



MEaSURES Antarctic Grounding Line from Differential Satellite Radar Interferometry, Version 1

USER GUIDE

How to Cite These Data

As a condition of using these data, you must include a citation:

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National Snow and Ice Data Center

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1 DETAILED DATA DESCRIPTION

1.1 Format

Data are provided in ASCII text (.txt) format.

1.2 File and Directory Structure

Data are available on the FTP site in the ftp://sidacs.colorado.edu/pub/DATASETS/nsidc0498_MEASURES_gl_antarc_V01/ directory. The files in the data set are described in Table 1.

Table 1. File Description

Filename	Description
InSAR_GL_Antarctica.txt	ASCII text file containing grounding line data.
InSAR_GL_Antarctica_info.txt	ASCII text file, containing additional information about the data.

1.3 File Naming Convention

Files are named according to the following convention and as described in Table 2:

InSAR_GL_Antarctica.txt

Where:

Table 2. . File Naming Convention

Variable	Description
InSAR	SAR Interferometry
GL	Grounding Line
.txt	ASCII text file extension

1.4 File Size

The data file, InSAR_GL_Antarctica.txt, is 168 MB.

1.5 Spatial Coverage

The data cover roughly 75 percent of the Antarctic grounding line (the transition from grounded ice to floating ice sheet) and partial coverage of the grounding line of ice-covered offshore islands.

Lines are discontinuous, and in some areas multiple picks from different SAR missions and dates are shown. Most of the fast-flowing, large-flux outlet glaciers and ice streams are mapped.

Southernmost Latitude: 90°S

Northernmost Latitude: 60°S

Westernmost Longitude: 180°W

Easternmost Longitude: 180°E

1.5.1 Spatial Coverage Map

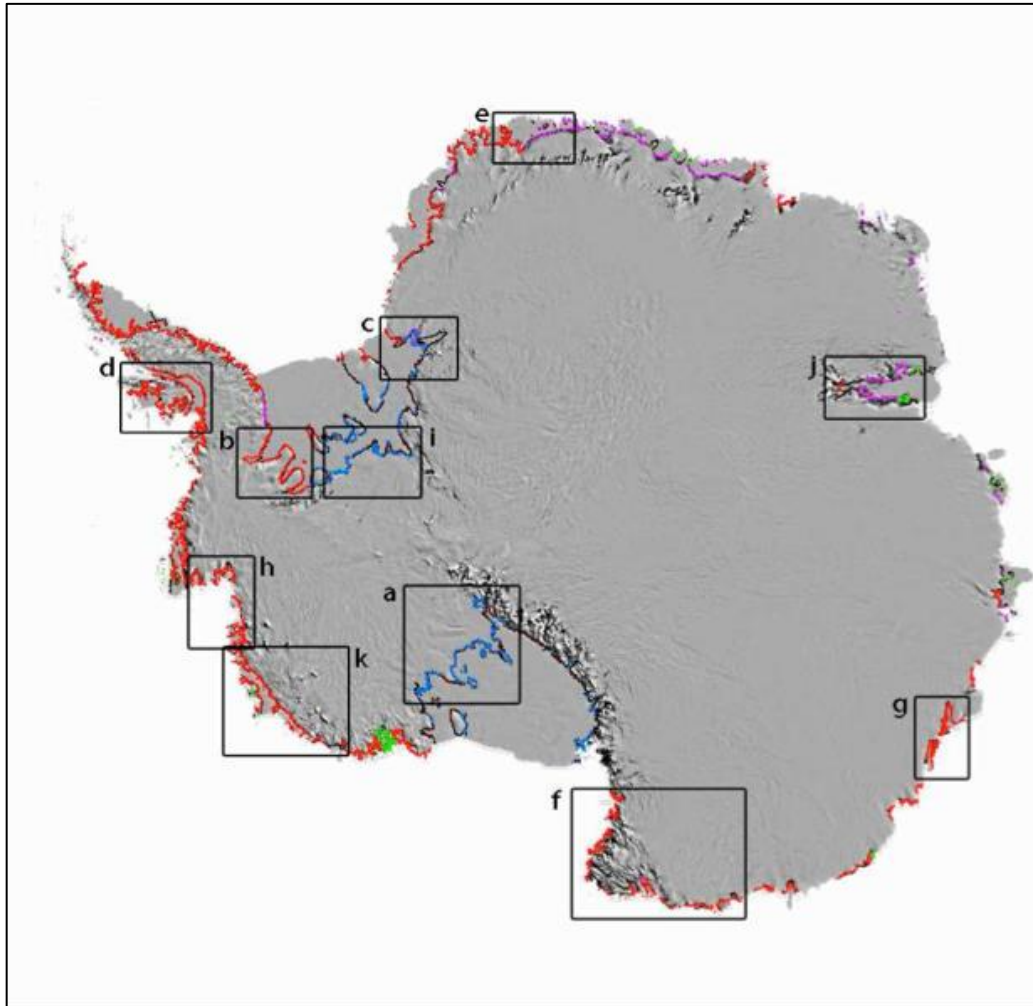


Figure 1. Delineation of Antarctic grounding lines with satellite radar interferometry (DInSAR) from ERS-1 and ERS-2 (red), RADARSAT-1 (purple), RADARSAT-2 (blue), ALOS PALSAR (green) overlaid on the Moderate Resolution Imaging Spectroradiometer (MODIS) mosaic of Antarctica. Lettered boxes refer to Figure 3 in Rignot et al. 2011. (Rignot, E., J. Mouginot, and B. Scheuchl 2011)

1.5.2 Spatial Resolution

Spatial resolution varies for each sensor. Table 3 lists the resolution for each sensor.

Table 3. Spatial Resolution

Sensor	Resolution
ERS-1, ERS-2	~50 m
RADARSAT-1	~35 m
RADARSAT-2	~46 m
ALOS PALSAR	~120 m

1.5.3 Projection and Grid Description

ASCII text file: Grounding line points are provided in latitude and longitude.

1.6 Temporal Coverage

Data were obtained from multiple satellites between 1992 and 2009. The satellites, year, and region of collection are listed below under 3.3 below.

1.7 Parameter or Variable

The data set provides detailed mappings of the location of the Antarctic Ice Sheet grounding line, derived from satellite data collected between 1992 and 2009. Parameters include latitude, longitude, sensor, and up to four orbits and acquisitions dates. Two interferograms are required to perform differential interferometry. This requires a minimum of three consecutive acquisitions of a single sensor. In some cases two sets of two consecutive acquisitions were used to generate the grounding line. In the case of the ERS-1/ERS-2 Tandem mission, two Tandem interferograms (four acquisitions) are used for grounding line detection.

Table 4. Parameter Description

Variable	Description
Latitude	Latitude of grounding line point as derived from satellite data
Longitude	Longitude of grounding line point as derived from satellite data
Sensor	Sensors used for this product include: ERS: European Space Agency Earth Remote Sensing Satellites 1 and 2 RSAT: RADARSAT-1 - Canadian Space Agency Synthetic Aperture Radar Satellite R2: RADARSAT-2 - Canadian Space Agency Synthetic Aperture Radar Satellite PALSAR: Japan Aerospace Exploration Agency Advanced Land Observing System (ALOS) Phased Array type L-band Synthetic Aperture Radar
Orbit	Sensor orbits: unique identifiers for the data used in the generation of the grounding line
Date	Dates of data acquisitions

Table 5. Sample Data Record

- 70.138771057128906 0	12.5141963958740230	PALSA R	8984	2007/10/ 2	9655	2007/11/1 7	1032 6	2008/1/2		---- --/--/--
- 70.265708923339844 0	297.658813476562500 0	ERS	2258 0	1995/11/ 9	2907	1995/11/1 0	2408 3	1996/2/22	441 0	1996/2/2 3
- 72.990554809570312 0	263.241790771484380 0	ERS	3375	1992/3/8	3418	1992/3/11	3461	1992/3/14		---- --/--/--
- 81.538093566894531 0	161.079696655273440 0	R2	6190	2009/2/1 9	6533	2009/3/15	6876	2009/4/8		---- --/--/--
- 69.774986267089844 0	13.2524194717407230	RSAT	2523 2	2000/9/4	2557 5	2000/9/28	2591 8	2000/10/2 2		---- --/--/--

Note. This sample data record shows records from theInSAR_GL_Antarctica.txt file. Representative records from each sensor are shown.

1.8 Quality Assessment

A detailed description of the product and its quality is provided in Rignot et al. 2011. To estimate the positional accuracy, results from multiple mappings, multiple instruments, and multiple epochs were compared. Standard error was found to be ± 100 m. Locally, greater geolocation variations are observed. In some cases, large (km) short-term and long-term migrations are present. The quality of grounding line mapping depends on the satellite data used (ERS-1 and -2 and RADARSAT-1 and -2 are better than ALOS PALSAR), the length of the interferometric baseline (short baselines yield more accurate positioning), the amplitude of the differential tides, and phase coherence (high phase coherence means less noise).

2 DATA ACCESS

2.1 Data Access

Data are available [via FTP](#). Registered users will receive e-mail notification about any product changes and new data availability. Please complete the [User Registration Form](#) to receive these notifications.

2.2 Volume

Total volume of the data set is 168 MB.

2.3 Related Data Collections

- [ICESat-Derived Grounding Zone for Antarctic Ice Shelves](#)
- [MEaSURES InSAR-Based Antarctica Ice Velocity Map](#)
- [MEaSURES InSAR-Based Ice Velocity Maps of Central Antarctica: 1997 and 2009](#)

3 DATA ACQUISITION AND PROCESSING

3.1 Theory of Measurements

The grounding line refers to the location where an ice sheet detaches from the bedrock and starts floating in the ocean. This data set provides grounding line locations for the entire Antarctic coastline, derived from a variety of satellite radar interferometry data.

3.2 Data Acquisition Methods

Grounding lines for the Antarctic Ice Sheet were derived using differential satellite synthetic aperture radar interferometry (DInSAR) data from the Earth Remote Sensing Satellites 1 and 2 (ERS-1 and -2), RADARSAT and RADARSAT-2, and the Advanced Land Observing System (ALOS) PALSAR for years 1992 to 2009. A detailed description of the product and the methodology is provided in Rignot et al. 2011.

3.3 Data Sources

Table 5 lists the temporal and spatial coverages for each satellite sensor used in this data set.

Table 6. Temporal and Spatial Coverages of Satellite Data

Parameter / Sensor	ERS-1, ERS-2	RADARSAT-1	RADARSAT-2	ALOS PALSAR
Temporal coverage	1992, 1994-1996, 1999, 2000	2000	2009	2007, 2008
Mode	N/A	F1	S5	FBS
Incidence angle	23 deg	38.5 deg	41.45 deg	39 deg
Number of Range Looks (Interferogram)	2	4	2	12
Number of Azimuth Looks (Interferogram)	10	5	6	30
Range pixel spacing (resolution)	8 (13.5 m)	5.3 (5.9 m)	11.8 (13.5 m)	4.7 (7.5 m)
Azimuth pixel spacing (resolution)	4 (5 m)	4.6 (6.9 m)	5.3 (7.7 m)	3.3 (4 m)

4 DOCUMENT INFORMATION

4.1 Acronyms

The following acronyms are used in this document.

Table 7. Acronyms and Abbreviations

Acronym	Description
ALOS	Advanced Land Observing System
CSA	Canadian Space Agency
ERS	Earth Remote Sensing Satellite
ESA	European Space Agency
FTP	File Transfer Protocol
IPY	International Polar Year
JAXA	Japan Aerospace Exploration Agency
MODIS	Moderate Resolution Imaging Spectroradiometer
NASA	National Aeronautics and Space Administration
NSIDC	National Snow and Ice Data Center
PALSAR	Phased Array L band Synthetic Aperture Radar
SAR	Synthetic Aperture Radar
STG	Space Task Group
URL	Uniform Resource Locator

4.2 Publication Date

19 February 2020

4.3 Date Last Updated

9 February 2020

4.4 Document URL

http://nsidc.org/data/measures/nsidc0498_rignot/index.html

5 CONTACTS AND ACKNOWLEDGMENTS

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ALOS PALSAR: Japan Aerospace Exploration Agency (JAXA)

ERS-1, ERS-2: European Space Agency (ESA)

RADARSAT, RADARSAT-2: Canadian Space Agency (CSA)

Data acquisitions between 2006 and 2009 are courtesy of the International Polar Year (IPY) Space Task group

6 REFERENCES AND RELATED PUBLICATIONS

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E. Rignot. 2002. East Antarctic Glaciers and Ice Shelves Mass Balance from Satellite Data, *Ann. Glaciol.* 34, 217-227.

7 RELATED DOCUMENTS

Table 8. Related Documents

Document	Description	URL
NASA MEaSURES Data at NSIDC	NSIDC MEaSURES Data Web site	http://nsidc.org/data/measures/index.html
NASA MEaSURES	NASA MEaSURES Projects Web site	http://earthdata.nasa.gov/our-community/community-data-system-programs/measures-projects