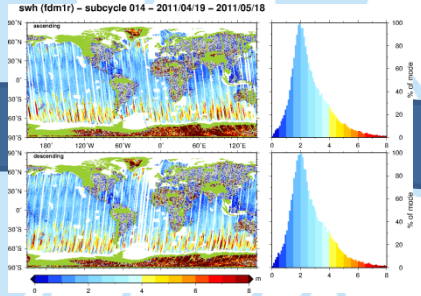
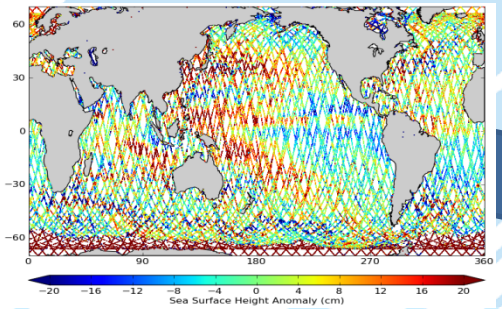
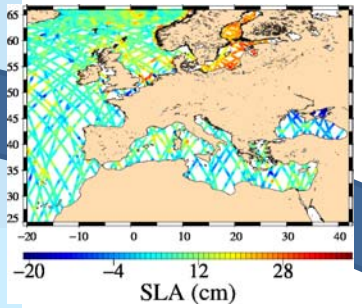
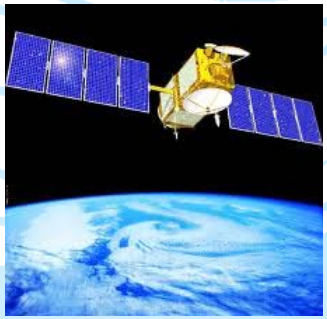
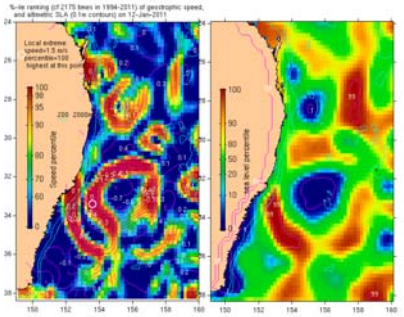
Near real time products to applications











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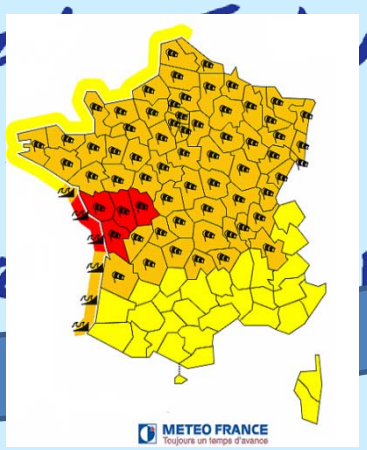
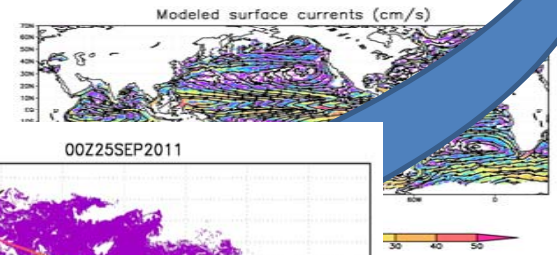
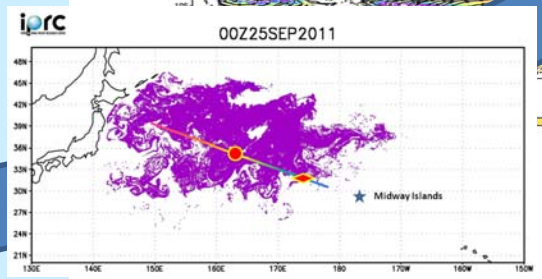






Processing to SWH, WSP, SSH
Connection to forecast systems
Application to monitoring and significant events

Javier Zavala-Garay **Evaluation of subsurface projection of satellite information in a variational data assimilation system for the Mid-Atlantic Bigh**
Charon Birkett **Near Real Time Monitoring of Global Reservoirs and Lakes**
Pierre Brasseur **Advanced Altimeter Data Assimilation for Physical Ocean Prediction and Ecosystem Monitoring**
Shailen Desai **Dense, High-Accuracy Sea Surface Height Data in Near-Real-Time from the Jason-1, Jason-2, and ENVISAT Missions**
David Griffin **Real-time oceanography and extreme events**
Christian Jayles **Another Improved DORIS/DIODE Software for Jason-2 OGDR**
Sylvie Labroue **Level-3 PISTACH Products for Coastal Studies**
Sylvie Labroue **Updates of the SSALTO DUACS Near Real Time System: Focus on Short Latency Data Products**
Jean-Michel Lefevre **Operational Forecasting of Wind-Generated Waves by Tropical Cyclones and Altimetry**
Nikolai Maximenko **Modeling distribution of marine debris before and after tsunami of March 11, 2011**
Francoise Mertz
Marie-Isabelle Pujol,
Natural Extreme Events Observed by Altimetry A Kerguelen regional Sea Level product to support the KEOPS2 experiment
Walter Smith **Near-Real-Time Wave, Wind, and Sea Surface Height from CryoSat FDM/L1B Data**
Javier Zavala-Garay **Evaluation of subsurface projection of satellite information in a variational data assimilation system for the Mid-Atlantic Bigh**

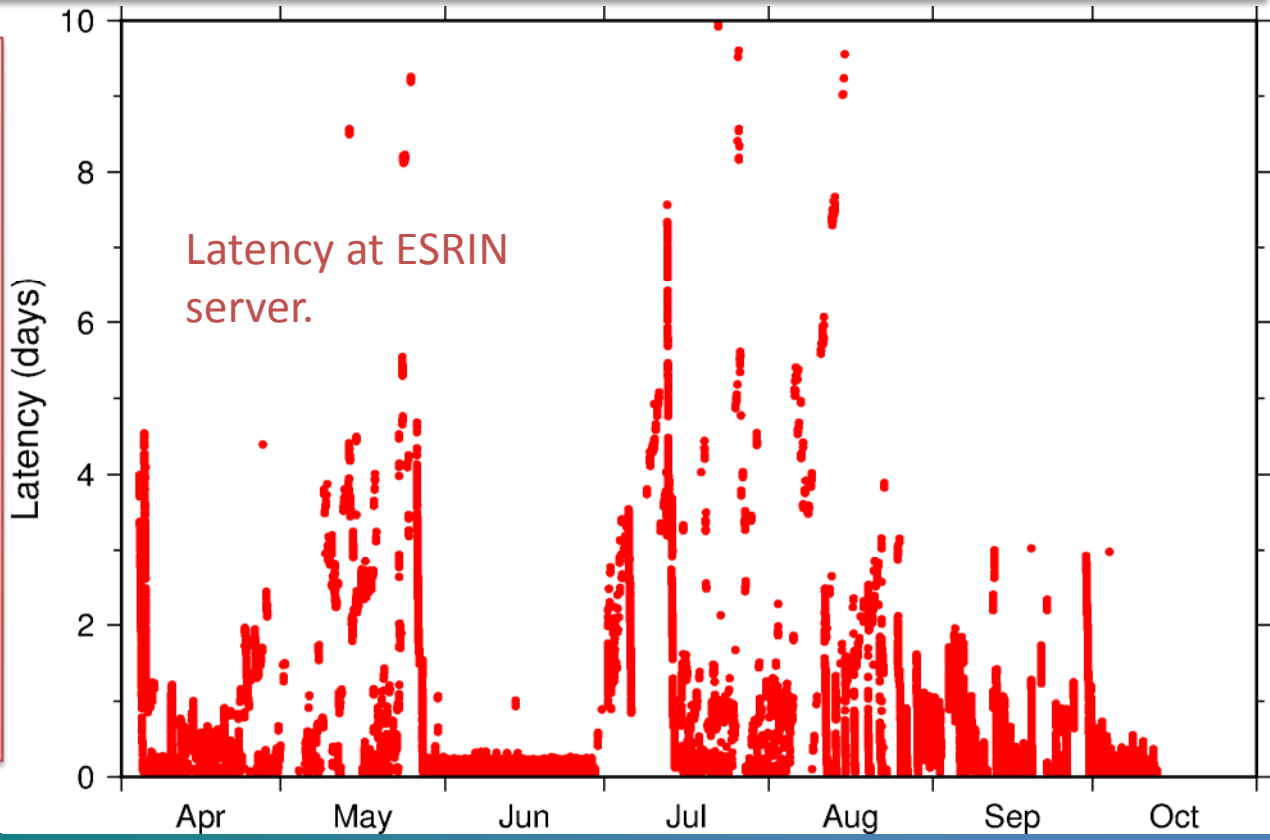
Speed & Latency

Every hour, we search ESA ESRIN ftp site for new FDM L1B data.

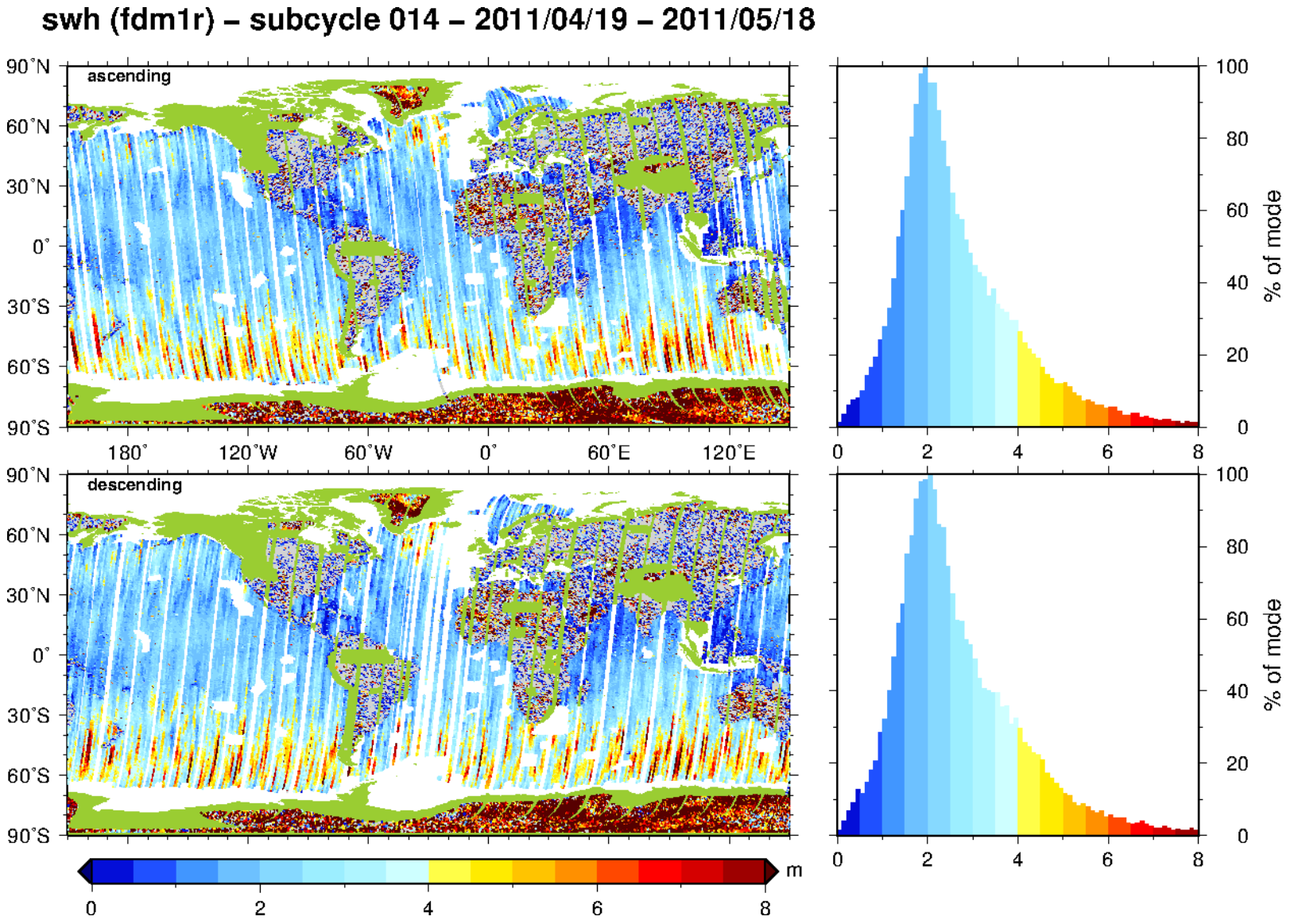
From ESRIN ftp to NOAA N-AWIPS, our process takes about 2 minutes, end-to-end. Thus latency is determined on the ESA side.

Until recently, less than 25% of FDM L1B files were available within 3 hours of real time. This has now improved.

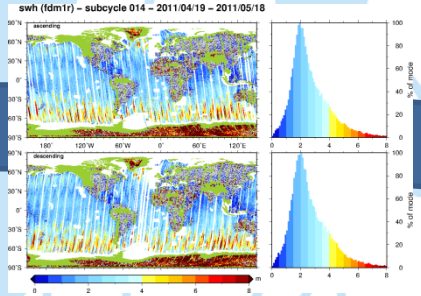
October 6-13:
34% within 3 hours;
77% within 6 hours;
all within 1 day.

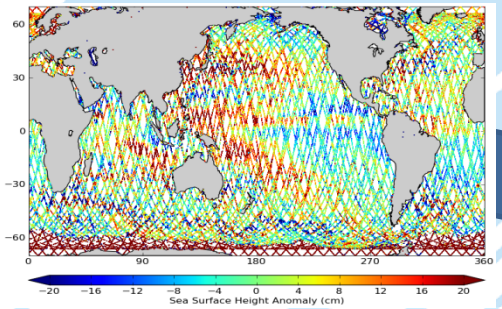


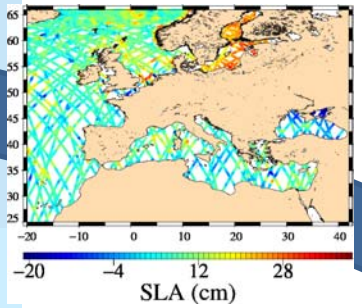
CS2 Wave Heights

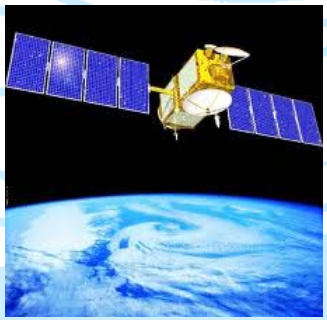


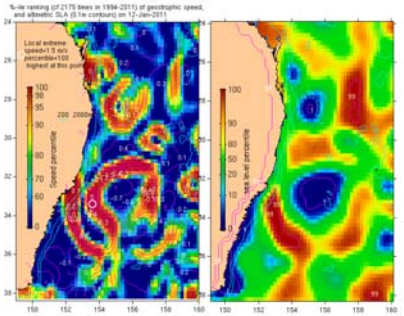
Near real time products to applica











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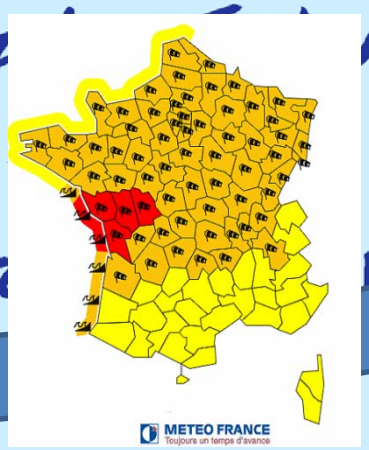
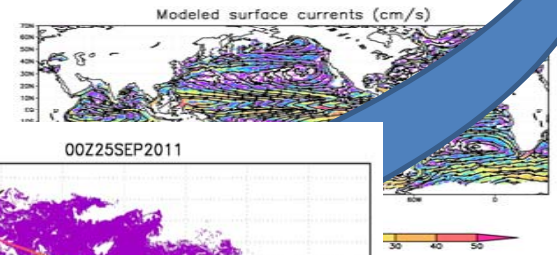
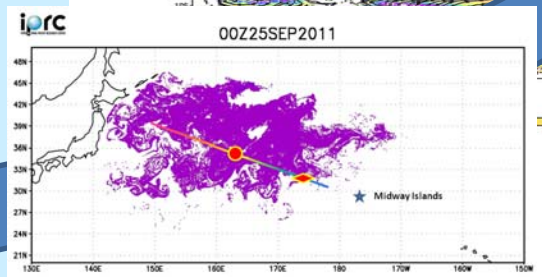






Approach

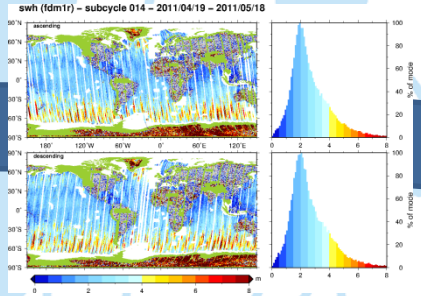
- Value-added products with high-accuracy measurements of SSHA in Near-Real-Time (NRT).
  - Typical 3-7 hour latency
- Improve density of NRT SSHA measurements using three missions: Jason-2, Jason-1, and **ENVISAT (new)**.
- Models for SSB and other geophysical corrections for Jason-1.
- Forecast pressure fields from National Centers for Environmental Prediction (NCEP)
- Orbit altitude accuracy is limiting error source for SSHA from project products.
- Improve orbit altitude accuracy:
  - Jason-2: GPS-based NRT precise orbit determination.
  - Jason-1 and ENVISAT: Inter-satellite SSH crossover-based orbit altitude determination with respect to Jason2 reference.

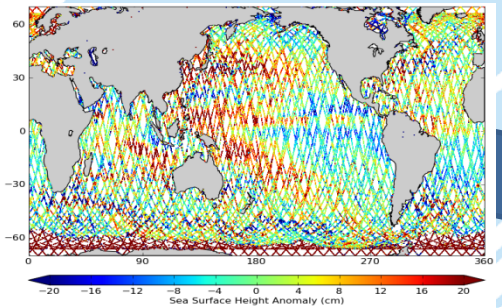
Conclusions

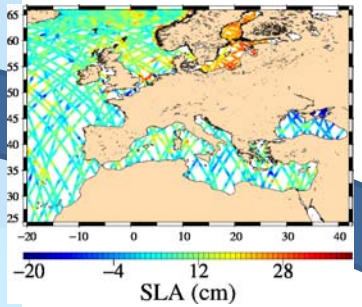
NRT SSHA Product	Orbit Altitude Accuracy (cm)	1-Hz SSHA Accuracy (cm)	Latency (hours)	Release Date
Jason-2 GPS-OGDR-SSHA	1	< 3.5	3-5	June 5, 2009
Jason-1 OSDR-SSHA	2	< 4.0	7-9	Dec. 17, 2009
ENVISAT FDGDR-SSHA	< 3	< 5.0	7-9	**Aug. 5, 2011**

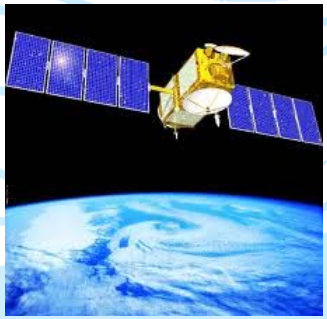
- Jason-2 NRT GPS-based precise orbit determination accuracy similar to GDR-T POE.
- Jason-1 and ENVISAT NRT orbit altitude accuracy slightly worse than MOE.
  - Additional tuning possible to improve Jason-1 and ENVISAT NRT orbit altitude accuracy.
- Significant advances in DIODE capability from ENVISAT, to Jason-1, to Jason-2.
- NRT SSHA products should not be considered as definitive climate records:
- Available at Physical Oceanography Distributed Active Archive Center: ftp://podaac.jpl.nasa.gov/SeaSurfaceTopography/
- **ENVISAT NRT FDGDR-SSHA product testament to productive partnership between ESA, CNES, and JPL.**

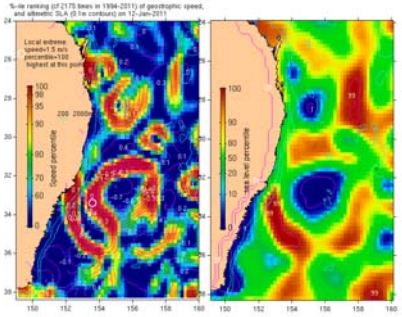
Near real time products to applications











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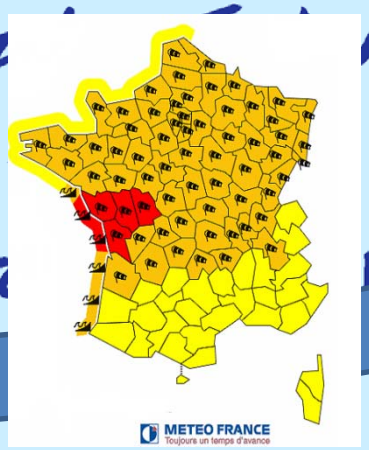
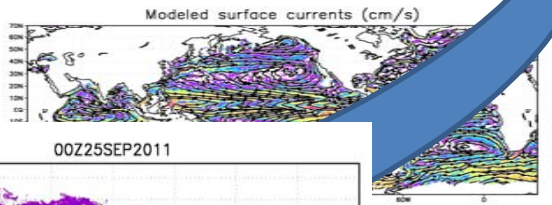
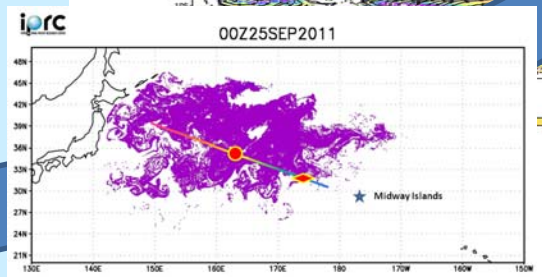
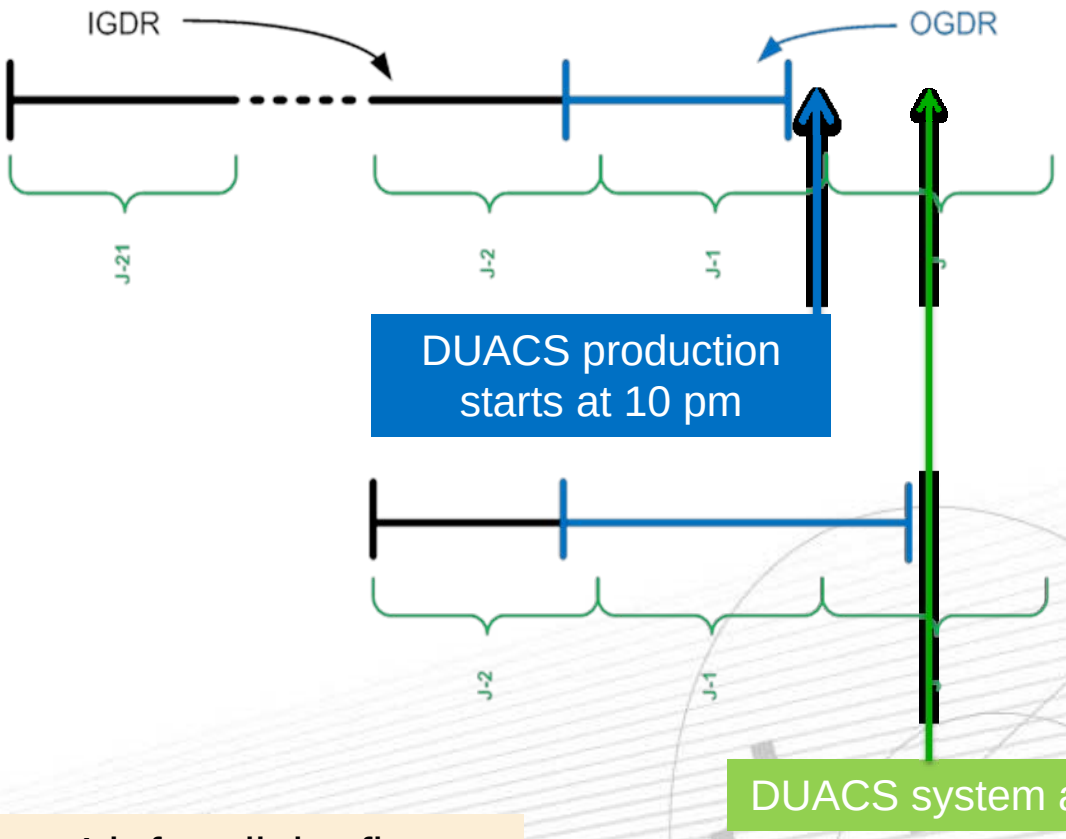






From OGDR to ‘OGDR on the fly’

OGDR

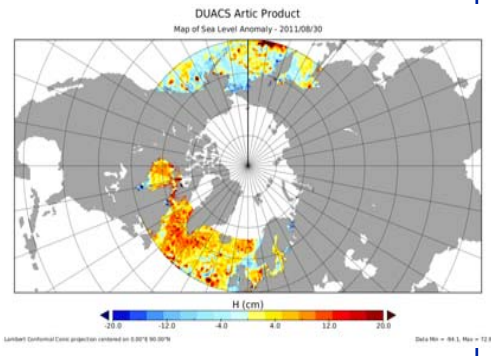


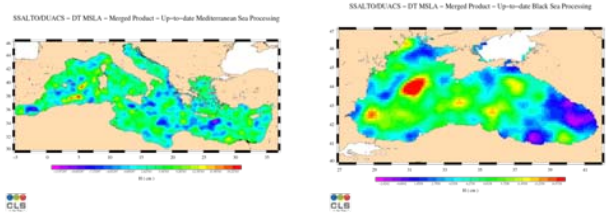
OGDR
‘On the fly’

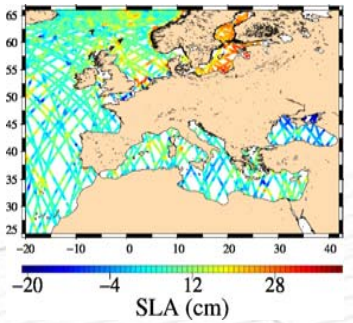
Timeliness reduced to 4 h for all the flows compared to 27 h

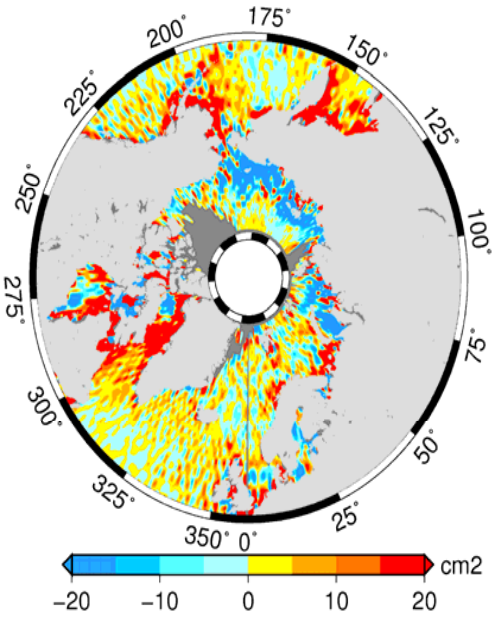
Improvement Level 3 along track products

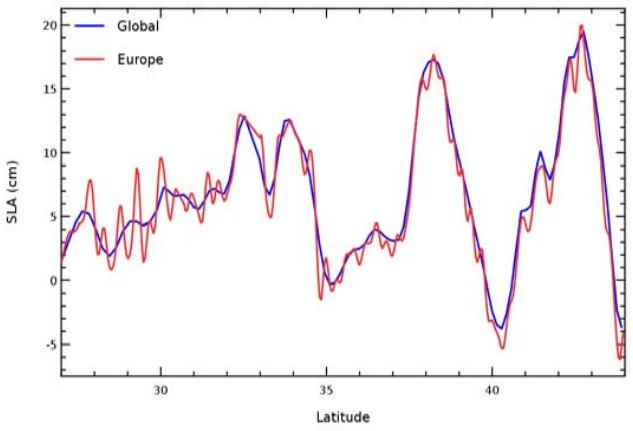
- Better serve the need for accurate along track operational products for modeling centers
- Towards L3 regional products
- Improvement of regional products
  - Towards higher resolution
  - Specific ocean tide models
  - Improving data coverage

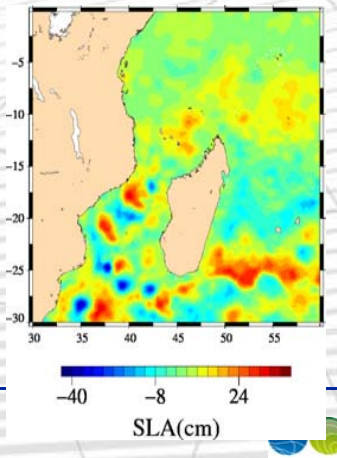




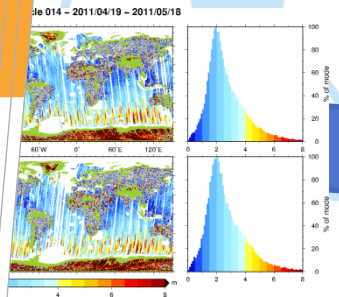


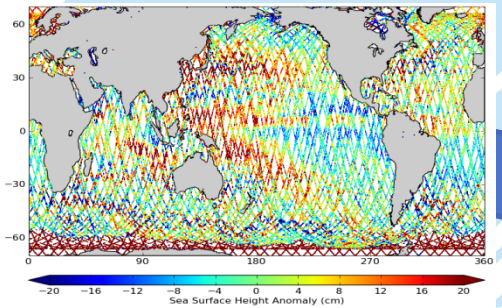


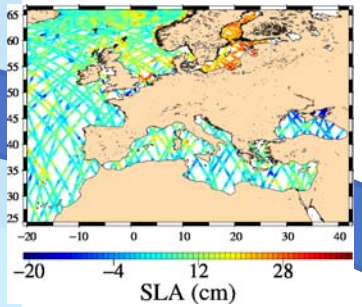


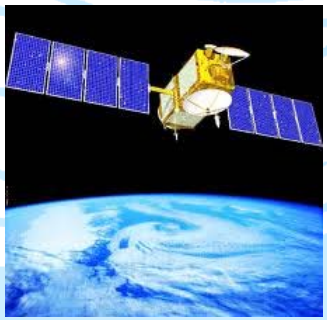


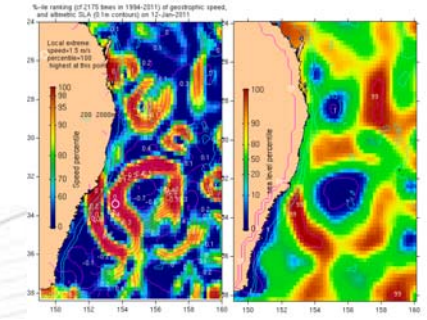
Near real time products to applications











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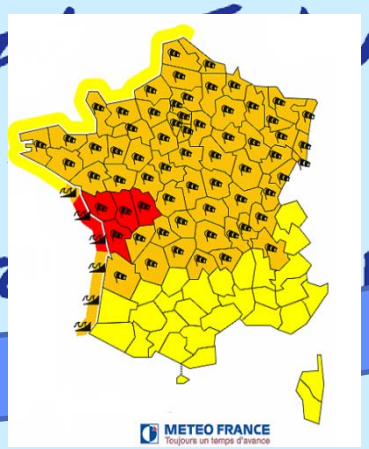

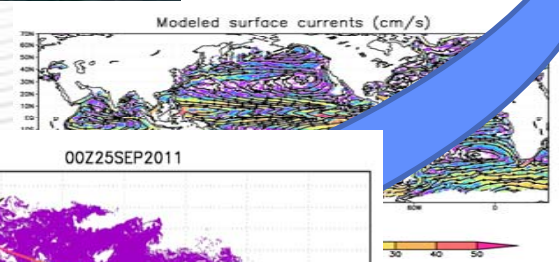

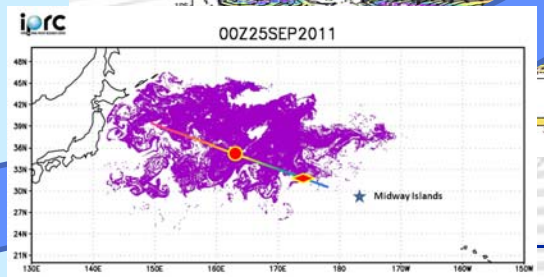

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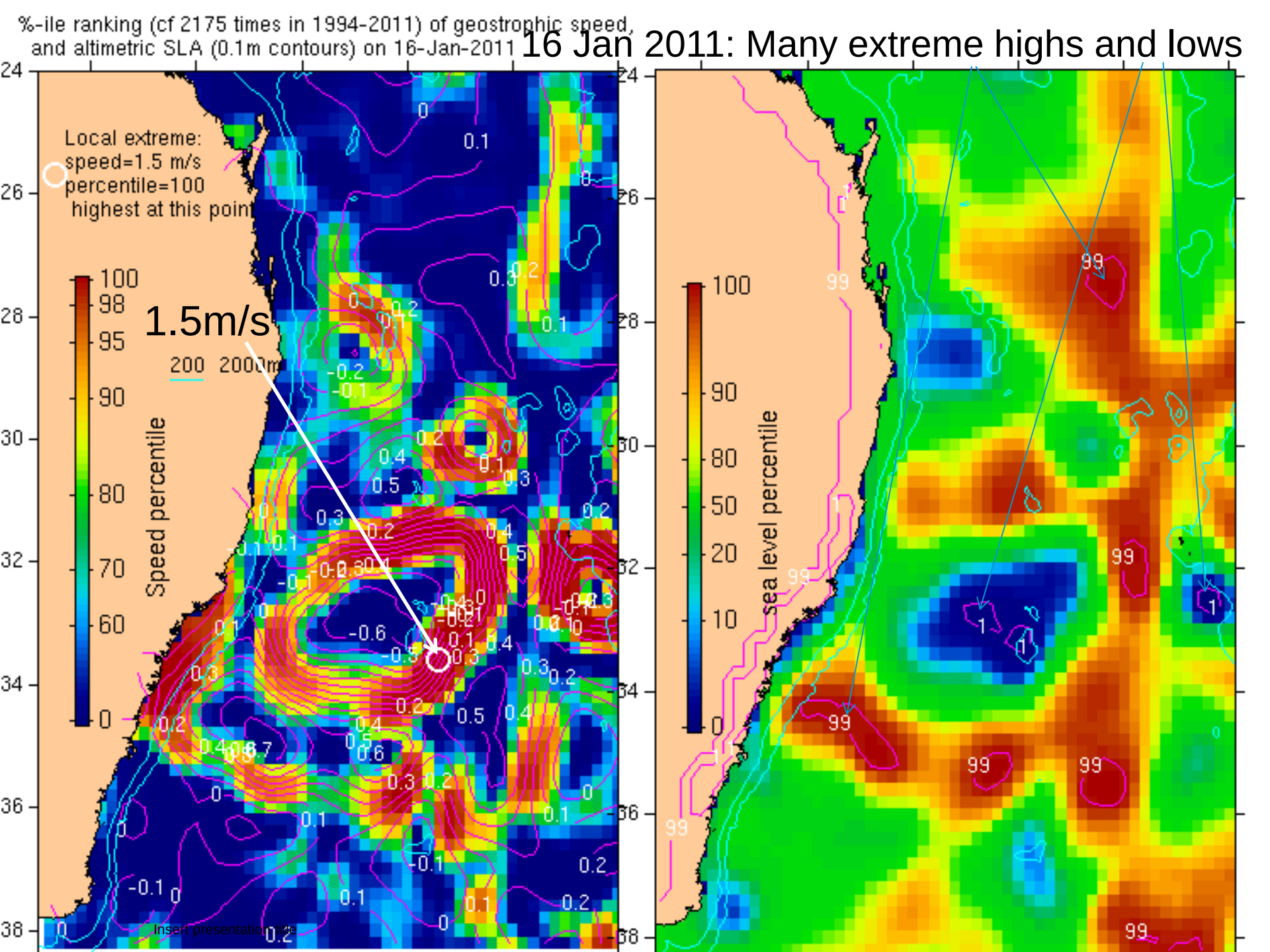
16 Jan 2011: Many extreme highs and lows



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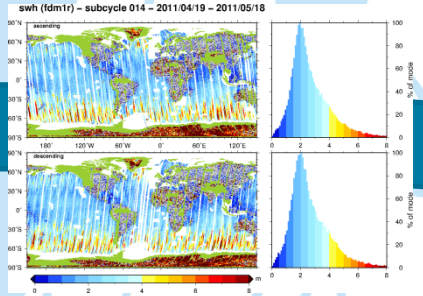

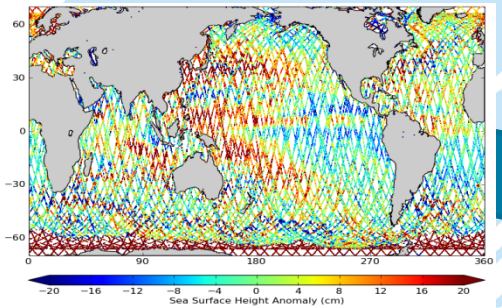

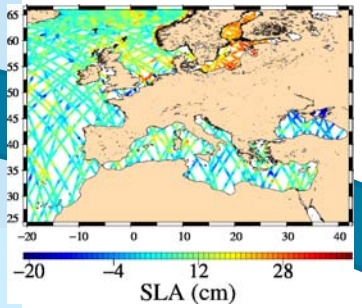

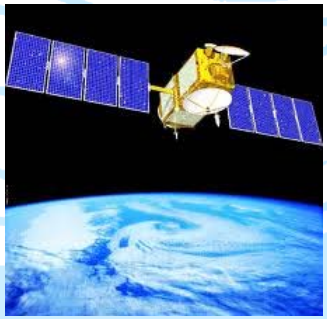

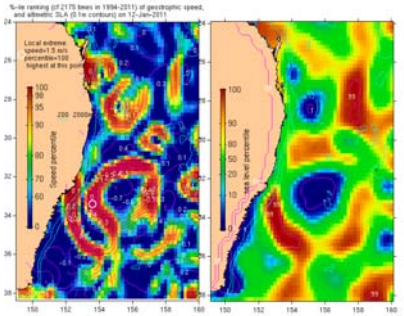

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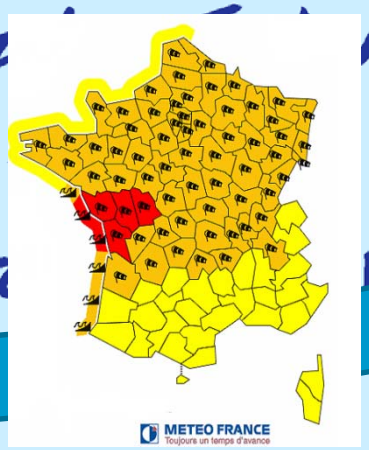
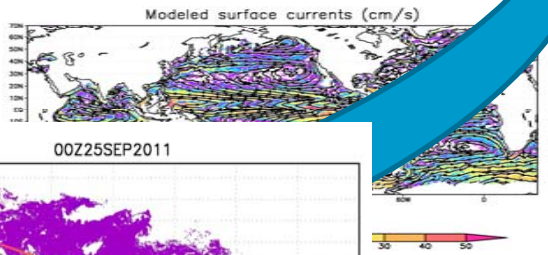
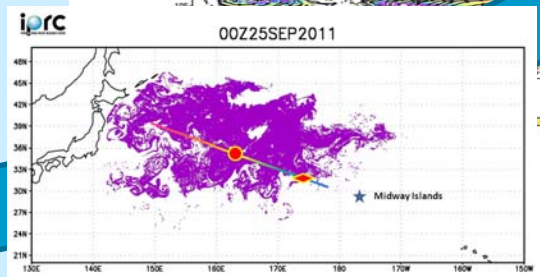
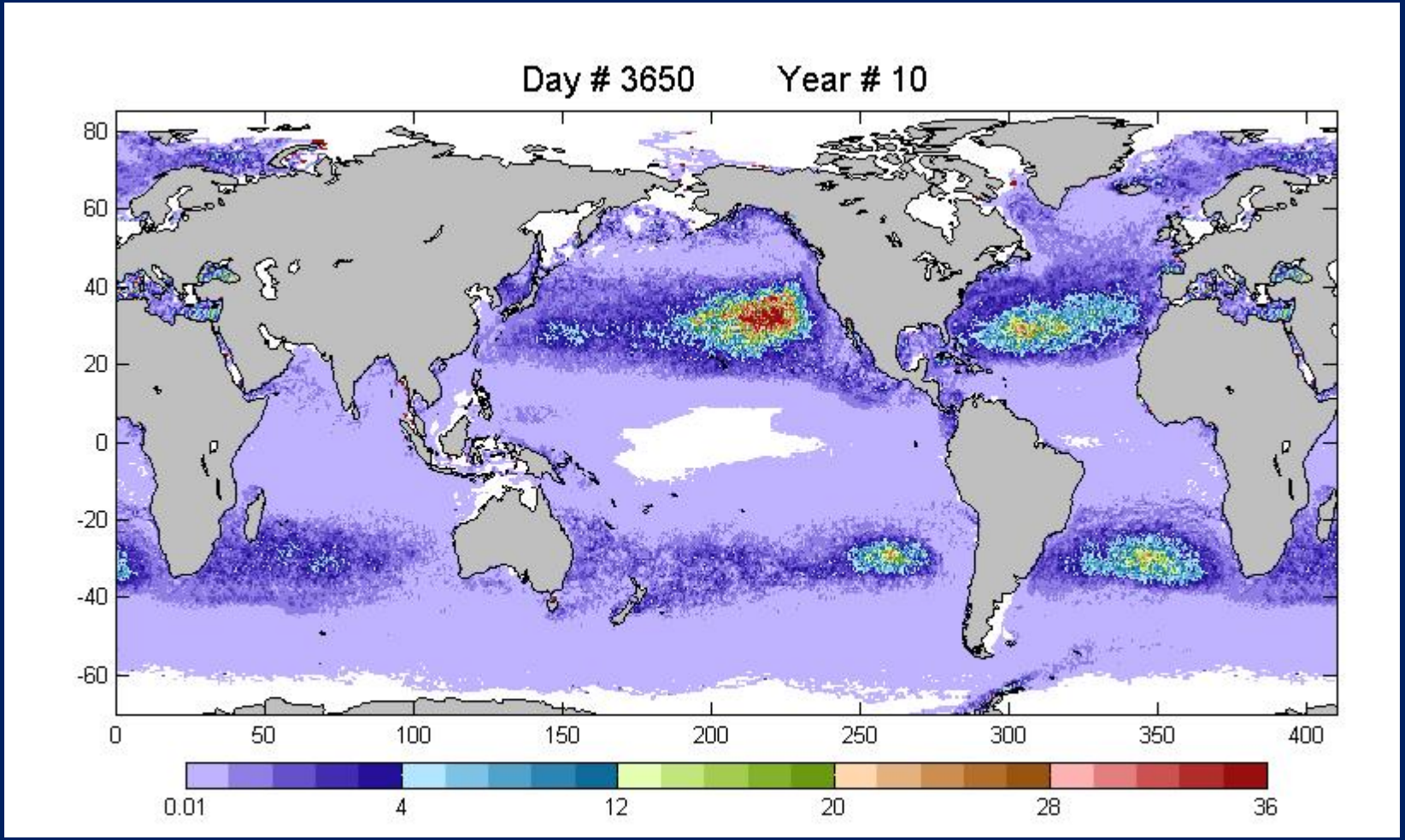




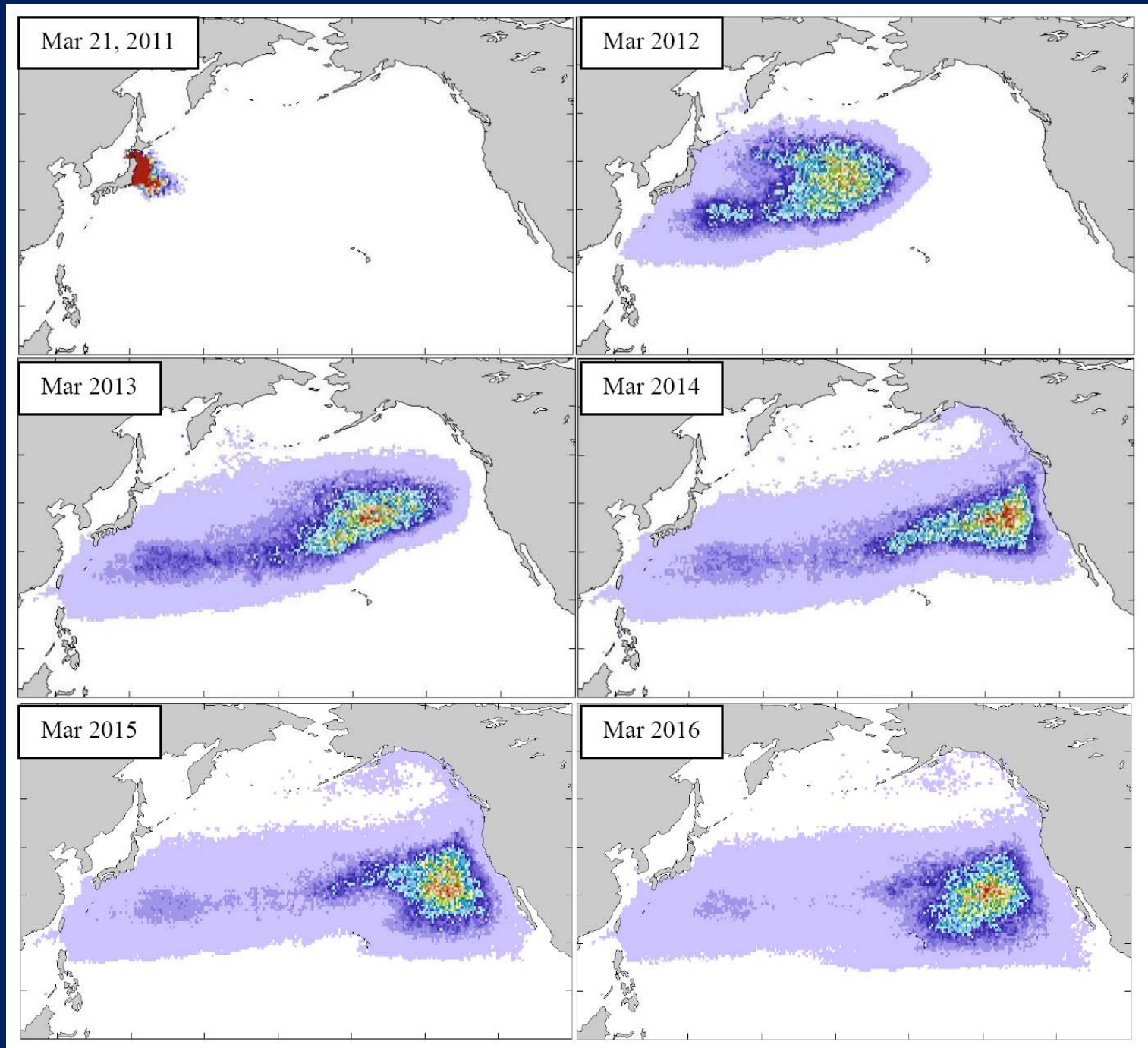


National Research FLAGSHIPS
Wealth from Oceans
CSIRO

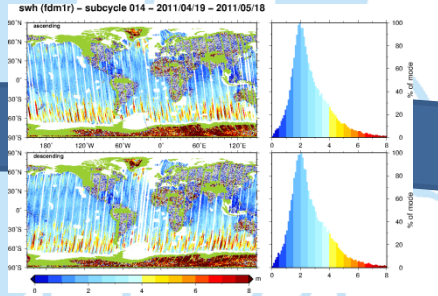
UH: Model debris distribution from coastal sources (without tsunami)

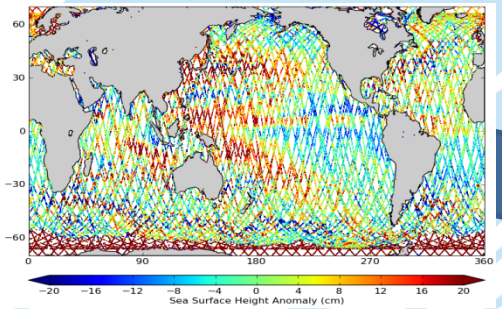


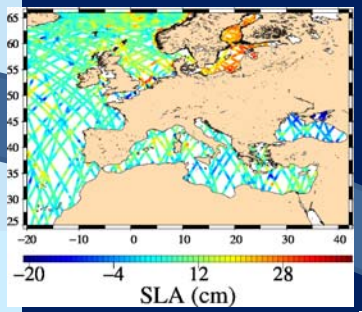
Collaborations with the SEA, “5 Gyres”, KAISEI/Ocean Voyages, Jim Mackey et al. helped to validate accumulation of microplastic in all five subtropical convergences

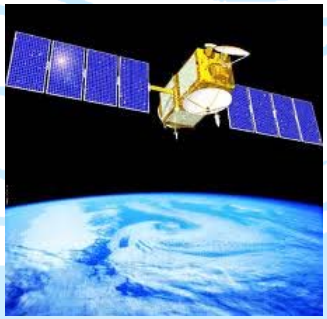

Mar 21, 2011
Mar 2012
Mar 2013
Mar 2014
Mar 2015
Mar 2016

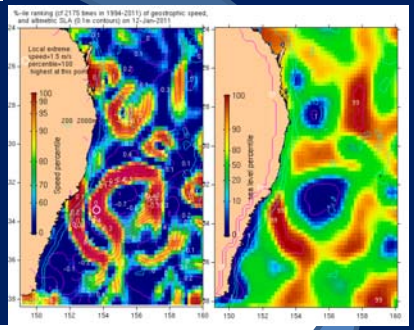
Near real time products to applications











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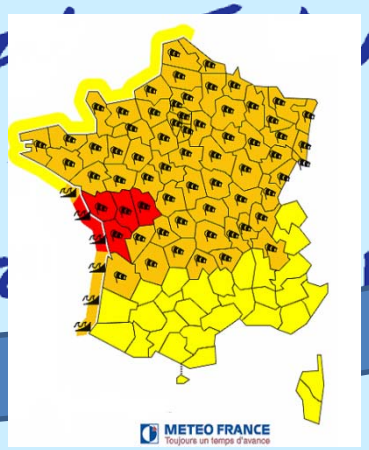
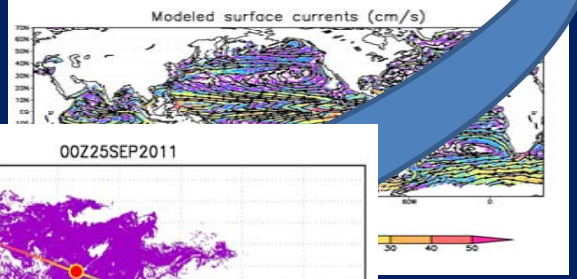
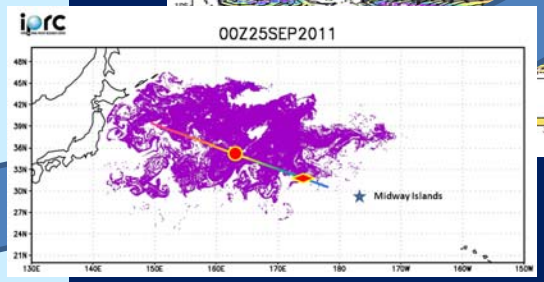
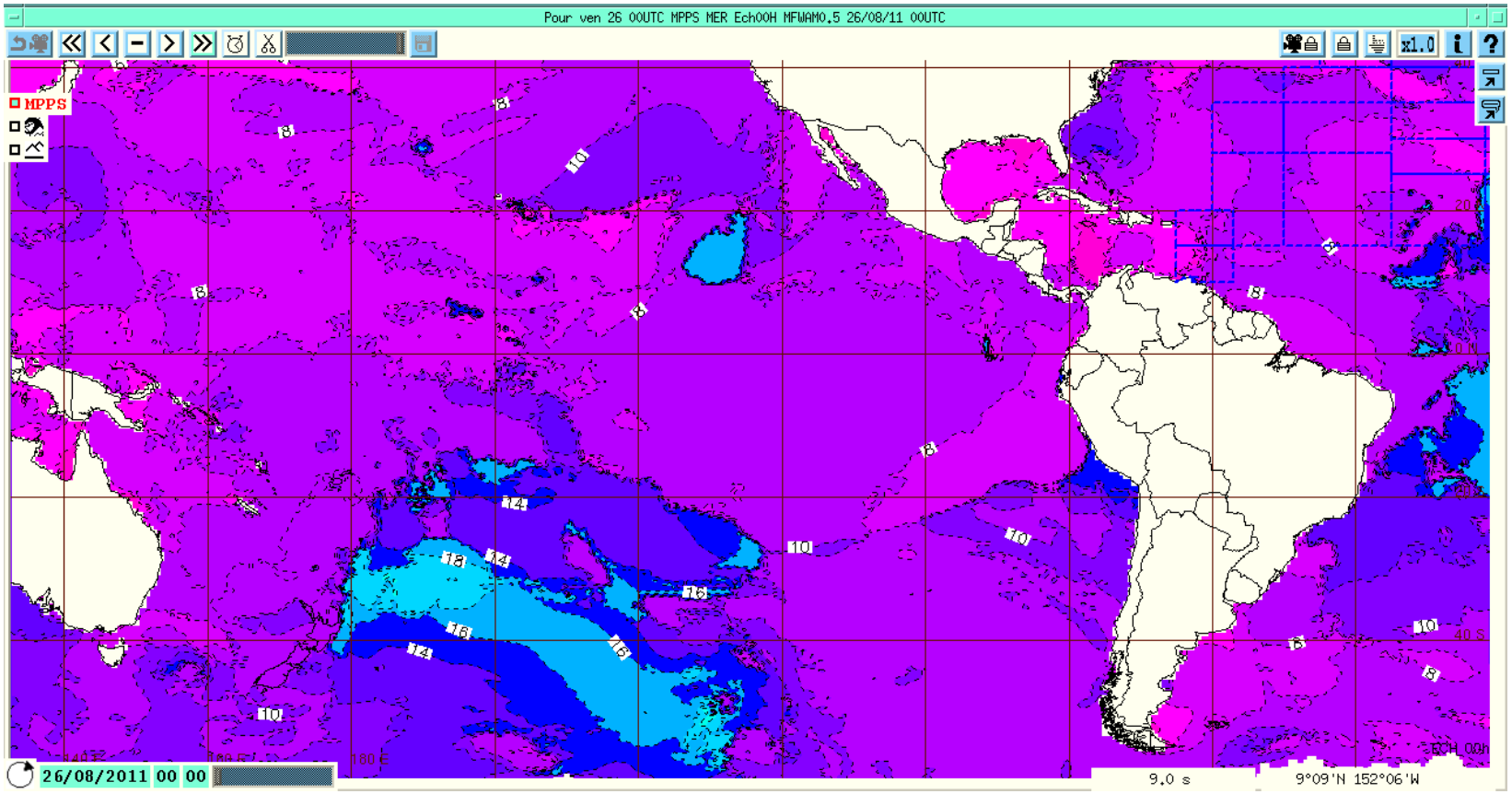
19-21 Oct 11







Example of event that activated the warning system in French Polynesia:



5 m and **18s** (wave length 500 m) swell

Expected wave set up, locally more than 1.5 m

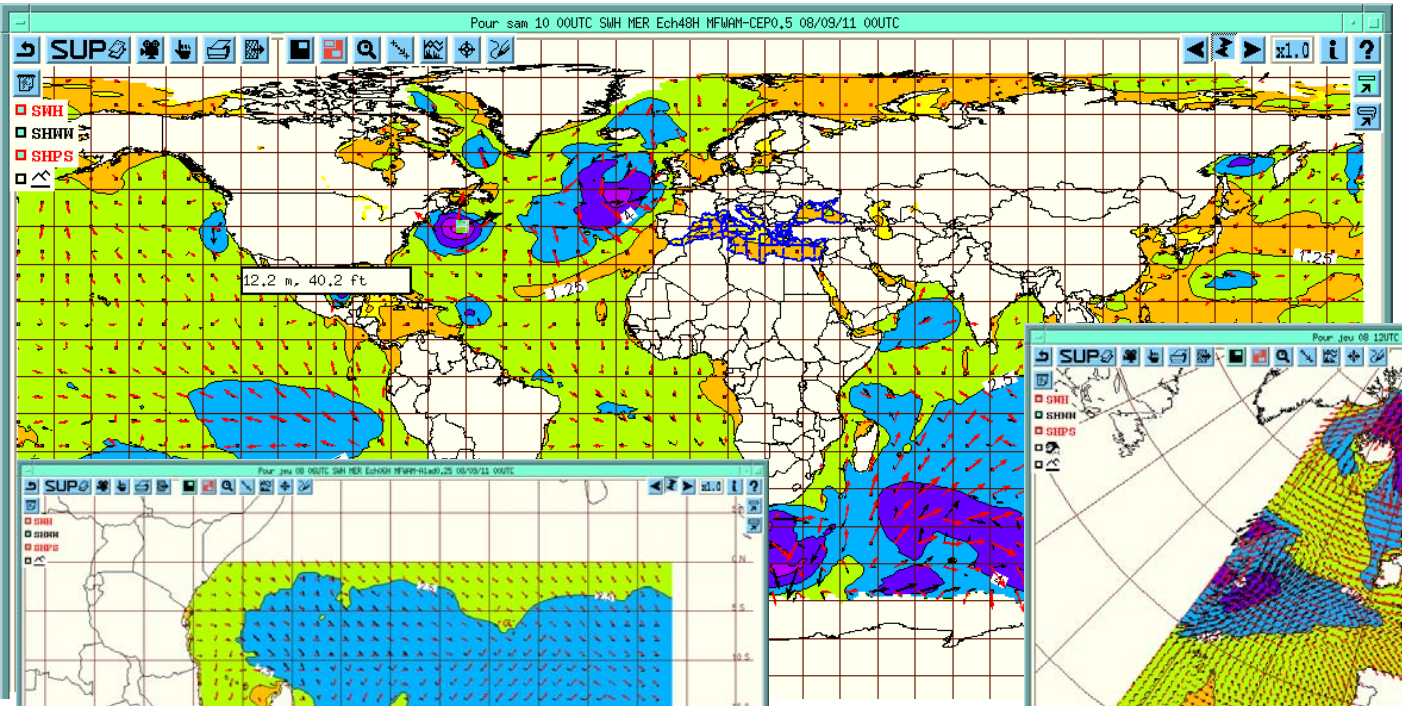
No buoy data, only data from space

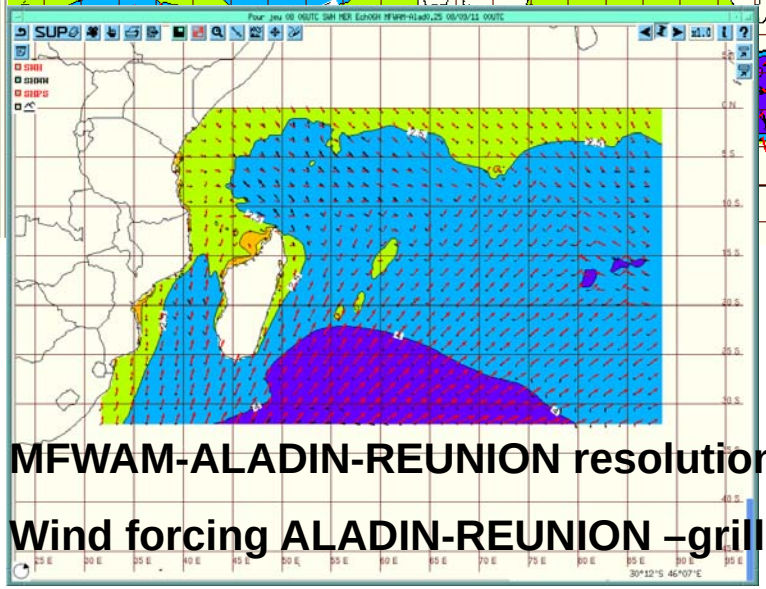
METEO FRANCE
Toujours un temps d'avance

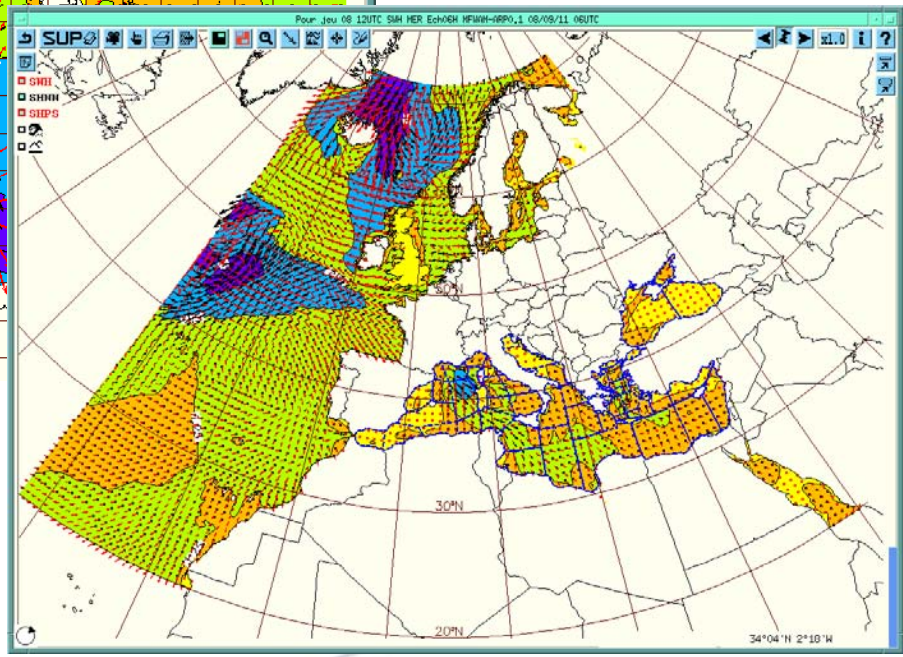
New wave forecasting system of Meteo-France:

2 global wave models MFWAM driven by different wind forcings: ECMWF and ARPEGE/IFS - resolution 55km

1 regional wave model MFWAM resolution 10km driven by ARPEGE. Soon with ECMWF aswell







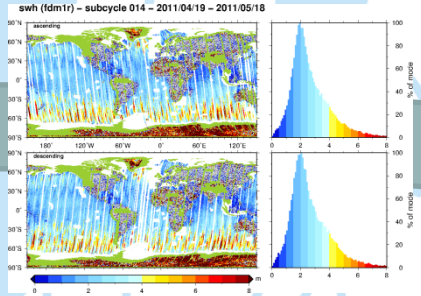
MFWAM-ALADIN-REUNION resolution 0.25°

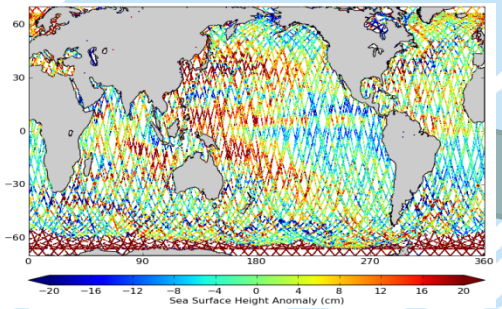
Wind forcing ALADIN-REUNION –grille 0.1 km

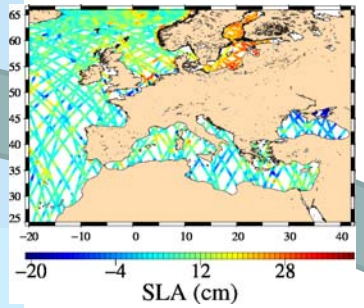
With hurricane bogusing – Next year other domains

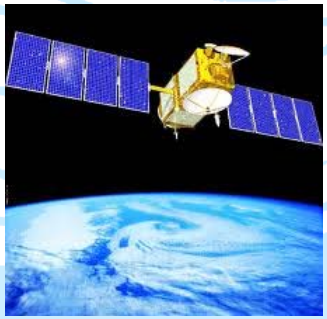
METEO FRANCE
Toujours un temps d'avance

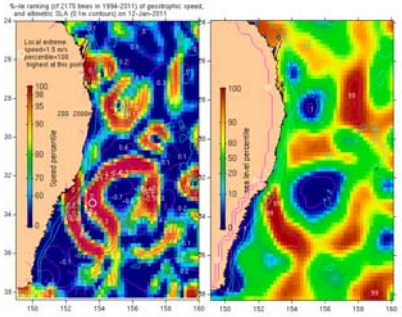
Near real time products to applications

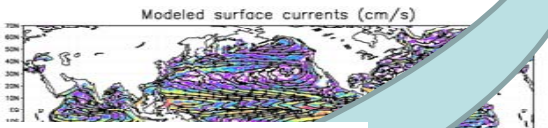


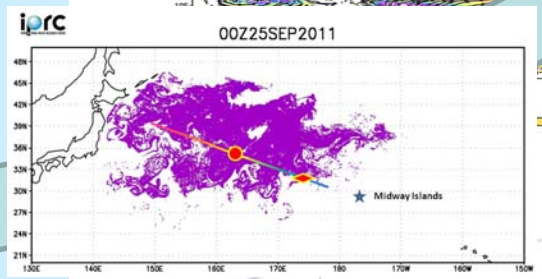


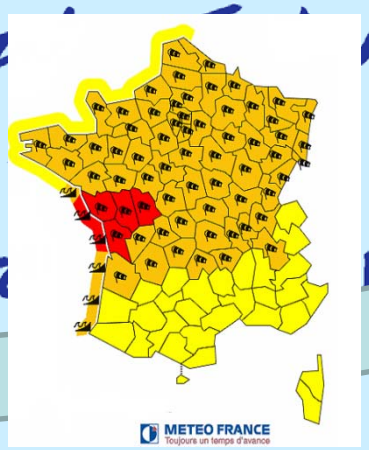












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METEO FRANCE
Toujours un temps d'avance

NRT Splinter Discussion Points

1. Recommend upload of V.11 DORIS/DIODE software

- Radial orbit error reduction from 3.3 cm to 2.7 cm in OGDRs

Summary

Latency times continue to decrease, which translates into improved forecast accuracies and warnings

Processing extends new missions (CS2) to applications, and old missions to new applications (coastal)

Applications continue to move closer to general public and impact daily life through monitoring of resources and warnings of significant events both traditional (hurricane) and unusual (tsunami)