Project GlobWave

SEASAR 2012 Meeting
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www.globwave.info

Partners

- ESA: Funding the project through its Data User Element Programme

- CNES: Providing co-funding and advice during the project

- Logica: Prime Contractor – responsible for all development, delivery and public outreach of GlobWave for ESA.

- Ifremer: Responsible for development of the portal, *in situ* database and hosting of the data and operational system

- SatOC: Responsible for the Altimeter processing, error characterisation methodologies and documentation

- CLS: Responsible for the SAR processing and error characterisation

- NOC: Responsible for the Pilot Spatial WFVS and HR-DDS

Improve the uptake of satellite-derived wind-wave and swell data in the

- Scientific,
- Operational
- Commercial

User Communities

Strategy

- Develop a GlobWave web portal

  — A single point of reference for satellite wave data

  — Clear documentation about satellite data acquisition techniques

  — Allow access to on-line tools, reports, cal/val info, etc.

- Provision of:

  — A multi-sensor set of satellite wave data in a common format and meta-data standard.

  — A set of demonstration data products such as on soprano.cls.fr

- Inter-comparison of different wave data sources

  — SAR and altimeter wave data with collocated in-situ measurements

  — Cross characterisation between different satellite data streams

User Interaction

- ESA received written commitments from 35 users before project kickoff

- Presentation by GlobWave Team at conferences/workshops
  - SeaSAR, OceanSAR, OceanObs, IGARSS, Coastal Altimetry Workshop, Living Planet Symposium, MARCDAT III

- As of yesterday the project team have signed up 100 additional users

- Portal and ftp stats
  - Portal had 800 hits in January with average of ~2000 hits over last 4 months
  - Ftp site had 100,000 files downloaded in January and 1,200,000 last month

- Two main aims going forward – deliver what existing users want and bring in more users.
  - GlobWave Wikipedia Page
  - GlobWave LinkedIn Networking Group
  - Summary of Services
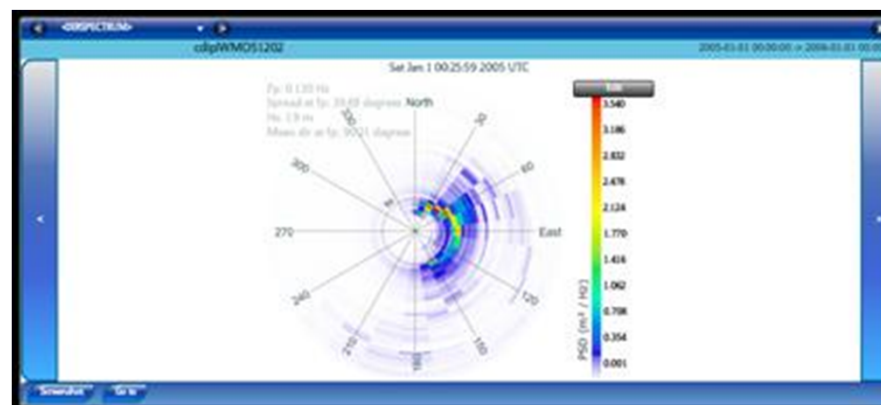 - Demo Products

Satellite Products

- Available in a "common" L2P format
  - NetCDF-3
  - Meta-data standard is CF-1.4 compliant

Altimeter

ERS-1, ERS-2, ENVISAT, TOPEX/POSEIDON, Jason-1, Jason-2, GEOSAT, GFO

SAR

ERS-1, ERS-2, ENVISAT

- 26 Years of consistently calibrated multi-mission satellite wave data!!
- NRT data available within 1-4 hours of observation from space
- Supported by a Product User Guide and Wave Data Handbook
- Support of further data streams when available; Cryosat-2, Altika

... and it's free!!

Physical Parameters

Common to SAR & Altimetry:

- Backscatter Coefficient (Sigma0)

- Altimeter/SAR Wind Speed

- Quality Flags

- Rejection Flags

SAR Specific:

- Swell Significant Wave Height (per spectral partition)

- Dominant wavelength (per spectral partition)

- Mean direction (per spectral partition)

- Standard Errors for the above

Altimeter Specific:

- Significant Wave Height (SWH)

- SWH Standard Error

Ancillary data:

- Model Wind Speeds

- Bathymetry

- Distance to Coast

- Sea Surface Temperature

- Surface Air Temperature

- Surface Air Pressure

Data Dissemination

- Email fpaf@ifremer.fr with the subject "GlobWave Data Access"

- You will be issued with a username and password

- Then just visit the ftp site or browse data files via your web browser

File organisation:

- Data files organised in a clear directory structure by mission, year, month, day

Browsing the meta-data:
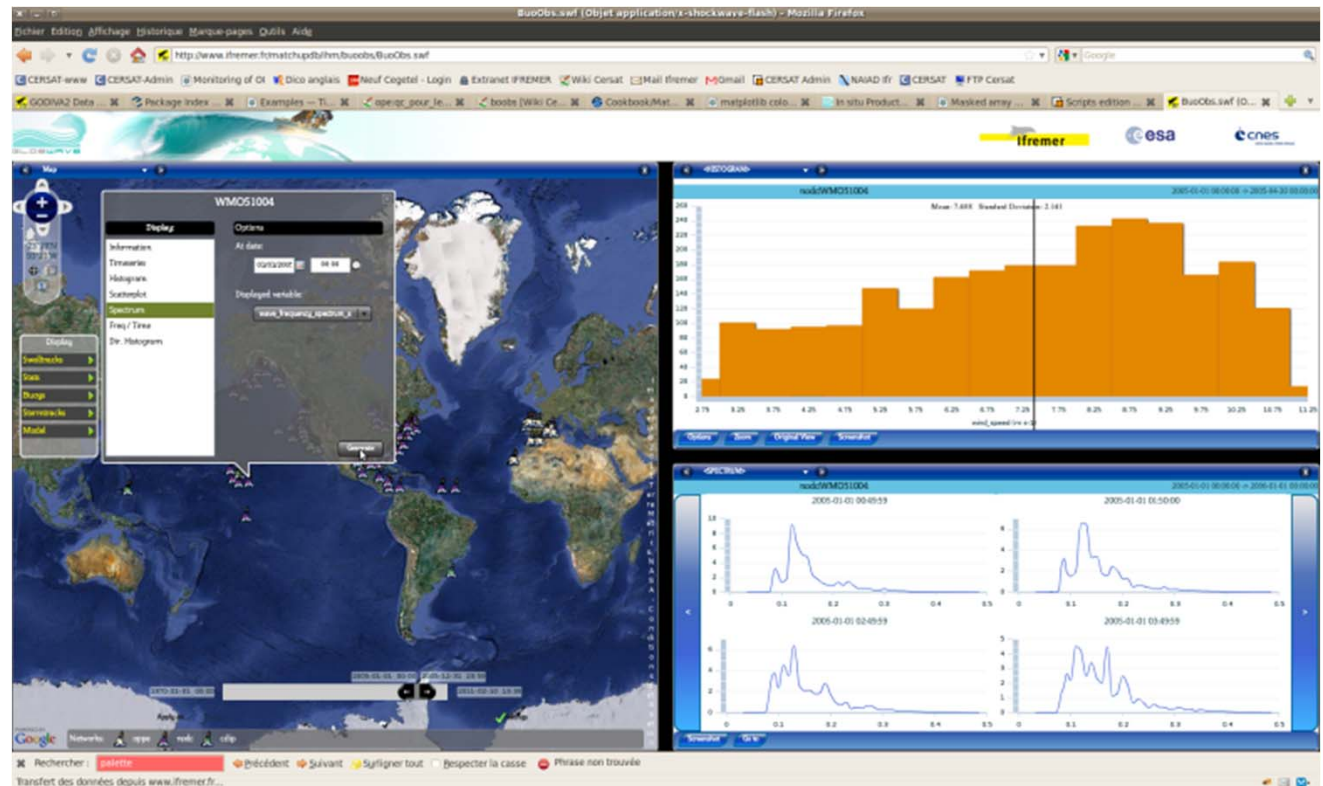
- Panoply

- HDFView

Online Tool for Satellite vs In Situ Matchup Database

A satellite vs. *in situ* matchup database has been constructed using:

— The full archive of GlobWave satellite data

— A set of *in situ* data sources from:

- POSEIDON

- Puertos del Estado

- NODC

- UKMO

- CDIP

- MEDS

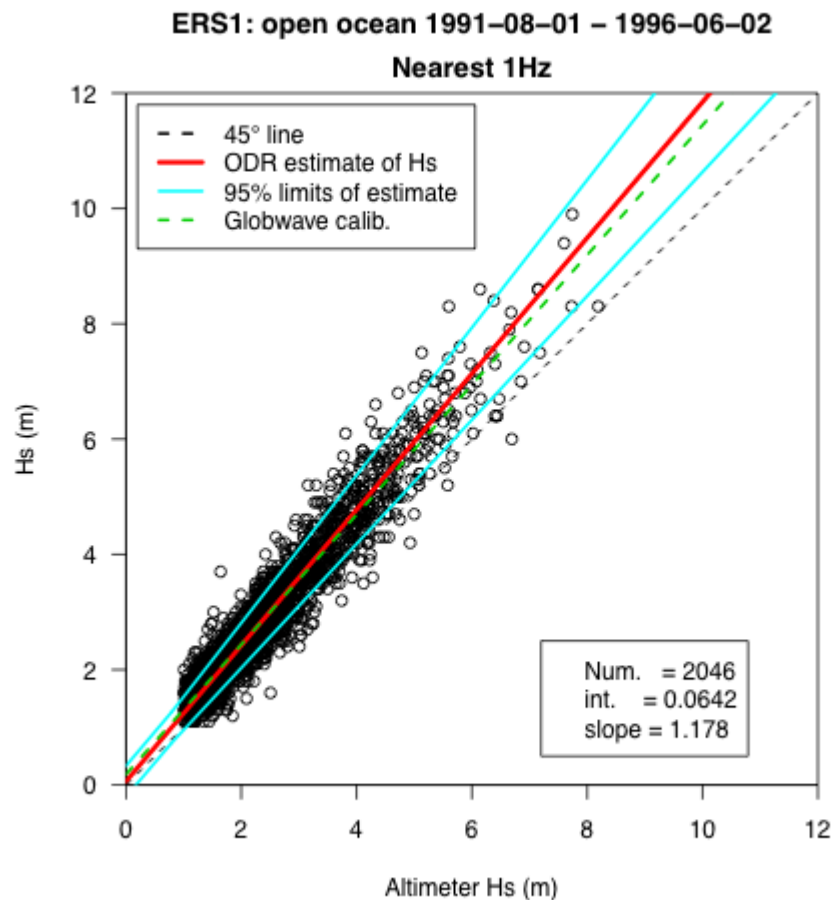- Query tool allows searches of matchups based on geo-location and time windows.

ERS-1 vs NODC SWH
(1991-1996)

Derivation of:
• Calibration equation
• Standard error
• 95% confidence limits

ERS1: open ocean 1991–08–01 – 1996–06–02
Nearest 1Hz

- - - 45° line
——— ODR estimate of Hs
——— 95% limits of estimate
- - - Globwave calib.

Num. = 2046
int. = 0.0642
slope = 1.178

Error Characterisation Analysis: Accuracy of Satellite Data

- Based on comparisons with NODC buoy data

Altimeter	Formula (Hs > 1m)	SE (Hs <= 1m)	SE (Hs = 4m)	SE (Hs = 8m)
ERS-1	0.094 + Hs*0.052	0.146	0.303	0.511
ERS-2	0.080 + Hs*0.059	0.139	0.317	0.554
Envisat	0.004 + Hs*0.076	0.080	0.306	0.608
GFO	0.022 + Hs*0.058	0.080	0.253	0.484
TOPEX A	0.043 + Hs*0.057	0.101	0.272	0.501
TOPEX B	0.039 + Hs*0.055	0.094	0.259	0.480
Jason-1	0.055 + Hs*0.052	0.107	0.263	0.471
Jason-2	0.058 + Hs*0.052	0.110	0.264	0.470

- Derived errors inserted back into satellite data
- Users given complete transparency on data accuracy

Error Characterisation Analysis: Accuracy of Buoy Networks

- Buoy network comparisons with Envisat

Buoy Network	Formula (Hs > 1m)	SE (Hs <= 1m)	SE (Hs = 4m)	SE (Hs = 8m)
NODC	0.004 + Hs*0.076	0.080	0.308	0.612
UKMet	0.059 + Hs*0.054	0.113	0.273	0.487
OPPE	0.089 + Hs*0.087	0.176	0.438	0.787
CDIP	0.195 + Hs*0.064	0.259	0.451	0.706

Data Sub-setting

3rd PartyTools already exist:

Allows query and extraction:

- Specified geo-location and time windows

- Physical Parameters

- Acquisition Type

NAIAD – developed by Ifremer

Users able to visualize:
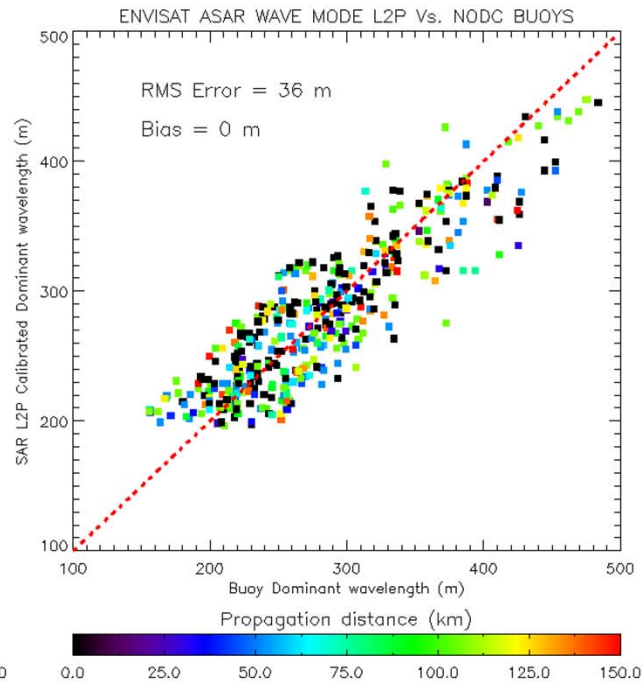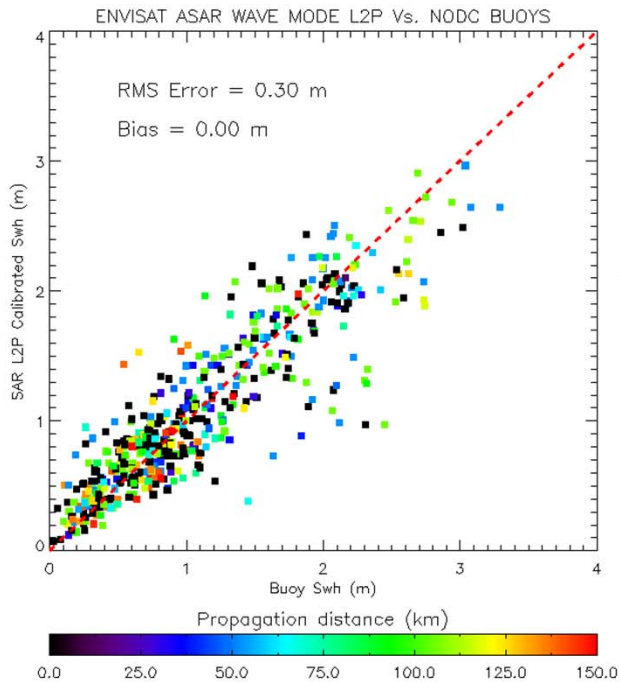
- Physical Parameters

- Data Volumes

- Satellite Tracks

World Wave Atlas – developed by Fugro Oceanor

Satellite vs In situ Matchup Database

- Hss   Wl   Dir
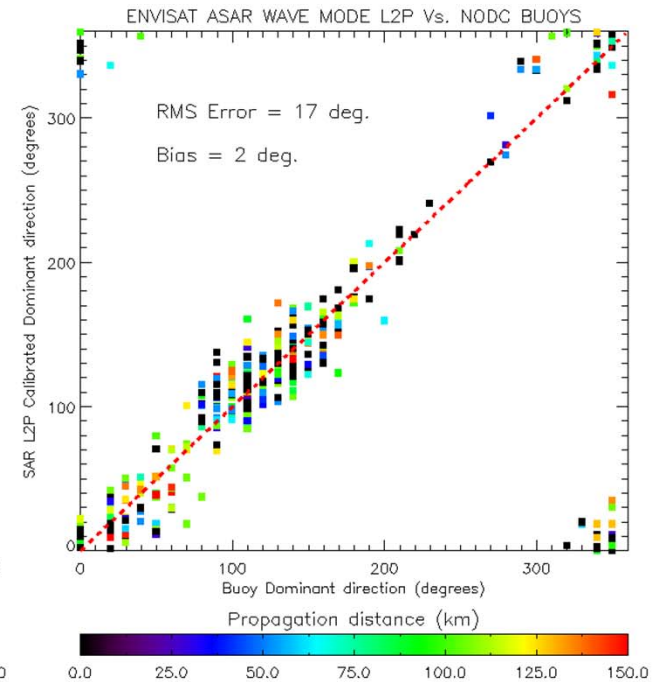
Global Wave Statistics

Goal is to compare measured quantities from different satellites over different regions
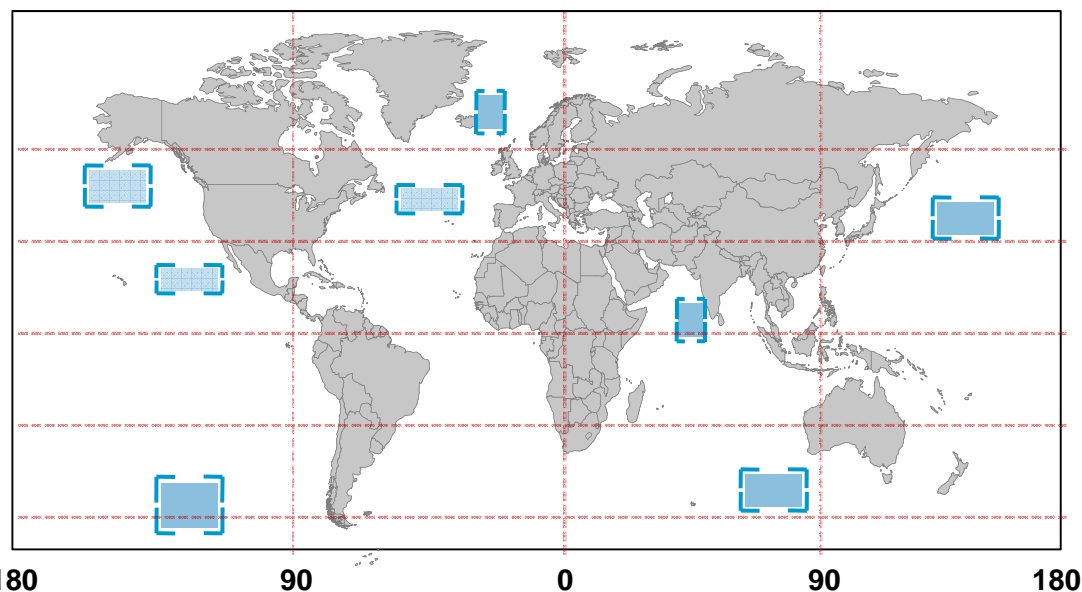
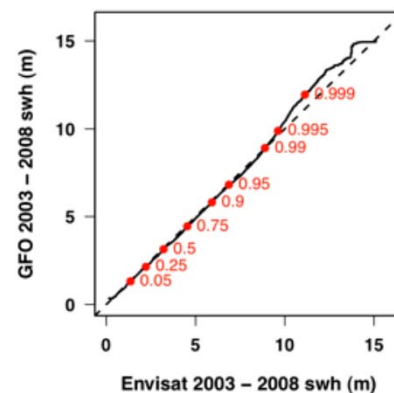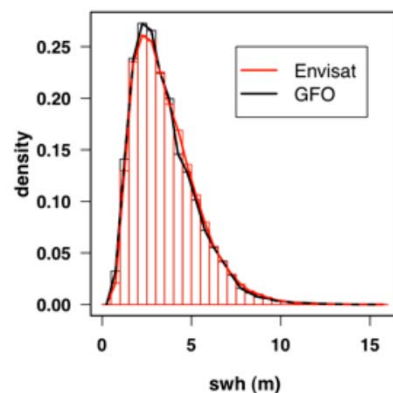The following physical quantities have been compared:

Altimeter

- o Significant wave height

SAR

- o Swell wave height
- o Dominant swell direction
- o Dominant swell wavelength
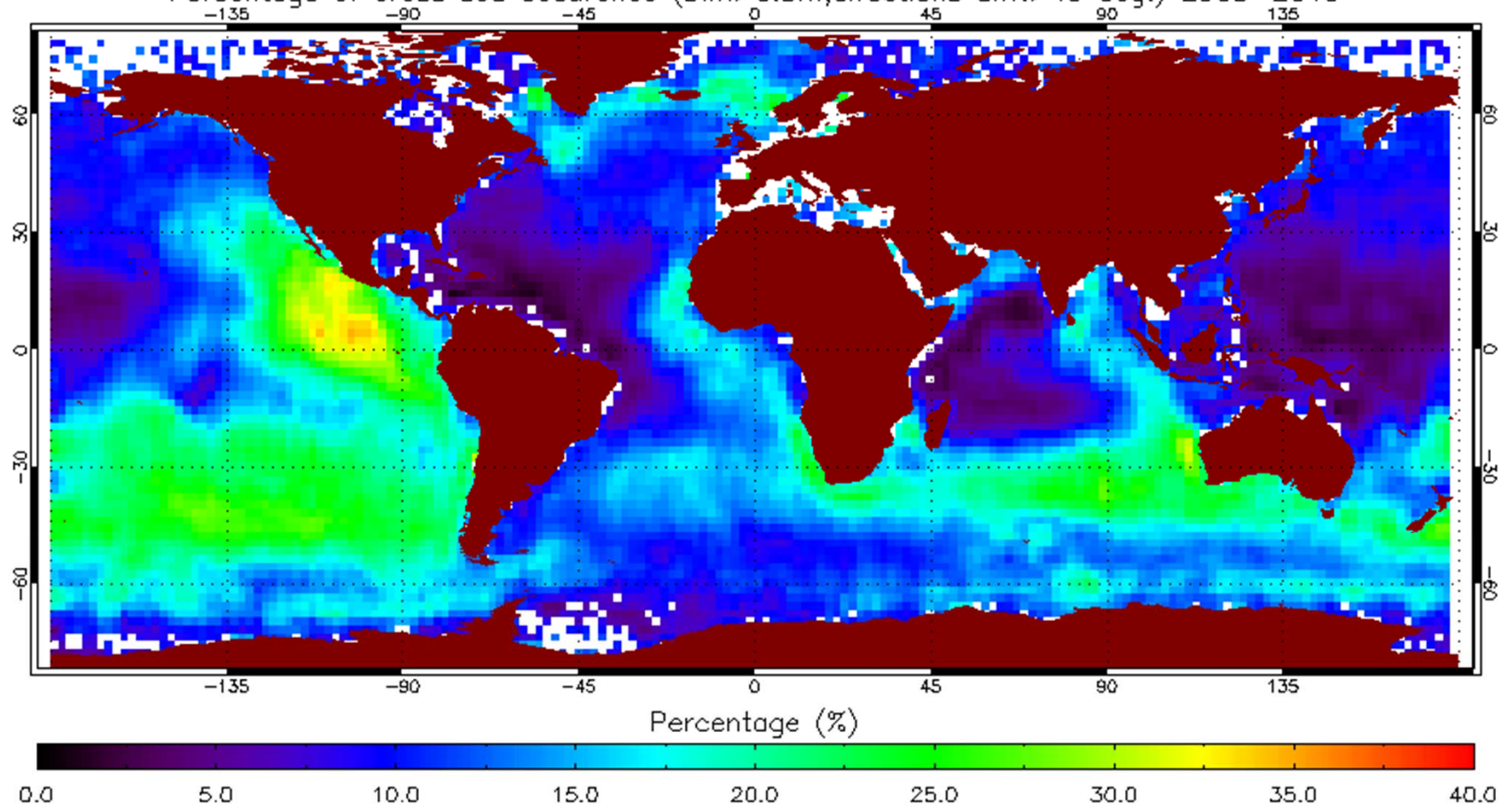
180   90   0   90   180

North Atlantic Region

SAR Cross Seas Analysis

Percentage of cross sea occurence (swh>0.5m,directions diff.>45 deg.) 2003-2010

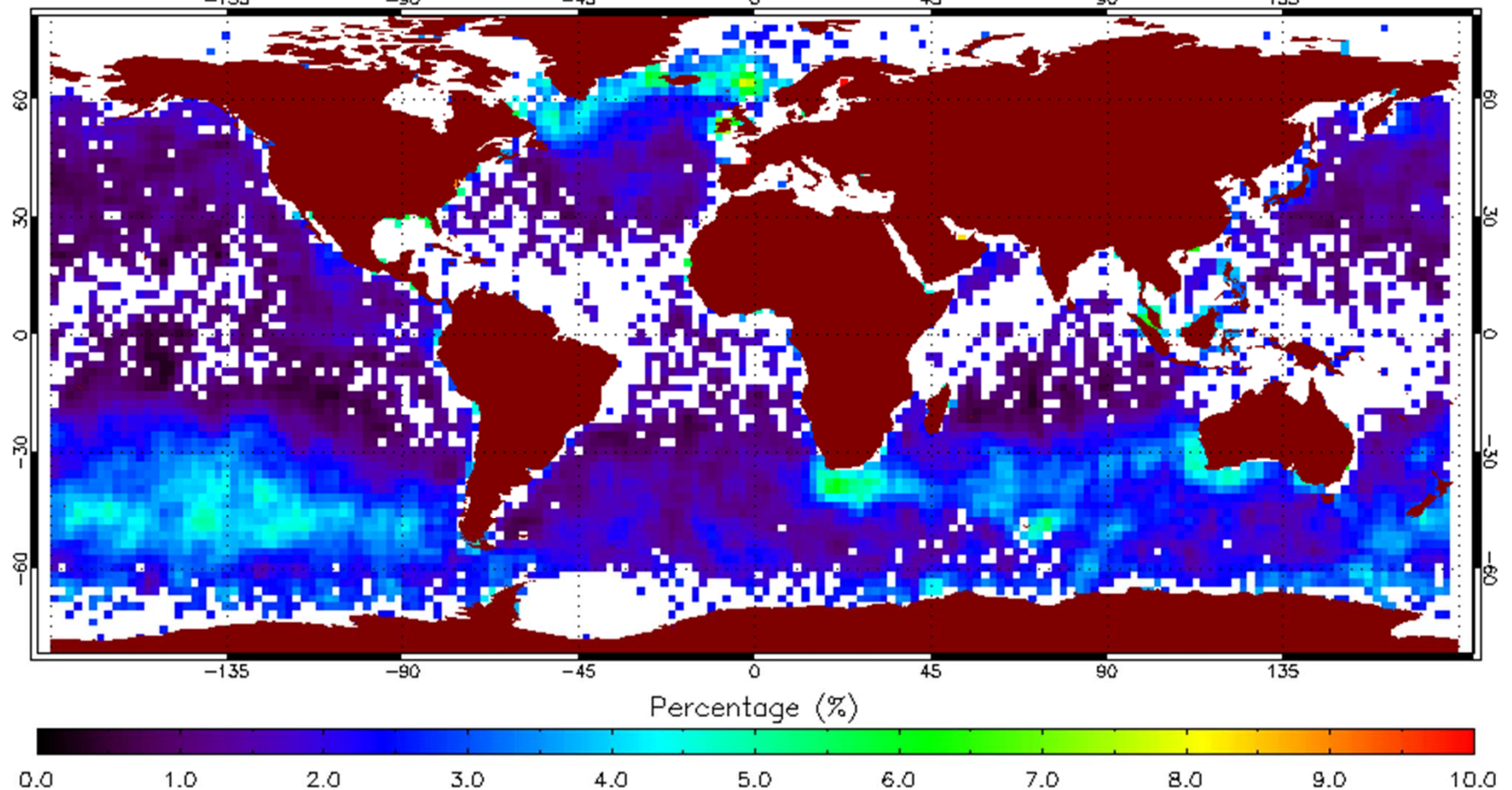• Of key interest to maritime users

SAR Cross Seas Analysis

Percentage of cross sea occurence (swh>1m,directions diff.>45 deg.) 2003-2010

Percentage (%)

- Of key interest to maritime users

Pilot Spatial Extension to the WFVS and GlobWave DDS

PS-WFVS *(participating met centres)*

- Allow inter-comparison of satellite and model data

- Ingesting model data on a monthly basis from participating organisations

- Providing (configurable) offline reports on a monthly basis illustrating the previous months inter-comparisons

DDS *(for public use)*

- Specific geo-location regions have been defined around the world

- Inter-comparison of:

  - Satellite vs. model data

  - Satellite vs. satellite data
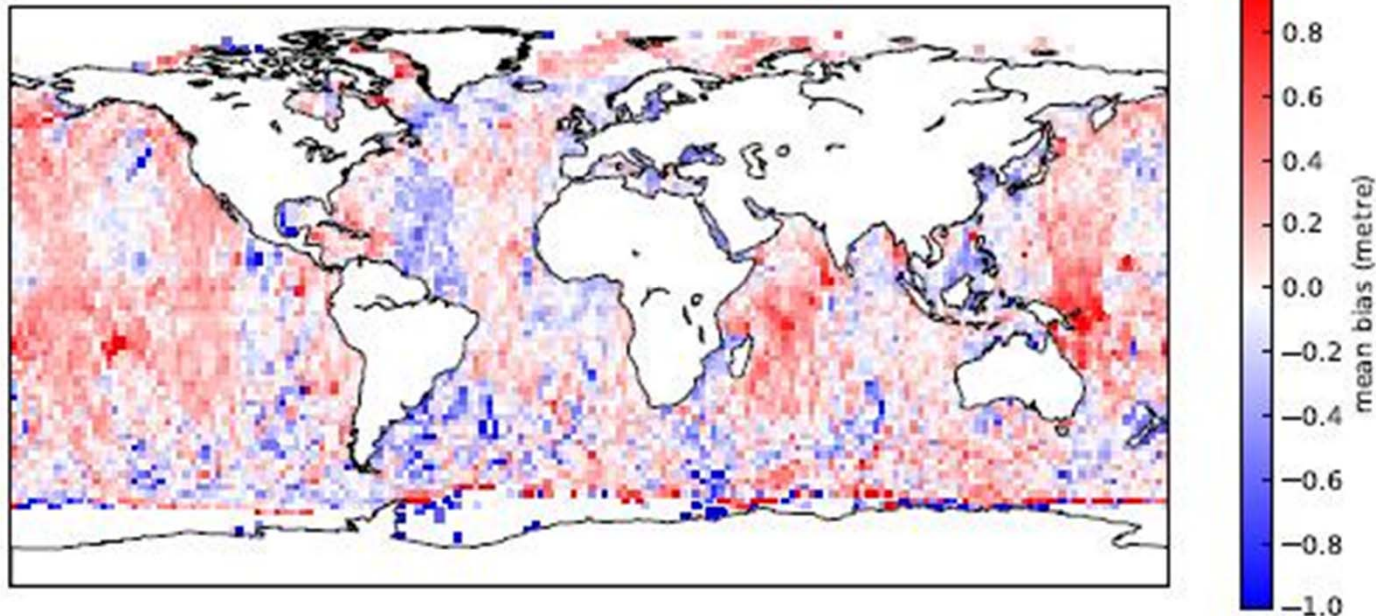
Feedback

- We have made every effort to make our satellite wave data:
  - Easy to locate
  - Easy to retrieve
  - Easy to use

- Our goal continues to be to increase the number of users of satellite wave data.

- Please do use our data and let us know how you have used it

- We are at your disposal to assist – contact geoff.busswell@logica.com with any issues/questions.

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