The need for observations of currents

Assistance to accidental marine pollution and search and rescue operations

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Marine and Oceanography

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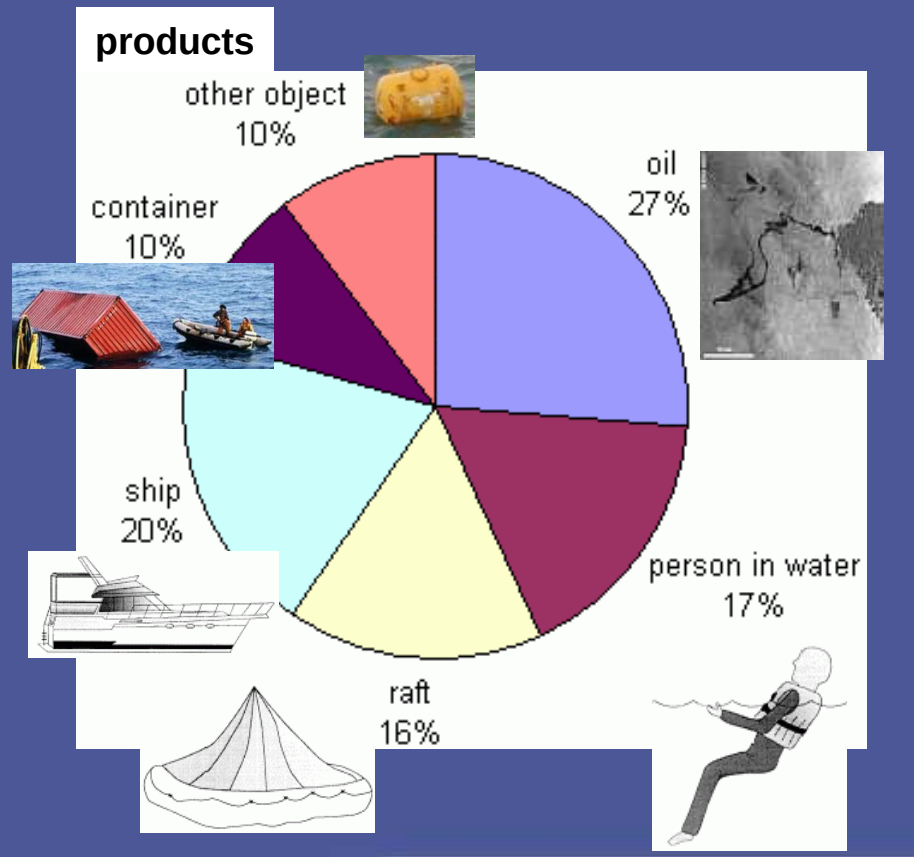
Drift forecasts at Météo-France

- System called MOTHY (Modèle Océanique de Transport d'Hydrocarbures)
- Predicts:
  - transport of spilled oil.
  - Containers drift.
  - Search & rescue targets.
- Worldwide capability on a 24h basis.
- About 500 requests per year.



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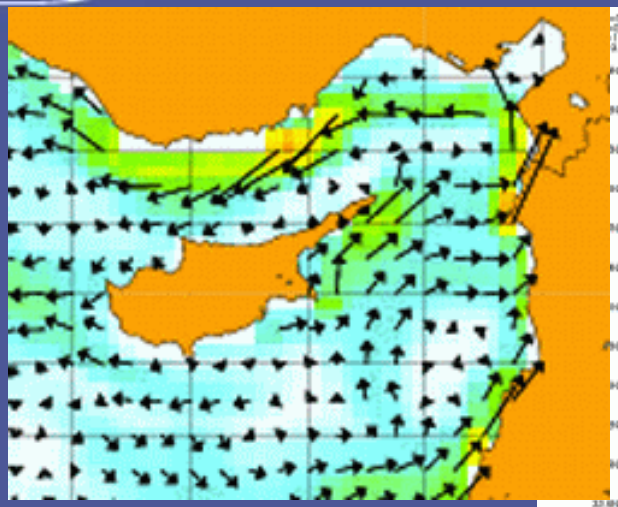
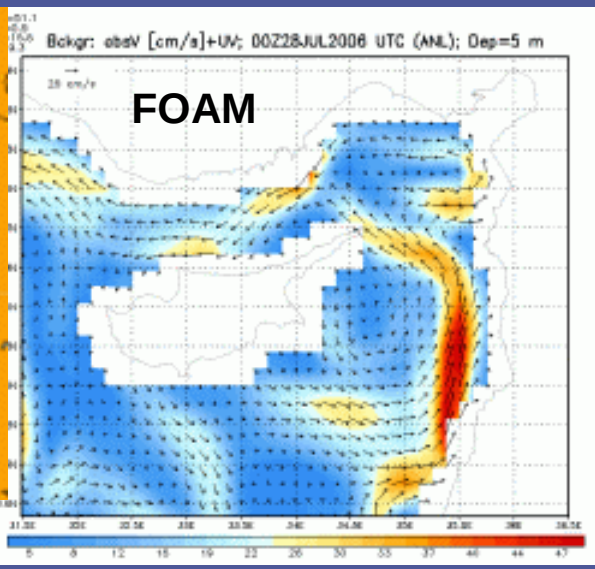
Critical constraints for drift models

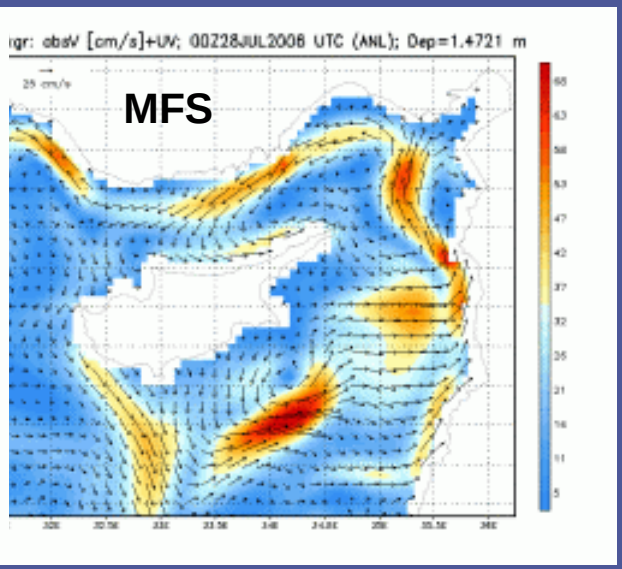
- Emergency response services depend on quick and reliable access to drift forecasts
  - response time <30 min (search & rescue)
  - 24/7/365 availability
- Critical component for drift forecasting is real-time access to *accurate* prognostic forcing data:
  - NWP models: wind
  - Ocean models: **currents**
- Access & Accuracy: main challenges!

Pb: Large differences between the current data sets

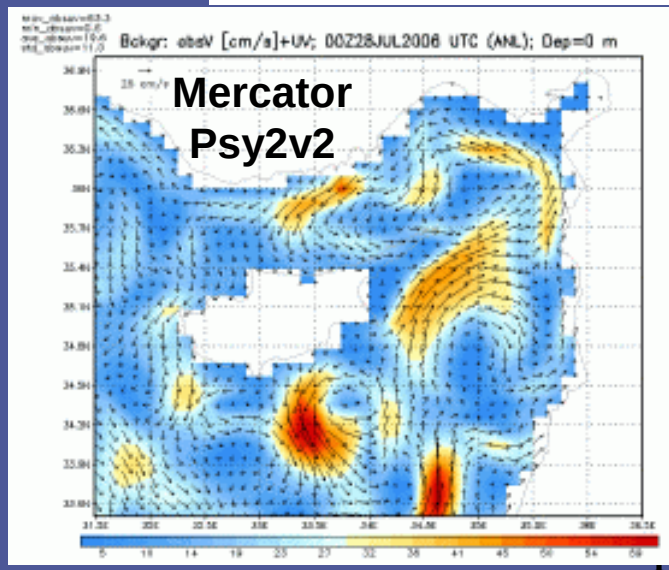


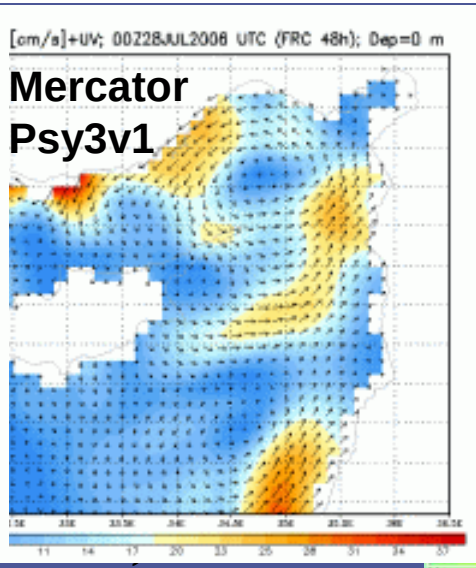
Climatology

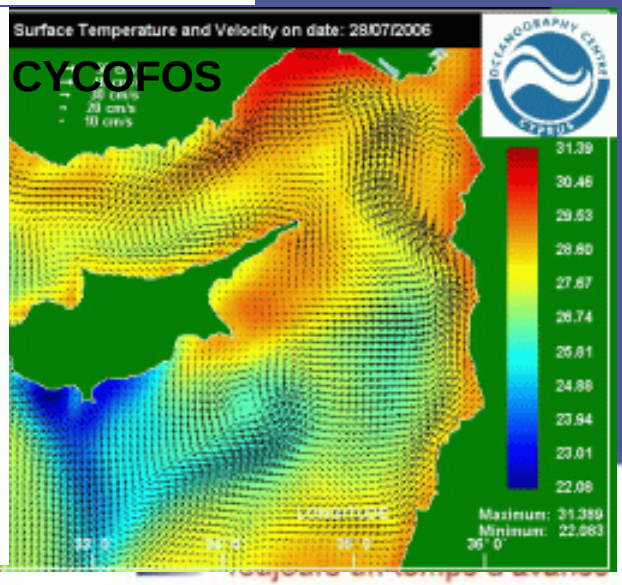




Pollution in Lebanon. Surface current, 28 July 2006



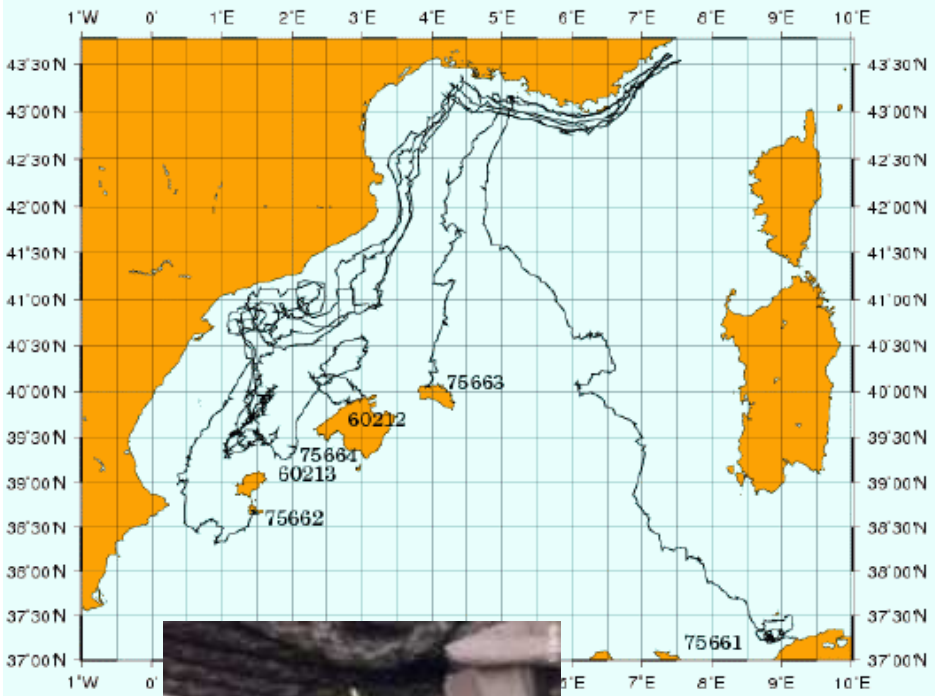




Mersea demonstrations

6 PTR buoys in the Western Mediterranean Sea

3 Argosphere buoys in the Eastern Mediterranean Sea



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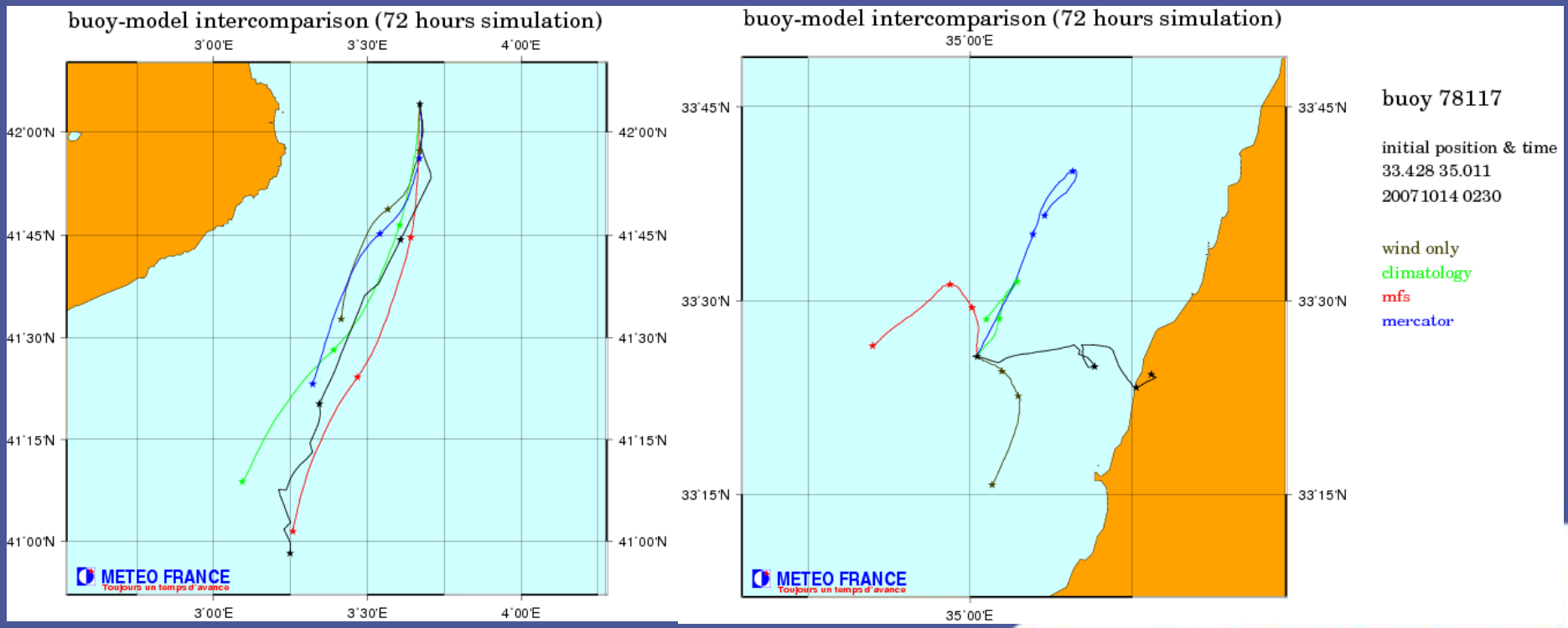
Mersea demonstrations

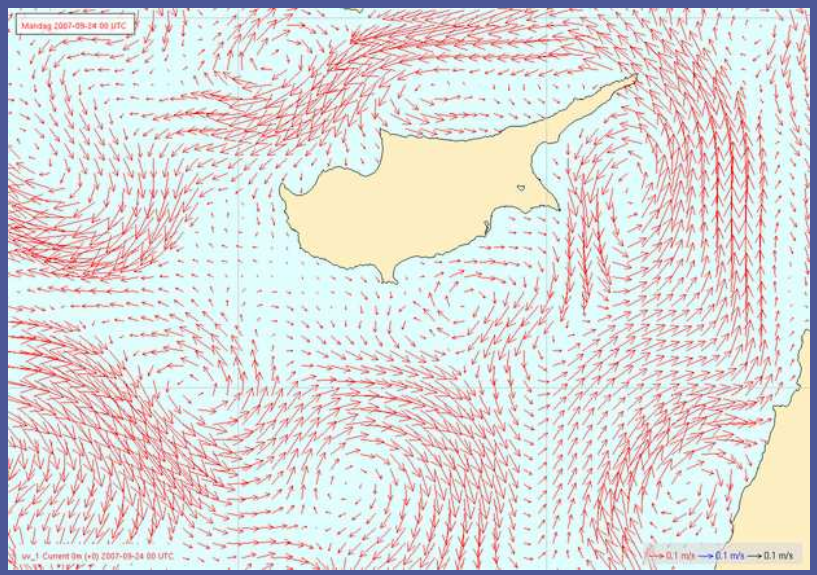
Conclusions:

- large differences in the predicted current fields
- drifter trajectories are better reproduced in stable and well marked circulation (left)
- large discrepancies between the predicted currents in the open ocean reflects the fact that the current field is dominated by unstable mesoscale dynamics (right)
- The most accurate results are obtained when applying currents from a local, fine-scale ocean model nested in basin-scale data.

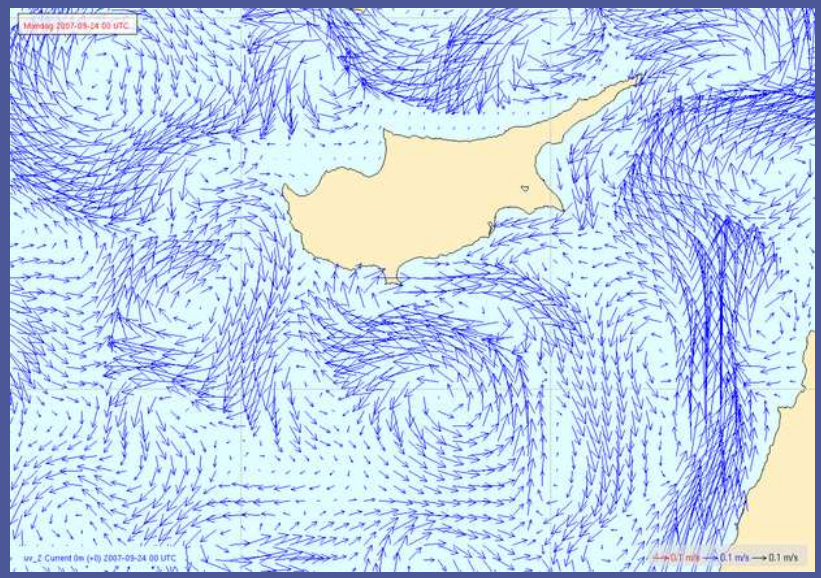


GODAE and oil spill forecasting – Europe
Meteo-France, met.no – Mersea simulations

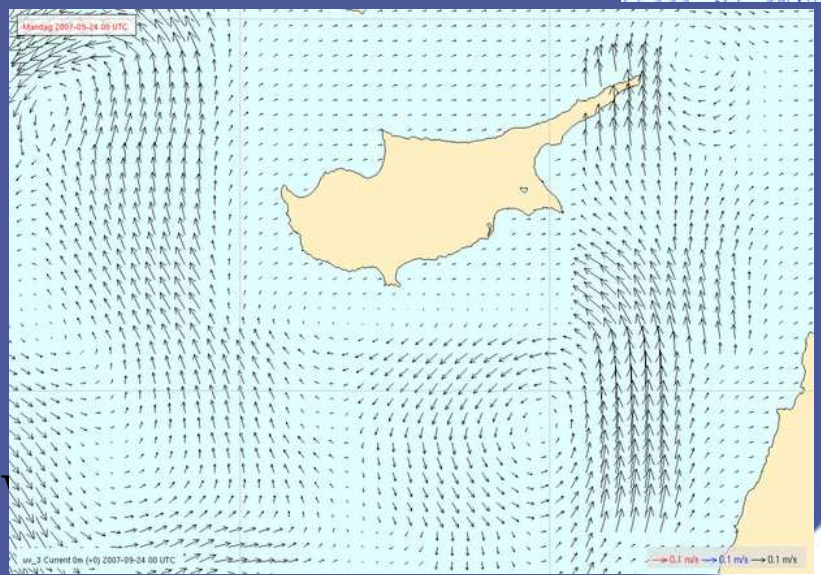
MFS 1/16th



Mercator MED 1/15th



Mercator Global 1/4th



All fields are daily means for 2007-09-24 00 UTC

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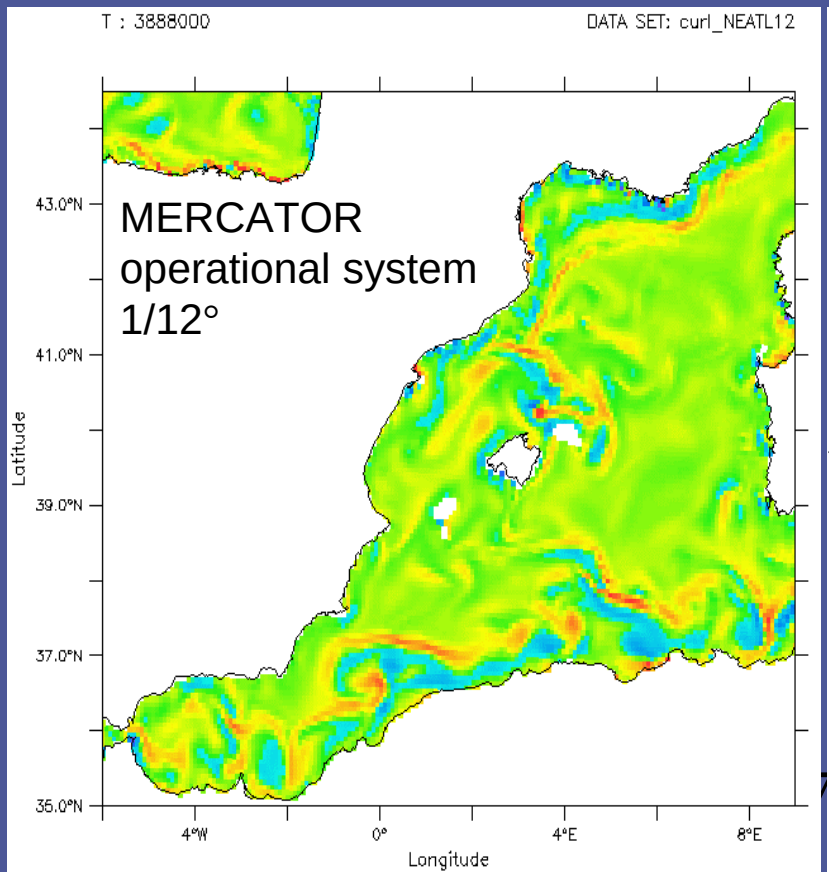
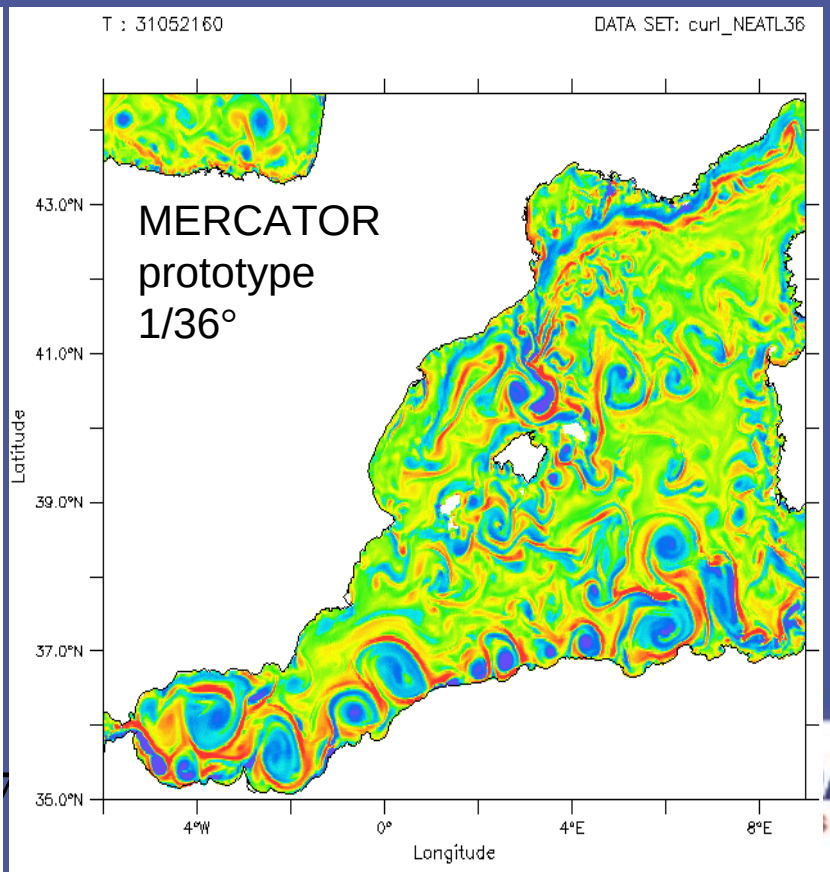
Main problem: description of the mesoscale

- Future requirements
  - high resolution models to refine the positioning of the mesoscale eddies where currents are more intense and narrow
  - high frequency atmospheric forcing
  - ability to assimilate surface data such as surface drifters or HF radars
  - ability to provide a level of confidence





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Future work: take into account Stokes drift

2012-2013

- HYCOM + Mothy

  - Stokes drift computed from wave spectra predicted with Numerical Wave Prediction models

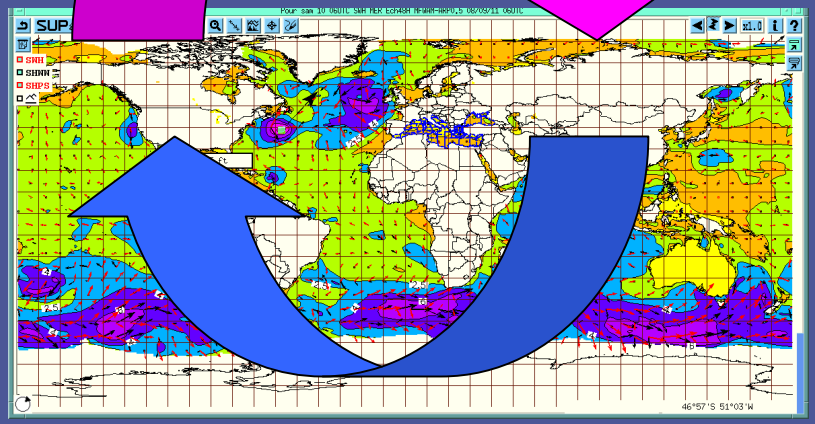
  - From third moment: importance of the high frequency part of the wave spectrum

Meteo-France Wave Prediction System

Based of MFWAM

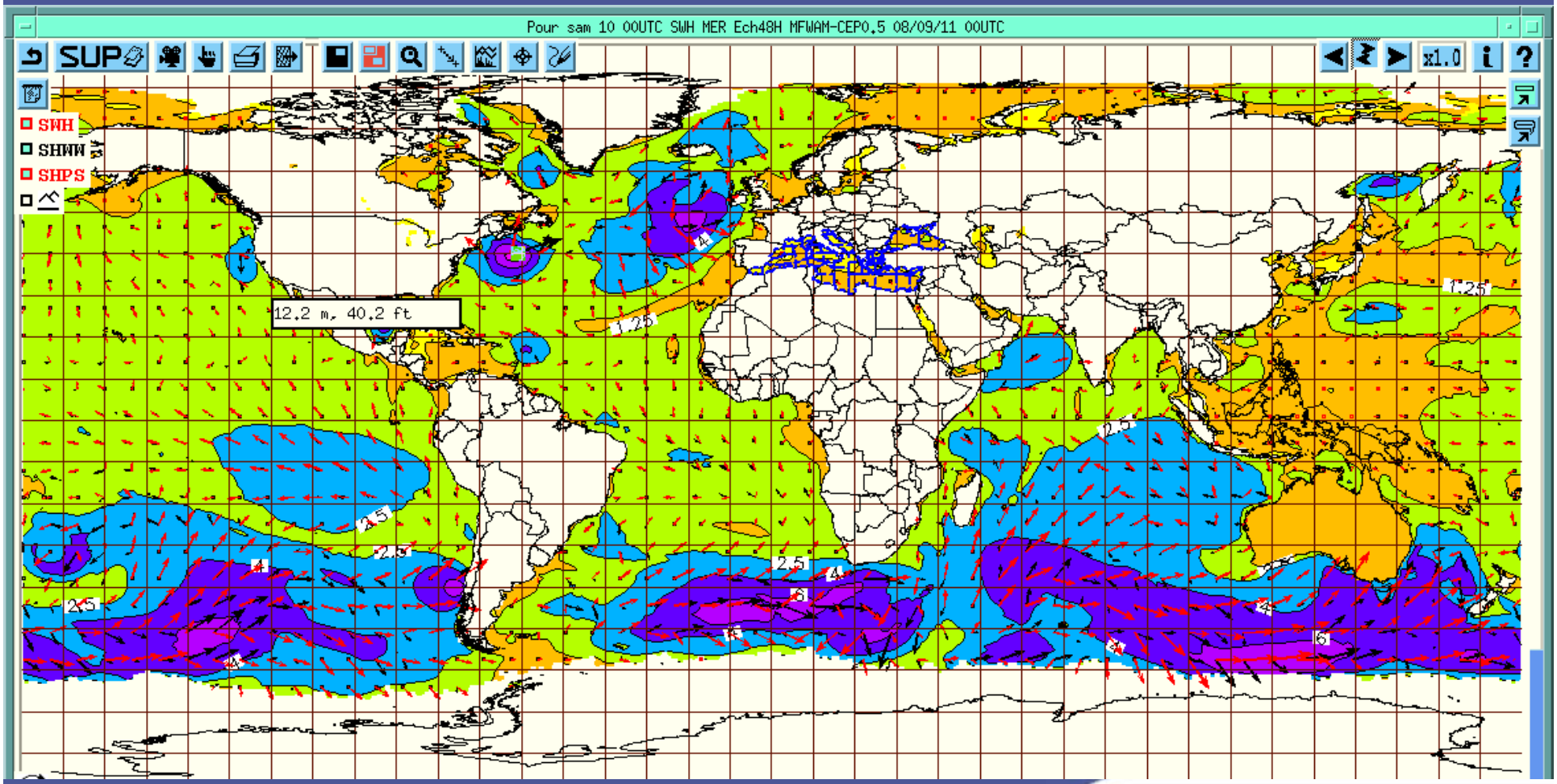
Model

Modelling Validation Assimilation



Prediction

MFWAM-CEP/0.5°and MFWAM-ARP - resolution 55km



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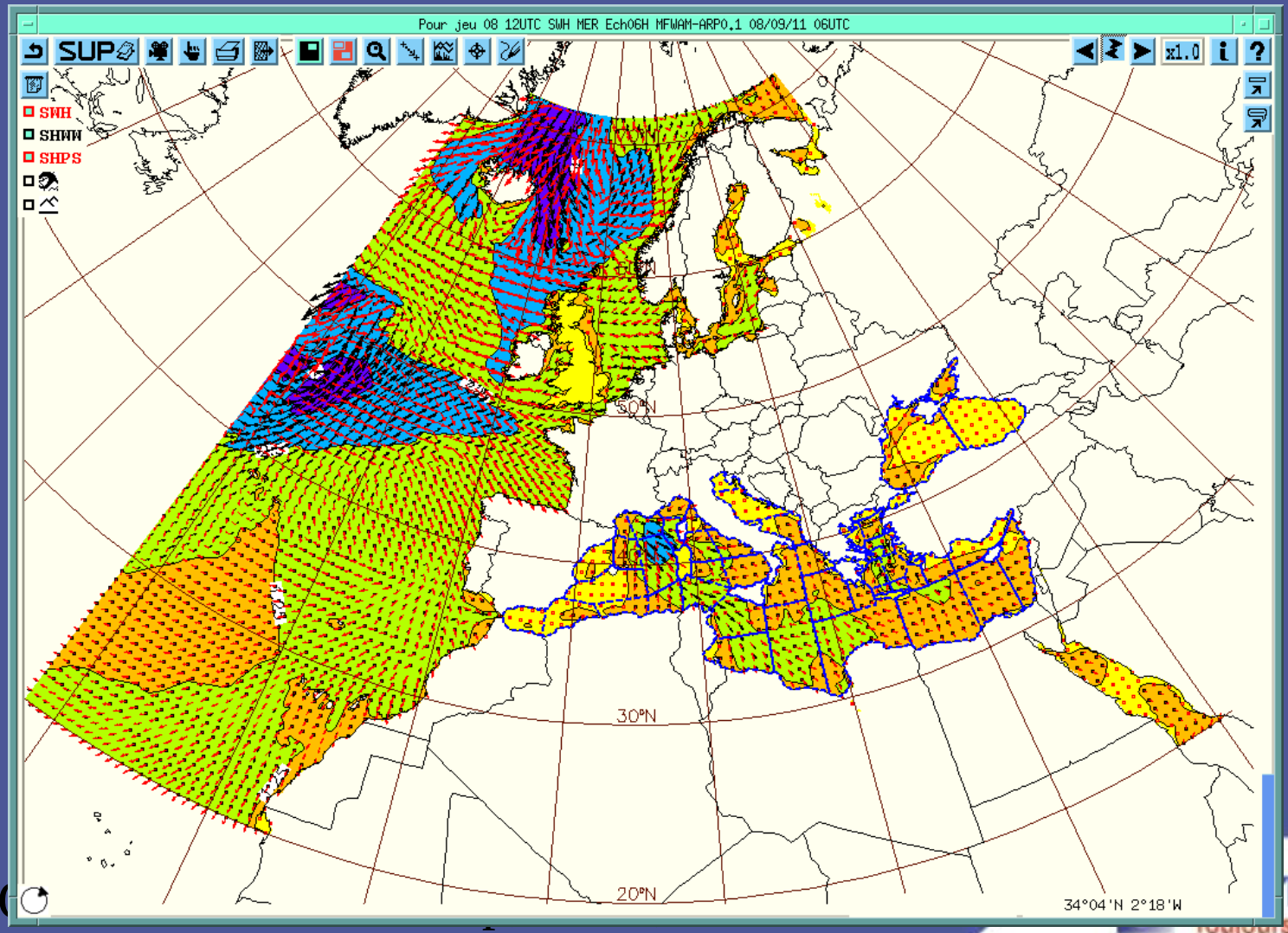
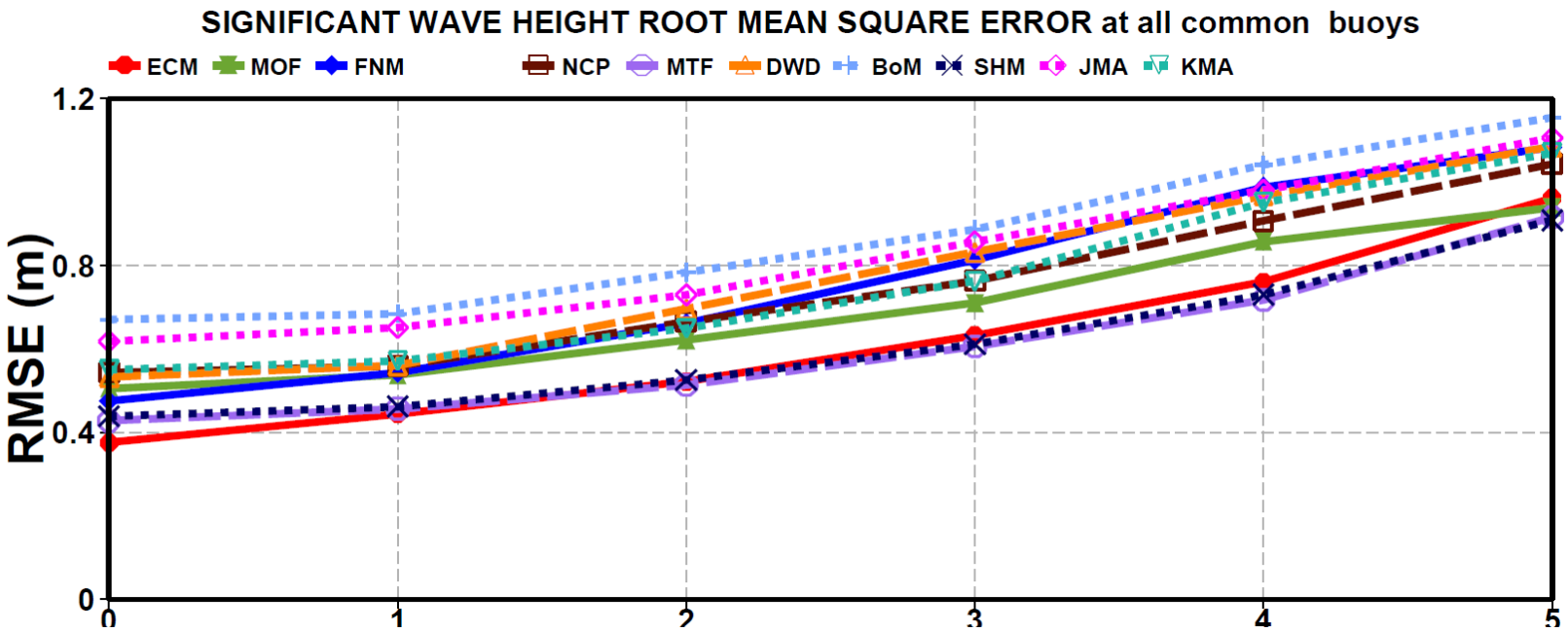
MFWAM-ARP/0.1°and MFWAM-CEP- resolution 11 km

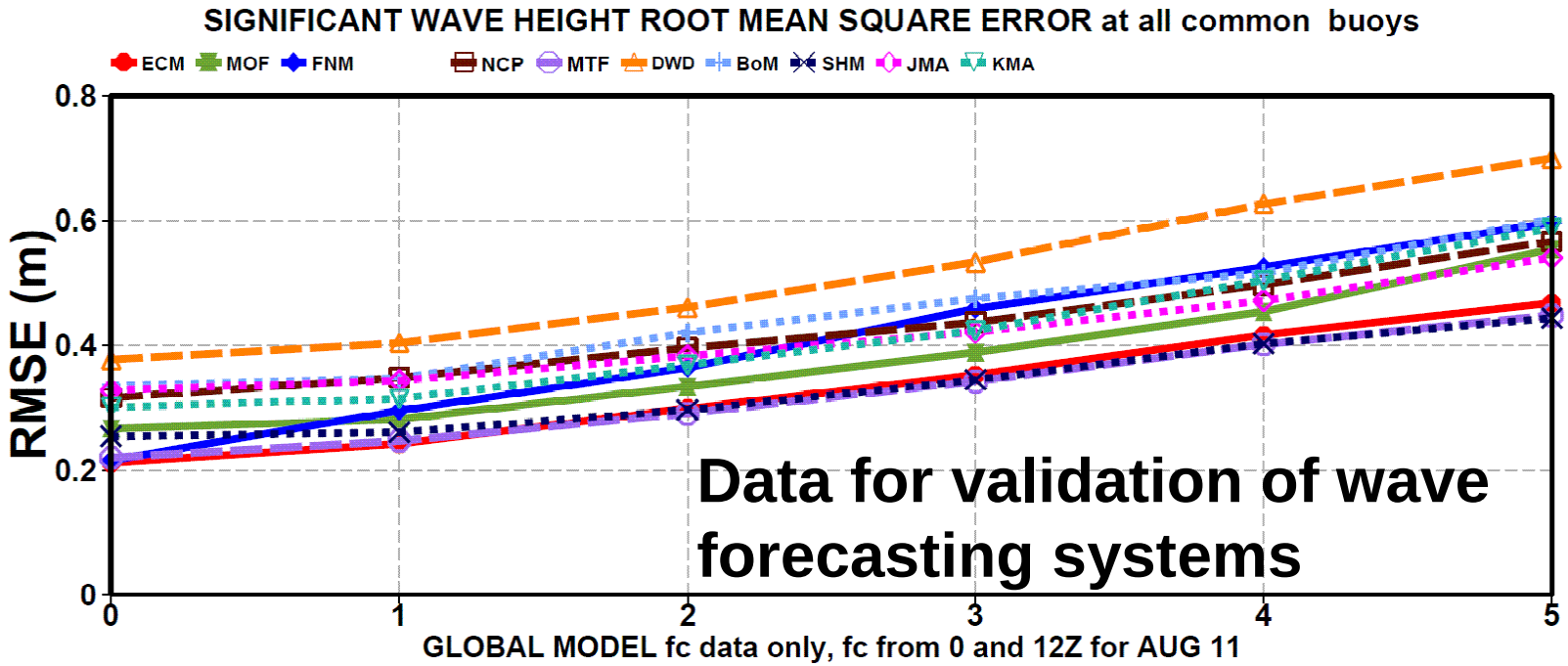


The JCOMM/WFVS: location of 90 common buoys

Bouée 03FR le 16 mars 1999

Photo Météo-France





Data for validation of wave forecasting systems

For this plot, wind forcing with same NWP model but with different resolution and frequency

MF-----

ECMWF__

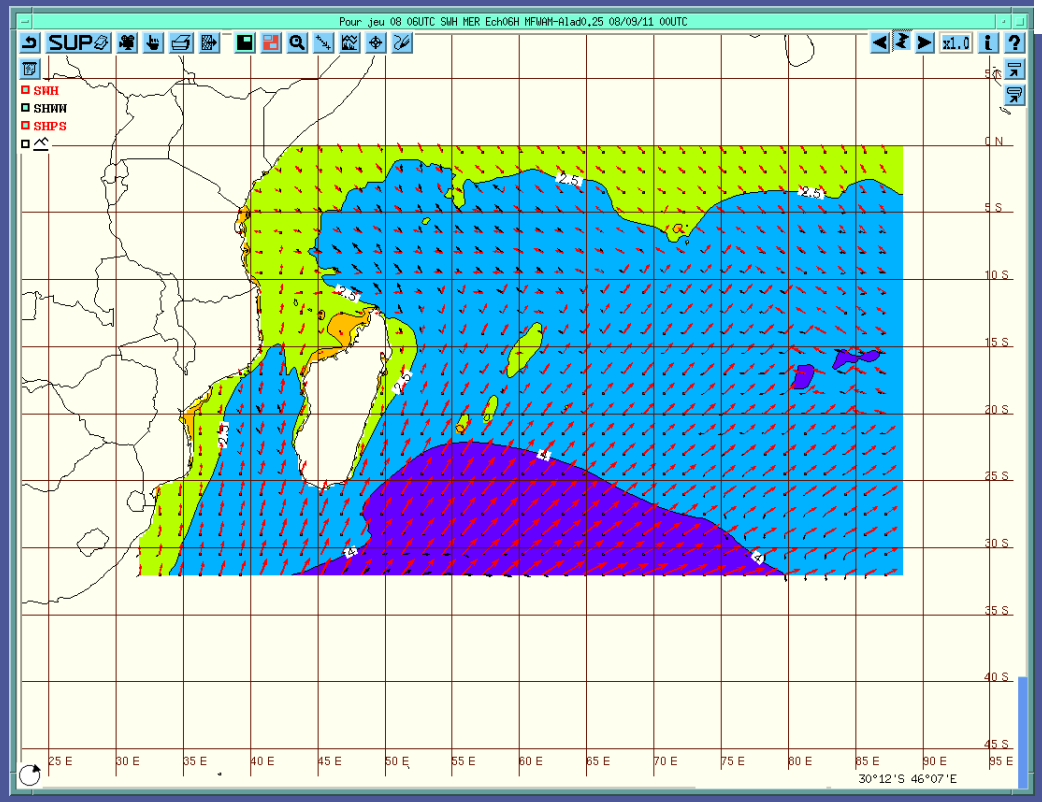
SHOM ---

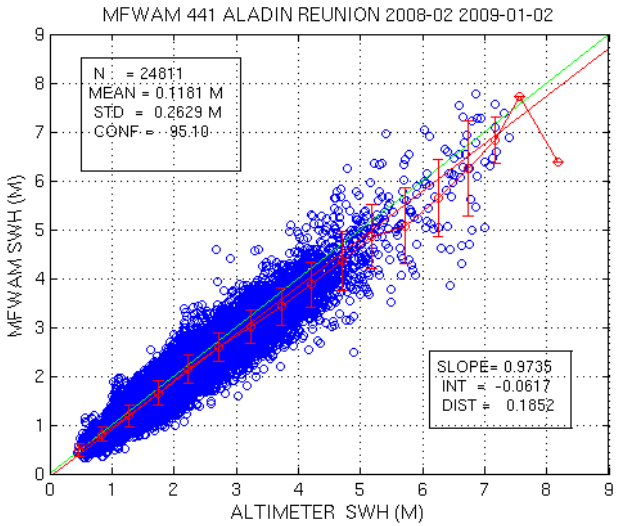
MFWAM-ALADIN-REUNION 0.25 Hurricane bogusing

MFWAM-ALADIN-CARRIBEAN 0;1°

MFWAM-PLYNESIE+NEW CALEDONIA 0.1°

MFWAM-AROME-0.025° in preparation





Importance of sateliite data for model validation→GlobWave

Introduction of Surface Currents in MFWAM

→ Needs of current data for validation

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