Climate Research Data Package (CRDPv2) - Technical Note

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Related documents

Acronym	Title	Document reference	Version	Date
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1. Purpose of this document

This is a technical document describing the contents of the Climate Research Data Package (CRDPv2) of the Glaciers_cci+ project. It provides an overview of the datasets created for the two study sites: Eastern Arctic and High Mountain Asia (HMA). We do not list here details of the individual datasets used for processing (e.g. date, path/row), but give a generalized overview and describe their main characteristics. The database itself is accessible on a separate webpage (http://glaciers-cci.enveo.at/crdp2_internal) containing zip files of all datasets complemented with metadata sheets (see Section 2).

2. Accessing the Climate Research Data Package

The use case input data and generated output products of Glaciers_cci are stored in the Climate Research Data Package (CRDP) database, which can be accessed via http://glaciers-cci.enveo.at. The website layout and look has been updated from Phase 2 of the project. The main landing page provides a brief introduction and links to a public and an internal database (Fig. 2.1). The latter is available for project partners only and is password protected.

Fig. 2.1: CRDP access on the website http://glaciers-cci.enveo.at.

Accessing public products

There is a two-step procedure for accessing the public database, related to (i) viewing and selecting of products and (ii) downloading the products. The first step "Viewing and selecting" does not require any registration. In the second step "Downloading of the product" we ask for the approval of a data usage disclaimer by providing name, affiliation and email address, a password is not required (see Figure 2.2). The entered information is only used for tracking the use of the products, fully compliant with EU data policy standards. Entering the Glaciers_cci CRDP public database provides direct access to released products, which can be selected and downloaded. All datasets are provided in a table providing some basic description

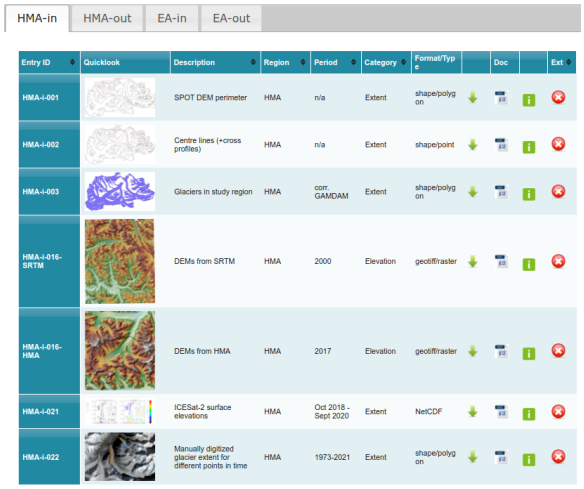
and the spatial and temporal coverage, type of data and downloadable metadata. The basic layout of these tables are the same as in the internal database and are further described in the next section. Eventually, the products from Glaciers_cci+ will be added here, currently these only include products from Phase 1 and Phase 2. For more details on these products, we refer to the CRDP document of Phase 2 of the project [RD1].

Fig. 2.2: Data disclaimer and login screen for accessing the public product database.

Internal database

The internal database for Glaciers_cci+ contains four additional tabs with input and output datasets for the two use cases on glacier dynamics in High Mountain Asia (HMA-in, HMA-out) and the Eastern Arctic (EA-in, EA-out). As for the public part, the tabs list all datasets in a table, providing some basic information, including an ID number, a description, the region and period covered, data category and format/type as well as a quicklook/coverage figure and download links for the dataset and associated metadata sheet. The ID number is a unique alphanumeric number used for internal identification of a dataset. The data category can be either: extent, elevation, velocity, surface elevation change (SEC) or 'other'. The metadata description provides information on the content of the file, product version, generation date, institute and author, satellite data used as input, geographical coverage, etc. It is provided as both a .docx and .pdf document. Additionally, there is a column which indicates whether a dataset is released and publicly available or not. Once a dataset is fit for release it will be moved to the public part of the database and this is indicated in this column. Figure 2.3 shows screenshots of the four main panels in the CRDP database listing the datasets. New datasets will be added during the project as they become available. An overview on the produced and/or foreseen datasets is provided in the following chapters. Figure 2.4 shows as example the standardized metadata sheet for "Surface elevation change in Svalbard from Sentinel-3B".

a)



b)

c)

d)

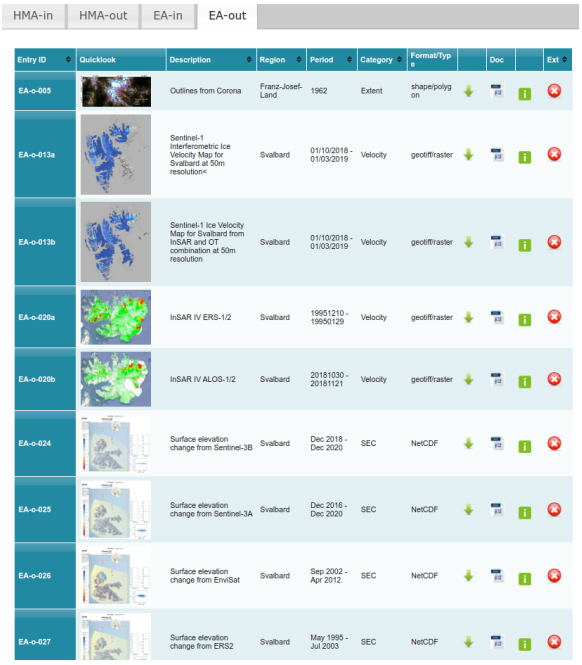


Figure 2.3: Screenshots of the four main panels of the CRDP database: a) HMA-in, b) HMA-out, c) EA-in, and d) EA-out. Note: not all datasets are visible; some datasets are placeholders for anticipated data sets.

Name	**Surface elevation change in Svalbard from Sentinel-3B**		
Description	Surface elevation change derived from Sentinel-3B SRAL data by CPOM		
Source	Initial data from Sentinel-3B SRAL Level 2 LAN product		
Reference	Initial data: Sentinel-3 Product Data Format Specification - SRAL/MWR Level 2 Land products, Reference: S3IPF.PDS.003.2, Issue 2.15, Date: 29/04/2020. Accessed from https://sentinel.esa.int/web/sentinel/user-guides/sentinel-3-altimetry/document-library in April 2021		
Temporal Coverage	December 2018 to December 2020	**Temporal Resolution**	n/a
Spatial Coverage	Svalbard	**Spatial Resolution**	1km
Vertical Coverage	n/a	**Vertical Resolution**	n/a
Map projection	EPSG 3413	**File format**	NetCDF

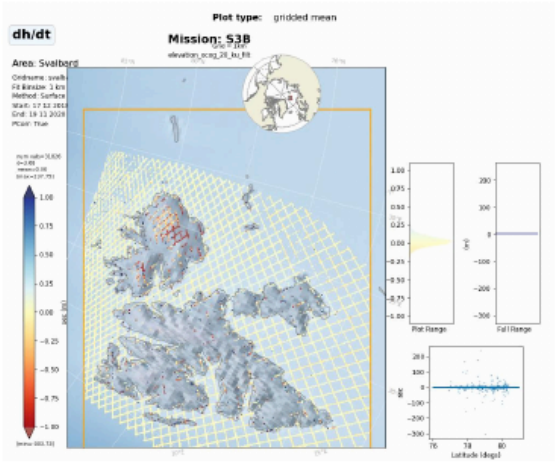


Figure 1: Surface elevation change from Sentinel-3B radar altimetry

Figure 2.4: Example metadata sheet for Surface elevation change in Svalbard derived from Sentinel-3B. This dataset is listed on the Eastern Arctic input tab (EA-out).

3. Datasets for the Eastern Arctic

The data production goals for the study region Eastern Arctic are:
- to provide an overview of glacier surges in Svalbard (characteristics, differences)
- to determine trends in flow velocities for the entire region
- to calculate glacier area changes for Franz-Josef- Land and Novaya Zemlya

For these purposes, we processed a diverse range of input data sets to generate the output datasets listed in Table 3.1. All datasets are or will be available from the internal server. Some of the output datasets will also be made publicly available once the related studies are published.

Two sets of data containing historical ice surface velocities over the Eastern Arctic (Novaya-Zemlya, Franz-Josef-Land, Severnaya Zemlya and Svalbard) are provided:

1) The velocities derived from offset-tracking of JERS-1 (1992-1998), ERS-1/2 (1991-2010) and ALOS-1 PALSAR-1 (2006-2011) data are available in vector format with metadata information for single image tracks. A comma-separated values (csv) file provides the northing and easting coordinates of measurement points, the elevation, the displacement in metres in the x, y and z directions, and the cross-correlation coefficient for each measurement. A metadata file in xml format provides information about the SAR images used, the processing parameters and quality aspects of the data such as the percent of valid information over ice and statistical measures over ice-free regions. In addition, for each image pair geotiff's of the three-dimensional ice surface displacement maps, the two intensity images, the differential interferogram, the phase coherence image, an RGB color composite of the coherence, intensity and intensity difference between both images, and the layover and shadow map are available.
2) Mosaics of ice velocities from various sensors and time intervals are available in Geotif format. This includes offset-tracking mosaics computed from the best winter JERS-1, ERS-1 and ALOS-1 PALSAR-1 image pairs, ERS-1/2 InSAR ice velocity maps of Nordaustlandet (Svalbard), South Svalbard and North-West Svalbard, and Sentinel-1 offset-tracking mosaics computed from winter 2020/2021 data.

Table 3.1: Products created for the test region eastern Arctic. FJL= Franz-Josef-Land, NZ= Novaya-Zemlya, SZ= Severnaya-Zemlya, all=FJL+NZ+SZ+Svalbard.

Nr.	Category	Format	Type	Region	Description	Period	Provider
1	Extent	shape	polyg	FJL	Outlines from Corona	1962	GIUZ
2	Elevation	NetCDF		all	SEC from S-3B	Dec 2018 - Dec 2020	SEEL
3	Elevation	NetCDF		all	SEC from S-3A	Dec 2016 - Dec 2020	SEEL
4	Elevation	NetCDF		all	SEC from EnviSat	Sep 2002 - Apr 2012	SEEL
5	Elevation	NetCDF		all	SEC from ERS2	May 1995 - Jul 2003	SEEL
6	Elevation	NetCDF		all	SEC from ERS1	Aug 1991 - May 1996	SEEL
7	Elevation	NetCDF		all	SEC from CryoSat-2	Oct 2010 - Nov 2020	SEEL
8	Velocity	geotif	raster	Svalbard	InSAR IV from S-1	2018/2019	Enveo
9	Velocity	geotif	raster	Svalbard	OT + InSAR IV S1	2018/2019	Enveo
10	Velocity	geotif/csv	vec/ras	NZ	IV from JERS-1	19980121-19980325	Gamma
11	Velocity	geotif/csv	vec/ras	NZ	IV from ALOS-1	20081211-20100429	Gamma
12	Velocity	csv	vector	NZ	IV from S-1 (12 days)	2015-present	Gamma

13	Velocity	geotif	raster	NZ	IV from S-1	20210204-20210225	Gamma
14	Other	geotif	raster	NZ	Fringes from ALOS-2	Mar 2017	Gamma
16	Velocity	geotif/csv	vec/ras	FJL	IV from JERS-1	19960404-19980529	Gamma
17	Velocity	geotif	raster	FJL	IV from JERS-1	19960808-19971011	Gamma
18	Velocity	geotif/csv	vec/ras	FJL	IV from ALOS-1	20101222-20110417	Gamma
19	Velocity	geotif/csv	vec/ras	FJL	IV from ALOS-2	20160208-20160307	Gamma
20	Velocity	csv	vector	FJL	IV from S-1 (12 days)	2015-present	Gamma
21	Velocity	geotif	raster	FJL	IV from S-1	20210110-20210212	Gamma
22	Other	geotif	raster	FJL	Fringes from ALOS-2	20180206-20180220	Gamma
23	Other	geotif	raster	FJL	Fringes from ALOS-2	20200201-20200215	Gamma
24	Velocity	geotif/csv	vec/ras	SZ	IV from ERS-1	19911018-19920302	Gamma
25	Velocity	geotif/csv	vec/ras	SZ	IV from ALOS-1	20100704-20101217	Gamma
26	Velocity	csv	vector	SZ	IV from S-1 (12 days)	2016-present	Gamma
27	Velocity	geotif	raster	SZ	IV from S-1	20201215-20210204	Gamma
28	Velocity	geotif/csv	vec/ras	Svalbard	IV from JERS-1	19930710-19980326	Gamma
29	Velocity	geotif	raster	Svalbard	IV from JERS-1	19940205-19980326	Gamma
30	Velocity	geotif/csv	vec/ras	Svalbard	IV from ERS-1	19920103-19920115	Gamma
31	Velocity	geotif/csv	vec/ras	Svalbard	IV from ALOS-1	20070904-20110301	Gamma
32	Velocity	geotif/csv	vec/ras	Svalbard	IV from TerraSAR-X	20080427-20121226	Gamma
33	Velocity	csv	vector	Svalbard	IV from S-1 (6 days)	2015-present	Gamma
34	Velocity	geotif	raster	Svalbard	IV from S-1	20150121-20150215	Gamma
35	Velocity	geotif	raster	Svalbard	IV from S-1	20170222-20170516	Gamma
36	Velocity	geotif	raster	Svalbard	IV from S-1	20190112-20190314	Gamma
37	Velocity	geotif	raster	Svalbard	IV from S-1	20210126-20210212	Gamma
38	Other	geotif	raster	Svalbard	Fringes from ALOS-2	Oct/Nov 2018	Gamma
40	Velocity	geotif	raster		InSAR IV ERS-1/2	19951210-19950129	Gamma
41	Velocity	geotif	raster		InSAR IV ALOS-2	20181030-20181121	Gamma

4. Datasets for High Mountain Asia

The data production goals for the study region High Mountain Asia are:
- to characterize the surges of three glaciers taking place in the central Karakoram
- to test the limits of current sensors for glacier area, elevation change and velocity products
- to analyse previous surges from historic datasets (Keyhole mission) for comparison

For these purposes, we processed a diverse range of input data sets to produce a set of products capturing the pre-surge and surge phase of the South and North Chongtar Glacier and an unnamed glacier, referred to as NN9, in the central Karakoram. The output products are listed in Table 4.1. The datasets consists of raster and shapefiles as well as image time series and cover the period 1972 to the present. All datasets are available from the internal server. Some of the output datasets will also be made publicly available once the related studies are published.

Table 4.1: Products created for the test region High Mountain Asia.

Nr.	Category	Format	Type	Description	Period	Provider	Comments
1	Extent	shape	point	Chongtar centre lines	present	GIUZ	
2	Extent	shape	line	Extent time series	1972-today	GIUZ	
3	Velocity	geotif	raster	TSX/TDX track 151 & 75	2011/12/14	Enveo	
4	Velocity	shape	point	values along centre lines	2011/12/14	Enveo	
5	Velocity	geotif	raster	from Sentinel-2	2016-2020	GUIO	pre-surge
6	Velocity	shape	point	along centrelines from S2	2016-2020	GUIO	pre-surge
7	Velocity	geotif	raster	from Sentinel-2	2019-2021	GUIO	during surge
8	Velocity	shape	point	along centrelines from S2	2019-2021	GUIO	during surge
9	Velocity	geotif	raster	from Landsat 7 & 8	2000-2018	GUIO	
10	Velocity	shape	point	along centrelines from L7/8	2000-2018	GUIO	
11	Velocity	geotif	raster	from Planet	2020	GUIO	
12	Velocity	shape	point	along centrelines from Planet	2020	GUIO	
13	Elevation	geotif	raster	dDEM HMA-SPOT6	2015	GUIO	
14	Elevation	geotif	raster	dDEM HMA-SPOT6	2015-2020	GUIO	
15	Elevation	geotif	raster	dDEM SPOT5-HMA	2010-2015	GUIO	
16	Elevation	geotif	raster	dDEM SPOT5-SPOT6	2010-2015	GUIO	
17	Elevation	geotif	raster	dDEM SRTM-HMA	200-2015	GUIO	
18	Elevation	geotif	raster	dDEM SRTM-SPOT5	2000-2010	GUIO	
19	Elevation	geotif	raster	dDEM SRTM-SPOT6	2000-2020	GUIO	
20	Elevation	csv	point	dhdt IceSAT-2 - SRTM	2000-2018/2020	GUIO	centreline intersection points
21	Other	gif	image	S-1 intensity time series	2020-2021	Gamma	