Met Office report

In situ Observations

- MAWS *(Marine Automated Weather Stations)* – 8 offshore including 2 in Biscay. Three inshore, two off SW Wales and one in English Channel (E1). 5 Light Vessels on-shelf in English Channel. Spectral wave data now available from 7 buoys.
- Data from North-Sea rigs and platforms received and transmitted on GTS. Met-ocean including waves and some SST. Of the order 60 presently operating.
- Deployment of drifters (through E-SURFMAR) in the North Atlantic. Number of drifters ~110 in N Atlantic and Med, a number of which enter the NOOS region.
- Voluntary Observing Fleet (VOF) of around 270 ships. Around 20% of UK Voluntary Observing Ships (VOS) observations are from the North Atlantic.
- 42 vessels with Automatic Weather Stations (AWS), the majority of ship-of which are in the NOOS region.

Remote sensing observations

- The OSTIA SST and sea-ice analysis produces 1/20^{o} products of foundation temperature globally.
  - Also developing diurnal products
- Available via MyOcean

Modelling - operational

- baroclinic model (NEMO FOAM AMM7) nested into a regional open ocean model (FOAM NATL12), 6 day forecasts, 1 x daily, nested to ERSEM ecosystem model and including OI SST data assimilation
- barotropic model (POLCOMS on C-grid) using 3 nest (a 12km shelf model (CS3X), a 1.2km Bristol Channel model and a 1.2km South Coast model). 4 x daily, 6 day forecasts. Model surge is combined with tides predicted at tide gauge sites.
- WWW-III surface waves – European wave model at 8 km, 4x daily (hourly) 2 day forecast, 2x daily (3-hourly) forecast to day 5 . UK waters wave model at 4 km, 4x daily (hourly) two day forecast

Modelling - Coming up

Pre-operational

- NEMOVAR data assimilation scheme

Under development:

- coupled ocean, atmosphere and wave models globally and for NOOS region (~1nm) (medium-term)
- A 4km ocean model for use in a coupled O-A-W system in the NOOS region (short-term)
- Real-time nesting to a Baltic model for outflow conditions to NWS model
- Real-time ingestion of hydrological data for prescribing river inputs
- NEMO based surge model (longer-term)

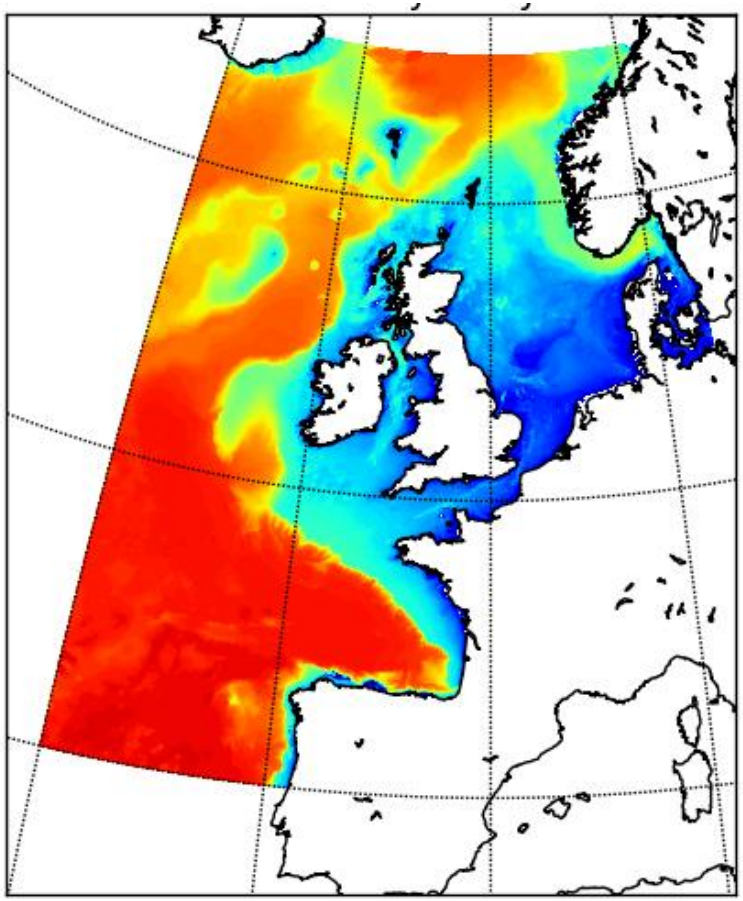
- Model and OSTIA data viewable internet (http://data.ncof.co.uk/thredds/catalog.html)

- FOAM AMM7 and OSTIA data available from MyOcean (servicedesk@myocean.eu.org or www.myocean.eu.org). Other ocean model data are available from http://www.ncof.co.uk/enquiry-form.htm or enquiries@metoffice.gov.uk

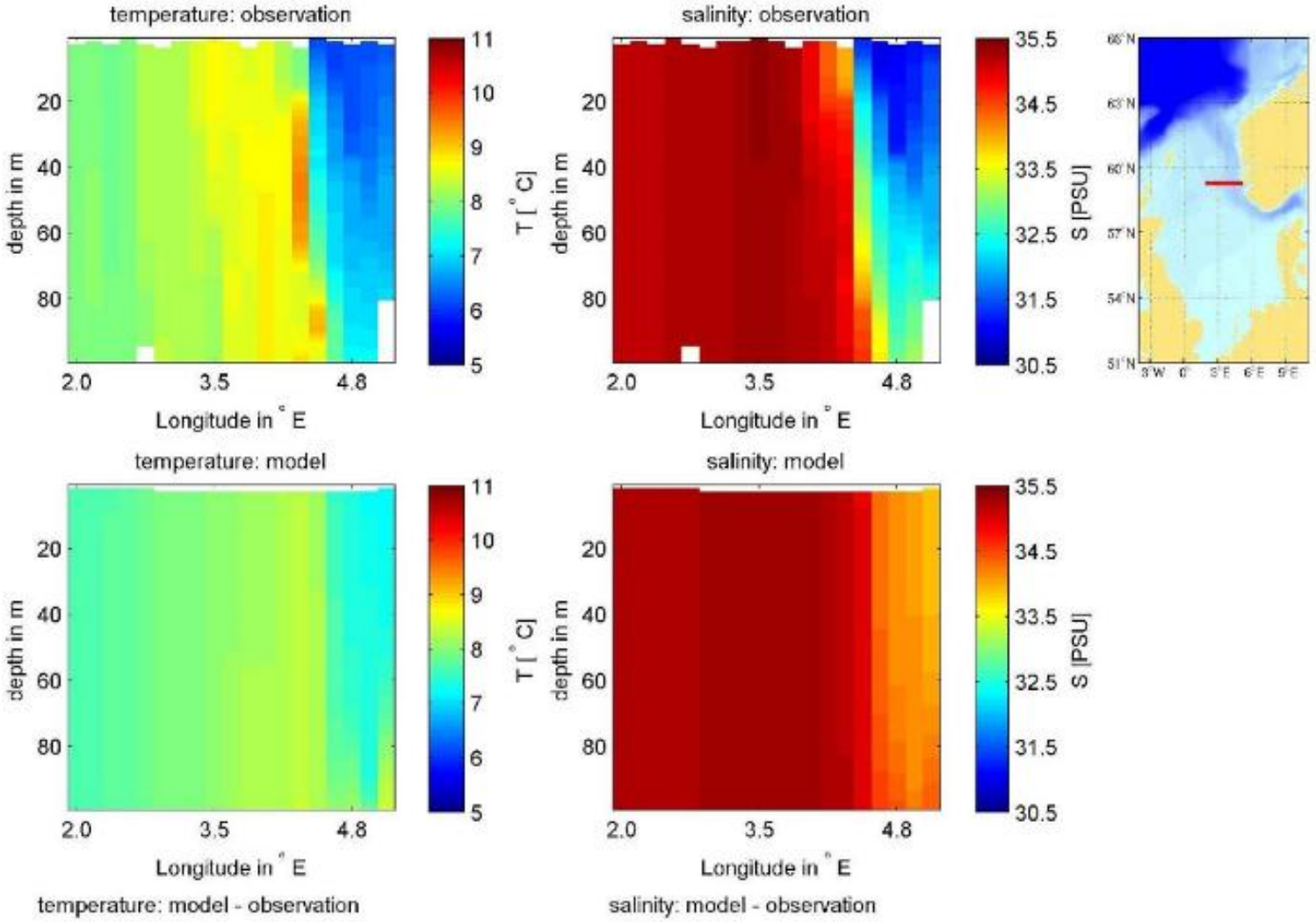
- Wave model data available from the Data and Products Distribution Service (DPDS)

- MAWS data available and viewable from (http://research.metoffice.gov.uk/research/ocean/goos/maws_pic.html)

NWS Reanalysis



The Norwegian Trench Problem

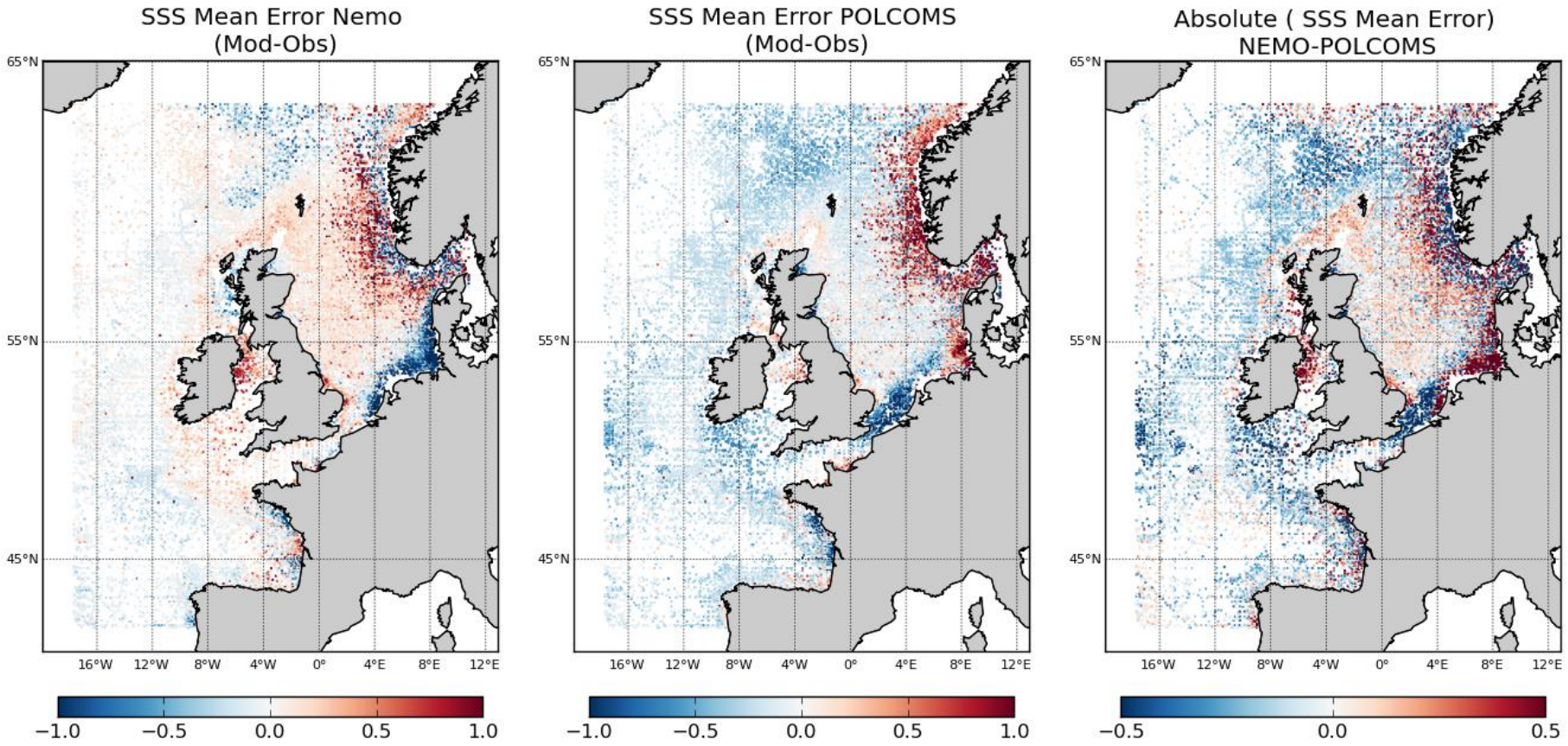


Changes since last reanalysis

- POLCOMS -> NEMO
- 12km -> 7km
- Incl SST assimilation

- Will use updated NEMO
  - Siddorn & Furner 2013 vertical coordinate
  - Baltic MFC data
  - E-Hype rivers

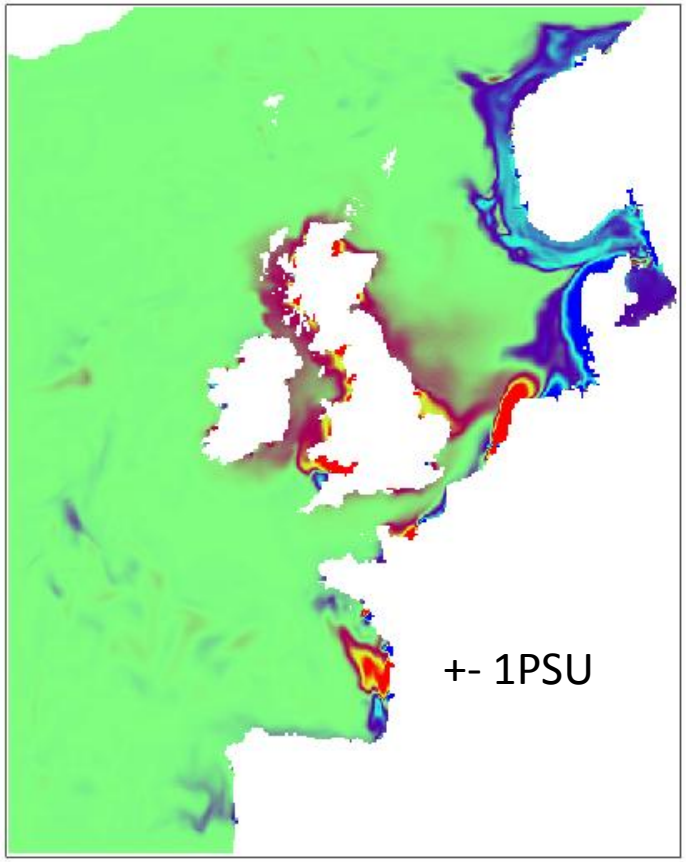
SSS biases (against POLCOMS)

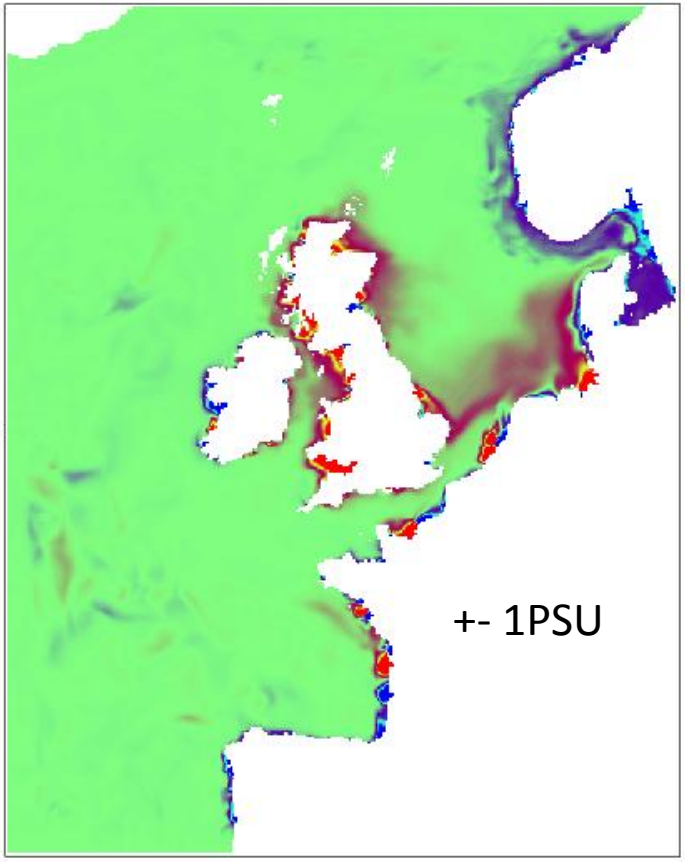


1981-2006 Sea Surface Salinity biases

Norwegian Trench looks a lot better, albeit perhaps needs better diffusion and perhaps too fresh near coast, too salty along trench edge

E-Hype rivers - salinity





EHype-Control

Summer

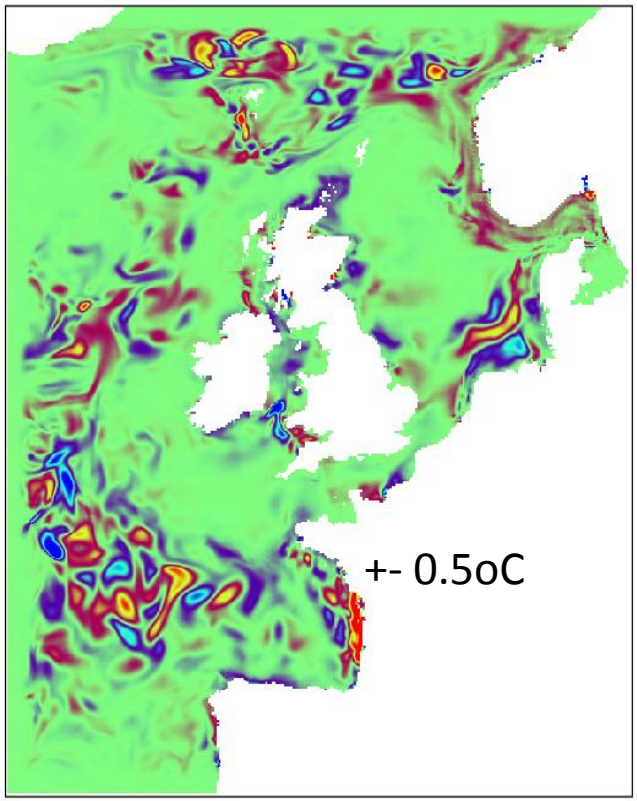
Winter

Fresher over Norwegian Trench
Fresher over German Bight

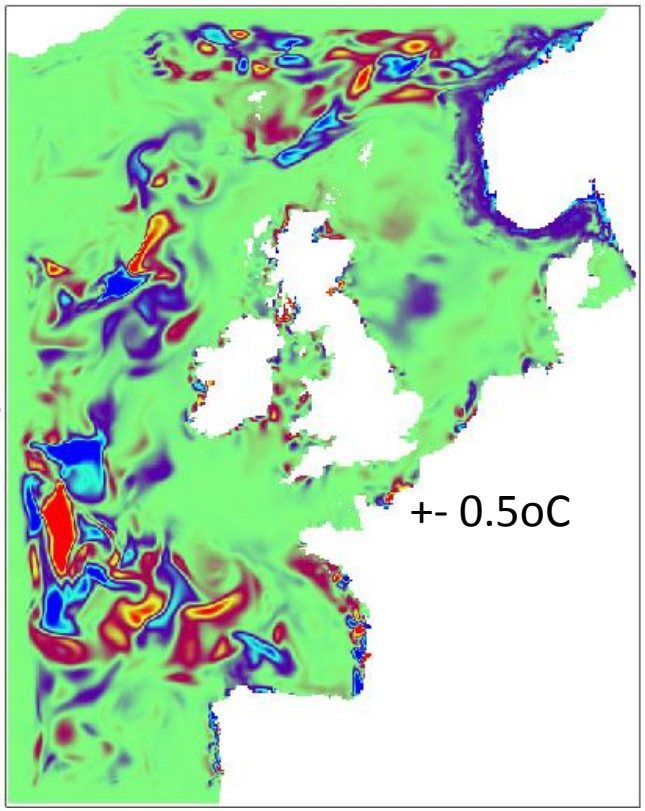
Not sure about these results – double check with Rachel.
Salinification around UK seems unlike other results

E-Hype rivers - temperature

EHype-Control

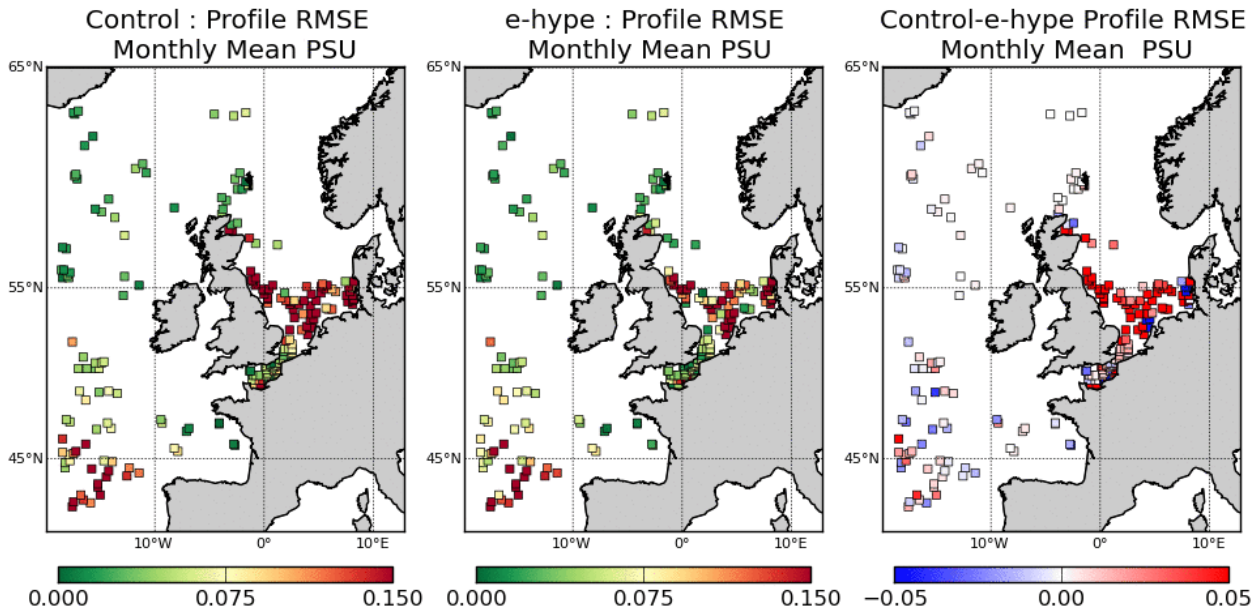


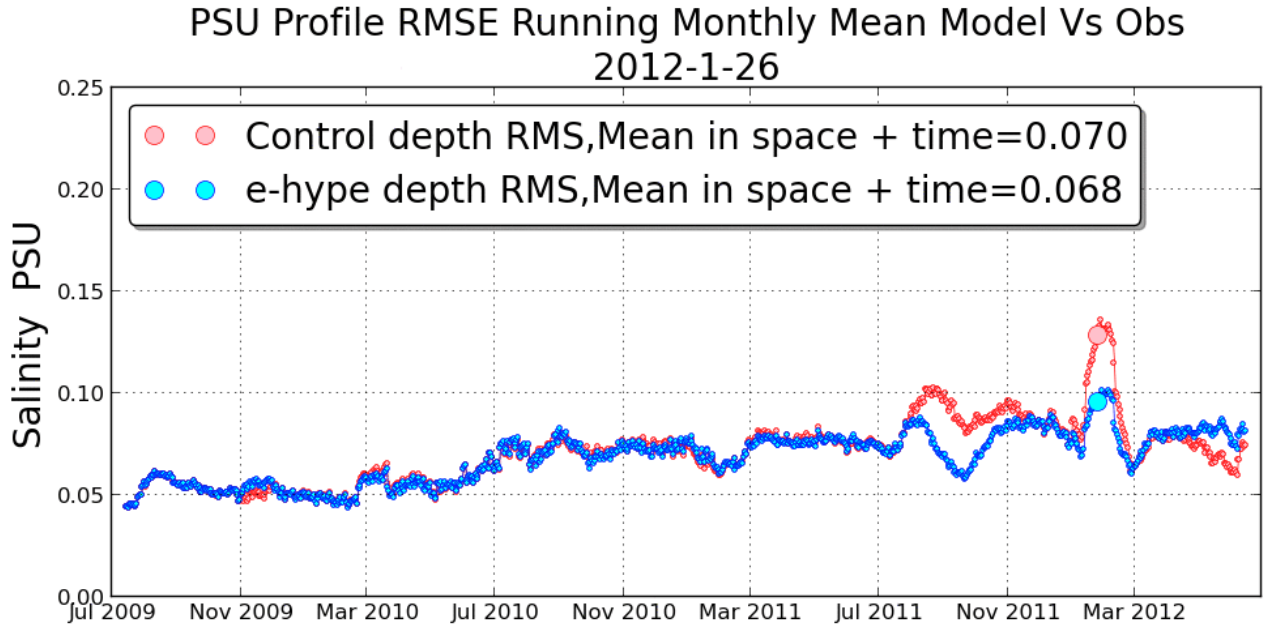
Summer



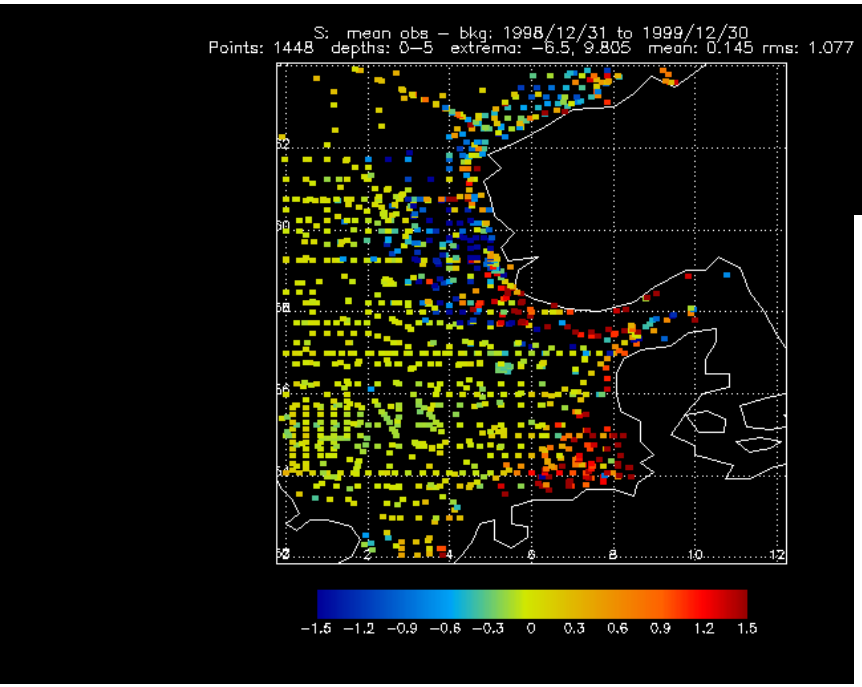
Winter

Warmer/Colder over Norwegian Trench
stratification effects

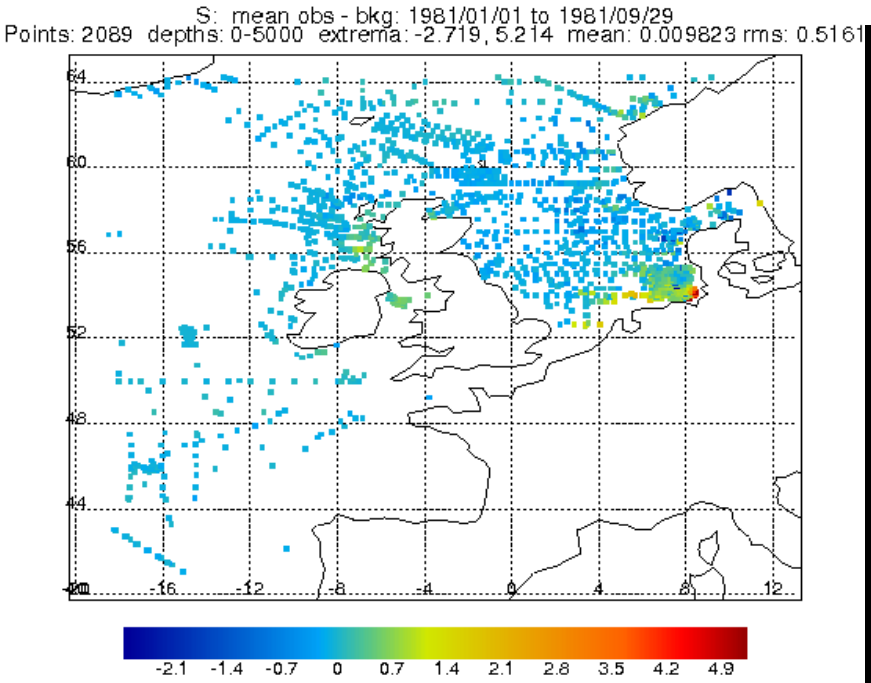

Control : Profile RMSE
Monthly Mean PSU
e-hype : Profile RMSE
Monthly Mean PSU
Control-e-hype Profile RMSE
Monthly Mean PSU
65°N
55°N
45°N
10°W
0°
10°E
0.000
0.075
0.150
−0.05
0.00
0.05


PSU Profile RMSE Running Monthly Mean Model Vs Obs
2012-1-26
Control depth RMS,Mean in space + time=0.070
e-hype depth RMS,Mean in space + time=0.068
Salinity PSU
0.25
0.20
0.15
0.10
0.05
0.00
Jul 2009
Nov 2009
Mar 2010
Jul 2010
Nov 2010
Mar 2011
Jul 2011
Nov 2011
Mar 2012

Salinity biases against EN3 and NOOS data



Surface



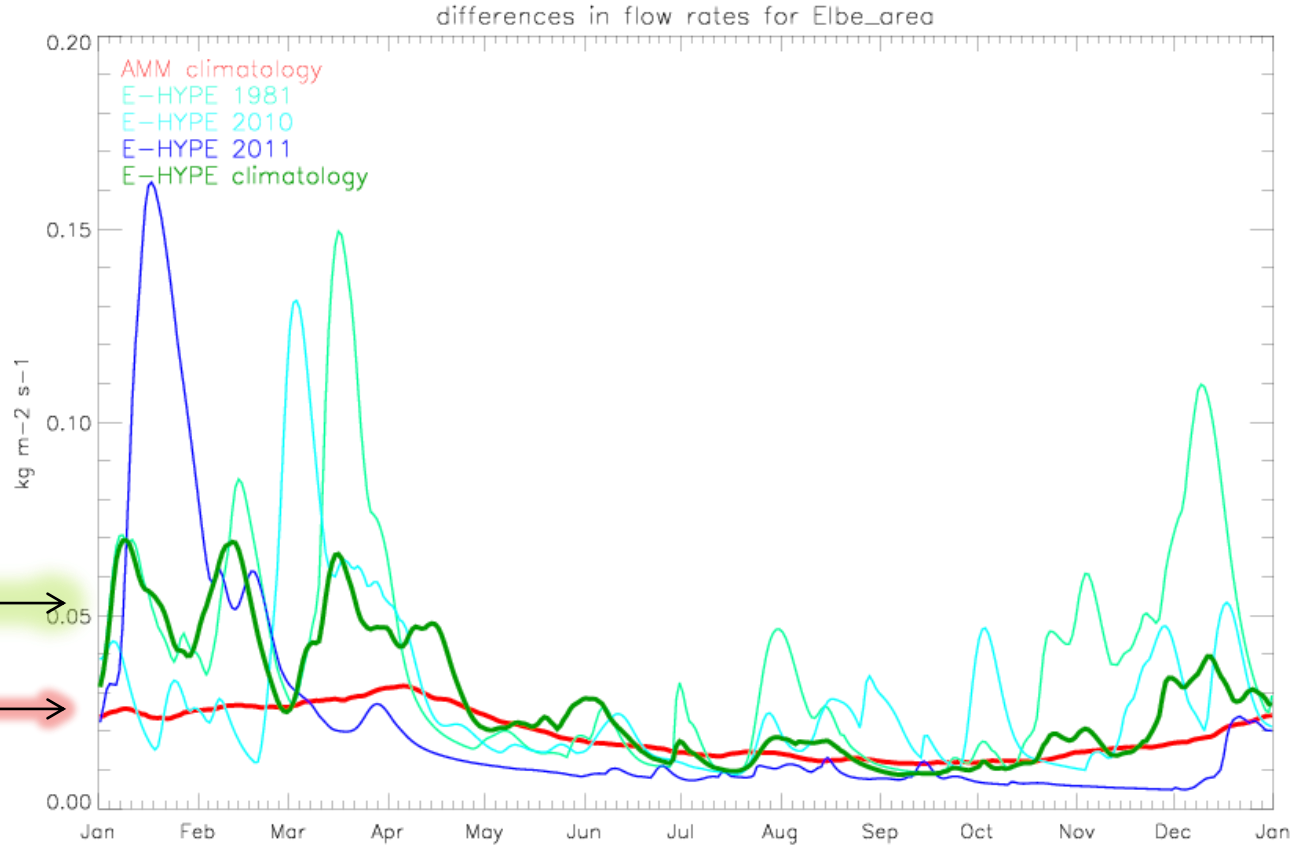
All data

- Problems near Elbe
  - probably model residual flow error
- Too fresh near Skagerrak
- Too salty off Norway

- Diffusion, Smagorinsky

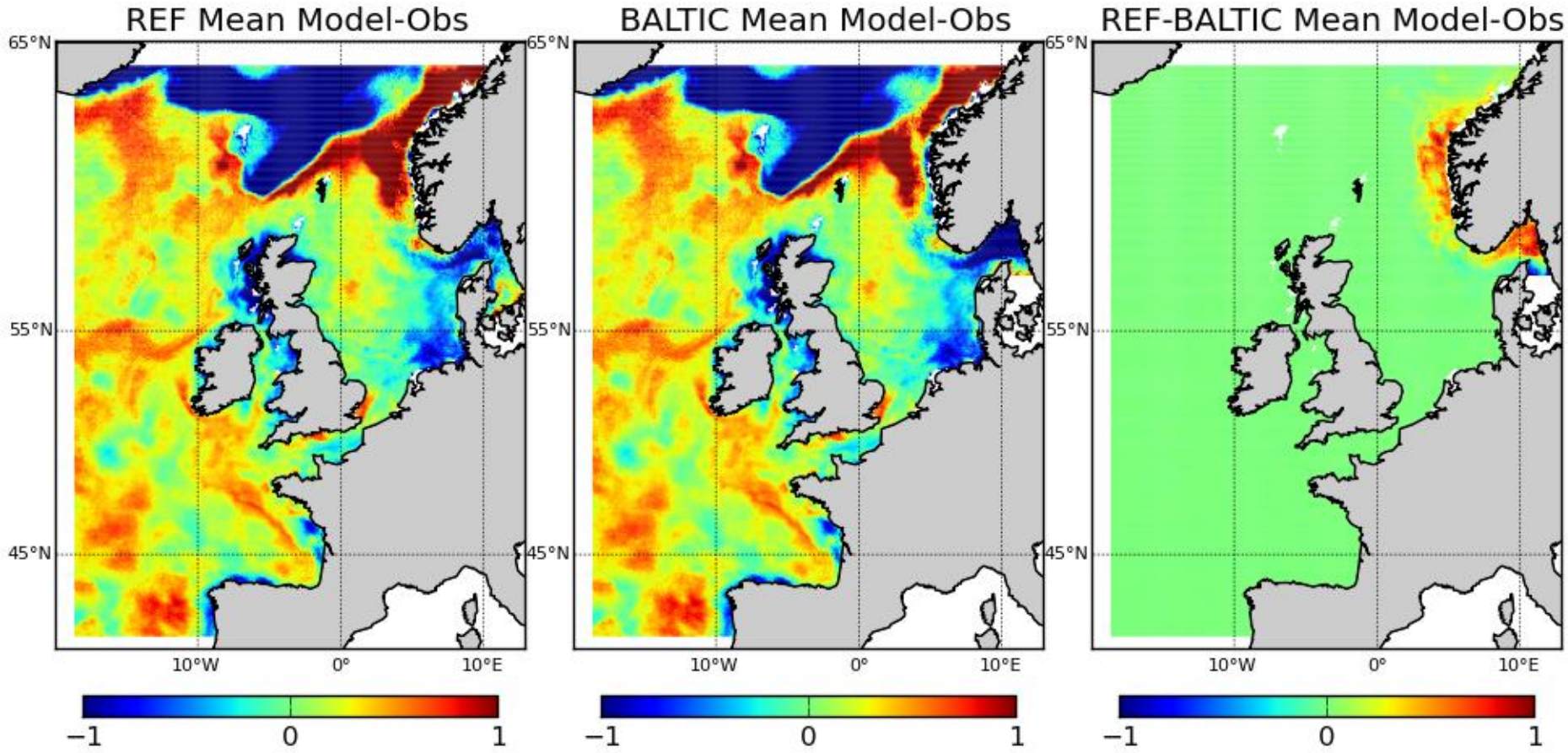
- Norwegian Trench is surface constrained

The river inputs



- More Ehype inputs, just where the model is sensitive to rivers
- Previous compensating errors kept model OK or too salty
- Ehype rivers look really good in this region

BALTIC changes



CONTROL

Baltic model inputs

Bias difference

Bias is reduced over Norwegian Trench by of the order 0.5°C

... But increased in Skagerrag.

... Combination with EHype rivers helps? No sign of Skagerrak bias in slide 2

Things that didn’t get in

- Profile assimilation (T and S)
  - Especially S profiles will really help; no SSS data
- Altimetry assimilation
  - Detided for surge; initial results promising