Data User Guide

Millersville University Upper Air Radiosondes IMPACTS

Introduction

The Millersville University Upper Air Radiosondes IMPACTS dataset contains atmospheric temperature, dew point temperature, wind speed, and wind direction measurements using Vaisala's Radiosonde RS41-SGP and Sparv Embedded S1H3 Windsond during the Investigation of Microphysics and Precipitation for Atlantic Coast-Threatening Snowstorms (IMPACTS) field campaign. IMPACTS was a three-year sequence of winter season deployments conducted to study snowstorms over the U.S Atlantic Coast (2020-2023). The campaign aimed to (1) Provide observations critical to understanding the mechanisms of snowband formation, organization, and evolution; (2) Examine how the microphysical characteristics and likely growth mechanisms of snow particles vary across snowbands; and (3) Improve snowfall remote sensing interpretation and modeling to significantly advance prediction capabilities. Data are available from January 16, 2022 through February 25, 2022 in ASCII format.

Citation

Clark, Rich and Todd Sikora. 2022. Millersville University Upper Air Radiosondes IMPACTS [indicate subset used]. Dataset available online from the NASA Global Hydrometeorology Resource Center DAAC, Huntsville, Alabama, U.S.A. doi: http://dx.doi.org/10.5067/IMPACTS/RADIOSONDE/DATA101

Keywords:

NASA, GHRC, IMPACTS, United States, radiosonde, windsond, atmospheric temperature, dew point temperature, wind speed, wind direction

Project

The Investigation of Microphysics and Precipitation for Atlantic Coast-Threatening Snowstorms (IMPACTS), funded by NASA's Earth Venture program, is the first comprehensive study of East Coast snowstorms in 30 years. IMPACTS will fly a complementary suite of remote sensing and in-situ instruments for three 6-week deployments (2020-2023) on NASA's ER-2 high-altitude aircraft and P-3 cloud-sampling aircraft. The first deployment began on January 17, 2020 and ended on March 1, 2020. IMPACTS samples U.S. East Coast winter storms using advanced radar, LiDAR, and microwave radiometer remote sensing instruments on the ER-2 and state-of-the-art microphysics probes and dropsonde capabilities on the P-3, augmented by ground-based radar and rawinsonde data, multiple NASA and NOAA satellites (including GPM, GOES-16, and other polar orbiting satellite systems), and computer simulations. IMPACTS addressed three specific objectives: (1) Provide observations critical to understanding the mechanisms of snowband formation, organization, and evolution; (2) Examine how the microphysical characteristics and likely growth mechanisms of snow particles vary across snowbands; and (3) Improve snowfall remote sensing interpretation and modeling to significantly advance prediction capabilities. More information is available from NASA's Earth Science Project Office's IMPACTS field campaign webpage.

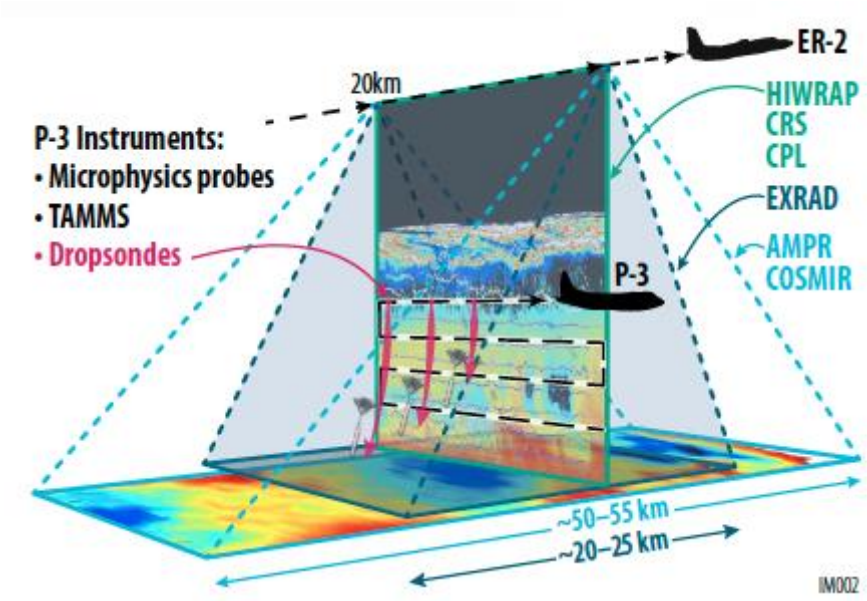

Figure 1: IMPACTS airborne instrument suite
(Image source: NASA IMPACTS ESPO)

Instrument Description

The Vaisala Radiosonde RS41-SGP offers data availability and accuracy of humidity, temperature, pressure, and wind measurement. The Vaisala Radiosonde RS41 temperature sensor utilizes linear resistive platinum technology. The small size of the sensor results in low solar radiation error and guarantees fast response. Wind data, height, and pressure are derived from Vaisala Radiosonde RS41 GPS data combined with differential corrected GPS

data from the ground station. More information about this instrument can be found at Vaisala Radiosonde RS41-SG and RS41-SGP User Guide M211667EN-G and Vaisala Radiosonde RS41-SGP.

Figure 2: Vaisala Radiosonde RS41-SGP sensor
(Image source: Vaisala)

The Sparv Embedded S1H3 Windsond is a weather balloon system for an immediate view of local conditions at different altitudes. This instrument collects temperature, humidity, air pressure, wind direction, and wind speed measurements. More information about this instrument can be found at Windsond Fact Sheet.

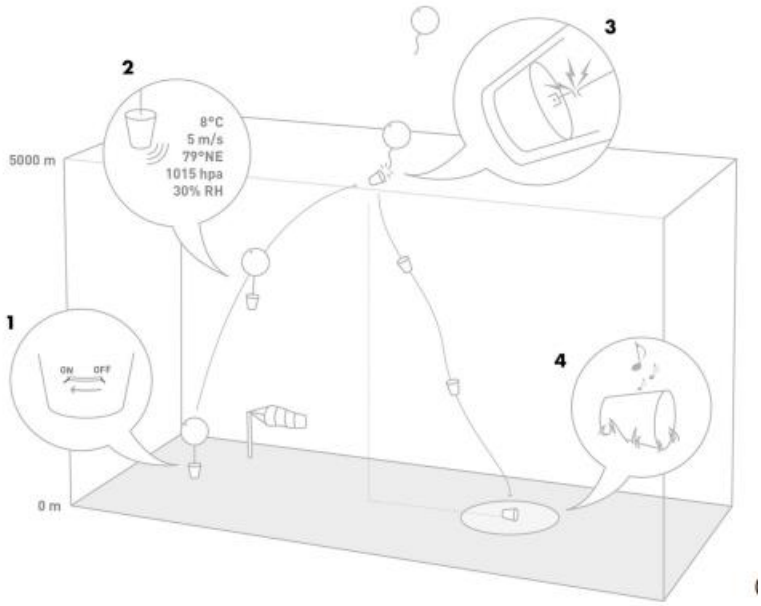

Figure 3: Sparv Embedded S1H3 Windsond
(Image Source: Sparv Embedded)

Investigators

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Data Characteristics

The Millersville University Upper Air Radiosondes IMPACTS data files are available in ASCII format. These data consist of atmospheric temperature, dew point temperature, wind speed, and wind direction during the IMPACTS field campaign. Data files are at a Level 2 processing level. More information about the NASA data processing levels is available on the EOSDIS Data Processing Levels webpage. The characteristics of this dataset are listed in Table 2 below.

Table 2: Data Characteristics

Characteristic	Description
Platform	Ground stations
Instrument	Vaisala's Radiosonde RS41-SGP Sparv Embedded S1H3 Windsond

Spatial Coverage	N: 43.097, S: 39.927 E: -72.503, W: -76.360 (Northeast United States)
Spatial Resolution	0.1 degrees
Temporal Coverage	January 16, 2022 - February 25, 2022
Temporal Resolution	6 seconds
Parameter	Atmospheric temperature, dewpoint temperature, wind speed, wind direction
Version	1
Processing Level	2

File Naming Convention

The Millersville University Upper Air Radiosondes IMPACTS data are within ASCII files and are named using the following convention:

Data files: IMPACTS_upperair_UMILL_[windsonde1|radiosonde]_YYYYMMDDhhmm_*.txt

Table 3: File naming convention variables

Variable	Description
[windsonde1|radiosonde]	windsonde1: windsonde data radiosonde: radiosonde data
YYYY	Four-digit year
MM	Two-digit month
DD	Two-digit day
hh	Two-digit hour in UTC
mm	Two-digit minute in UTC
*	Name of individuals who quality controlled the data files
.txt	ASCII format

Data Format and Parameters

The Millersville University Upper Air Radiosondes IMPACTS data files are in ASCII format. Tables 4-5 describes how these measurements are organized in each file, as well as their units.

Table 4: Windsonde ASCII data fields

Column	Description	Units
1	Pressure level	hPa
2	Height above mean sea level	m
3	Temperature	Degrees C
4	Dew point temperature	Degrees C
5	Wind direction	Degrees from true North
6	Wind speed	kts

Table 5: Radiosonde ASCII data fields

Column	Description	Units
1	Number of data collected	-
2	Elapsed time	s
3	Time in hh:mm:ss	UTC
4	Height from the ground	m
5	Temperature	Degrees C
6	Dew point temperature	Degrees C
7	Mixing ratio	g/kg
8	Relative humidity	%
9	Virtual temperature	Degrees C
10	Pressure	hPa
11	Wind direction	degrees
12	Wind speed	m/s
13	Wind comp East	m/s
14	Wind comp N	m/s
15	Ascend rate	m/s
16	Latitude	Degrees N
17	Longitude	Degrees E

Quality Assessment

Quality control was performed by examining plotted soundings manually. Any flag notes were placed at the top of each of the ASCII files.

Software

These data are in ASCII format, so no software is required.

Known Issues or Missing Data

There are no known issues or missing data with this dataset.

References

Sparv Embedded. Windsond Lightweight and reusable radiosonde. http://sparvembedded.com/Windsond_flyer_v5.pdf

Vaisala. Vaisala Radiosonde RS41-SGP. https://www.vaisala.com/sites/default/files/documents/WEA-MET-RS41SGP-Datasheet-B211444EN.pdf

Vaisala. Vaisala Radiosonde RS41-SG and RS41-SGP User Guide. https://www.vaisala.com/sites/default/files/documents/Vaisala%20Radiosonde%20RS41-SG%20and%20RS41-SGP%20User%20Guide%20M211667EN-G.pdf

Related Data

All other datasets collected as part of the IMPACTS campaign are considered related and can be located by searching the term "IMPACTS" in the Earthdata Search. You can find other Radiosonde data by searching the term 'Radiosonde'.

Contact Information

To order these data or for further information, please contact:

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