CLS
COLLECTE LOCALISATION SATELLITES

Ocean Information for Maritime Transport:

Status & perspectives

Gilles Larnicol, Collecte Localisation Satellite

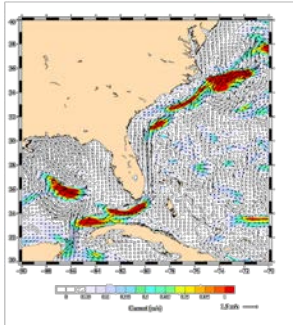
Maritime Transport Challenges

The needs

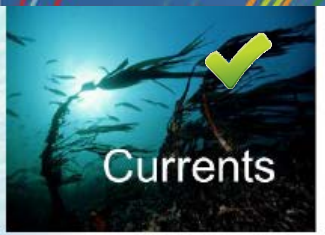
- Enhance the safety of crew and equipment
- Respect sheduled time at passage gates (Suez, Panama) and at arrival
- Reduce fuel consumption for ecological (CO2) & economical ($) reasons

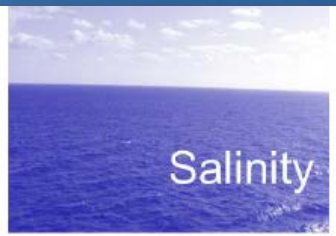
Solutions

- Optimize engines, propellers, hulls,
- **Take benefit of Ocean &** Meteorological **information**



Ocean Information for maritime transport

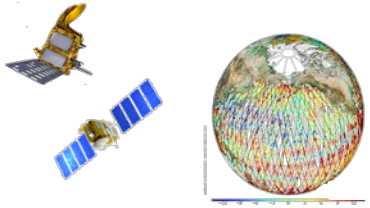




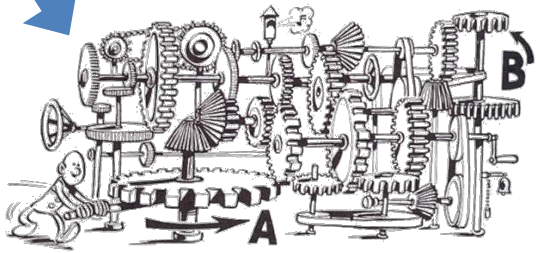
- Surface (0-15m)
- Analysis & Forecast
- Worldwide
- Reliable

Where the data come from ?

Satellites

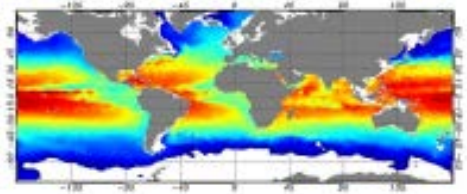


In-Situ



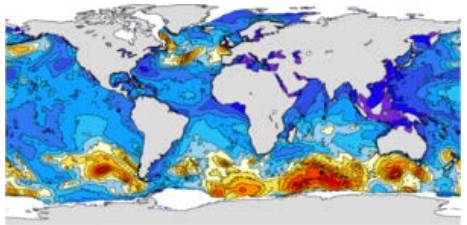
Mapping

Obs-based Products



Assimilation

Model Products



BLUE PLANET Oceans and Society a GEO Initiative
Copernicus Marine Service
SATELLITE EVENT TOULOUSE EUROPEAN CITY OF SCIENCE ESOF 2018

Where the data come from ?

Open and free
Products and Services

http://marine.copernicus.eu/

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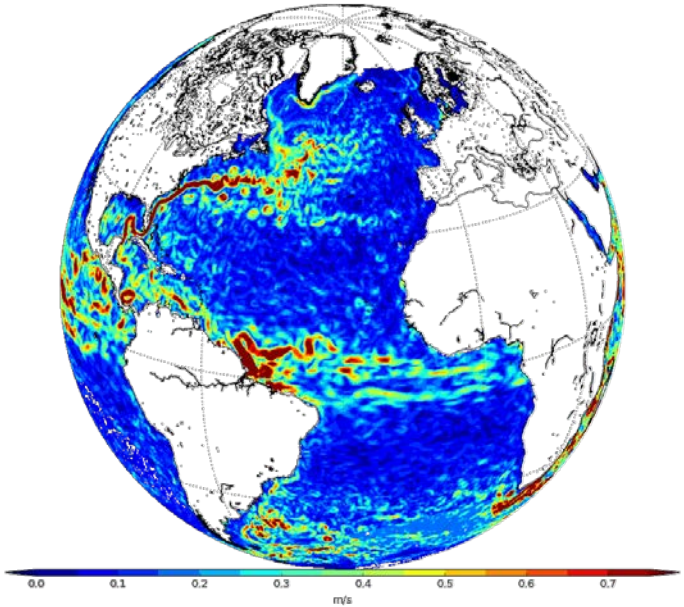
The Currents

- **Forecast:** Global and european region
  10 days forecast; 3D 1/12° daily (hourly)

- **Obs-based:** 3D analysis at ¼° (1/8°) daily

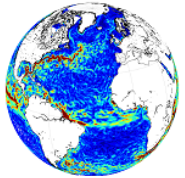


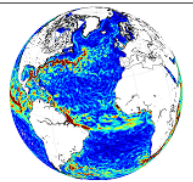
The Currents

New products
Service open yesterday !

- Obs-based global surface current product
  - Physical content: geostrophy + ekman
  - Global ¼° daily, NRT and Reprocessing
  - Layer: 0 and 15 metres

- Good illustration of coordination between Copernicus Service (CMEMS) and R&D (Globcurrent/ESA & CNES)

MULTIOBS_GLO_PHY_NRT_015_003		
GLOBAL TOTAL SURFACE AND 15M CURRENT FROM ALTIMETRIC GEOSTROPHIC CURRENT AND MODELED EKMAN CURRENT PROCESSING		
OBSERVATION	L4	GLO
UV		
0.25 degree x 0.25 degree (2 depth levels)		
From 2017-01-01 to 2018-06-21		
6-hourly-instantaneous, hourly-instantaneous, daily-mean, monthly-mean		
MORE INFO ADD TO CART WMS Sub-setting		

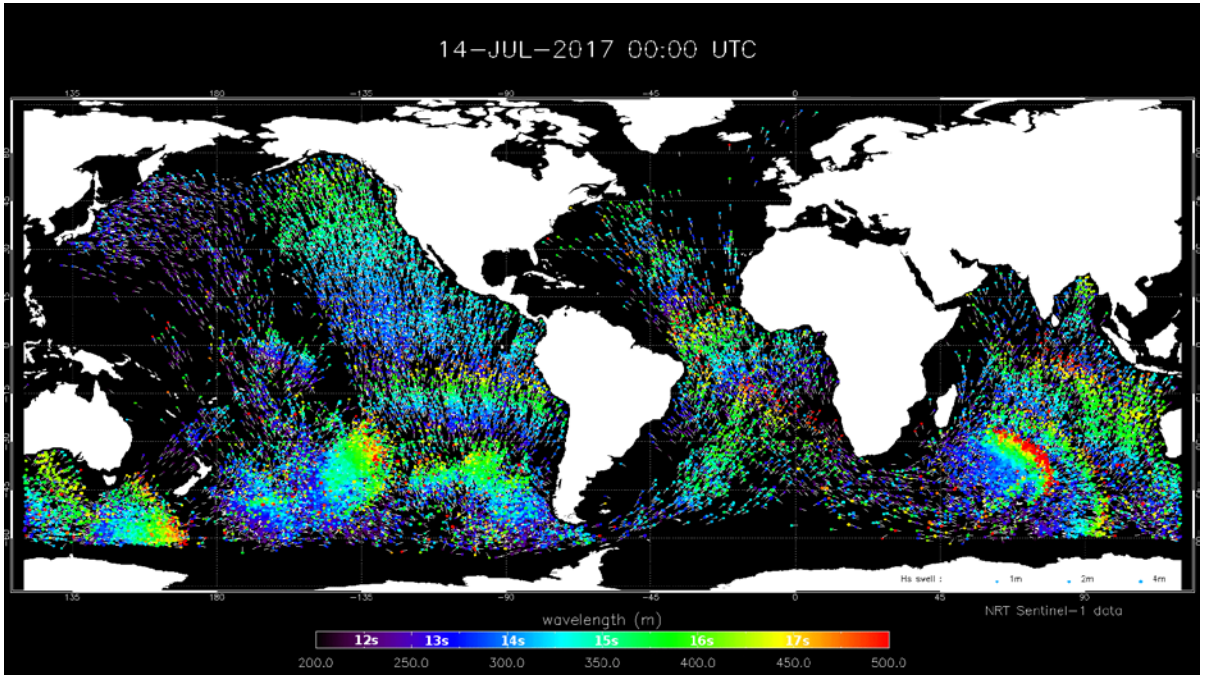
MULTIOBS_GLO_PHY_REP_015_004		
GLOBAL TOTAL SURFACE AND 15M CURRENT FROM ALTIMETRIC GEOSTROPHIC CURRENT AND MODELED EKMAN CURRENT REPROCESSING		
OBSERVATION	L4	GLO
UV		
0.25 degree x 0.25 degree (2 depth levels)		
From 1993-01-01 to 2017-12-31		
6-hourly-instantaneous, hourly-instantaneous, daily-mean, monthly-mean		
MORE INFO ADD TO CART WMS Sub-setting		

The wave products

Wave parameters
-Significant wave heigth
-Swell (H, period, wavelength)

- Obs-based products
1°x1° grid, daily (altimetry)
0.5°x0.5°, 3 hours (SAR)

- Forecasts
5 days forecast at 1/12°, daily

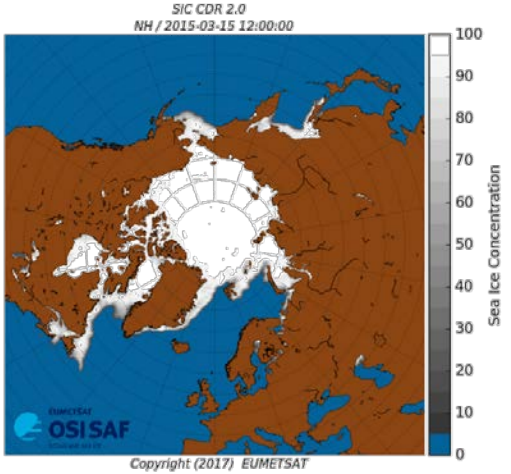


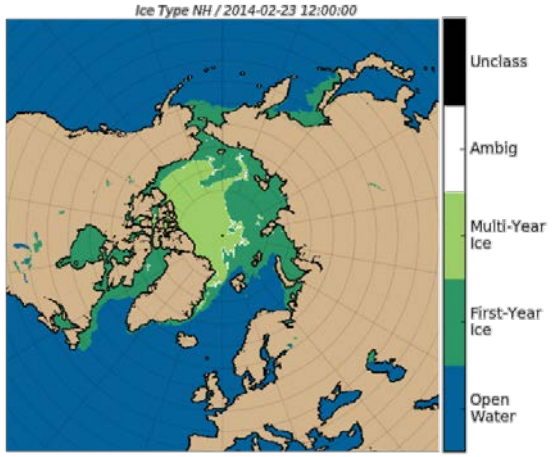
The Sea Ice products

Concentration & Type

Obs-based: ¼°, daily

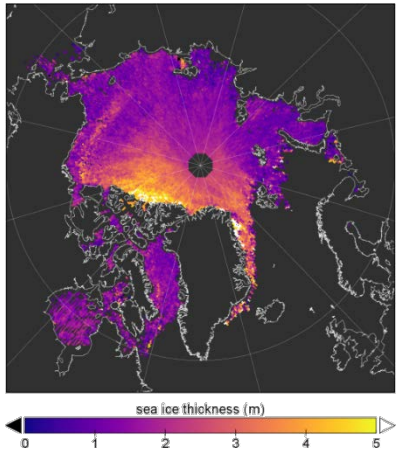
Forecast: 1/12°, daily, 10 days





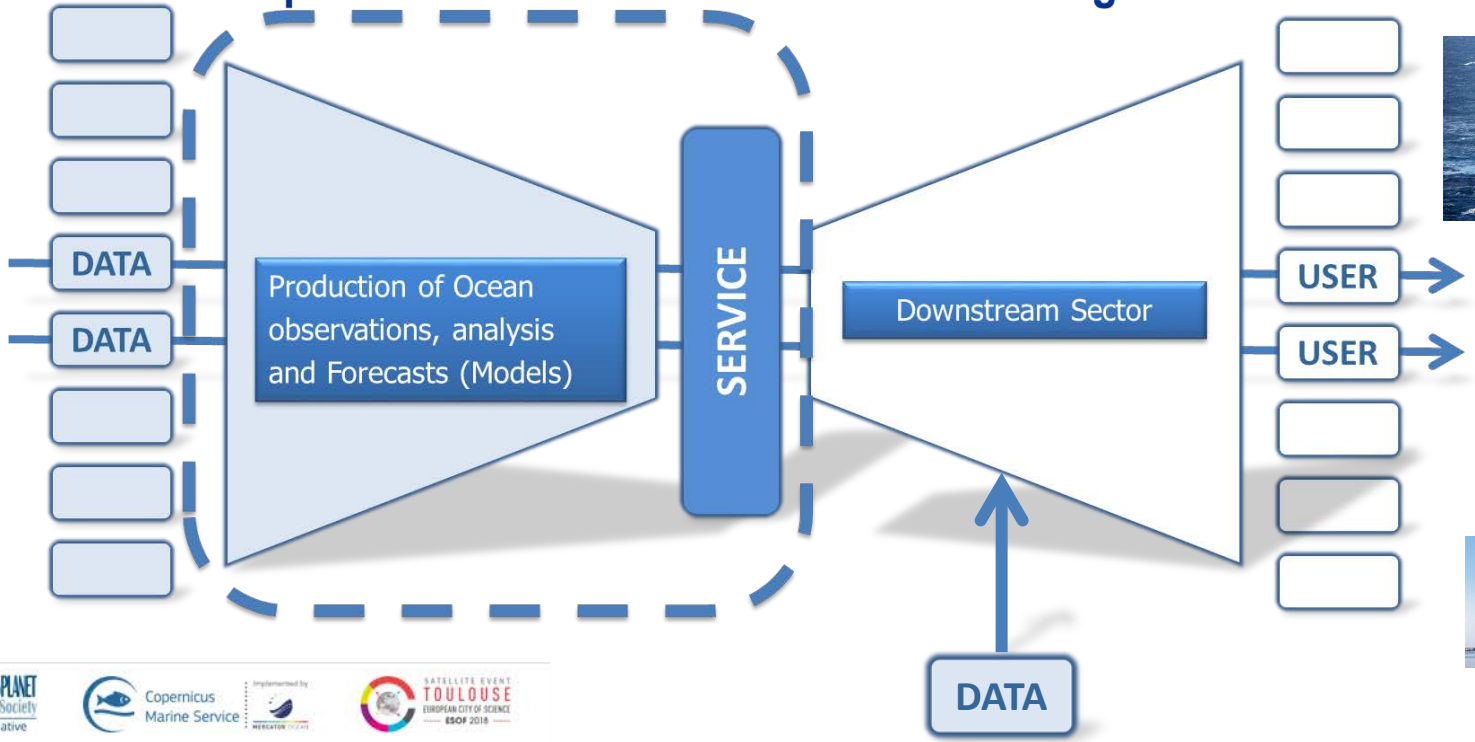
Thickness

Obs-based: ¼°, monthly



End-User Needs

Copernicus Marine Environment Monitoring Service



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CMA-CGM Use Case

Objective: Reduce comsumption of fuel by 1%

→ for the whole CMA-CGM fleet: 60 000 t Fuel

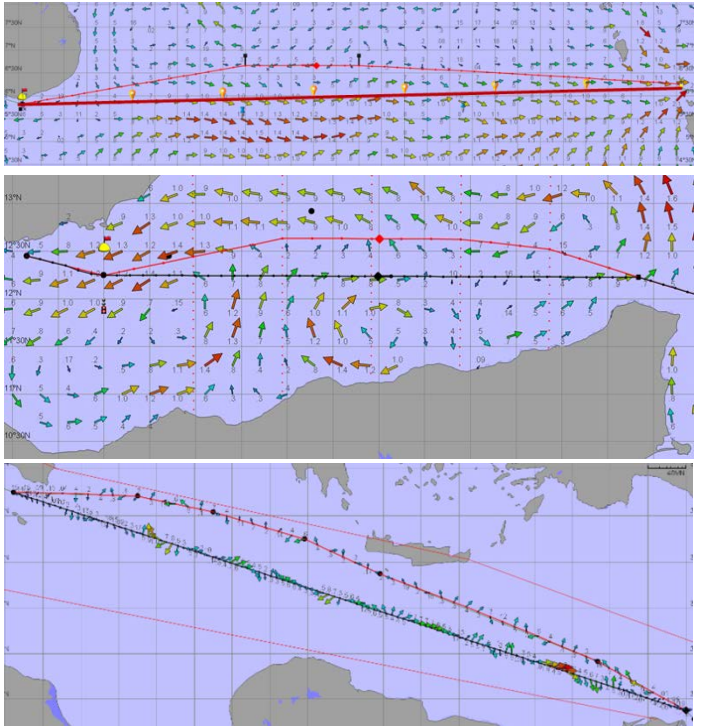
180 000 t CO2

A reasonable target?
Yes, if using better ocean information and in particular currents !

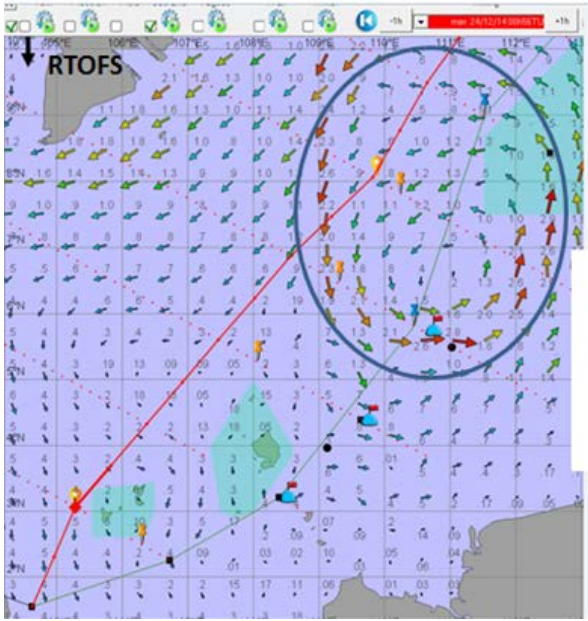
Tests for ship routing:
CMA-CGM Amerigo Vespucci between Europe and China – March / May 2015

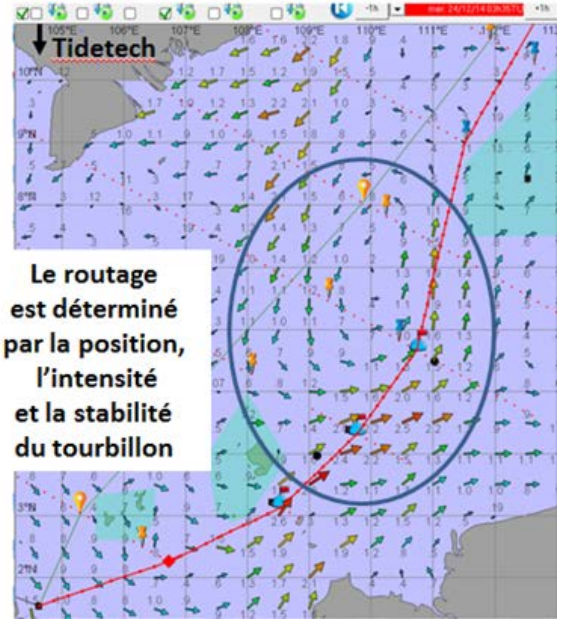
Total consumption during the voyage: 4150 t
Actual savings due to « current routing »: 19 t = 0,4%

Improvement potential: 50 t = 1,2% using better ocean information



CMA-CGM Use Case





Le routage est déterminé par la position, l'intensité et la stabilité du tourbillon

Need to select the best forecasts :

- Select best products in each area during a time window

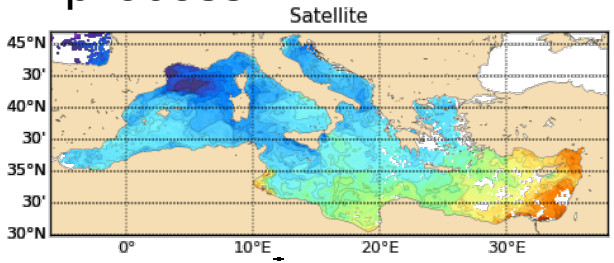
- Verify the consistency between Observations (sat, in-situ) and model products

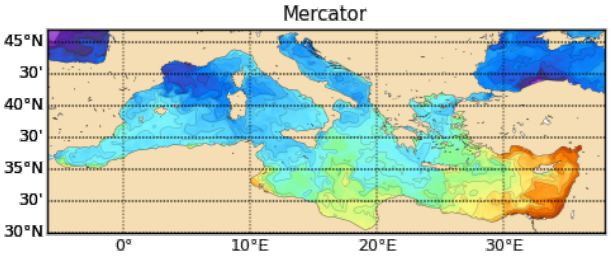
- Assign a confidence index

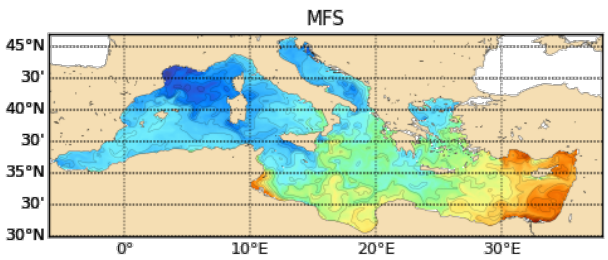
Expert in ocean processes but also on the products to be used

CMA-CGM Use Case

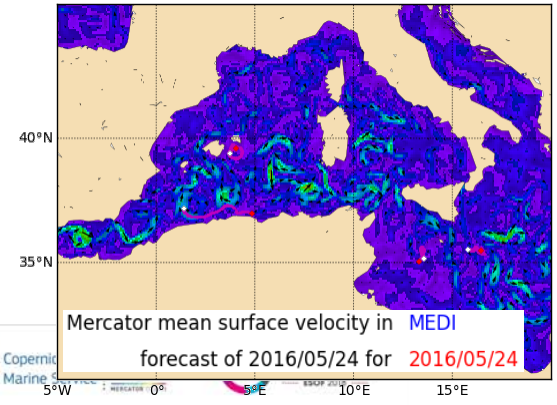
Illustration of Copernicus products used for the qualification and selection process

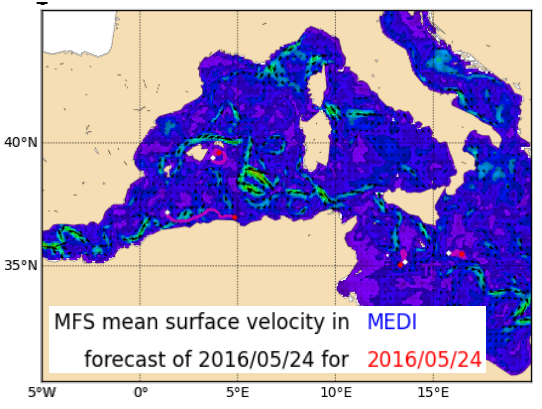






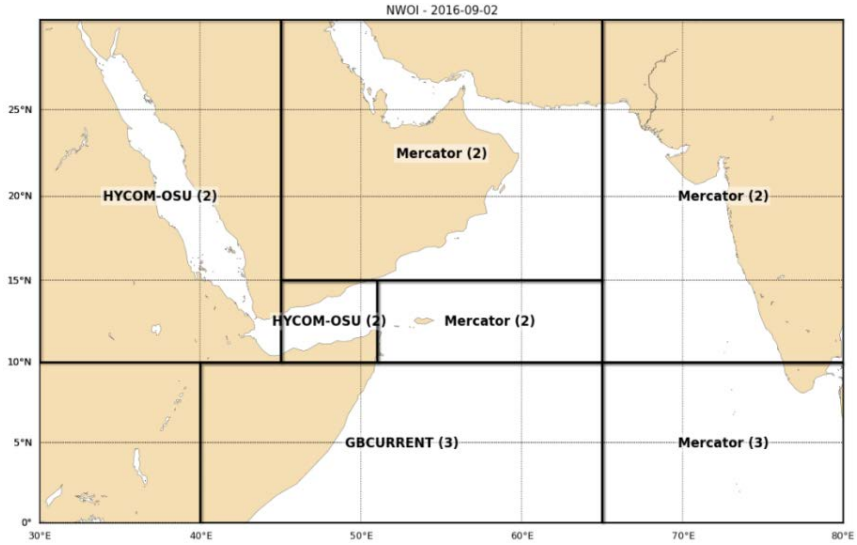
SST: 2016-05-20 → 2016-05-25

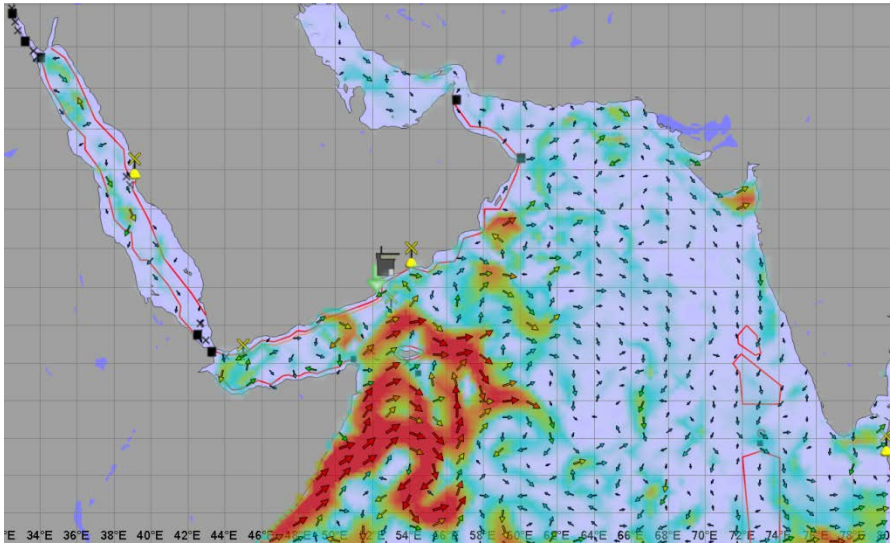




CMA-CGM Use Case

Illustration of selection of products after the selection process





Perspectives – Future Challenges

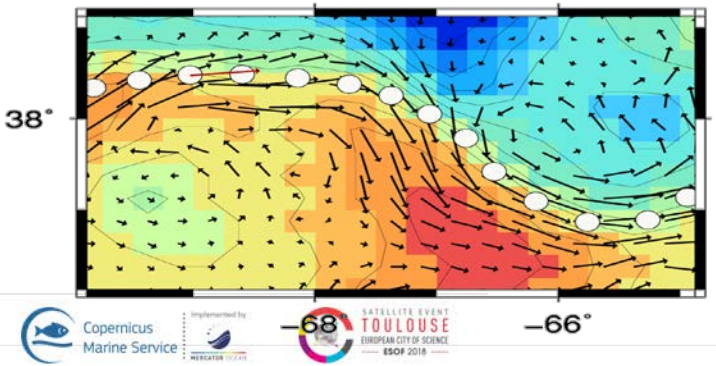
Improvement of resolution and reliability of surface currents and waves

- Increase the number of satellite
- New satellite missions (SWOT swath)

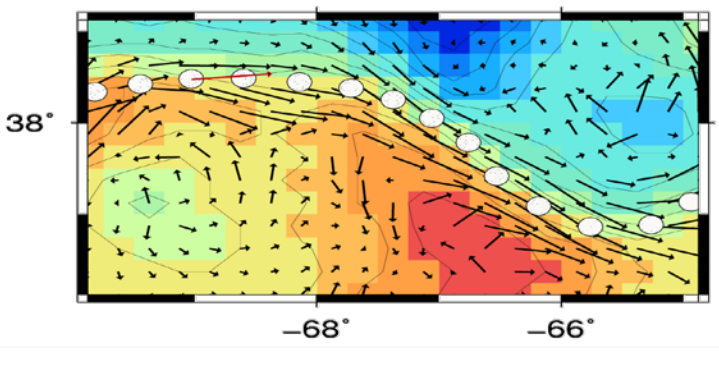
→ To be assimilated by the forecast model

- Sensor synergy products

Altimetry



Altimetry + SST



Perspectives – Future Challenges

- Arctic Zone (high latitudes)

  will become a strategic zone

  Europe (Copernicus) aim to develop a polar orbiting mission with several instruments (SAR, Optical, Microwave)

  ⇩

  Improved sea ice products

Thank you !