



# SMEX02 Airborne Synthetic Aperture Radar (AIRSAR) Data, Iowa, Version 1

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## USER GUIDE

### How to Cite These Data

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

Jackson, T. 2004. *SMEX02 Airborne Synthetic Aperture Radar (AIRSAR) Data, Iowa, Version 1*. [Indicate subset used]. Boulder, Colorado USA. NASA National Snow and Ice Data Center Distributed Active Archive Center. <https://doi.org/10.5067/EPHBHKBQEJ09>. [Date Accessed].

FOR QUESTIONS ABOUT THESE DATA, CONTACT [NSIDC@NSIDC.ORG](mailto:NSIDC@NSIDC.ORG)

FOR CURRENT INFORMATION, VISIT <https://nsidc.org/data/NSIDC-0206>



National Snow and Ice Data Center

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NOTE: 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.

# 1 DETAILED DATA DESCRIPTION

In AIRSAR's POLSAR mode, the data consist of three bands (C-, L- and P-band) each with four polarizations (HH, VV, HV and VH), for a total of 12 channels. Basic characteristics of the AIRSAR are listed in table 1. Additional information can be found at [http://airsar.jpl.nasa.gov/data/data\\_format.pdf](http://airsar.jpl.nasa.gov/data/data_format.pdf).

Table 1. AIRSAR Antenna Parameters

<b>Bane</b>	C (5.31 Ghz), L (1.26 Ghz), P (0.45Ghz)
<b>Incidence angles</b>	0o – 75o (theoretical, in practice between 20o and 60o )
<b>Altitude</b>	≈ 8 km
<b>Bandwidth</b>	20 MHz
<b>Range Resolution</b>	7.5 m

## 1.1 Format

The data are provided in ASCII and binary (compressed Stokes matrix) formats.

## 1.2 File and Directory Structure

There is one folder for each POLSAR scene ID, using the JPL label for the name of the folder and in the format of cm####.

Some POLSAR scene directories contain a “filtered\_p” sub-directory. A P-band filter was applied to these data files to reduce the impact of interference in the Pband imagery. However, there may be a small amount of p-band interference still present in the data and the P-band filter is not effective in all cases. Because the P-band filter may adversely impact the calibration of the data, both the filtered and unfiltered files are provided.

The following remarks should be noted before downloading and using the data:

- for July 5th , one scene of flight line 2 (JPL label cm6503) is not available at the ftp-site.
- On July 8th, an additional scene seems to be acquired for flight line 1(JPL\_label cm6484), named N-S flight line ‘1b’. The datasets labeled cm6478 and cm6483 contain exactly the same scene. However a different processing is applied to the two datasets, see the log files for details.
- for July 9th, S-N flight line ‘1’ is not available.

## 1.3 File Naming Convention

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The “CM” indicates that the data are in a compressed Stokes matrix format. CM is followed by a four-digit output product number (JPL label); this number is unique for each scene. See tables 2-6.

## 1.4 File Size

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The files range in size from 1 KB – 164,750 KB

## 1.5 Spatial Coverage

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Southernmost Latitude: 41.308° N

Northernmost Latitude: 42.389° N

Westernmost Longitude: 93.937° W

Easternmost Longitude: 93.017° W

### 1.5.1 Spatial Resolution

7.5 m

## 1.6 Temporal Coverage

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Measurements were taken on July 1, 5, 7, 8, and 9, 2002. Flights occurred twice each day over each of the three flight lines.

## 1.7 Parameter or Variable

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### 1.7.1 Parameter Description

In AIRSAR’s POLSAR mode, the radar instrument collects backscattering coefficients at quad polarization [HH, VV, HV and VH in the C-, L- and P-band frequency ranges.

The POLSAR operating mode of the AIRSAR instrument collects twelve channels of data, four in each of the three frequencies of AIRSAR: P-, L-, and C-band. The four data channels are:

- HH horizontally polarized transmit wave, horizontally polarized receive wave
- HV horizontally polarized transmit wave, vertically polarized receive wave
- VH vertically polarized receive wave, horizontally polarized receive wave
- VV vertically polarized receive wave, vertically polarized receive wave

The compressed Stokes matrix data are oriented so that each pixel sample is decreasing azimuth (along track) and each pixel line is of increasing range (crosstrack).

## 2 SOFTWARE AND TOOLS

Any application that can read ASCII or binary (compressed Stokes matrix) files

## 3 DATA ACQUISITION AND PROCESSING

During the Soil Moisture Experiments in 2002 (SMEX02) the AIRSAR instrument onboard NASA's DC-8 flew on 5 days: July 1, 5, 7, 8, and 9. Each day, three flight lines were flown over the SMEX02 study area capturing two scenes per flight line. Two flight lines were east-west in orientation and were concentrated around the Walnut Creek (WC) watershed. The other line was north-south orientated, and covered both the WC watershed and the regional study area. The flight lines are shown in figure 1.

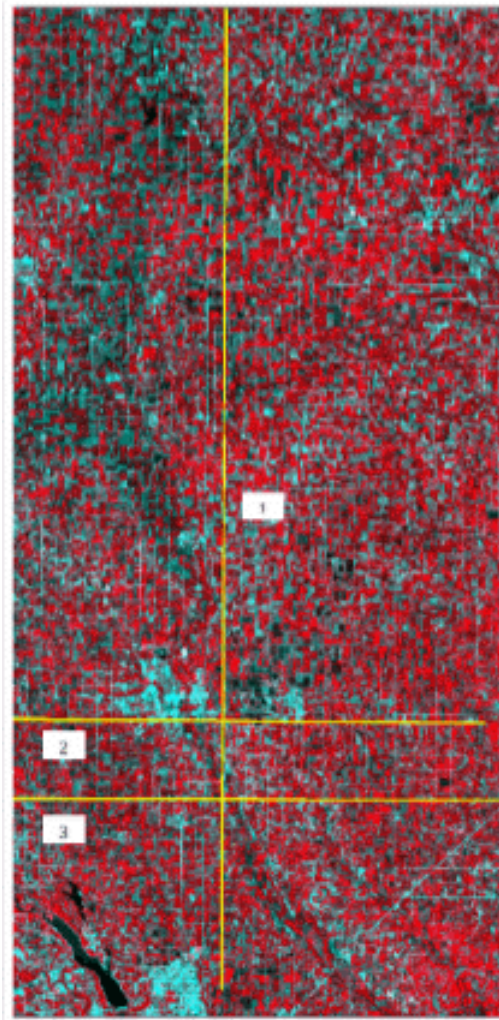


Figure 1. DC-8 Flight Lines

The JPL labels used for the file names do not correspond to a specific location, a specific date or specific flight line. For convenience, the geolocation of the various flight lines are specified in tables

2-6. Note that the 'top right' and 'lower left' coordinate are approximated and can only be used as an indication for the data coverage of a specific scene.

Table 2. AIRSAR Flight Lines and the Corresponding JPL Labels for the 1st of July

	<b>Top Right*</b>		<b>Lower Left*</b>			
JPL_label	Latitude	Longitude	Latitude	Longitude	Heading	Line Number
cm6476	42.4424	-93.7415	41.7025	-93.5354	S-N	1
cm6591	42.6237	-93.5677	42.0761	-93.3609	N-S	1
cm6568	42.0252	-93.9101	41.8730	-93.1756	E-W	2
cm6468	42.0042	-93.9963	41.8504	-93.2635	E-W	2
cm6461	42.0664	-93.0143	41.9126	-92.9682	W-E	3
cm6539	42.0453	-94.0006	41.8907	-93.2677	W-E	3

\*coordinates are approximations and should not be used to process the data

Table 3. AIRSAR Flight Lines and the Corresponding JPL Labels for the 5th of July

	<b>Top Right*</b>		<b>Lower Left*</b>			
JPL_label	Latitude	Longitude	Latitude	Longitude	Heading	Line Number
cm6582	42.3579	-93.7512	41.8103	-93.5458	S-N	1
cm6596	42.6441	-93.5587	42.0966	-93.3518	N-S	1
cm6506	42.0189	-93.9808	41.8665	-93.1736	E-W	2
cm6503	41.9973	-93.9461	41.8447	-93.2119	E-W	2
cm6456	42.0730	-93.985	41.9192	-92.9385	W-E	3
cm6557	42.0519	-93.9837	41.8973	-93.2507	W-E	3

\*coordinates are approximations and should not be used to process the data

Table 4. AIRSAR Flight Lines and the Corresponding JPL Labels for the 7th of July

	<b>Top Right*</b>		<b>Lower Left*</b>			
JPL_label	Latitude	Longitude	Latitude	Longitude	Heading	Line Number
cm6586	42.3648	-93.7563	41.8172	-93.5508	S-N	1
cm6592	42.6355	-93.5552	42.0880	-93.3483	N-S	1
cm6565	42.0156	-93.1678	41.8634	-93.9021	E-W	2
cm6574	41.9936	-93.1646	41.8416	-93.8987	E-W	2
cm6538	42.0281	-94.0133	41.9207	-92.9679	W-E	3
cm6460	42.0980	-93.2467	41.8972	-93.9792	W-E	3

\*coordinates are approximations and should not be used to process the data

Table 5. AIRSAR Flight Lines and the Corresponding JPL Labels for the 8th of July

	<b>Top Right*</b>		<b>Lower Left*</b>			
<b>JPL_label</b>	<b>Latitude</b>	<b>Longitude</b>	<b>Latitude</b>	<b>Longitude</b>	<b>Heading</b>	<b>Line Number</b>
cm6478	42.2920	-93.7507	41.7230	-93.5447	S-N	1
cm6483	42.2920	-93.7507	41.7230	-93.5447	S-N	1
cm6590	42.6254	-93.5591	42.0779	-93.3522	N-S	1
cm6484	42.7765	-93.7517	42.2075	-93.5456	S-N	1^b
cm6511	42.0189	-93.9150	41.8669	-93.1806	E-W	2
cm6477	41.9983	-94.2315	41.8445	-93.1837	E-W	2
cm6455	42.0715	-93.9924	41.9179	-92.9465	W-E	3
cm6573	42.0515	-94.0024	41.8968	-93.2695	W-E	3

\*coordinates are approximations and should not be used to process the data

Table 6. AIRSAR Flight Lines and the Corresponding JPL Labels for the 9th of July

	<b>Top Right*</b>		<b>Lower Left*</b>			
<b>JPL_label</b>	<b>Latitude</b>	<b>Longitude</b>	<b>Latitude</b>	<b>Longitude</b>	<b>Heading</b>	<b>Line Number</b>
cm6593	42.6400	-93.5583	42.0925	-93.3514	N-S	1
cm6553	42.0183	-93.9235	42.0925	-93.1890	E-W	2
cm6518	41.9968	-93.9067	41.8445	-93.1728	E-W	2
cm6457	42.0719	-94.0112	41.9181	-92.9658	W-E	3
cm6513	42.0519	-94.0090	41.8973	-93.2769	W-E	3

\*coordinates are approximations and should not be used to process the data

## 4 REFERENCES AND RELATED PUBLICATIONS

[JPL's Airborne Synthetic Aperture Radar](#)

## 5 CONTACTS AND ACKNOWLEDGMENTS

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## 6 DOCUMENT INFORMATION

### 6.1 Publication Date

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26 March 2013

### 6.2 Date Last Updated

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23 March 2021