Subsurface Currents
ESSENTIAL CLIMATE VARIABLE (ECV) FACTSHEET

GLOBAL CLIMATE OBSERVING SYSTEM
KEEPING WATCH OVER OUR CLIMATE

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ECV IN BRIEF

Domain: Ocean
Subdomain: Physical
Scientific Area: Physical Properties
Products: Interior Currents

Subsurface Currents

Observations of subsurface ocean velocity contribute to estimates of ocean transports of mass, heat, freshwater, and other properties on local, to regional and basin to global scales. They are essential in resolving the wind and buoyancy driven ocean circulation, and the complex vertical velocity structure, for example, in the major ocean boundary currents, tides, equatorial currents, wave propagations, ocean eddies. Vertical velocity profile information can be used to estimate the order of ocean mixing using fine-scale parameterizations of turbulent dissipation by internal wave breaking. Velocity estimates can be combined in data assimilation models to provide gridded global estimates of ocean circulation at varying temporal and spatial scales.

ECV Product[1]

PRODUCT	DEFINITION	REQUIREMENTS				
		FREQ.	RESOLUTION	REQUIRED MEASUREMENT UNCERTAINTY	STABILITY	STANDARDS/ REFERENCES
INTERIOR CURRENTS	Ocean vector motion measured with depth.	Hourly to weekly	1-50 km	0.02m/s	Not specified	See EOV Specification Sheet at www.goosocean.org/eov

Data Sources[2]

▶ National Center for Environmental Information, Global Ocean Currents Database.
https://www.nodc.noaa.gov/gocd/index.html

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[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.
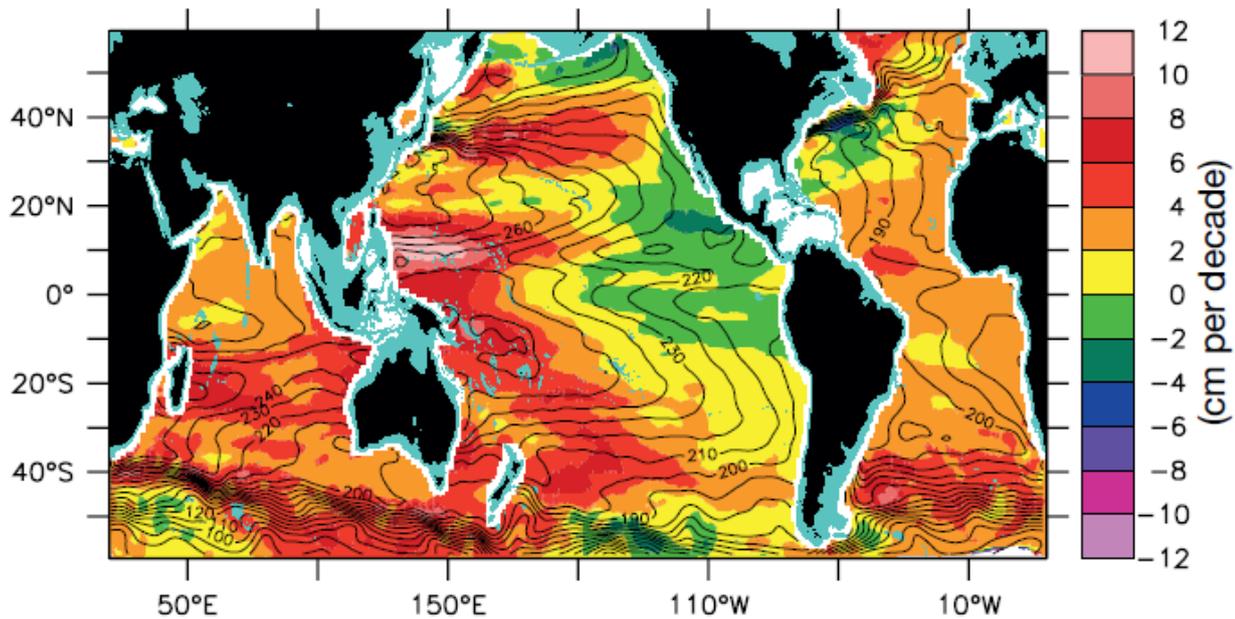
Geostrophic flow from Argo and Altimeter

Figure: Mean steric height of the sea surface relative to 2000 decibars (black contours at 10cm intervals) shows the pattern of flow for the Argo era (2004-2012) based on Argo profile data, updated from Roemmich and Gilson (2009). The sea surface height (SSH) trend (cm per decade, colour shading) for the period 1993-2011 is based on the AVISO altimetry 'reference' product (Ducet et al., 2000). Spatial gradients in the SSH trend, divided by the (latitude-dependant) Coriolis parameter, are proportional to changes in surface geostrophic velocity. For display, the mean steric contours and SSH trends are spatially smoothed over 5 degrees longitude and 3 degrees latitude.

Reference: IPCC 5th Assessment Report, WG1 Chapter 3: Ocean Observations

Source (13/12/2017): http://rstb.royalsocietypublishing.org/content/367/1593/1245

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