

DUE GlobWave

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Phase 2 User Assessment Report



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Prepared by (Logica)	Geoff Buswell GlobWave Project Manager	(Signature)
Accepted by (ESA/ESRIN)	Simon Pinnock GlobWave Technical Officer	(Signature)

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Name	Role	Company
Simon Pinnock	ESA Technical Officer	ESA
Geoff Busswell	GlobWave Project Manager	Logica
Clive Farquhar	GlobWave Team, Logica	Logica
Jean-Francois Piolle	GlobWave Team, Ifremer Lead	Ifremer
Fabrice Collard	GlobWave Team, CLS Lead	CLS
Helen Snaith	GlobWave Team, NOC Lead	NOC
Maureen Pagnani	GlobWave Team, NOC Scientist	NOC
Ellis Ash	GlobWave Team, SatOC Lead	SatOC
GlobWave Community		

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1 EXECUTIVE SUMMARY

GlobWave has gone to the next level in Phase 2 with full operations of all the services commencing. Near real-time data has been served for over a year within about 3 hours of the actual observational measurements, the Pilot Spatial Wave Forecast Verification Scheme has been providing reliable monthly and daily comparisons of wave model forecast and satellite data, and a dynamic and user friendly [online tool](#) is available for users to query matchups between satellite and buoy data. Also, new archive data covering 2010 has been ingested, converted to the common format, and made available on the [ftp site](#).

Further work included the [Global Wave Statistics](#) analysis using 11 different ocean basin areas, as well as the continued quality analysis of the data. The [Annual Quality Control Report](#) performed comprehensive analysis of the archived data covering 2010, following on from the similar work done on the full archive in the [Satellite Wave Data Quality Report](#). Also, [quarterly reports](#) were issued analysing the near real-time data produced during 2011.

Outreach activities have involved active content update on the portal with 18 news items, 2 Newsletters, a [GlobWave Lesson](#), and links to [LinkedIn](#), [Wikipedia](#) & useful [3rd Party Software](#) pages. Presentations were given at the MARCDAT III workshop at ESRIN in May and the CFOSAT meeting at Ifremer in November. As a result of these outreach efforts we have seen significant increased usage statistics. The number of registered users has more than doubled from 55 to 115, and the number of portal hits peaked at 4335 in June, up from the initial 1704 seen in January.

Towards the end of phase 2 we held an enjoyable and dynamic User Meeting at the National Maritime College of Ireland (NMCI) in Cork. [Presentation](#) themes comprised Calibration and Validation, Applications, Future Concepts, and Wave Data Inter-comparisons. The meeting was concluded with a lively panel discussion, which allowed GlobWave users to provide much valued feedback to the panel comprising key GlobWave Team members. In addition, there was a very interesting tour of the NMCI facilities (including a Marine Simulator and Wave Tank) and a free evening networking event with dinner and drinks.

We now enter the final phase of the project and the focus is to understand who the power users of GlobWave are and what they are using the data for. This information will enable tutorials and case studies to be developed and explained on the portal, which will be a very valuable resource to help users understand the potential of GlobWave and maximise the uptake of satellite wave data.

Finally, the Project Team must ensure that GlobWave continues beyond 2012 as we are receiving overwhelming feedback that the services are of great benefit to the user community.

2 INTRODUCTION

This is the second Annual User Assessment Report, deliverable [D.28], which summarises Phase 2 of the GlobWave project. A further User Assessment Report will be delivered at the end of Phase 3 in January 2013.

2.1 Purpose and Scope

The Annual User Assessment is a summary of all the services provided by GlobWave, including the data products, the Pilot Spatial WFVS and all functionality of the GlobWave portal. It also contains the recommendations of the Wave Community and Steering Team collected during the 2nd User Meeting.

All recommendations will be taken into account by the GlobWave Consortium in defining the work plan for the remainder of the project.

2.2 Document Structure

The document structure is as follows:

- Section 1 – Executive Summary
- Section 2 – Introduction
- Section 3 – System Development Status and Product Summary
- Section 4 – Overview of User Meeting
- Section 5 – Feedback
- Section 6 – Steering Team Recommendations.
- ANNEX A – Feedback Repository

2.3 Definitions and Acronyms

A list of the definitions and acronyms used in this document is provided as follows:

Acronym	Description
ASAR	Advanced Synthetic Aperture Radar
ASCII	American Standard Code for Information Interchange
AVISO	Archiving, Validation and Interpretation of Satellite Oceanographic Data
CD	Compact Disc
CDIP	Coastal Data Information Program
CLS	Collecte Localisation Satellites
CNES	Centre National d'Etudes Spatiales
CSV	Comma Separated Value

Acronym	Description
DUE	Data User Element
DVD	Digital Versatile Disc
ECMWF	European Centre for Medium-Range Weather Forecasts
ENVISAT	ESA's Environmental Satellite
EO	Earth Observation
ERS	European Remote-Sensing Satellite
ESA	European Space Agency
ESRIN	ESA Space Research Institute
ESTEC	European Space Research and Technology Centre
GDR	Geophysical Data Record
GEOSAT	GEOdetic SATellite
GFO	GEOSAT Follow On
GHR SST	GODAE High Resolution Sea Surface Temperature
GODAE	Global Ocean Data Assimilation Experiment
GOES	Geostationary Operational Environment Satellites
HR-DDS	High Resolution Diagnostic Data Set
Hs	Significant Wave Height
I/O	Input/Output
JCOMM	Joint Technical Commission for Oceanography and Marine Meteorology
L2P	Level-2-Preprocessed
MATLAB	MATrix LABoratory
MDB	Match Up Database
MERSEA	Marine Environment and Security for the European Area
NASA	National Aeronautical Space Administration
NCOF	National Centre for Ocean Forecasting
NDBC	National Data Buoy Center
NERSC	Nansen Environmental and Remote Sensing Center
NetCDF	Network Common Data Form
NOAA	National Oceanic and Atmospheric Administration
NOCS	National Oceanography Centre Southampton
NODC	National Oceanographic Data Center
NRT	Near Real Time
PDF	Portable Document Format
PM	Progress Meeting
RADS	Radar Altimeter Database System
RB	Requirements Baseline

Acronym	Description
RMS	Root Mean Square
SAR	Synthetic Aperture Radar
SatOC	Satellite Oceanographic Consultants
SHOM	Service Hydrographique et Océanographique de la Marine
SQL	Structured Query Language
SSALTO	Segment Sol multi-missions d'ALTimetrie, d'orbitographie et de location précise
SST	Sea Surface Temperature
TBC	To Be Confirmed
THREDDS	THematic Real-time Environmental Distributed Data Services
UKMO	United Kingdom Meteorological Office
WAM	Wave Analysis Model
WFVS	Wave Forecast Verification Scheme

Table 2-1: Acronyms

3 SYSTEM DEVELOPMENT STATUS AND PRODUCT SUMMARY

3.1 GlobWave Portal

The GlobWave portal is available on www.globwave.info. It contains basic information about the project, an area to access data products, access to 3rd party subsetting tools, a news area and a list of conferences and workshops (including those where GlobWave has been presented).

The GlobWave deliverables released to the User Community are made available on the portal. As a result of feedback from Phase 1 and further completed work in Phase 2, there were many additions to the portal which were as follows:

- Updated [Product User Guide](#) to take account of product modifications during phase 2.
- [Online Tool](#) to allow visualisation and interactive analysis to various data used or produced by GlobWave project for the validation or inter-comparison with satellite data, such as buoys, satellite/buoy matchups or model outputs.
- A [Wave Data Handbook](#) has been made available which introduces ocean waves; the measurements techniques of Altimetry and SAR; past, present and future satellite missions involving wave parameters; and example applications of satellite wave data
- Additional [Demonstration Products](#) including a [Merged Altimeter Product](#) and [GlobWave Lesson](#).
- A [Summary of Services](#) section to allow users to easily reach all the GlobWave data and services of interest.
- [News Items](#) – there were 18 News Items during the Phase 2 period of 2011.
- [3rd Party Software Solutions](#) - we provide information and external links regarding downloadable software packages suitable for reading and visualising GlobWave data. These software solutions are available via public and private sector organisations.
- [LinkedIn](#) and [Wikipedia](#) page links which can be reached from the Home Page of the Portal

Also, more general modifications have been made to make it easier to find information on the GlobWave Satellite Data. For example there are links from the main page allowing people to [browse](#) the GlobWave data, as well as expanded material answering [common questions](#) about GlobWave.

We have also been tracking the statistics of people accessing the portal and illustrating the total number of hits for each month in 2011. Figure 3-1 shows a very heavy spike of 4335 hits in June when we were actively encouraging people to attend the User Meeting in October. However, there is a general trend of

increased activity on the portal during 2011 which is very encouraging. The decrease in activity during December is probably due to the holiday period. We also provide colour coded information of hits for each area of the portal where it can be seen that the Home and Products pages are always the most popular.

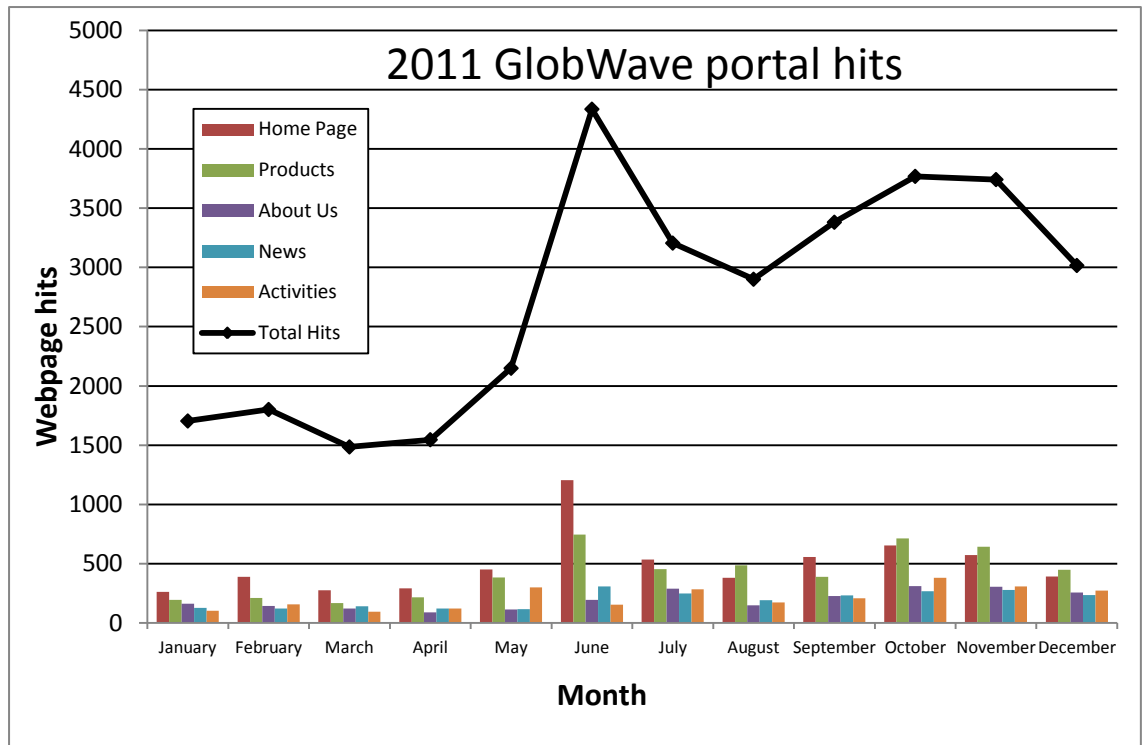


Figure 3-1: Monthly GlobWave Portal access statistics for 2011

3.2 Data Collection and Processing

3.2.1 Satellite Data

The delayed mode GlobWave data covers 26 years of Altimeter and SAR data from both ESA and non-ESA sources.

The delayed mode Altimeter data is available from the following satellites: ERS-1, ERS-2, Envisat, Topex/POSEIDON, Jason-1, Jason-2, US Navy GEOSAT and US Navy/NOAA GEOSAT Follow On. Delayed mode SAR data is available from Envisat. ERS-1 and ERS-2 SAR data will also be available in the future once the ESA Level 2 reprocessing is completed.

To access this data please see the [GlobWave Satellite Data](#) area of the portal for instructions. A [Product User Guide](#) is also available which outlines the GlobWave products and their content.

During Phase 2 we made available all the updated GDR data covering the year of 2010. Based on user feedback we also identified a few corrections that were required in some data fields and these were made in July.

Also, we have successfully provided NRT data during the whole of Phase 2 for the following data streams:

- Jason-1 Altimeter
- Jason-2 Altimeter
- Envisat Altimeter
- Envisat SAR

These data streams are made available on the [ftp site](#) within about 3 hours of the actual observations being made.

Also, we have analysed the download statistics of the GlobWave data files. Figure 3-2 shows a general increase in the total number of files downloaded although there appears to be a regular cyclical variation in downloads. Altimeter GDR data is by far the most popular satellite product downloaded.

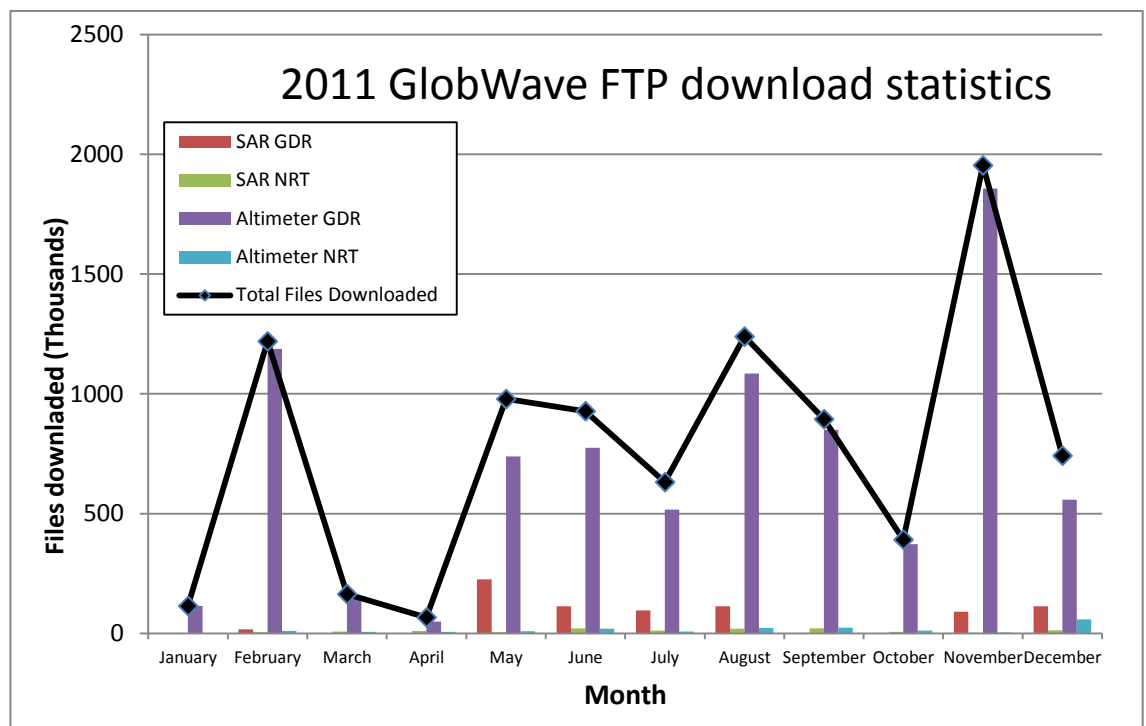


Figure 3-2: Monthly GlobWave FTP file downloads statistics for 2011

3.2.2 In situ Data

The project utilises a number of *in situ* data sources which were chosen based on the geographic location, size of network, and the provision of directional spectra and quality checked data.

There were two main areas of progress here:

- The full archive of MEDS Marine Environment Data Services (MEDS) was acquired and processed into the common format.
- Data has been acquired and processed covering the 2010 period for the existing *in situ* data sets which are:

- National Oceanographic Data Centre (NODC) - US Buoy network in Atlantic and Pacific
- Hellenic Centre for Marine Research (HCMR) - Greek buoys in the Mediterranean
- UK Met Office - UK Met Office buoys around the British Isles
- Coastal Data Information Program (CDIP) - Mainly coastal buoys around North America and Pacific Islands
- Puertos del Estado - Spanish buoys in Atlantic and Mediterranean

The above *in situ* data has been used to generate collocation matchups with the GlobWave satellite data. These matchups are available [via ftp](#) or are queryable via the [GlobWave Online Tool](#). It is also possible to query directly for some *in situ* data sets directly (e.g. NODC) via the Online tool.

3.3 Error Characterisation and Intercomparison

3.3.1 Global Wave Statistics

This work was designed to support investigations into differences between sources of satellite wave data in order that any biases can be made clear and traceable. We note that the comparisons are not done using crossover data but using geo-location areas large enough where parameters from different data streams can be meaningfully compared.

The analysis was performed using 11 areas from different ocean basins (typically 10° latitude by 20° longitude). For altimetry an overall comparison was made between altimeter pairs in 8 areas using Quantile-Quantile plots. Monthly results are also given, for area 1 in the main text and for other areas in an Annex. For SAR 3 further areas were used and there are statistics for Envisat including full global statistics giving mean swell significant wave heights for the full time period of analysis as well as by year, season and month. Global and regional distributions of integrated parameters are included covering the altimetry regions.

The full [Global Wave Statistics](#) report is available from the portal.

3.3.2 Quality Control Reports

3.3.2.1 Annual Quality Control Report

The [Annual Quality Control Report](#) focuses on the new GDR GlobWave data acquired during Phase 2 and provides a continuation of much of the analysis provided in the [Satellite Wave Data Quality Report](#) (which looked at the full archive of GDR data up to the end of 2009). There are five sets of analysis:

1. A summary of the quality levels of the delayed-mode L2P data set for 2010.
2. The L2P error characterisation for 2010 using collocation measurements with *in situ* buoys.

3. The L2P intercomparison for 2010 using satellite crossover measurements.
4. A sample comparison between GDR and NRT data
5. SAR wave spectra error analysis

The following results were found during the analysis:

- The altimetry quality analysis shows nominal performance for Envisat (with the exception of a period without data) and Jason-2, but highlights some quality problems during 2010 for Jason-1.
- The error characterisation analysis provides an estimate of the significant wave height (Hs) standard error for 2010 and compares this with values calculated over the whole previous time period.
- The satellite crossover analysis for Envisat/Jason-1 and Envisat/Jason-2 shows good agreement between sensors.
- The sample comparison between GDR and NRT data versions shows that Hs values are identical between versions for Envisat and Jason-2, but different for Jason-1.

3.3.2.2 Quarterly Quality Control Reports

At the start of Phase 2 we began making GlobWave NRT data available within about 3 hours of the actual observations being made. To help users understand and appreciate any issues with this data we have made available [Quarterly Quality Control](#) reports. The first of these covered Q1 2011 with the most recent covering Q4 2011 and they can all be found on the portal.

Specifically, these reports contain information on the quality levels of NRT L2P data products, for both SAR and altimetry.

3.4 Pilot Extension of the JCOMM Wave Forecast Verification Scheme

Since February 2011, the PS-WFVS has been running in operational mode, automatically generating monthly operational reports for the active participants. We are now supplying 3 users with operational reports; the UK Met Office, PREVIMER and ECMWF.

In addition to the operational reports, the system also generates daily reports. These were started primarily as an internal check on the system to ensure that regular report generation was possible and to allow early detection of problems with any data streams. It was decided to make these reports available to users in the same way as operational reports, as they provide quick access to some diagnostic information for their forecasts.

During March 2011, the code-base was placed under version control using the bitbucket repository. This was a major requirement for the operational phase as it allowed clear separation of the operational system from development branches.

The repository also allows ready notification of bugs or requirements for additional features in the code.

Online access was provided to all reports for users, including user registration and ability to download reports from the website.

In addition to downloading full reports – either operational or daily reports – the user can click on individual plots within the report to be taken directly to a version of that plot online. From the link, it is possible to download the graphic in a number of different formats (PDF, PNG etc) and also to download the data used for the plot as a netCDF file (as shown in the figure below). These data links are permanent and the plot will be regenerated dynamically at the time of download if it has been cleared from the cache.

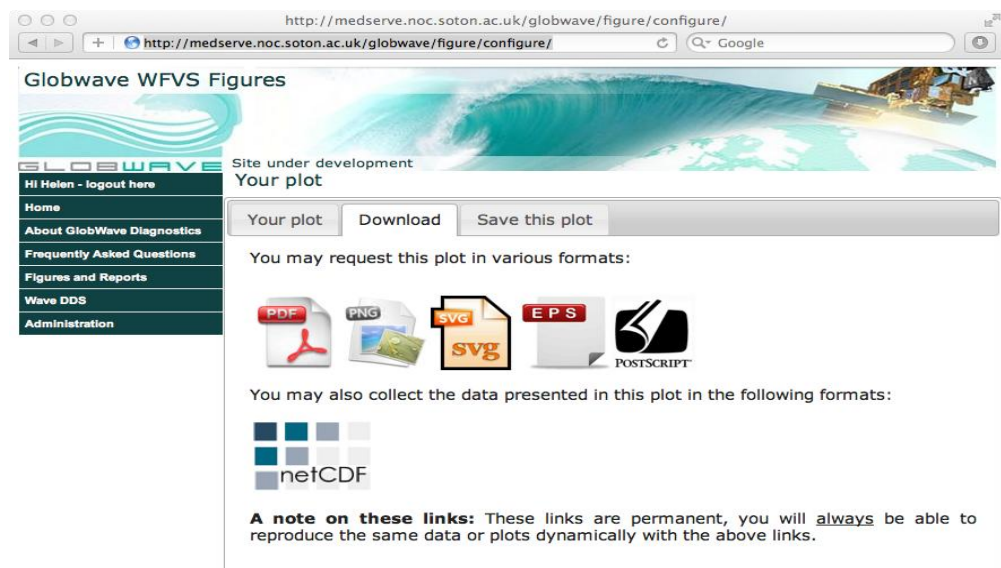


Figure 3-3: Plot / data download selection from the PS-WFVS website

At the request of users, additional plots were added to the service:

- *Regional plotting*: a number of defined regions have been configured (e.g. North Atlantic, North Sea) and these can be added to using the site administration, and include in reports or used for personal report generation.
- Addition of *data quality plots* for satellite data

3.5 Communications, Outreach and GlobWave User Consultation Meetings

3.5.1 Conferences and Workshops

The GlobWave project has been presented by members of the Consortium at a variety of conferences and workshops. The table below provides a list of all posters, presentations and papers that have been presented to date.

Meeting	Dates	Venue	Type	Title
MARCDAT-III Workshop	2-6 May, 2011	ESRIN, Italy	Oral	Project GlobWave
CFOSAT Science Meeting	14 – 16 November, 2011	Brest, France	Oral	Project GlobWave

3.5.2 Newsletters

The 3rd and 4th GlobWave Newsletters have been issued – the first in [August 2011](#) and the second in [February 2012](#).

3.5.3 E-mails

Several e-mail communications have been sent to the Wave Community mailing list involving things like the release of documents, news items and the GlobWave lesson.

3.5.4 2nd User Meeting

The 2nd User Meeting was held during October 2011 and is described in section 0.

3.5.5 GlobWave Wave Community news items

There has been a number of news items uploaded to the portal during 2011. These are:

- [The Science of Waves in the Popular Media](#)
- [TU Delft Announces SWAN Update](#)
- [GlobWave User Meeting at the NMCI in Cork, Ireland](#)
- [Ocean waves in one place](#)
- [The Global Wave Statistics and first two Quarterly Quality Control Reports are now available](#)
- [GlobWave Newsletter \(August 2011\) now available](#)
- [End of ERS-2 mission after 15 years](#)
- [Release of GlobWave Online Tool](#)
- [Release of GlobWave Wave Data Handbook](#)
- [Visit our new Wikipedia Page and LinkedIn Group](#)
- [Online GlobWave lesson](#)
- [ESA GlobCurrent – User Consultation Meeting First Announcement](#)
- [Python script for accessing GlobWave L2P data](#)

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- [3rd Party Software Solutions](#)
 - [ERS SAR Wave Mode Mission Reprocessing Update](#)
 - [User Meeting Presentations Online](#)
 - [New merged altimeter database just released](#)

3.5.6 GlobWave Wikipedia page and LinkedIn Group

As a continued effort to improve outreach we have created both a [Wikipedia page](#) and a [LinkedIn User Group](#). The latter is updated on a regular basis informing members of GlobWave news and activities, such as the online GlobWave lesson or the availability of the User Meeting presentations.

4 OVERVIEW OF USER MEETING

This section outlines what occurred at the 2nd User Meeting which was held in October at the National Marine College of Ireland in Cork, Ireland. It contains the objectives and structure of the meeting as well as links to the final agenda and presentations given.



Figure 4-1: GlobWave User Meeting delegates at NMCI, Cork, Ireland

4.1 Objectives

There were two main objectives to the meeting which were to:

- Present the project to Wave Community. This involved explaining what data and services are already available and what we plan to do over the remainder of the project
- Obtain feedback from the Wave Community. This involved interacting with the users and ensuring that what we have done and plan to do aligns with their needs. A full description of the feedback is available in section 5.

4.2 User Meeting Structure

The User Meeting was split over two days, with each day being divided into a series of themed sessions. The following subsections explain the focus of each day and list the presentation given. We note that pdf's of all the presentations and the final agenda of the meeting are available [here](#). Additionally, several presentations demonstrated the GlobWave 'live' online, facilitating engagement with the audience. One such presentation was by CLS on their online satellite verses *in situ* matchup database.

4.2.1 Day 1 on 05/10/11

Day 1 was a full day with a number of sessions throughout the day. The day kicked off with an introductory session that set out the meeting objectives and a project overview. It was then followed by sessions focused on Calibration and Validation,

GlobWave Applications, and concluded with a Future Concepts sessions that focused on future project of interest to GlobWave uses. These presentations were as follows:

- *Meeting Objectives*: Simon Pinnock, ESA
- *Project GlobWave*: Geoff Buswell, Logica
- *GlobWave Product User Guide & Handbook*: Ellis Ash, SatOC & Fabrice Collard, CLS
- *Wave Height Measurements from Altimeters: Validation Status & Applications*: Pierre Queffeuilou, Ifremer
- *Demo of Matchup Online Tool*: Fabrice Collard, CLS
- *GlobWave Quality & Statistics Reports*: Ellis Ash, SatOC & Fabrice Collard, CLS
- *eSurge: Increasing the Uptake of Storm Surge Data Products*: Helen Snaith, NOC
- *Harnessing EO for Ireland's Maritime and Energy Research Campus and Commercial Cluster*: Valerie Cummins, MERC3
- *Using GlobWave Products for Research and Consultancy*: Laure Grignon, HR Wallingford
- *SeaZone Hydro Spatial II: GlobWave as Input Data Source for Remote Sensing Derived Data Layers for Marine Offshore Applications*: Carlos Berna Esteban, HR Wallingford
- *Wave Information Requirements for Development and Deployment of Ocean Energy Devices*: Tony Lewis, UCC
- *Identification of Swell Fields from Particular Storm Sources in SAR and Wave Model Data, and Analysis of the Far-field Structures of Open Ocean Storms*: Jenny Hanafin, Ifremer
- *DUE GlobCurrent User Consultation*: Olivier Arino, ESA
- *On the Interest of GlobWave in the Context of the Future CFOSAT Mission*: Daniele Hauser, CNRS
- *Sentinel-3 Capabilities for Wave-related Measurements*: Craig Donlon, ESA

During the evening delegates has a chance to tour the NMCI Facilities, which include a marine simulator and wave tank. This was followed by the GlobWave dinner and drinks in Cork City Centre where users were able to network with each other and talk to members of the Project Team in more detail.

4.2.2 Day 2 on 06/10/11

On the morning of the 06/10/11, five presentations were given that focused on Wave Data Inter-comparisons. These presentations were as follows:

- *HR-DDS & Pilot Spatial Wave Forecast Verification Scheme*: Dave Poulter, NOC

-
- Characterisation of the Wave Conditions in the Equatorial Pacific Zone Using Wave Model Data, Satellite Observations and In Situ Measurements: Jesus Portilla, Universidad San Francisco de Quito
 - GlobWave contribution to global and regional wave forecasting: Jean-Michel Lefevre, Meteo-France
 - SAR Sea State Measurements over North Atlantic Storms in Comparison to Model Results: Susanne Lehner, DLR
 - Combining GlobWave and In Situ Verification Products for Assessment of the Met Office Operational Global Wave Model: Andy Saulter, UK Met Office

The final session of the meeting was a panel discussion that allowed the audience of GlobWave users to provide much valued feedback to a panel of key GlobWave Team personnel. The last day also saw a closed meeting between Logica and the GlobWave Steering Committee, a group consisting of ESA personnel and domain experts who are tasked with ensuring the project is optimally aligned with the needs of the user communities; the preliminary conclusions of this meeting were positive, both for the direction of the GlobWave project and the holding of the GlobWave User Meeting event over the two days.

5 FEEDBACK

Feedback was obtained throughout 2011 in the following ways:

- Questions and Answers after each presentation at the User Meeting (UP) – at the end of each session all attendees were expected to complete the supplied feedback forms and deposit them in a box in the coffee area. These forms provide much of the feedback for the presentations
- General Feedback (GF) – this was supplied by verbal discussion or e-mail throughout 2011 and at the User Meeting.
- Panel Discussion (PD) at User Meeting
- Recommendations from the GlobWave Steering Committee Meeting (SCM)

The (essentially) raw feedback is recorded in Annex A, except for the relevant Steering Team recommendations which are outlined in section 6. The feedback concerning areas for improvement has been grouped together into a number of areas, each represented by the subsections below.

5.1 Outreach

Feedback Refs	Brief Description	Feedback Mechanism	Next Action
SCM-1 & PD-4	To promote GlobWave specifically to the offshore industry either through attending conferences or using intermediate organisations.	Steering Team & Panel Discussions	Logica to investigate conferences in 2011 and submit appropriate abstracts.
PD-11	Recommended that GlobWave data be used in the Ifremer training courses on MyOcean	Panel Discussions	Ifremer to investigate
PD-7	Understand more about the GlobWave power users, and also future potential users e.g. those that are students or researchers. This would help in building a case for continuing the GlobWave project.	Panel Discussions	Logica have used statistics from the GlobWave ftp site to establish who the power users are. These users will be contacted in order to understand how the data is being used.

5.2 Datasets and the Access Mechanism

Feedback Refs	Brief Description	Feedback Mechanism	Next Action
SCM-5	Logica to fully clarify differences between NRT and GDR data	Steering Team	This has been investigated in the Annual Quality Control Report
UP-GB-3	In situ data access: 1. Would it be possible to have access to the in situ (buoys) time series data from the GlobWave portal? 2. What in situ datasets are	User Presentations	The publicly available in situ data can now be queried and downloaded from the online tool, available from the portal.

Feedback Refs	Brief Description	Feedback Mechanism	Next Action
	publically available? NDBC, Spain, Meteo-france, UK?		
PD-9	It is a good idea to keep all unfilled data or metadata as these parameters may be needed in the future.	Panel Discussions	Needs discussion as there is other user feedback which says the opposite!
GF-26	If fields are never filled then the fields should be removed from the files.	General Feedback	Needs discussion as there is other user feedback which says the opposite!
PD-12	The use of the OpenDAP system that is used in MyOcean should be investigated to overcome some of the user friendliness issues present in systems such as RADS.	Panel Discussions	Logica to investigate
UP-PQ-5	There is a need for a Cryosat GlobWave product	User Presentation	SatOC have since developed a Cryosat processor to convert into the L2P format. This will be used to convert the data in the common format and the new data stream will be made available in late March
GF-6	A smaller number of larger netCDF files would be easier to work with.	General Feedback	A merged Altimeter product has been available on the demo products section which has daily netCDF files.
GF-7	Why are the data files zipped? Unzipped files would be easier to work with.	General Feedback	Ifremer to investigate making the data files available in unzipped format
UP-LG-4	A maintained, quickly searchable catalogue of meta-data would be very useful	User Presentation	The NAIAD tool (available from the portal) can be used to query meta-data.
GF-2	It would be useful whenever possible, to add information on if a satellite is descending or ascending. It would also be useful to know how the buoy / satellite collocation is carried out It would also be useful to add more buoy data such as the Italian network	General Feedback	The technical specification document outlines how the collocation process works. Italian buoy data is currently being processed by Ifremer and will be made available in late April.
GF-23	I have found quite a few instances of missing ancillary fields and sigma0 information	General Feedback	The data was thoroughly checked in summer 2011 and reprocessed to insert all available ancillary fields and sigma0 values
GF-24	Inconsistency between SAR and Altimeter data in terms of the longitude. Altimeter L2P data goes from 0 to 360 degrees whereas the SAR data goes from -180 to 180 degrees.	General Feedback	This will be corrected in the next processing round in March 2012

5.3 Portal

Feedback Ref	Brief Description	Feedback Mechanism	Next Action
SCM 2, PD-11, UP-LG-1, PD-6, GF-20	To introduce case studies and tutorials to the GlobWave portal of real example use of GlobWave data. It is recommended to create a tutorial package that can be used for training and to use new media such as YouTube to help in training.	Steering Team, Panel Discussions, User Presentations & General Feedback	A tutorial has already been introduced and is available from the demo products section. Logica will investigate putting further tutorials there based on real use of GlobWave data.
GF-22	Since the files are written in netCDF does GLOBWAVE have any tool/software program that can be made available for use by the wave modelling community to read and extract the appropriate fields from these files?	General Feedback	Logica have introduced a section on the portal which gives links to the most common netCDF reading/writing tools. An area has also been made available which shows how to write scripts to interface with the fields in the data directly.
GF-25	It would be useful to have links to some of the coastal altimetry initiatives.	General Feedback	Logica have added links to sample data from the COASTALT and PISTACH initiatives.

5.4 Handbook, Matchups and Error Characterisation

Feedback Ref	Brief Description	Feedback Mechanism	Next Action
PD-2	The Product User Handbook should include more pictures.	Panel Discussions	SatOC to investigate
GF-18	It would be good to have statistical measures available digitally as global or regional grids	General Feedback	SatOC to investigate

5.5 HR-DDS and PS-WFVS

Feedback Ref	Brief Description	Feedback Mechanism	Next Action
SCM-4	Logica and ECMWF to discuss pilot wave forecast verification reports on assessing calibration information to determine if this is sufficient	Steering Team	Logica, NOC and ECMWF to investigate
GF-10	On the PS-WFVS the shipping forecast category diagrams have strong potential, but it would be good to see the sample size for	General Feedback	NOC to investigate

Feedback Ref	Brief Description	Feedback Mechanism	Next Action
	each category on these images		
GF-11	Sustainability of the PS-WFVS service is extremely important.	General Feedback	NOC to investigate
GF-12	For the PS-WFVS the comparison against the SAR data will be of particular interest when that is available	General Feedback	SAR comparisons are available in the PS-WFVS reports
GF-13	Further partners need to be brought into the PS-WFVS e.g. Meteo-France, NCEP.	General Feedback	NOC to investigate
GF-14	In the PS-WFVS reports the normalised bias as shown is not very useful. As another measure, I would suggest to replace it by the symmetric slope which gives a better idea of the model is globally under or over forecasting (the symmetric slope is the sqrt of the ratio of the variance: $SS = \sqrt{\frac{y^2}{x^2}}$)	General Feedback	NOC to investigate
GF-15	In the PS-WFVS reports could it mention specifically which models enter into the ensemble nowcasts (the report will go to our managers who would not know the full context)	General Feedback	NOC to investigate
GF-16	In the PS-WFVS report we should remind users what the Douglas Sea Scale is	General Feedback	NOC to investigate
GF-17	Since colour is used in other plots, could we also have coloured scatter plots in the PS-WFVS reports	General Feedback	NOC to investigate

5.6 Miscellaneous

Feedback Ref	Brief Description	Feedback Mechanism	Next Action
PD-1, PD-3	GlobWave is very useful and needs to survive after the ESA funding ends in December 2012.	Panel Discussions	Logica to work with Consortium to ensure sustainability

6 STEERING TEAM RECOMMENDATIONS

After the User Meeting a meeting of the Steering Team, Logica and ESA took place on the afternoon of Thursday 6th October 2011. The following are recommendations relevant to the GlobWave data and services.

Feedback Ref	Brief Description	Next Action
SCM-1	To investigate 2012 events suitable for a GlobWave booth / stand / session presence.	Investigate suitable conference in 2012
SCM-2	To introduce case studies and tutorial to GlobWave portal	Logica to introduce case studies and tutorials to the GlobWave portal
SCM-4	Logica and ECMWF to discuss pilot wave forecast verification reports on assessing calibration information to determine if this is sufficient	Logica and ECMWF to start discussions on this matter
SCM-5	Logica to fully clarify differences between NRT and GDR data	Logica to investigate

7 FEEDBACK SUMMARY

The feedback has identified some general themes to concentrate on. By far the most common feedback we received during 2011 was regarding the need to understand who the power users of GlobWave are and what they are using the data for. This information will enable tutorials and case studies to be developed and explained on the portal, which will be a very valuable resource to help users understand the potential of GlobWave. This exercise has already begun with a tutorial available on the portal. Also, 2 case studies on real uses of GlobWave have been explained in the recent February 2012 Newsletter.

There was also very useful feedback about the content, format and consistency of the meta-data and data, some of which has already been addressed.

Finally, users are keen to get confirmation that the GlobWave services will be sustained beyond 2012. We have been working hard on this and expect to be able to announce positive news by the end of June.

ANNEX A FEEDBACK REPOSITORY

Feedback was obtained throughout 2011 in the following ways:

- Questions and Answers after each presentation at the User Meeting (UP) – at the end of each session all attendees were expected to complete the supplied feedback forms and deposit them in a box in the coffee area. These forms provide much of the feedback for the presentations
- General Feedback (GF) – this was supplied by verbal discussion or e-mail throughout 2011 and at the User Meeting.
- Panel Discussion (PD) at User Meeting

The (essentially) raw feedback is recorded below.

A.1 User Presentations

Feedback Reference	Presenter	Description	Good Point (GP) or Area for Improvement (AI)
UP-GB-2	Geoff Busswell, Logica	Could the graphs be made available to download?	AI
UP-GB-3	Geoff Busswell, Logica	In situ data access: 1. Would it be possible to have access to the in situ (buoys) time series data from the GlobWave portal? 2. What in situ datasets are publically available? NDBC, Spain, Meteo-France, UK?	AI
UP-ES-1	Ellis Ash, SatOC	Documentation produced for the project is very useful for end user (technical and non-technical user).	GP
UP-PQ-5	Pierre Queffeulou, Ifremer	There is a need for a Cryosat GlobWave product	AI
UP-FC-1	Fabrice Collard, CLS	Good: Very impressed with the user friendly interface of the online tool!	GP
UP-FC-2	Fabrice Collard, CLS	Good: Fabrice's demo will generate a lot of usage of the tools.	GP
UP-FC-3	Fabrice Collard, CLS	Match-up tool looks very powerful	GP
UP-FC-4	Fabrice Collard, CLS	Impressive, enjoyed seeing the match-up tool.	GP
UP-LG-4	Laure Grignon, HR Wallingford	A maintained, quickly searchable catalogue of meta-data would be very useful	AI

A.2 General Feedback

Feedback Reference	Description	Good Point (GP) or Area for Improvement (AI)
GF-2	It would be useful whenever possible, to add information	AI

Feedback Reference	Description	Good Point (GP) or Area for Improvement (AI)
	<p>on if a satellite is descending or ascending.</p> <p>It would also be useful to know how the buoy / satellite collocation is carried out</p> <p>It would also be useful to add more buoy data such as the Italian network</p>	
GF-6	A smaller number of larger netCDF files would be easier to work with.	AI
GF-7	The data files should be available in an unzipped format	AI
GF-8	A maintained, quickly searchable catalogue of meta-data would be very useful	AI
GF-9	Particular strong points of the PS-WFVS are the mapped datasets and the ability to download images or data files via the monthly reports; the latter are particularly valuable if we wish to do extra investigative work on a particular feature we've seen in the monthly data	GP
GF-9	For the PS-WFVS the performance of our model relative to an ensemble of other models has a strong potential for spotting exceptional cases in our data, although this is pending the addition of a number of other centres.	AI
GF-10	On the PS-WFVS the shipping forecast category diagrams have strong potential, but it would be good to see the sample size for each category on these images	AI
GF-11	Sustainability of the PS-WFVS service is extremely important.	AI
GF-12	For the PS-WFVS the comparison against the SAR data will be of particular interest.	AI
GF-13	Further partners need to be brought into the PS-WFVS e.g. Meteo-France, NCEP.	AI
GF-14	In the PS-WFVS reports the normalised bias as shown is not very useful. As another measure, I would suggest to replace is by the symmetric slope which gives a better idea is the model is globally under or over forecasting (the symmetric slope is the sqrt of the ratio of the variance: $SS = \sqrt{\langle y^2 \rangle / \langle x^2 \rangle}$)	AI
GF-15	In the PS-WFVS reports could it mention specifically which models enter into the ensemble nowcasts (the report will go to our managers who would not know the full context)	AI
GF-16	In the PS-WFVS report could we remind the users what the Douglas Sea Scale is.	AI
GF-17	Since colour is used, could we also have coloured scatter plots in the PS-WFVS reports	AI
GF-18	It would be good to have statistical measures available digitally as global or regional grids	AI
GF-19	GlobWave is a tremendous resource	GP
GF-20	It would be good to alter the GlobWave lesson to show	AI

Feedback Reference	Description	Good Point (GP) or Area for Improvement (AI)
	how to filter on good/bad quality flags.	
GF-21	The handbook was very interesting – particularly the applications section	GP
GF-22	Since the files are written in netCDF does GLOBWAVE have any tool/software program that can be made available for use by the wave modelling community to read and extract the appropriate fields from these files?	AI
GF-23	I have found quite a few instances of missing ancillary fields and sigma0 information	AI
GF-24	Inconsistency between SAR and Altimeter data in terms of the longitude. Altimeter L2P data goes from 0 to 360 degrees whereas the SAR data goes from -180 to 180 degrees.	AI
GF-25	It would be useful to have links to some of the coastal altimetry initiatives.	AI
GF-26	If fields are never filled then the fields should be removed from the files.	AI

A.3 Panel Discussions

Feedback Reference	Description	Good Point (GP) or Area for Improvement (AI)
PD-1	Sustainability of the service: Users are keen for the GlobWave services to be sustained after the ESA funding finishes at the end of 2012. The quicker this sustainability is secured the more users we are likely to get on board.	AI
PD-2	Product User Handbook: it is suggested the user handbook could use more pictures	AI
PD-3	Altimeter data: having developed a multi-sensor altimeter database with extensive calibration information, it would be a pity not to ensure it survives.	GP
PD-4	Promote GlobWave to the offshore industry: the GlobWave mailing list has 300 people, but this can be expanded future into the offshore industry and get more of them using GlobWave data.	AI
PD-5	Have a GlobWave presence at Shipping conferences: GlobWave should have a presence at shipping conferences such as Oceanography or OMAE in 2012. It is also noted that organisations such as HR Wallingford are a good intermediate between GlobWave data and the end users.	AI
PD-6	User Meeting feedback: there was a general agreement that the meeting over 1 ½ days was a good idea. There was also a suggestion that presentations be shorter and	GP & AI

Feedback Reference	Description	Good Point (GP) or Area for Improvement (AI)
	<p>have more time for both questions and answers and general discussions.</p> <p>Delegates also liked the applications session and would like to see more testimonials of how the data is used. Some people thought some of the talks had quite similar content.</p>	
PD-7	<p>Understand the GlobWave users: as GlobWave moves towards phase 3, it is an ideal time to see who the real GlobWave users are, which is difficult to understand from the registered user list. Looking forward this will be useful to understand the benefits of GlobWave and build a case for the real users.</p> <p>It takes time for people to get use to new kinds of data, looking at spectra and using it, so it is also important to understand what users are doing with the data. Being more interactive in terms of training would increase communication with users.</p>	AI
PD-8	<p>Long-term increase in GlobWave's user base: It is recognised there is a lag between provision and uptake. A good idea to increase user base is to focus on researchers and PhDs prior to their joining industry, perhaps by allocating resources to train them while still at university.</p>	AI
PD-9	<p>Data and services: it is a good idea to keep unfilled data or metadata as in the future these parameters may be needed. Some parameters are currently not used operationally so can be ignored during processing.</p>	GP
PD-10	<p>How to increase GlobWave data uptake by end uses: Some of the presentations were from organisations sitting between GlobWave and end users, such as the Met Office. There is a desire to increase the uptake by end users by making the data more robust, by undergoing processes such as due diligence, certification etc. GlobWave can also be used to assess model accuracy by comparing to collocated observation data (<i>in situ</i>, satellite, complementary).</p>	AI
PD-11	<p>Training, education and outreach: training is scheduled for the user meeting next year and it is recommended to include some case studies.</p> <p>It would be a good idea to further use the portal for training such as the online tutorial or possibly using new media such as YouTube. It would also be useful to develop a tutorial package that could be used in training. A simple visualisation tool for people on ships would also be very useful for the market.</p> <p>It would also be recommended that GlobWave data be used in the Ifremer training courses on MyOcean.</p>	AI
PD-12	<p>User-friendly data format and storage: the RADS system has some issues with user friendliness. The possibility on using a system such as OpenDAP, which is used by MyOcean should be investigated.</p>	AI

Company Address

Logica UK Ltd.
Keats House
The Office Park
Springfield Drive
Leatherhead
Surrey
KT22 7LP

Contact person:

Dr. Geoff Buswell
GlobWave Project Manager
P: +44 (0) 7595 612 392
F: +44 (0) 1372 759 890
E: geoff.buswell@logica.com
www.logica.com

