Globwave and applications of global satellite wave observations

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The primary objective of the GlobWave project is to improve the uptake of satellite-derived wind-wave and swell data by the scientific, operational and commercial user community. The project is a 3 year initiative funded by the European Space Agency, which aims to develop, operate and maintain an integrated set of information services based on satellite wave data.

Wave data are available from in situ measurements, satellite altimeter and SAR instruments and are generated by an increasing number of wave models used in forecasting wave conditions. However, the use of satellite wave data in a commercial, scientific and operational environment has been hampered the lack of harmonized and integrated datasets; users are often confused by what wave data are available, the data quality and a lack of data standardization. Cross calibration and error characterisation of complementary satellite and in-situ measurements can deliver satellite wave products with enhanced accuracy. This requires the development of methodologies for complementary use of wave data from these different sources.

This concept has been pioneered in the GHRSST initiative (including its ESA component Medspiration), which has clearly shown the benefits of a user-centric scientific approach. The GlobWave project proposes to transfer this successful approach into the wave domain, and build on it with new achievements. The strategy to achieve our objective is the following:

• Standardised wave data products and formats to provide a uniform, harmonised set of satellite wave data and ancillary information, in a common netcdf format.

• Reliable wave data based on multiple sensors and sources, which has been quality controlled, calibrated and validated with consistent characterisation of errors and biases.

• Easy access to wave data products via a web portal, regularly updated including processed near-real-time data, and based on an integrated set of information services that are continuously updated and improved based on user feedback and ongoing process improvement.

• A sustainable service that users can rely upon to meet their needs in the long term.

The project builds on the knowledge and contacts of the consortium members, led by Logica UK, with support from CLS, IFREMER, SatOC and NOCS, to increase the value provided to GlobWave by existing projects. The project User and Steering Groups provides direction and focus for the project, ensuring the widest range of activities are included and ensuring that user expectations are met.

Additionally to the basic postprocessed L2 satellite products, so called L2P, the project is aimed at making available to the wave data user community a number of demonstration higher level products such as the level3 swell firework. A methodology, the so called "firework technique", has been developed to routinely derive integral properties of the longerwavelength (swell) portion of the wave spectrum using SAR level 2 products to both monitor and predict their evolution across ocean basins. Sparse SAR-derived estimates of the detected peak directions are used to project the swell systems in one dimension along their corresponding great circle route, both forward and back in time, using the inferred group velocities. The resulting real-time data set of great circle–projected wave systems produces two-dimensional maps that can be used both to detect the storm source regions and to monitor and predict the spatial extent and temporal evolution of individual ocean swell fields as they propagate away from their source region to distant coastlines. The coherence of swell height is found to be very high both along and across a single great circle path. Exploiting these very large correlation time and space scales of the swell field will help pushing further the quality and the time horizon of the swell forecasts.

Other demonstration wave products based on analysis of image mode and wide swath mode SAR products are made available (http://soprano.cls.fr) and possible applications for assessment of renewable energy ressources based on these observations are discussed.

The consolidated archive of satellite based wave observations from SAR and altimeters over the last two decades is also opening the way to climatologic studies by using wave energy as a proxy of momentum transfer from atmosphere to oceans and swell propagation as a momentum transfer mecanism between ocean source regions to distant coastlines.

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