

Notice to Data Users:
The documentation for this data set was provided solely by the Principal Investigator(s) and was not further developed, thoroughly reviewed, or edited by NSIDC. Thus, support for this data set may be limited.

AMSRice03 Sea Ice Thickness Data

Summary

This data set contains ice thickness measurements collected over sea ice in the Barrow, Alaska area and at the Navy Ice Camp in the main pack ice of the Arctic Ocean as part of the joint in situ and aircraft AMSRice03 campaign conducted in March 2003. The ice thickness data were collected 09 March 2003 to 21 March 2003 using a Geonics EM31 electromagnetic induction device. Data set parameters include sea ice conductivity, ocean salinity, snow depth, snow and ice thickness, and ice thickness. The total volume of this data set is approximately 101 KB. Data are provided in eight American Standard Code for Information Interchange (ASCII) text files, and are available via FTP.

These data were collected as part of a validation study for the Advanced Microwave Scanning Radiometer - Earth Observing System (AMSR-E). AMSR-E is a mission instrument launched aboard NASA's Aqua Satellite on 04 May 2002.

Citing These Data:

The following example shows how to cite the use of this data set in a publication. List the principal investigators, year of data set release, data set title, publisher: NSIDC, and digital media.

Sturm, M., and Julienne Stroeve. 2009. *AMSRice03 Sea Ice Thickness Data*. Boulder, Colorado USA: National Snow and Ice Data Center. Digital media.

Overview Table

Category	Description
<u>Data format</u>	ASCII tab-delimited text files
<u>Spatial coverage</u>	Barrow: 71.18 N to 71.28 N, 156.15 W to 156.40 W Navy Ice Camp: 72.90 N to 72.95 N, 147.50 W to 147.65 W

<u>Temporal coverage</u>	09 March 2003 to 21 March 2003
<u>File naming convention</u>	Beau0315.txt
<u>File size</u>	7 KB to 28 KB
<u>Parameter(s)</u>	sea ice conductivity, ocean salinity, snow depth, snow and ice thickness, ice thickness
<u>Procedures for obtaining data</u>	Data are available via FTP.

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1. Contacts and Acknowledgments:

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Acknowledgements:

We thank the Barrow Arctic Science Consortium for providing logistics for the field campaign. Special thanks to Glenn Sheehan and Richard Glenn. Warren Matumeak

provided field advice from his long experience on the sea ice. Tom Douglas, William Simpson and others enthusiastically participated in the field work. Don Cavaliere provided encouragement and support for the entire concept of an in-depth field campaign.

2. Data Description:

Format:

Eight ASCII tab-delimited text files.

File Naming Convention:

The files are named according to the following convention and are further described in Table 1.

xxxxyyzz.txt

Table 1. Description of File Name Variables

Variable	Description
xxxx	Name of site (e.g. Beaufort, Chukchi, Elson, Navy)
mmdd	2-digit month and 2-digit day (e.g. 0309, 0310, 0311, 0312, 0314, 0320, 0321)
.txt	Indicates a text file

File Size:

The eight files range from 7 KB to 28 KB and total 101 KB.

Spatial Coverage:

Navy Ice Camp:

Southernmost Latitude: 72.90 N

Northernmost Latitude: 72.95 N

Westernmost Longitude: 147.65 W

Easternmost Longitude: 147.50 W

Barrow Area:

Southernmost Latitude: 71.18 N

Northernmost Latitude: 71.28 N

Westernmost Longitude: 156.40 W

Easternmost Longitude: 156.15 W

Temporal Coverage:

Measurements were taken between 09 March 2003 and 21 March 2003.

Parameter or Variable:

Parameters in this data set include sea ice conductivity, ocean salinity, snow depth, snow and ice thickness, and ice thickness. Data set files consist of six columns, plus a header describing the location where the measurements were made. An additional column for comments may also be found.

Dist	BH1	E	Snow	Ice+Snow	Ice
Distance in meters	Raw measurement of conductivity	Ocean salinity	Snow depth	Thickness (snow + ice)	Ice thickness

3. Data Access and Tools:

Data Access:

Data are available via FTP at:
[ftp://sidads.colorado.edu/pub/DATASETS/AVDM/data/cryosphere/AMSRice03/groun
d_data/ice_thickness/](ftp://sidads.colorado.edu/pub/DATASETS/AVDM/data/cryosphere/AMSRice03/groun
d_data/ice_thickness/)

Software and Tools:

No special tools are required to view these data. Any text reader or Web browser is suitable.

Related Data Collections:

For related data collections, please see the AMSR-E Validation Data Web site:
http://nsidc.org/data/amr_validation/

4. Data Acquisition and Processing:

The AMSRice field experiment consisted of a detailed set of snow and ice measurements over sea ice along a series of transects across the shore-fast ice near

Barrow, Alaska, USA and at a U.S. Navy ice camp in the central Beaufort Sea on the main pack ice 175 km north of Barrow. Indirect measurements of ice thickness were made with a Geonics EM31 electromagnetic induction (EM) device. The two co-planar transmitter and receiver antenna coils were mounted at a spacing of 3.66 m and operated at 9.8 kHz. The entire instrument was mounted in a polyethylene kayak hull to allow for towing by hand or snowmobile across the ice surface.

The instrument determines the apparent conductivity of the underlying medium based on measurement of the secondary electromagnetic field induced by a transmitter coil in the ice and the seawater underneath. Owing to low summertime sea ice conductivities (<50 mS m⁻¹) and high seawater conductivities (>2500 mS m⁻¹), the signal is controlled by eddy currents generated at the ice-seawater interface (mS m⁻¹ = units of conductivity in millisiemens/meter).

The accuracy of the EM31 instrument is specified at better than 1 mS m⁻¹. Based on the first derivative of the empirical thickness-conductivity relations, the sensitivity of the method has been derived as 0.015 m for 3 m thick level ice and 0.09 m for 5 m thick level ice. Uncertainties in the distance between the instrument and the ice surface and in coil orientation increase the total measurement error to approximately 0.05 m for 2 m thick ice when compared against profile drill-hole ice thickness measurements (at a point spacing and profile length that captures the relevant ice roughness features; Haas et al., 1997).

Ice thicknesses were derived from apparent conductivity measurements through inversion of an empirical ice thickness-conductivity relationship based on a large data set collected over Arctic first- and multi-year summer sea ice (Haas et al., 1997, Haas, unpublished).

5. References and Related Publications:

Sturm, Matthew, James Maslanik, Don Perovich, Julienne Stroeve, Jackie Richter-Menge, Thorsten Markus, Jon Holmgren, John Heinrichs, and Ken Tape. 2006. Snow Depth and Ice Thickness Measurements from the Beaufort and Chukchi Seas Collected During the AMSR-Ice03 Campaign. *IEEE Transactions on Geoscience and Remote Sensing - Part 1*, 44(11): 3009-3020, doi:10.1109/TGRS.2006.878236.

Refer to the AMSRIce03 Web site for in-depth information on the science mission and goal of the AMSRIce03 project:
<http://polarbear.colorado.edu/AMSRICE/AMSRIce03.html>.

6. Document Information:

List of Acronyms

The following acronyms are used in this document:

AMSR-E – Advanced Microwave Scanning Radiometer – Earth Observing System
CCREL – Cold Regions Research and Engineering Laboratory
CIRES – Cooperative Institute for Research in Environmental Sciences
FTP – File transfer protocol
NASA – National Aeronautics and Space Administration
NSIDC – National Snow and Ice Data Center

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