

Sea State

ESSENTIAL CLIMATE VARIABLE (ECV) FACTSHEET



GLOBAL CLIMATE
OBSERVING SYSTEM
KEEPING WATCH OVER OUR CLIMATE



ECV IN BRIEF

Domain: Ocean
Subdomain: Physical
Scientific Area: Physical Properties
Products: Wave Height



Sea State

Sea State is the characterization of wave and swell, typically in terms of height, wavelength, period, and directional wave energy flux. Waves generated by ocean surface stress evolve from wind waves to swell through nonlinear dynamical processes.. Wave characteristics are modified by bathymetry when the depth of the water is comparable to the wavelength, and by surface currents. Sea state is most well known for its impacts on marine safety, marine transport and damage to structures. It is also a substantial modifier of air-sea exchanges of momentum, moisture and CO₂. Waves also impact beach erosion, storm-related water damage (wave set-up contributes to storm surge), surface albedo, and transport of larva. Waves can also modify the growth or decay of sea ice.

ECV Product¹

PRODUCT	DEFINITION	REQUIREMENTS				
		FREQ.	RESOLUTION	REQUIRED MEASUREMENT UNCERTAINTY	STABILITY	STANDARDS/ REFERENCES
WAVE HEIGHT	The distance between the trough of the wave and the adjacent crest of the wave. The significant wave height is the mean wave height (trough to crest) of the highest third of the waves in a wave spectrum	3 hourly	25 km	10 cm	5 cm	See EOV Specification at www.goosoccean.org/eov

¹ Current Products and Requirements as in the Implementation Plan 2016 (GCOS-200). GCOS is reviewing and will update the requirements until 2022. More information on: gcos.wmo.int and climatedata.wmo.int.



Data Sources²

- ▶ National Centers for Environmental Information (NCEI)
<https://www.nodc.noaa.gov/General/wave.html>
- ▶ British Oceanographic Data Center (BODC)
http://www.bodc.ac.uk/data/bodc_database/waves/
- ▶ Marine Environment Data & Information Network (MEDIN)
http://www.oceannet.org/online_data_by_theme/waves/
- ▶ AVISO
<https://www.aviso.altimetry.fr/en/data/data-access/las-live-access-server/lively-data/2005/feb-15-2005-waves-in-statistics.html>

Map of Wave Height

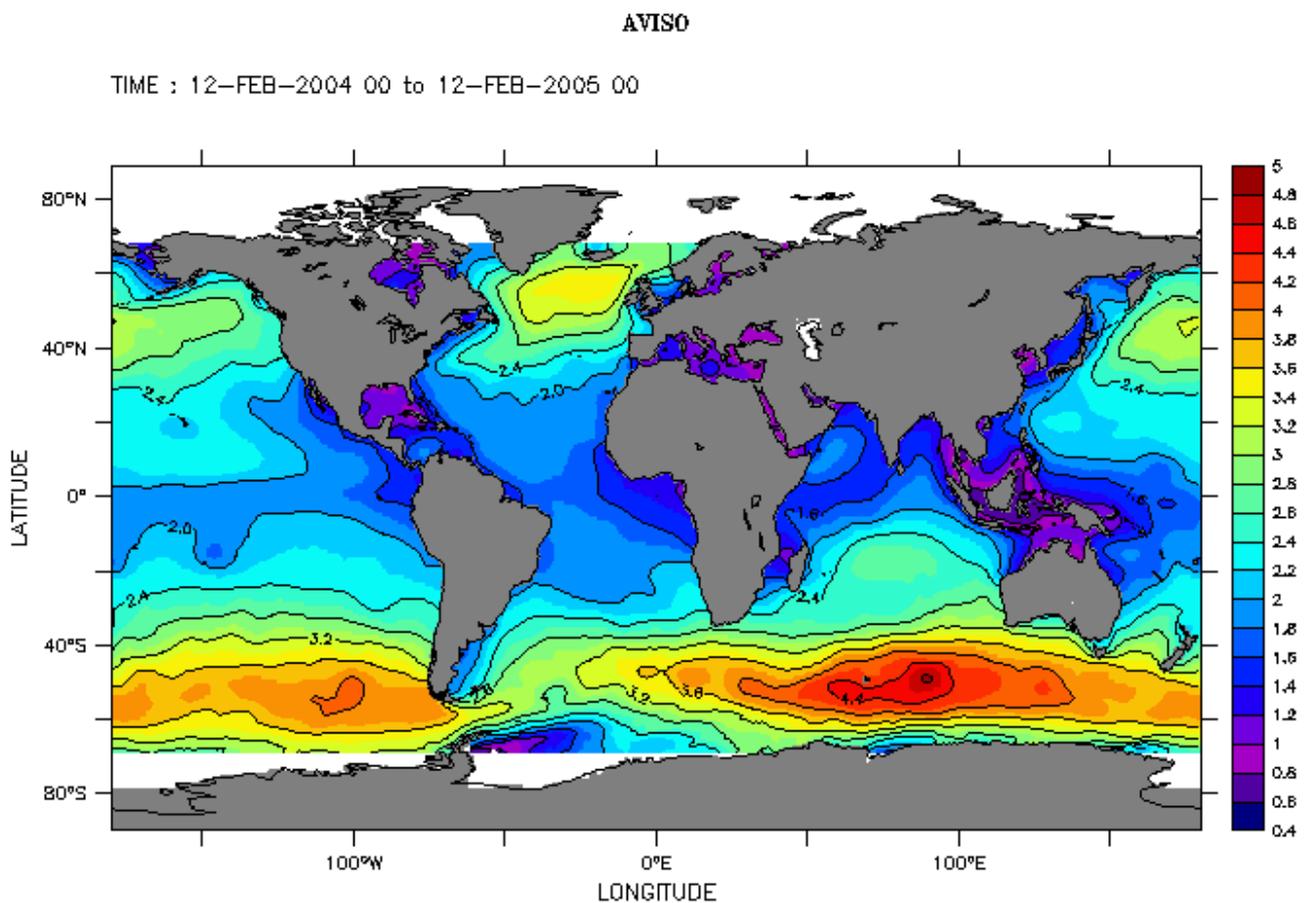


Figure: Annual Mean significant wave height in m, measured by the Jason-1 Satellite.

Source: <https://www.aviso.altimetry.fr/en/data/data-access/las-live-access-server/lively-data/2005/feb-15-2005-waves-in-statistics.html>

² This list provides sources for openly accessible data sets with worldwide coverage for which metadata is available. It is curated by the respective GCOS ECV Steward(s). The list does not claim to be complete. Anyone with a suitable dataset who would like it to be added to this list should contact GCOS.