

SMOS Sea Ice Thickness



Main improvements and changes in v3.3

- Transition of L1C data from v620 to v724: In v3.3, v724 L1C data is used instead of v620 L1C.
- Polar stereographic projection update: Following NSIDC we consider the EPSG 3411 and 3412 as deprecated and replaced this with 3413 and 3976 in v3.3 (https://nsidc.org/data/polar-stereo/ps_grids.html).
- NetCDF format update: Furthermore, the output of L3 data is updated to NetCDF v4.

Version	Date	Comments
v3.2	15.10.2018	Official ESA release
v3.3	03.11.2021	Official ESA release

Links

- [Product Description Document](#)
- [Read_me_first Technical note](#)

ESA Websites:

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Product Description

Overview

Table 1: Overview of SMOS Product

Parameter	Sea ice thickness
Spatial coverage	Northern hemisphere, poleward of 50°N, -180°E to 180°E
Spatial Resolution	12.5 km x12.5 km
Temporal Coverage:	since 15. Oct. 2010
Temporal Resolution	1 day
Data Format (s)	NetCDF v4
Platforms	SMOS
Version	v3.3

File name

NetCDF files are named as:

SMOS_Icethickness_v3.3_north_<date>.nc

File Format

Daily mean SMOS sea ice thickness is given in NetCDF v4 format. Global attributes are given in Table 2. The variables are given as grid arrays as listed in Table 3.

Table 2: Global attributes from an example NetCDF file.

Attribute	Value
title	Daily gridded sea-ice thickness and auxiliary parameters from satellite L-band radiometry data

project	CS2SMOS PDS CR-1: SMOS Sea Ice Data Product Processing and Dissemination Tasks, supported by ESA
institution	Alfred-Wegener-Institut Helmholtz Zentrum für Polar und Meeresforschung (AWI), http://www.awi.de
contributor_name	Xiangshan Tian-Kunze, Lars Kaleschke, Stefan Hendricks
publisher_email	xiangshan.tiankunze@awi.de
platform	"ESA Soil Moisture and Ocean Salinity (SMOS) mission"
sensor	"Microwave Imaging Radiometer using Aperture Synthesis (MIRAS)"
source	SMOS v724 L1C brightness temperature
product_version	v3.3
Processing_level	L3c
grid	NSIDC polar stereographic projection. https://nsidc.org/data/polar-stereo/ps_grids.html
tracking_id	08533af0-7656-4f35-b0a8-7ae4081a2c9a
naming_authority	de.awi
history	Product generated with SMOS sea ice thickness retrieval Algorithm v3.3
summary	This dataset contains Level-3 daily sea ice thickness products from satellite observations in the northern hemisphere. Northern hemisphere sea ice thickness coverage is limited to the winter month between October and April. 100% sea ice coverage is assumed, which leads to underestimation of sea ice thickness.

to pi cc at eg ory	Oceans Climatology Meteorology Atmosphere
ke y w or ds	Earth Science > Cryosphere > Sea Ice > Ice Depth/Thickness, Earth Science > Oceans > Sea Ice > Ice Depth/Thickness, Earth Science > Climate Indicators > Cryospheric Indicators > Ice Depth/Thickness, Geographic Region > Northern Hemisphere, Vertical Location > Sea Surface, Institutions > AWI > Alfred Wegener Institute for Polar and Marine Research
id	awi-cs2smos-l3c-sithick-smos-nh_12p5_km_polstereo-YYMMDD-fv3p3
d oi	none
D a t e — c r e a t ed	e.g. "Tue Mar 24 17:37:59 2020"
sp ati al _r es ol uti on	12.5 km grid spacing
ti m e_ co ve ra ge _d ur ati on	P1D
ti m e_ co ve ra ge _s ta rt	yyyy-mm-ddT00:00:00
ti m e_ co ve ra ge _e nd	yyyy-mm-ddT23:59:59

time_coverage_resolution	P1D
geospatial_bounds_crs	EPSG:3413
geospatial_extent_max	90.0
geospatial_extent_min	50.0
geospatial_extent_max	180.0
geospatial_extent_min	-180.0
geospatial_vertical_max	0.0

ge os pa tia l_ ve rti ca l_ min	0.0
re fe re nc es	1) Kaleschke, L., X. Tian-Kunze, N. Maass, M. Maekynen, and M. Drusch (2012), Sea ice thickness retrieval from SMOS brightness temperatures during the Arctic freeze-up period, Geophys. Res. Lett., 39, L05501, doi:10.1029/2012GL050916. (2) Tian-Kunze, X., Kaleschke, L., Maass, N., Maekynen, M., Serra, N., Drusch, M., and Krumpen, T., SMOS-derived sea ice thickness: algorithm baseline, product specifications and initial verification, The Cryosphere, 8, 997-1018, doi:10.5194/tc-8-997-2014, 2014 (3) Kaleschke, L., Tian-Kunze, X., Maass, N., Beitsch, A., Wernecke, A., Miernecki, M. and others, SMOS sea ice product: operational application and validation in the Barents Sea marginal ice zone, Remote Sensing of Environment 180 (2016), 264-273. doi: 10.1016/j.rse.2016.03.009 (4) Tietsche, S., Alonso-Balmaseda, M., Rosnay, P., Zuo, H., Tian-Kunze, X., and Kaleschke, L.: Thin Arctic sea ice in L-band observations and an ocean reanalysis, The Cryosphere, 12, 2051-2072, https://doi.org/10.5194/tc-12-2051-2018 , 2018.

Table 3: NetCDF file content.

Variable	Description	Unit	Type	Dimension
latitude	latitude coordinate	degrees _north	float32	896 x 608
longitude	longitude coordinate	degrees _east	float32	896 x 608
x	Projection_x_corordinate	km	float32	608
y	Projection_y_corordinate	km	float32	896
sea_ice_thickn ess	SMOS sea ice thickness	m	float32	1 x 896 x 608
ice_thickness_ uncertainty	sea ice thickness total uncertainty	m	float32	1 x 896 x 608
saturation_ratio	ratio of retrieved ice thickness and maximal retrievable ice thickness	%	int16	1 x 896 x 608
TB	brightness temperature intensity (TBh+TBv)/2	K	float32	1 x 896 x 608
TB_uncertainty	brightness temperature uncertainty defined as one standard deviation of TB devided by the sqrt(nPair)	K	float32	1 x 896 x 608
Tsurf	SMOS derived snow surface temperature	K	float32	1 x 896 x 608
Sice	Bulk ice salinity	psu	float32	1 x 896 x 608
nPair	number of TBh and TBv pairs available		int16	1 x 896 x 608
RFI_ratio	percent of RFI-contaminated measurements in total measurements	%	float32	1 x 896 x 608
land	land_binary_mask		int8	896 x 608
time	hours since 2010-01-01 00:00:00	hour	double	1

Grid

Table 4: Northern Hemisphere Grid Coordinates of NSIDC Polar Stereographic Grids

(ref.: https://nsidc.org/data/polar-stereo/ps_grids.html)

X (km)	Y (km)	Latitude (deg)	Longitude (deg)	position
-3850	5850	30.98	168.35	corner
0	5850	39.43	135.00	midpoint
3750	5850	31.37	102.34	corner
3750	0	56.35	45.00	midpoint
3750	-5350	34.35	350.03	corner
0	-5350	43.28	315.00	midpoint
-3850	-5350	33.92	279.26	corner
-3850	0	55.50	225.00	midpoint

