

Ice Sheets and Ice Shelves

ESSENTIAL CLIMATE VARIABLE (ECV)
FACTSHEET



**GLOBAL CLIMATE
OBSERVING SYSTEM**
KEEPING WATCH OVER OUR CLIMATE



ECV IN BRIEF

Domain: Terrestrial
Subdomain: Cryosphere
Scientific Area: Snow and Ice
ECV Stewards: Hiroyuki Enomoto
Products: Surface Elevation Change
 Ice Velocity
 Ice Mass Change
 Grounding Line Location and Thickness



Ice Sheets and Ice Shelves

The understanding of the timescale of ice-sheet response to climate change has changed dramatically over the last decade. Rapid changes in ice-sheet mass have surely contributed to abrupt changes in climate and sea level in the past.

ECV Product¹

PRODUCT	DEFINITION	REQUIREMENTS				
		FREQUENCY	RESOLUTION	REQUIRED MEASUREMENT UNCERTAINTY	STABILITY	STANDARDS/ REFERENCES
Surface Elevation Change	Local measurements of the height above a reference (geoid or ellipsoid) of the snow-air surface or uppermost firn layers	30 days	Horizontal 100m	0.1m/year	0.1m/year	
Ice Velocity	Surface-parallel vector of the surface ice flow	30 days	Horizontal 100m	0.1m/year	0.1m/year	
Ice Mass Change	Direct measurement of local mass changes or inferred mass change from combining measurements	30 days	Horizontal 50km	10km ³ /year	10km ³ /year	
Grounding Line Location and Thickness	Location of the line (zone) where ice outflow to an ocean begins to float	Yearly	Horizontal 100 m; Vertical 10 m	1 m	10 m	

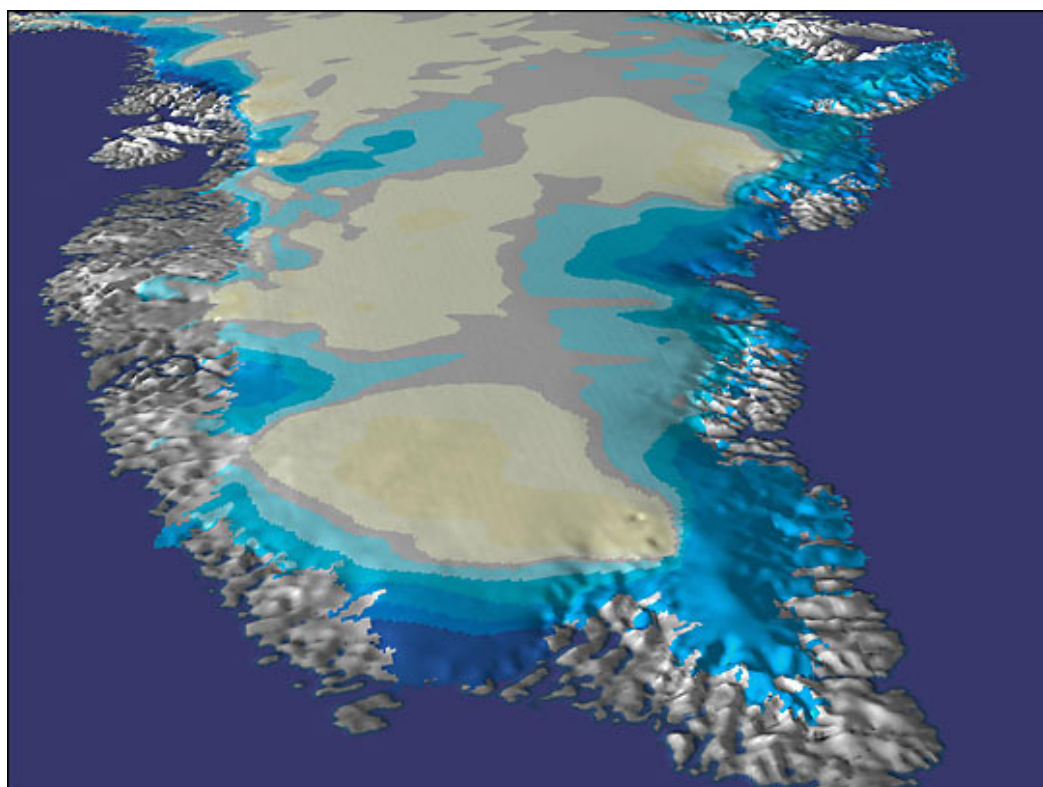
¹ Current Products and Requirements as in the Implementation Plan 2016 (GCOS-200). GCOS is reviewing and will update the requirements as part of their contribution to the UNFCCC Global Stocktake. More information on: climatedata.wmo.int.



Data Sources²

- ▶ PARCA: Program for Regional Climate Assessment
<http://cires1.colorado.edu/science/pro/parca/data/>
- ▶ Radarsat Antarctic Mapping Project Digital Elevation Model, Version 2
<http://nsidc.org/data/nsidc-0082>
- ▶ MEaSURES Annual Antarctic Ice Velocity Maps, 2005-2017, Version 1
<http://nsidc.org/data/NSIDC-0720/versions/1>
- ▶ MEaSURES Greenland Ice Mapping Project (GIMP) Digital Elevation Model from GeoEye and WorldView Imagery, Version 1
<http://nsidc.org/data/NSIDC-0715/versions/1>
- ▶ Global Land Ice Velocity Extraction from Landsat 8 (GoLIVE)
<https://nsidc.org/data/golive/>
- ▶ US International Trans-Antarctic Scientific Expedition (US ITASE) Glaciochemical Data Version 2²
<https://nsidc.org/data/nsidc-0273>
- ▶ Satellite ECV Inventory by the CEOS/CGMS Working Group on Climate (WGClimate)
<http://climatemonitoring.info/ecvinventory>
- ▶ TanDEM-X 90m DEM
<https://tandemx-90m.dlr.de>
- ▶ ALOS/PRISM 30m DEM (AW3D30)
<http://www.eorc.jaxa.jp/ALOS/en/aw3d30/data/index.htm>
- ▶ Global DEM 2m
<https://www.pgc.umn.edu/data/rema/>

Greenland Ice Sheet



Rate of Change in Icecap Height (cm/year)

-60 -20 -2 +2 +20 +60

Until 2007, rate of decrease in ice sheet height in cm per year.

Source: https://commons.wikimedia.org/wiki/File:Cambios_en_la_capa_de_hielo_de_Groenlandia.jpg; Work of the United States Federal Government under the terms of Title 17, Chapter 1, Section 105 of the US Code.

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) and reflects the status as of 01/2019. 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.



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