Assimilation of HF Radar and SST information in the Ligurian Sea

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High frequency radar currents assimilation

Domain and parameters

- ROMS model
- 1/60th degree resolution
- 100 members
- Inflation : 1-1.05
- Correlation length : 30 km
- Analysis window : 6 hours (or 12)
- No twin experiment : validation done with independant data (mainly drifters)

Surface temperature and surface currents
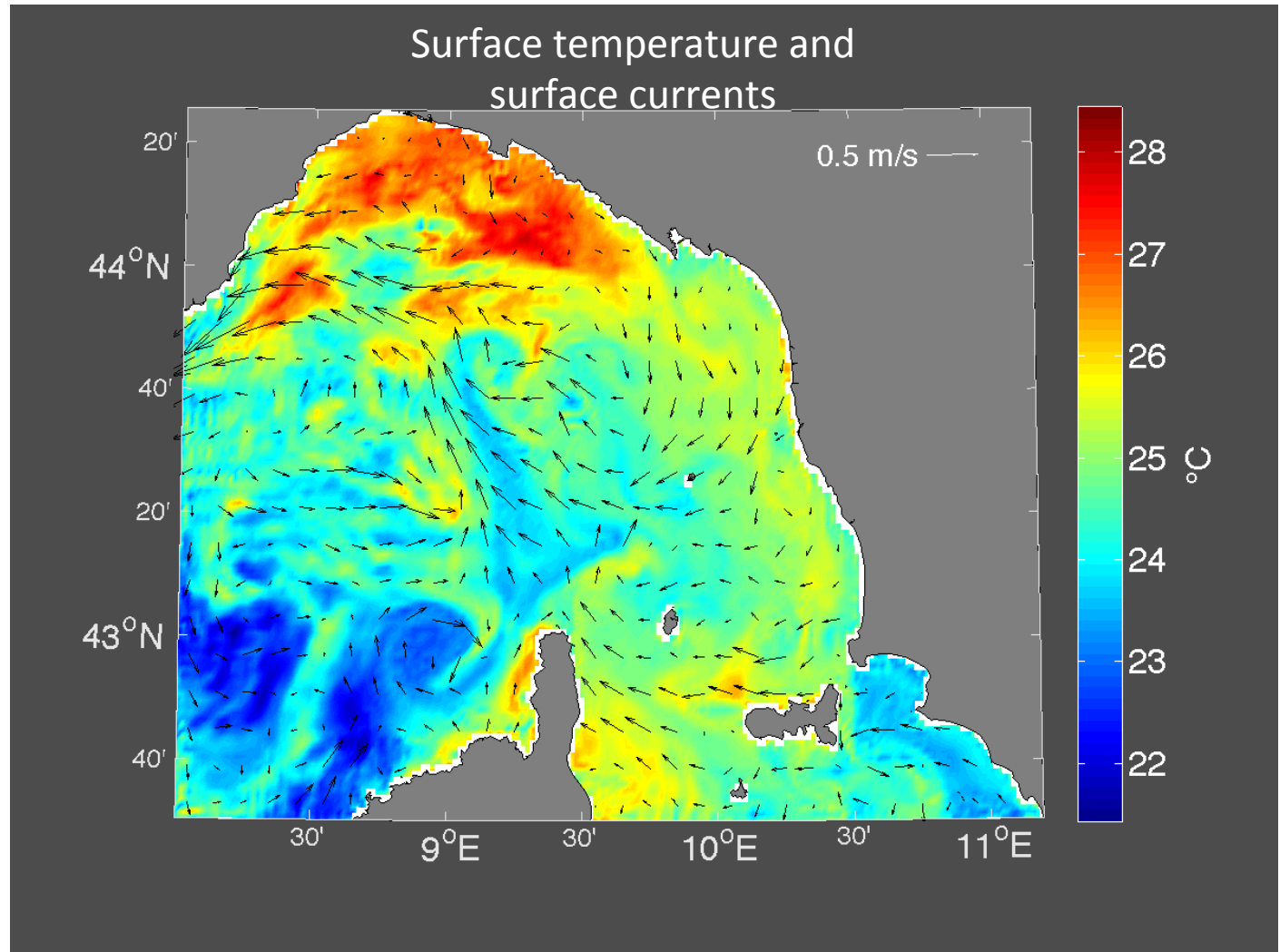
High frequency radar currents assimilation

Perturbations

Perturbed fields :
- Wind
- Boundary conditions

Method : Fourier decomposition taking into account time variability of 2D fields, see

Barth, A., Alvera-Azcárate, A., Beckers, J., & Staneva, J. (2010). Correcting surface winds by assimilating high-frequency radar surface currents in the German Bight. *Ocean Dynamics*, 1–29.

High frequency radar currents assimilation

## Typical uncertainties (1 week free run from same initial conditions and perturbed fields)

Surface temperature and surface currents uncertainties
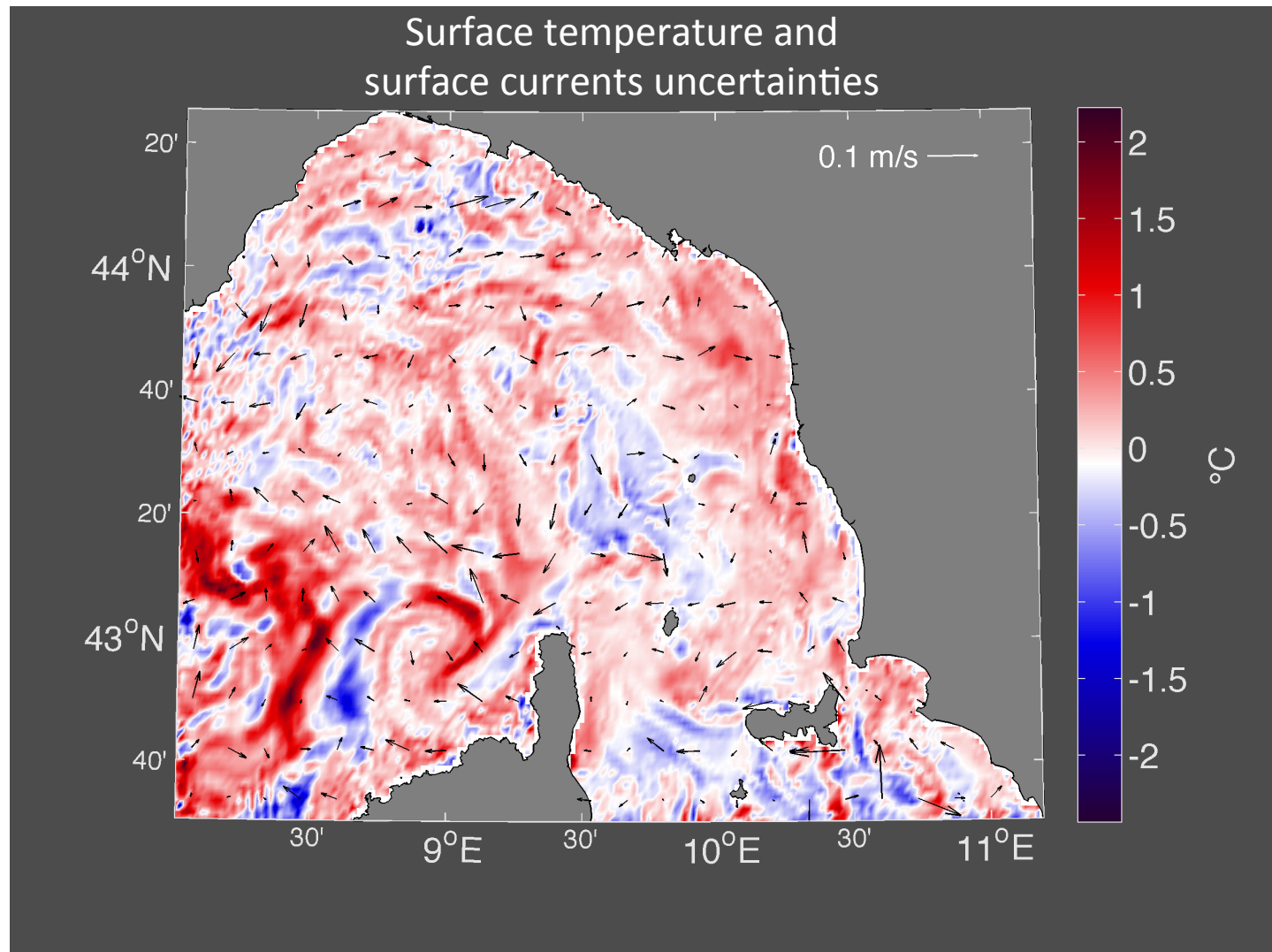
High frequency radar currents assimilation

Observations

High frequency radar currents

Errors :
- Instrumental derived from variance measurment over several measures (~5cm/s)
- Representativity to be tuned (~30cm/s) (spatial correlation ?)

Surface radial velocities
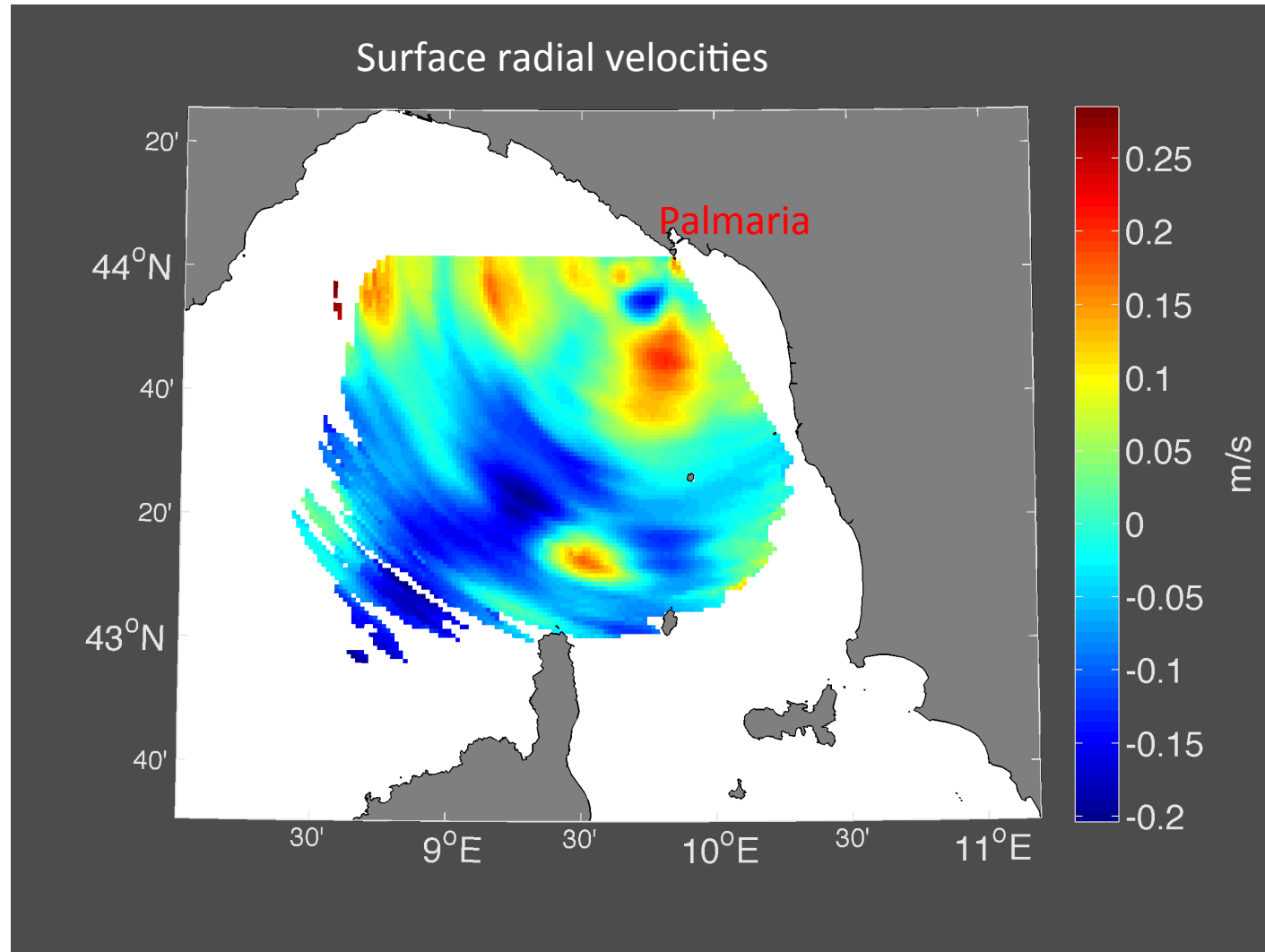
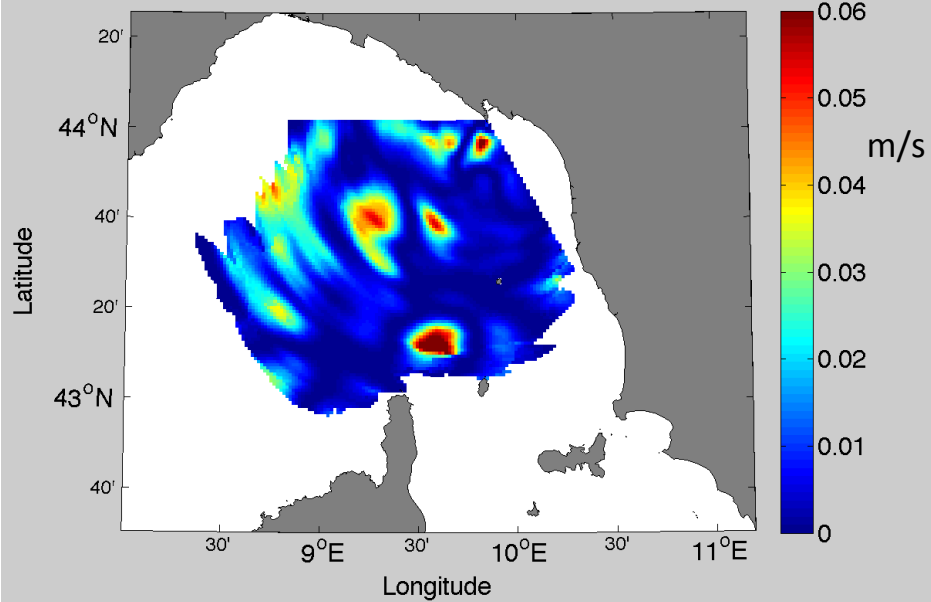# High frequency radar currents assimilation
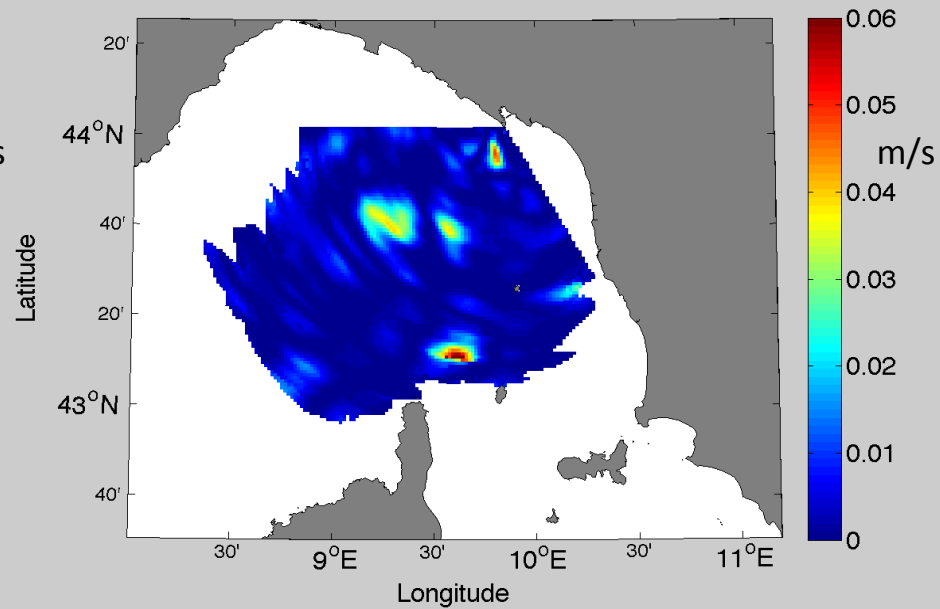
First case :
Observations = only radar
currents.
Only correct model output

Observation operator : forecast
speeds transformed to radial on
same grid as observations
(see hfradar_extractf routine)
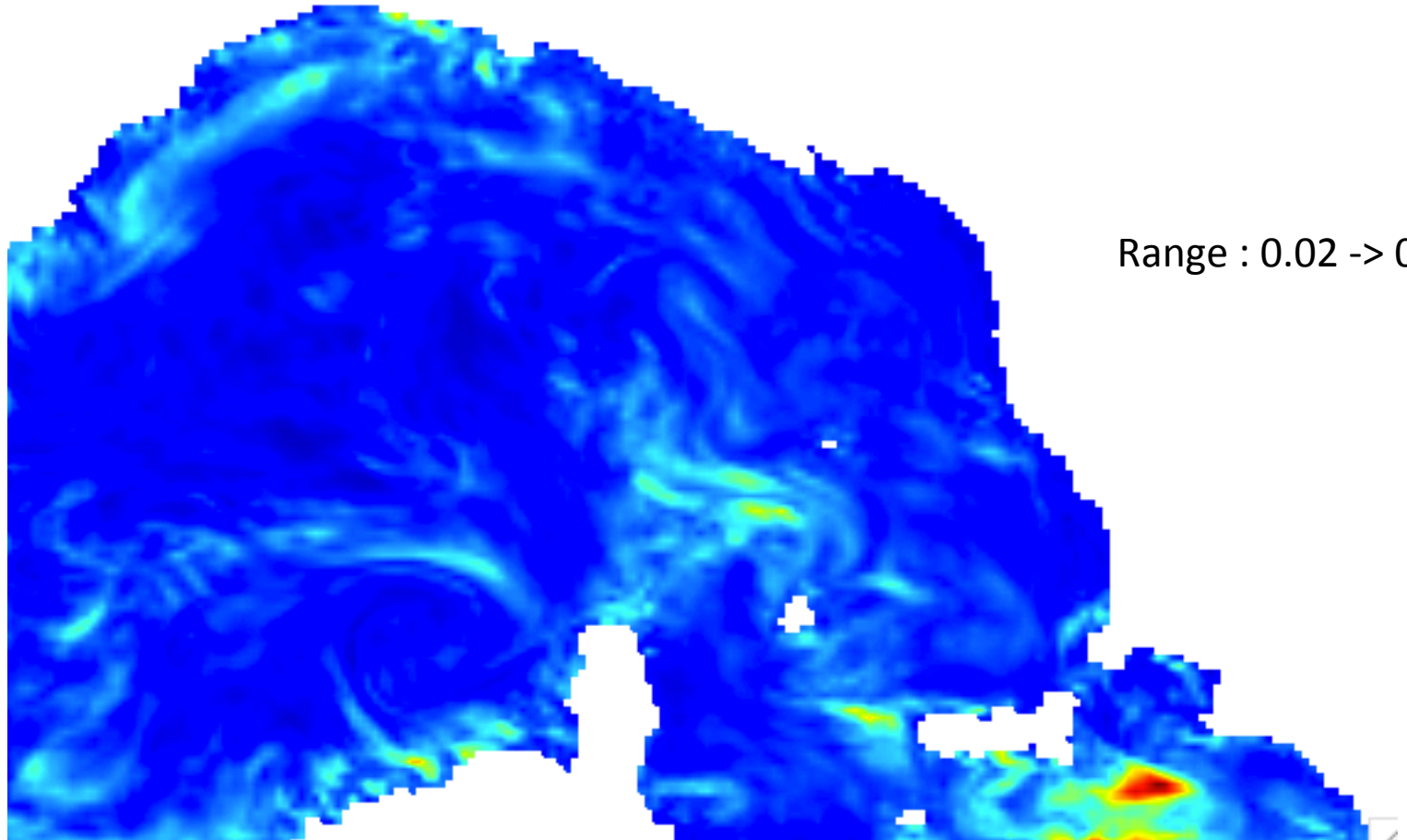
Forecast - observations   Analysis - observations

RMS gain : ~10-20%

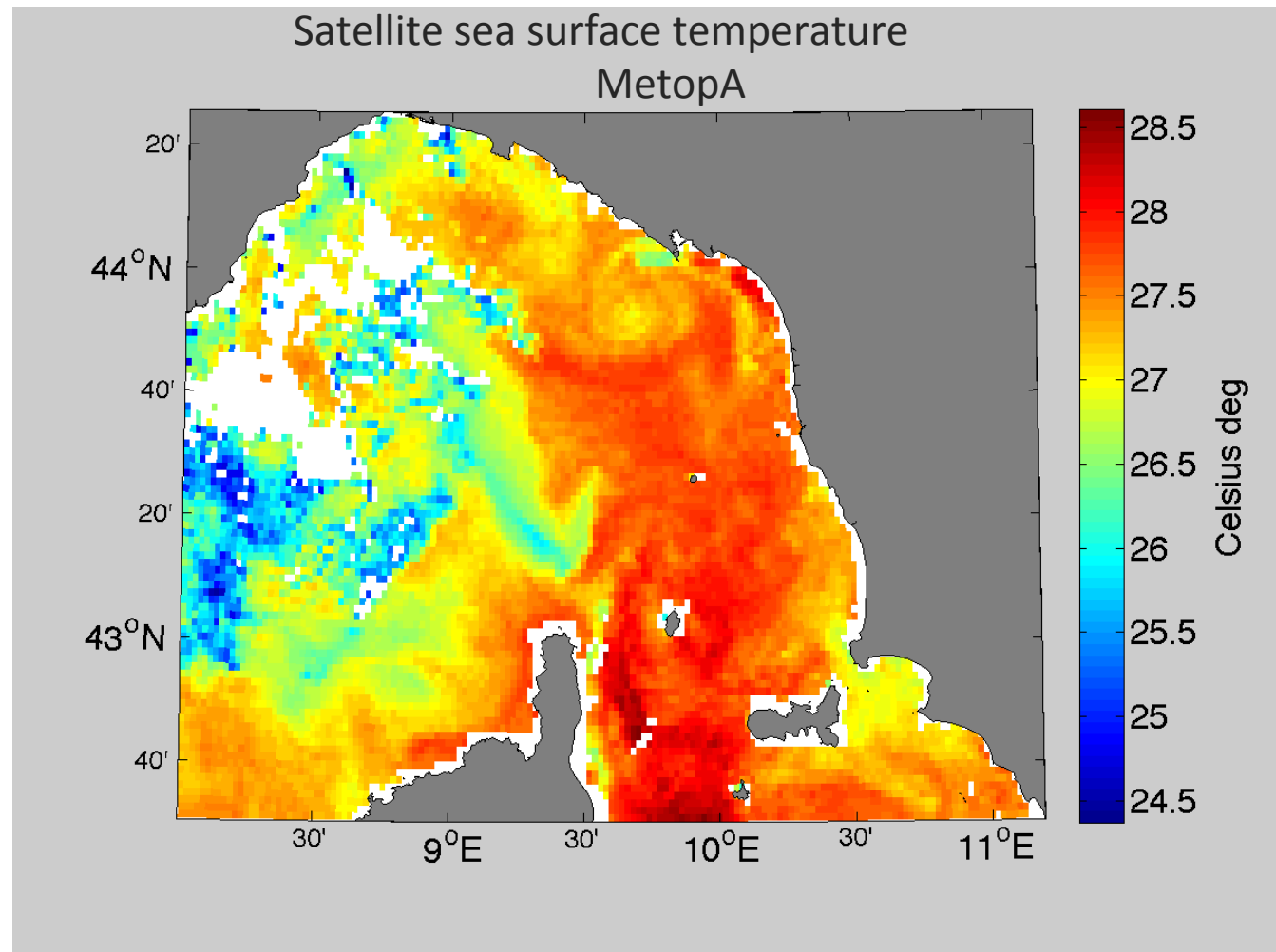# Zonal velocity (u) : Ensemble spread

Range : 0.02 -> 0.14

High frequency radars assimilation

Other observations available

Sea surface
temperature
(METOP-A)

Errors :
- Instrumental (~0.5 °C)
- Representativity error : to be tuned (1-2°C)

Second case :

Observations = radar currents + SST

Correction of model output

Third case :

Observations = radar currents + SST

Correction of model output and

forcings and lateral conditions