

Permafrost

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:	Philippe Schoeneich
Products:	Thermal State of Permafrost Active Layer Thickness



Permafrost

The properties of frozen ground react sensitively to climate and environmental changes in high-latitude and high-altitude regions. This includes the temperature distribution in the permafrost layer and the depth of the overlying active layer where seasonal freezing and thawing occur. Changes in these quantities have important impacts on terrain stability, coastal erosion, surface and subsurface water, the carbon cycle and vegetation development.

ECV Product¹

PRODUCT	DEFINITION	REQUIREMENTS				
		FREQUENCY	RESOLUTION	REQUIRED MEASUREMENT UNCERTAINTY	STABILITY	STANDARDS/ REFERENCES
Thermal State of Permafrost	Ground temperatures measured at specified depths along profiles	Daily to weekly	Sufficient sites to characterise each bio-climate zone	0.1K		
Active Layer Thickness	Thickness of seasonally thawed ground measured in (cm)	Daily to weekly	Sufficient sites to characterise each bio-climate zone	2cm		

Data Sources²

- ▶ Global Terrestrial Network for Permafrost (GTN-P) Database
<http://gtnp.arcticportal.org/>

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.

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.



Permafrost Temperature Evolution

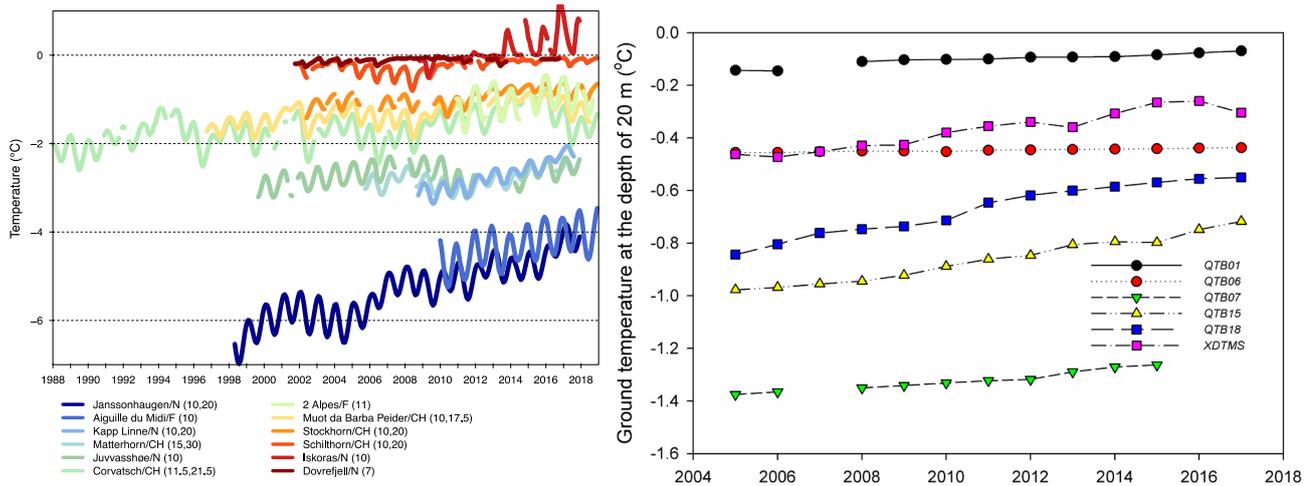


Figure: Permafrost temperature evolution at 20 m depth at selected borehole sites: Left: Permafrost sites in Norway and the European Alps. Right: Permafrost temperature along the Qinghai-Xizang Highway on the Tibetan Plateau.

Source: BAMS report 2019 (in prep.)