are/could be beneficial for your system?**

- **Are beneficial:**
  - Class4 intercomparison exercises, such as current work on velocities and ice area in IV-TT
  - Technical discussions around e.g. data assimilation, BGC ensembles, etc

- **Could be beneficial**
  - Official class4 website hosted by OceanPredict
  - Further intercomparisons, e.g.:
    - Impact of physics assimilation on vertical mixing and biogeochemistry
    - Tropical storm forecasts in coupled and uncoupled systems

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- **Ideas for the terms of reference (what should be the groups' purpose?)**
  - Improve dialogue between national systems and with TTs

- **What benefit do you see for you/your system in becoming a member of this group?**
  - Increased visibility of international developments and knowledge sharing

- **What would be the ideal mechanism & frequency of group interactions?**
  - Semi-regular (6-monthly?) video meeting with talks and discussion?

- **How do you see this group working with OPST, the TTs and external groups?**
  - Help with coordinating research efforts and operational systems

- **Should regional and ecosystem model efforts be represented in the group?**
  - I think they should be included, even if core focus is on global physics
  - Can link to COSS-TT and MEAP-TT where appropriate

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Would you be confident / interested to

- Sharing issues among group members regarding issues with your operational system?

- Develop best practices for tech transfer procedures?

- Sharing information about your 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?

  - **Yes to all, though resourcing requirements would need to be discussed**
  - **1/12° global system is for defence, so restrictions on data sharing**

USA (NOAA-NCEP)
Avichal Mehra, presented by Eric Bayler

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RTOFS

- **All NOAA/NCEP operational systems under a freeze/moratorium till FY22 Q4**
- **The OP tables need updating for RTOFS**
- **Add new/alternate ocean observations for ingestion after the moratorium is lifted**

  - METOP-C SST's
  - Sentinel-6 ADT's
  - Saildrone T,S

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RTOFS

▪ **What TT activities are/could be beneficial for your system?**

➢ **Now**
- o **Data Assimilation Task Team (DA-TT)**
- o **Observing System Evaluation (OSEval-TT)**
- o **Coupled Prediction Task Team (CP-TT)**
- o **Intercomparison and validation Task Team (IV-TT)**
- o **Coastal and Shelf Task Team (COSS-TT)**

➢ **Future**
- o **Marine Ecosystem Analysis and Prediction Task Team (MEAP-TT)**

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- **Ideas for the terms of reference (what should be the groups' purpose?)**
  - Co-ordination with Task Teams and external groups
  - Emphasize operational nature/targets of OceanPredict Science
  - Roles should be distinct from ETOOFS

- **What benefit do you see for you/your system in becoming a member of this group?**
  - Leveraging mature TT activities for potential operational use
  - Increase operational relevance of OP
  - Provide connections to other operational activities

- **What would be the ideal mechanism & frequency of group interactions?**
  - During regular OPST and TT meetings

- **Should regional and ecosystem model efforts be represented in the group?**
  - Yes

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Would you be confident / interested to

- **Sharing issues among group members regarding issues with your operational system?**
  - Science issues; Evaluation Tools and Data

- **Develop best practices for tech transfer procedures?**
  - Unsure because of diverse procedures in use. Operational tech transfer procedures/rules are unique for every op centre.

- **Sharing information about your system upgrades ?**
  - Yes

- **Develop common process for implementing class-4 / intercomparison at your system?**
  - Already in place.

  Caveat -- At NCEP/EMC, V&V is handled by a separate Branch/Group which is distinct from model development/operations.

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Would you be confident / interested to

Contribute to updating/improving the current Nat system reports? What is missing?

- List of observations assimilated, coupling strategies (for coupled systems)