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INSITU_GLO_WAV_DISCRETE_MY_013_045

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CHANGE RECORD

When the quality of the products changes, the QuID is updated and the SQO is updated. A line is added to this table and the version of the SQO document is the same than that of the REFERENCE QUID. The third column specifies which sections or sub-sections have been updated.

Issue	Date	§	Description of Change	Authors	Validated By
1.0	27/05/2020	All	Creation of the document	Marta de Alfonso, Fernando Manzano, Alejandro Gallardo	Validated by PQ leader
4.0	04/09/2020	All	Update for Dec 2020 release and inclusion of wave spectra	Marta de Alfonso, Fernando Manzano, Alejandro Gallardo	Jerome Gourrion
4.1	21/02/2022	All	Update of version number to coincide with the corresponding QuID	Marta de Alfonso	Stéphane Tarot
5.0	06/06/2022		New product naming, new Production Unit and new template	Marta de Alfonso, Fernando Manzano, Alex Gallardo	Stéphane Tarot
5.1	02/08/2023		New dataset with hourly data	Marta de Alfonso, Fernando Manzano, Alex Gallardo	Stéphane Tarot

Contents

Executive summary

The INSITU_GLO_WAV_DISCRETE_MY_013_45 product is based on in situ observations.

The data validation is carried out by automatic quality control tests both in real time and delayed mode (Copernicus In Situ TAC, Real Time Quality Control for WAVES, https://doi.org/10.13155/46607). Moreover, data is visualized by experts to detect spikes and anomalous behaviour of the sensors and additionally, comparison with other sources is performed to detect possible wrong data.

It is important to note that this product is providing data from stations moored by national or local institutions, and they are responsible of the data transmission and the equipment maintenance.

The temporal coverage has been divided in five different decades from 1970 up to now (2022). The metric includes the mean number of platforms in every region and the standard deviation. The spatial coverage is presented through maps with the distribution of platforms with colours showing the number of years of data coverage and distinguishing between active and non-active platforms.

Both for scalar and directional waves it is clear the increase in the number of platforms collected along the period, especially in the last two decades. For wave spectra the coverage is null until 90's decade and increases significantly in the last years.

Regarding the spatial coverage, most of the stations providing scalar waves are concentrated in the Northern Hemisphere and close to the coast. In the European Seas there are differences between the regions with high coverage in all of them except in the Southern Black Sea, the Arctic and the Southern and Eastern Mediterranean. For directional waves, the coverage decreases mainly in Asia and in some regions of Europe. For wave spectra the coverage is limited to the Spanish, French, US and Canadian networks.

For additional information regarding the in-depth validation of this product, the calculation of the assessment metrics presented in this product and other detailed information in quality and remarkable events please refer to the reference quid document CMEMS-INS-QUID-013_045 (https://catalogue.marine.copernicus.eu/documents/QUID/CMEMS-INS-QUID-013_045.pdf).

Important notice:
The contents of this document are an assessment based on the best set of observations available for evaluation at the time the operational system was validated. The validation methodology was defined and agreed within Copernicus Marine Service, inheriting the long experience of MyOcean and MERSEA series of projects (Hernandez et al., 2018) The results presented in this report and derived estimated accuracy numbers (EAN) are representative of average error levels over large areas of the ocean. These numbers might be used as a mean error in one given point of the area, but in order to refine error estimates locally, the reader is invited to use complementary information from reference QUIDs (error maps for instance, when available).

1. Scalar waves

The dataset coverage of scalar waves has been increasing along the last fifty years. Table 1.1 shows the evolution of the mean and standard deviation of the number of platforms along the decades in the period 1970-2022 at global scale. It can be appreciated how the numbers increase, specially in the last two decades. In Figure 1.1 the spatial distribution of the platforms is shown with the colour meaning the number of years covered by the station and a black circle around it indicating the platform is active (data provided in the last two months). Most of the platforms are condensed in the Northern Hemisphere and more concretely in Europe, North America, Japan and India. In the Southern Hemisphere there are some stations in South America and Australia. In European Seas the coverage is high except in Arctic, Middle and Eastern Mediterranean and Southern Black Sea areas.

WAVES (Global)	Coverage (number of platforms)									
	1970-1980		1980-1990		1990-2000		2000-2010		2010-2022	
	Mean	Std	Mean	Std	Mean	Std	Mean	Std	Mean	Std
Height	41.7	22.9	111.0	19.1	173.0	15.2	324.0	82.8	642.8	82.0
Period	16.9	14.9	93.4	27.6	172.1	15.3	323.0	82.8	607.3	63.5

Table 1.1. Estimated coverage (number of platforms) for scalar waves (height and period) along the period 1970-2022 at global scale.

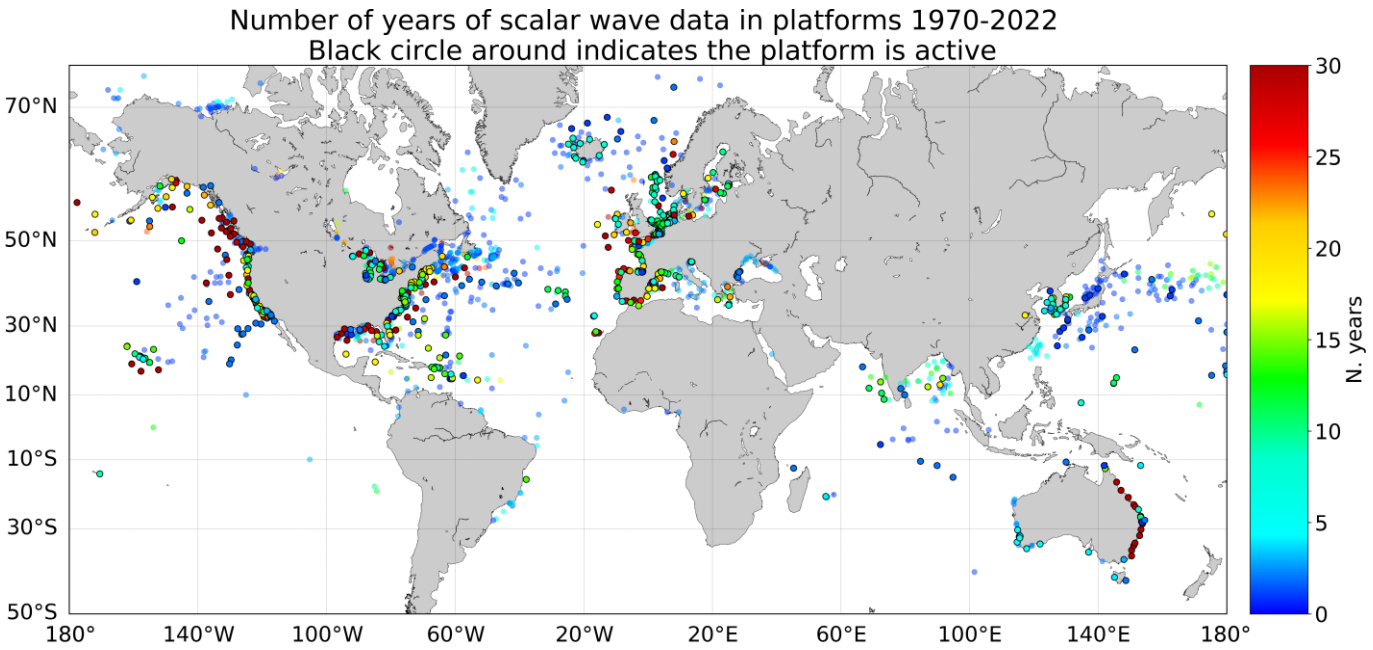

Figure 1.1. Map with the spatial distribution of scalar wave platforms.

2. Directional waves

The dataset coverage of directional waves has been increasing along the last fifty years. Table 2.1 shows the evolution of the mean and standard deviation of the number of platforms along the decades in the period 1970-2022 at global scale. As in the case of scalar waves the increase is specially noted in the last two decades. In Figure 2.1 the spatial distribution of the platforms is showed with the colour meaning the number of years covered by the station and a black circle around indication the platform is active (data provided in the last two months). Most of the platforms are condensed in the Northern Hemisphere and more concretely in Europe and North America. In the Southern Hemisphere there are some stations in Australia. In European Seas the coverage is high, except in Arctic, Southern and Eastern Mediterranean and Southern Black Sea areas. The patterns are similar to scalar waves figure, but the coverage is noticeable less in some areas. Most of the Asian stations disappear because they are providing only scalar waves. A similar situation is observed with the British network and some platforms in the North Sea and in the US coast.

WAVE (Global)	Coverage (number of platforms)									
	1970-1980		1980-1990		1990-2000		2000-2010		2010-2022	
	Mean	Std	Mean	Std	Mean	Std	Mean	Std	Mean	Std
Direction	10.9	10.4	57.7	13.3	99.4	10.6	188.8	52.0	399.1	69.8

Table 2.1. Estimated coverage (number of platforms) for directional waves (direction) along the period 1970-2022 at global scale.

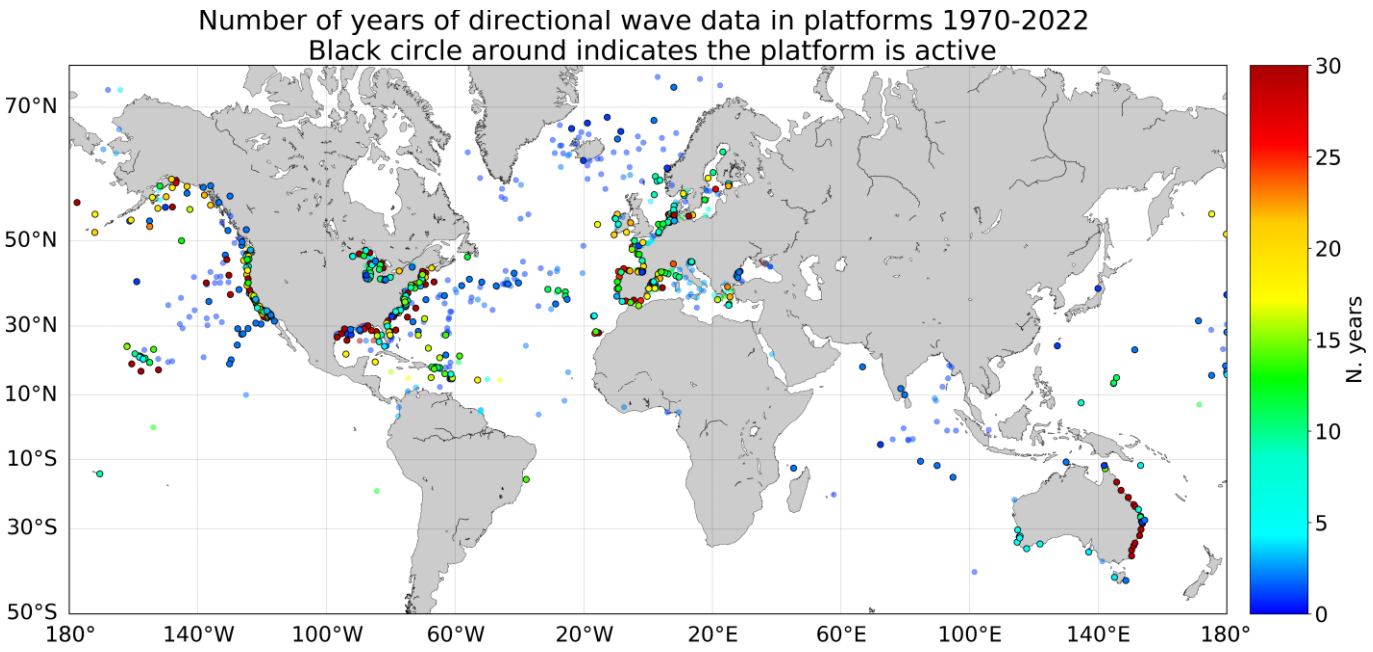

Figure 2.1. Map with the spatial distribution of directional wave platforms.

3. Wave spectra

The dataset coverage of spectral waves has increased in the last decade. Table 3.1 shows the evolution of the mean and standard deviation of the number of platforms along the decades in the period 1970-2022 at global scale. There is no coverage in the first two decades, data started in the mid 90's and grow especially in the last years.. In Figure 3.1 the spatial distribution of the platforms is showed with the colour meaning the number of years covered by the station and a black circle around indication the platform is active (data provided in the last two months). Only Spanish, French, US and Canada networks are providing this information, being the French and the Canadian very recent (less than 10 years) while the Spanish and US networks have a more extended coverage, with more than 20 years in some stations. The recent incorporation of the spectral information from drifters and saildrones has allowed the availability of spectra in open waters as reflected in the figure.

WAVE (Global)	Coverage (number of platforms)									
	1970-1980		1980-1990		1990-2000		2000-2010		2010-2022	
	Mean	Std	Mean	Std	Mean	Std	Mean	Std	Mean	Std
Spectra	0.0	0.0	0.0	0.0	27.1	33.2	84.9	11.7	139.9	53.9

Table 3.1. Estimated coverage (number of platforms) for wave spectra along the period 1970-2021 at global scale.

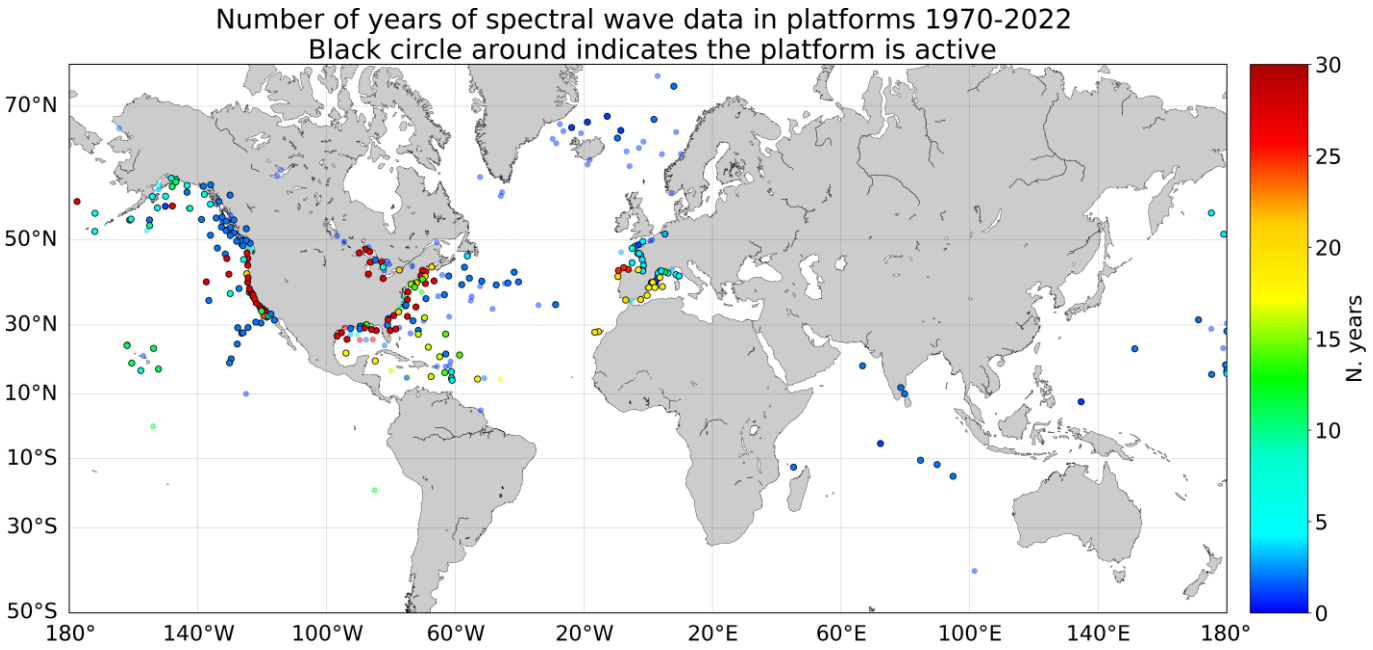

Figure 3.1. Map with the spatial distribution of platforms providing wave spectra.

References

Hernandez, F., et al., 2018: Measuring performances, skill and accuracy in operational oceanography: New challenges and approaches. In "New Frontiers in Operational Oceanography", E. Chassignet, A. Pascual, J. Tintoré, and J. Verron, Eds. GODAE OceanView, 759-796, doi:10.17125/gov2018.ch29.

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