

GOOS Phenomena List

Version 1

This reference document contains the list of important global phenomena reflected in the GOOS Essential Ocean Variables. It is not an exhaustive list of all ocean phenomena, and is designed to support harmonisation of terminology across GOOS. Some of the phenomena are indicators of change and are used as such by relevant frameworks (e.g. sea level, sea ice extent, ocean acidification or deoxygenation).

Ocean phenomena can be properties (e.g. distribution of a species), processes (e.g. air-sea fluxes), or events (e.g. upwelling) that have distinct spatial and temporal scales and when observed, inform assessments of ocean state and ocean change (GOOS, 2016; 2018).

The list of 'key' phenomena was harmonised by the GOOS Physics and Climate (OOPC), Biogeochemistry (BGC) and Biological and Ecosystem (BioEco) Expert Panels. The GOOS Expert Panels are the stewards of the GOOS Essential Ocean Variables (EOVs).

GOOS Essential Ocean Variables: *The minimum set of ocean variables that are needed to assess ocean state and variability for important global ocean phenomena, and to provide essential data for applications that support societal benefit. They are derived from sustained individual measurements, or combinations of measurements, that can be undertaken at global scale and in a cost-effective manner.*

The list of GOOS phenomena in the following page was updated in November 2025.

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- Circulation
- Ventilation / water masses
- Storage (Heat, Freshwater and Carbon)
- Fronts and eddies
- Tides
- Upwelling
- Stratification and Mixed layer
- Sea level
- Sea ice extent
- Marine heatwaves
- Air-sea fluxes (heat, GHG)
- Land-ocean fluxes (water, carbon, nutrients)
- Sediment resuspension and transport
- Ocean acidification
- Deoxygenation
- Eutrophication
- Contamination/pollution events
- Anthropogenic carbon sequestration
- Remineralization
- Calcification
- Export fluxes
- Mass mortality
- Community or population abundance status and trends
- Changes in primary production
- Changes in secondary production
- Changes in phenology
- Trends in species diversity
- Changes in marine life distribution
- Habitat loss or recovery
- Harmful algal bloom (HAB) Occurrence