

November 12 20 UTC session : OCEAN

Fabrice Hernandez (keynote) : Measuring Performance, Skill and Accuracy in Operational Oceanography : Overview of approaches proposed by the GODAE/Ocean Predict Intercomparison and Validation Task Team

Discussion/questions:

Barbara Casati (BC): a good overview of the data. We (the atmospheric community) share issues of data sparseness and representativeness

BC: how are the drifts verified: integrating the displacement every hour?
(was not able to capture the answer very well – I invite Fabrice to fill this in)

Mohan: over the Bay of Bengal and Indian Ocean, we see extreme ocean warming leading to cyclones. Is extreme warming observed in the data and how can we get the data?

FH: daily changes are monitored. We have observations of surface and mixed layer. Compare with SST satellite product. Cooling due to tropical cyclones – can capture sudden changes in mixed layer due to cyclones. We see both warming and changes to extreme events and these are captured in the metrics. Drifters in the Bay of Bengal include temperature, salinity, oxygen content etc.

Dominique Brunet: Frechet metric (dog-leash metric) could also be used for comparing trajectories
BC [3:56 PM] Casati,Barbara (ECCC)

To Dominique: if they use every day distance, it is a bit like a Frechet, right Angela?

[3:58 PM] Cheng,Angela (ECCC)

Frechet can match with relaxed temporal constraints, allowing for better spatial matching.

Dominique: It might happen that the final distance is small even if the trajectories are very different

[3:57 PM] Peterson,Andrew (ECCC)

So basically, we have lots we can learn from the atmospheric dispersion community?

Should we be investigating other methods for calculating drift?

FH: open to looking at these

Jan Maksymczuk: We have recently been working with Marion to apply HiRA and MODE to ocean datasets (see the next talk...), so the cross-pollination of ideas between the ocean and atmospheric communities is progressing well

[3:57 PM] Casati,Barbara (ECCC)

Similarly, how did they compare the gulf stream?

FH: Air France crash over the Atlantic spurred work on drfit. Compare different forecasts. One metric is the position of the Gulf Stream → 12C SST value. Use ensemble mean, look at clustering.

[4:06 PM] todd.spindler (Guest)

For the Gulf Stream distance metric we use a variant on the Modified Hausdorff Distance to compare between the observed GS path (from the US Navy) and a path computed from ocean models.

BC: question about ARGOS

FH: salinity, temperature oxygen content etc data. Robotic system, lifetime 2-5 years, probes remain at a depth of 1000m, surfacing every 10 days to transmit data, then drop to 2000m before coming back to 1000m.

BC: this is analogous to radiosonde data

Marion Mittermaier (oral): Using MODE and MODE TD to investigate the evolution of the 2019 Chlorophyll-a bloom season in the North West European Shelf region

Discussion/questions

[4:28 PM] Brunet, Dominique (ECCC)

Is it appropriate at all to try to apply MODE to CHL data? As I see it, one strength of MODE is the clear interpretability when objects can be clearly defined and properly matched. However, it seems to me that it is very hard to get clearly interpretable objects (e.g. ellipsoid-like) after smoothing and thresholding data.

MM: not expert in biogeochemical area. The gridded product can identify clear features of distinct blooms. The bloom is distinct from the background and can be followed. Satellite data is important as gridded information is important. Traditional verification measures (e.g. Hanssen-Kuiper) can be misleading. It's similar to thunderstorms, which pop up before you think, etc.

Drew Peterson: with respect to bias, is this regards the biogeochemical or the physical model.

MM: some differences are noise. DA could help sort this out. Timing errors of 1 ½ months indicates there are deficiencies in the physical model

Gregory Smith (oral): Verification of eddy-properties in operational oceanographic analysis systems

Discussion/questions

[4:44 PM] Peterson, Andrew (ECCC)

The altimeter products (AVISO) also have a 7-day (I believe) repeat cycle. Problem of short radius is not all model. AVISO is not getting all either

GS: could be spurious eddies in AVISO. We tracked eddies in time, using only eddies that lasted a minimum of 4 days

BC: is the equation on slide 14 used to isolate eddies? Is this used to do the eddy matching on slide 9?

GS: for each eddy, we identify all eddies within a radius, then minimize the cost function. There are issues with smaller eddies and had considered leaving them out, but decided that the fairest approach was to keep them all

FH: why not use vorticity?

GS: The problem is with respect to what is observed. It's easier to use sea surface height. Other methods are promising, but need good velocities.

FH: Propagation is good for comparing models. Are you going to use this?

GS: This is not necessarily going to tell you location. Next step is forecast lead-time for model geophysical fields

Emanuela Clementi (poster): The Mediterranean, Black and Marmara Seas analysis and forecasting physical systems: validation methodology and quality assessment

Discussion/questions

BC: These metrics are the same as those from Fabrice Hernandez presentation?

EC: The observations are the same

BC: do you exchange scores?

EC: yes, Centres send scores to centralized hub and are published on Copernicus web-site

Saima Aijaz (oral): Verification and inter-comparison of near-surface ocean currents in a global ocean forecasting system

FH: Is there a positively oriented metric to differentiate zonal and meridional characteristics?

AS: we are focusing on this. Complex analysis takes into account both, but haven't looked at specific methods. Calculating metrics in different regions accomplishes this somewhat

[5:41 PM] Casati,Barbara (ECCC)

For the comparison of the errors, slide 10, you could use a bootstrap technique and assess if the difference is significant (the scatter plot is quite noisy).

AS: we have looked at density plots for these errors. Looked at scatter plots of errors in unfiltered data. When data is filtered, outliers are eliminated.

[5:42 PM] Casati,Barbara (ECCC)

For the difference in the pdf, maybe the earth moving distance could be a metric?

[5:39 PM] Peterson,Andrew (ECCC)

Any idea about the observational error? Buoys in high current locations will have short resident time and higher obs. error.

[5:57 PM] Saima Aijaz (Guest)

Andrew, yes you are correct, we are looking at both obs and model errors. Though recalling that very high currents generated by winds are excluded because the drogoue is likely untethered from the drifter buoy

[6:00 PM] Peterson,Andrew (ECCC)

I was thinking that your largest errors (either model) were in western boundary currents, where the bouys won't spend a lot of time before being ejected -- therefore I would suspect the observational error in these locations would be larger.

[6:02 PM] Saima Aijaz (Guest)

yes indeed, and if the obs are sparse, then the model errors could be higher

Yvonick LeClainche (poster): Regional Class 4 verification of the Canadian operational ice-ocean prediction systems

BC: you could exchange vertical profiles. Compare that with WMO exchange of atmospheric variables

TR: only exchange verification data on 4 levels

End of session discussion

BC: the atmospheric community has a lot to learn from the Ocean community, who are very advanced in their metrics.

Sorry, I got totally distracted here and did not capture much of Fabrice's comments, except that he mentioned lots of data being stored, over a long time period, and invited people to look into this and share and exchange ideas. Barbara then suggested setting up a meeting of interested parties to discuss further work.