



permafrost
cci

CCI+ PHASE 1 – NEW ECVS
Permafrost

CCN3 Option 6
IMPROVED SOIL DESCRIPTION THROUGH A
LANDCOVER MAP DEDICATED FOR THE ARCTIC

D4 Product Validation and Intercomparison Report
(PVIR)

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Author team

Annett Bartsch, BGEOS
Aleksandra Efimova, BGEOS
Barbara Widhalm, BGEOS
Xaver Muri, BGEOS
Gustaf Hugelius, SU
Tazio Strozzi, GAMMA

ESA Technical Officer:
Frank Martin Seifert

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Executive summary

Within the European Space Agency (ESA), the Climate Change Initiative (CCI) is a global monitoring program which aims to provide long-term satellite-based products to serve the climate modeling and climate user community. Permafrost has been selected as one of the Essential Climate Variables (ECVs) which are elaborated during Phase 1 of CCI+ (2018-2021).

CCN3 Option 6 addresses the need for landcover information of relevance for Permafrost monitoring and modelling. The specific aim of this CCI+ Permafrost subproject is to implement a circumpolar landcover description with sufficient thematic content. It utilizes prototypes of ESA DUE GlobPermafrost, i.e. traditional landcover classification, vegetation height maps and surface roughness maps.

This document is the Product Validation and Intercomparison Report (PVIR) of Option 6 within CCN3 of Phase 1 of the Permafrost_cci project. It evaluates the product of the landcover product targeting proxies for soil properties in tundra regions underlain by permafrost. The product specifications address the main requirements expressed by the users in the User Requirements Document (URDv1.0, RD-3) including those expressed by the Permafrost_cci Climate Research Group (CRG)

Landcover information is provided at 10m resolution, polar stereographic projection, covering the Arctic tundra and representing the status 2016-2022. Product level is 4 and 5. The datasets are created from the analysis of lower level data, resulting in gridded, gap-free products. In addition aggregated information is provided for further use in the Permafrost_cci project.

The PVIR includes the documentation of the level 4 result assessment. This includes the comparison to the prototypes developed in ESA DUE GlobPermafrost, a detailed assessment with respect to fire disturbance, comparison with two other satellite derived circumpolar landcover dataset and the CCI Landcover. A detailed documentation of soil and vegetation properties based on more than 2000 in situ samples is provided.

1 Introduction

1.1 Purpose of the document

The purpose of this document is to present the evaluation of the landcover product through comparison to other similar products, including the documentation of the units based on in situ data.

1.2 Structure of the document

Section 2 provides the link to the preprint which details the assessment.

1.3 Applicable documents

[AD-1] ESA 2017: Climate Change Initiative Extension (CCI+) Phase 1 – New Essential Climate Variables - Statement of Work. ESA-CCI-PRGM-EOPS-SW-17-0032

[AD-2] Requirements for monitoring of permafrost in polar regions - A community white paper in response to the WMO Polar Space Task Group (PSTG), Version 4, 2014-10-09. Austrian Polar Research Institute, Vienna, Austria, 20 pp

[AD-3] ECV 9 Permafrost: assessment report on available methodological standards and guides, 1 Nov 2009, GTOS-62

[AD-4] GCOS-200, the Global Observing System for Climate: Implementation Needs (2016 GCOS Implementation Plan, 2015.

1.4 Reference documents

[RD-1] van Everdingen, Robert, ed. 1998 revised May 2005. Multi-language glossary of permafrost and related ground-ice terms. Boulder, CO: National Snow and Ice Data Center/World Data Center for Glaciology. (<http://nsidc.org/fgdc/glossary/>; accessed 23.09.2009)

[RD-2] Bartsch, A., Westermann, S., Heim, B., Wieczorek, M., Pellet, C., Barboux, C., Kroisleitner, C., Strozzi, T. (2019): ESA CCI+ Permafrost Data Access Requirements Document, v1.0

[RD-3] Bartsch, A., G. Hugelius, Strozzi, T.(2021): ESA CCI+ Permafrost CCN3 Option 6: improved soil description through a landcover map dedicated for the Arctic. User Requirements Document, v1.0

[RD-4] Bartsch, A., Widhalm, B., Efimova, A., Hugelius, G., Palmtag, J., Strozzi, T. (2022): ESA CCI+ Permafrost CCN3 Option 6: improved soil description through a landcover map dedicated for the Arctic. Design Engineering, v1.0

[RD-5] Bartsch, A., Efimova, A., Hugelius, G., Strozzi, T. (2023): ESA CCI+ Permafrost CCN3 Option 6: improved soil description through a landcover map dedicated for the Arctic. Product User Guide, v1.0

2 Assessment documentation

Bartsch, A., Efimova, A., Widhalm, B., Muri, X., von Baeckmann, C., Bergstedt, H., Ermokhina, K., Hugelius, G., Heim, B., and Leibmann, M.: Circumarctic landcover diversity considering wetness gradients, *EGUsphere* [preprint], <https://doi.org/10.5194/egusphere-2023-2295>, 2023.

This publication includes the comparison to the prototypes developed in ESA DUE GlobPermafrost, a detailed assessment with respect to fire disturbance, comparison with two other satellite derived circumpolar landcover dataset and the CCI Landcover. A detailed documentation of soil and vegetation properties based on more than 2000 in situ samples is provided.