AMMR Air and Brightness Temperature Data, Wakasa Bay, Version 1

USER GUIDE

How to Cite These Data

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

Wang, J. 2004. *AMMR Air and Brightness Temperature Data, Wakasa Bay, Version 1*. [Indicate subset used]. Boulder, Colorado USA. NASA National Snow and Ice Data Center Distributed Active Archive Center. https://doi.org/10.5067/V9OBAWL8XE4H. [Date Accessed].

FOR QUESTIONS ABOUT THESE DATA, CONTACT NSIDC@NSIDC.ORG

FOR CURRENT INFORMATION, VISIT https://nsidc.org/data/NSIDC-0194

National Snow and Ice Data Center

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1 DATA DESCRIPTION

The Wakasa Bay Field Campaign was conducted to validate rainfall algorithms developed for the Advanced Microwave Scanning Radiometer - Earth Observing System (AMSR-E).

This data set represents one in a series of aircraft campaigns to validate rainfall algorithms developed for the Advanced Microwave Scanning Radiometer - Earth Observing System (AMSR-E). The AMSR/AMSR-E Wakasa Bay Field Campaign was conducted over Wakasa Bay, Japan, in January and February 2003. The campaign was designed to:

Validate both AMSR and AMSR-E shallow rainfall and snowfall retrievals.

Extend the database of rainfall properties needed to implement a comprehensive physical validation scheme.

Extend understanding of rainfall structures through new remote sensing technology.

The Wakasa Bay Field Campaign was extended into 2003 with joint research observations by the Japan Aerospace Exploration Agency (JAXA, Contractor: Mitsubishi Electric Corporation), AMSR precipitation validation team, and the NASA AMSR-E team.

The experiment included several sensors aboard a NASA P-3 aircraft, an array of ground-based radars, and in-situ ground and airborne hydrometer observations provided by Japan's Core Research for Evolutional Science and Technology (CREST) program. The Airborne Multichannel Microwave Radiometer (AMMR) provided brightness temperature (TB) measurements for this data set. Air temperature data come directly from the P-3 aircraft navigation data.

1.1 Parameters

Following are the first four lines of data from "ammr3014.txt." See the Format section for columns.

```
2003    1   14    4    8   16   15.8   13.8  41.3527 139.1815   8159.75  201.22   -0.87   -3.51  -15.53
2003    1   14    4    8   17   15.8   13.8  41.3517 139.1811   8143.25  200.99   -0.87   -3.28  -15.56
2003    1   14    4    8   18   15.8   13.8  41.3507 139.1807   8127.25  200.76   -0.86   -3.06  -15.58
2003    1   14    4    8   19   15.9   13.8  41.3496 139.1803   8106.75  200.56   -0.87   -2.87  -15.62
```

Figure 1. Sample Data

1.2 File Information

1.2.1 Format

Data are in tab-delimited ASCII text format with the following columns:

Year

Month

Day

Hour (UTC)

Minute

Second

21 GHz TB (°C)

37 GHz TB (°C)

Latitude (decimal degrees)

Longitude (decimal degrees)

Altitude (m)

Heading (decimal degrees)

Pitch (decimal degrees)

Roll (decimal degrees)

Air temperature (°C)

1.2.2 File Contents

ammr3014.txt: 1.55 MB

ammr3019.txt: 1.99 MB

ammr3021.txt: 1.98 MB

ammr3034.txt: 1.64 MB

The complete data set equals 7 MB.

1.2.3 Naming Convention

ammr3014.txt: 14 January 2003

ammr3019.txt: 19 January 2003

ammr3021.txt: 21 January 2003

ammr3034.txt: 03 February 2003

1.3 Spatial Information

1.3.1 Coverage

Wakasa Bay is located north of Osaka in the Sea of Japan. Measurements fall within the following coordinates:

Southernmost Latitude: 30.6763°N
Northernmost Latitude: 41.476°N
Westernmost Longitude: 134.0313°E
Easternmost Longitude: 150.3528°E

1.4 Temporal Information

1.4.1 Coverage

14 January 2003: 04:08:16 to 08:58:08 UTC

19 January 2003: 02:49:33 to 09:06:07 UTC

21 January 2003: 02:18:02 to 06:41:58 UTC

03 February 2003: 01:27:56 to 06:36:23 UTC

1.4.2 Resolution

Sampling resolution is once per second.

2 DATA ACQUISITION AND PROCESSING

2.1 Quality, Errors, and Limitations

The T_B sensitivity is < 0.5 K, and calibration accuracy is about ± 4 K.

2.2 Instrumentation

2.2.1 Description

The AMMR sensor measures thermal microwave emission (in °C of TB) from the surface and atmosphere. The up-looking radiometer at 21 and 37 GHz is a component of AMMR that was developed in the 1970's for precipitation measurements from an aircraft. The entire AMMR assembly covers a frequency range of 10 to 92 GHz. The 21/37 GHz unit has been flown in many types of aircraft during the past three decades in various field campaigns. It was refurbished during the year 2000 and is ready for flights again.

The fixed-beam Dicke radiometer has a beam width of about 6° and is currently programmed with radiometric output every second. The temperature sensitivity is < 0.5 K, and the calibration accuracy is about ±4 K. The calibration is performed on the ground by viewing targets of known brightness (e.g., sky and absorber with known brightness temperature). The unit is installed in one of the windows of the NASA P-3 aircraft so that it views at an angle of about 15° from zenith; thus, it is necessary to spiral the aircraft gradually down to a region below the freezing level in order to make measurements effectively. Ideally, the aircraft descends at the rate of about 1 km per 5 minutes. The system requires a bottle of N2 gas to keep the wave guides dry during the in-flight operation.

3 RELATED DATA SETS

- AMSR-E Validation Data

4 CONTACTS AND ACKNOWLEDGMENTS

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5 DOCUMENT INFORMATION

5.1 Publication Date

March 2004

5.2 Date Last Updated

February 2021

APPENDIX A - AIRBORNE MULTICHANNEL MICROWAVE RADIOMETER (AMMR) DESCRIPTION

The Airborne Multichannel Microwave Radiometer (AMMR) measures thermal microwave emission (in degrees Kelvin of brightness temperature) from surface and atmosphere. The up-looking radiometer at 21 and 37 GHz is a component of AMMR that was developed in the 1970's for precipitation measurements from an aircraft. The entire AMMR assembly covers a frequency range of 10-92 GHz. The 21/37 GHz unit has been flown in many types of aircraft during the past three decades in various field campaigns. It was refurbished during the year 2000 and is ready for flights again.

The fixed-beam Dicke radiometer has a beam width of about 6 degrees and is currently programmed with radiometric output every second. The temperature sensitivity is < 0.5 K, and the calibration accuracy is about ±4 K. The calibration is performed on the ground by viewing targets of known brightness (e.g., sky and absorber with known brightness temperature). The unit is installed in one of the windows of the NASA P-3 aircraft so that it views at an angle of about 15º from zenith. Thus, it is necessary to spiral the aircraft gradually down to region below the freezing level in order to make measurements effectively. Ideally, the aircraft descends at the rate of about 1 km per 5 minutes. The system requires a bottle of N2 gas to keep the wave guides dry during the in-flight operation. After calibration and processing, the final data sets will be distributed in text format, tagged with date and time, as well as some key aircraft parameters such as altitude, pitch, roll, heading, etc.