
GRAINEX 2018

Surface Meteorology Data Report

NCAR/EOL Integrated Sounding System

Jacquelyn Witte and William Brown

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**Earth Observing Laboratory
In situ Sensing Facility**

NATIONAL CENTER FOR ATMOSPHERIC RESEARCH

P.O. Box 3000
BOULDER, COLORADO 80307-3000

OVERVIEW

This document describes NCAR/EOL surface meteorology data for the GRAINEX field project. In the event that information from this document are used for publication or presentation purposes, please provide appropriate acknowledgement to NSF and NCAR/EOL and make reference to Witte, J., and W.O.J. Brown, (2020): *GRAINEX 2018 NCAR/EOL ISS Surface Meteorology Data Report*.

SAVANT Principal Investigators:

PI: Rezaul Mahmood (U Nebraska Lincoln)
Co-PIs: Udaysankar Nair (U Alabama Huntsville)
Eric Rappin (Western Kentucky U)
Roger A. Pielke, Sr. (U Colorado Boulder/CIRES)
William Brown (NCAR/EOL)

EOL Staff:

ISS Lead Scientist and Contact: William Brown wbrown@ucar.edu
Lead Engineer: John Sobotzak
Technician: Lou Verstraete
Software Engineers: Gary Granger, Isabel Suhr
Data Manager: Jacquelyn Witte, Matthew Paulus

NCAR / Earth Observing Laboratory
P.O. Box 3000
3090 Center Green Drive
Boulder, CO 80301, USA

Websites:

GRAINEX Homepage: https://www.eol.ucar.edu/field_projects/grainex
GRAINEX data archive: https://data.eol.ucar.edu/master_lists/generated/grainex/
ISS Operations and quicklook plots: <https://www.eol.ucar.edu/content/grainex-eol-iss-report>
ISS Homepage: https://www.eol.ucar.edu/observing_facilities/iss

Citations:

If EOL surface met. data are used for research resulting in publication, please acknowledge EOL and NSF and include the following citations in your paper as appropriate:

1. UCAR/NCAR - Earth Observing Laboratory. 2021. NCAR/EOL ISS Surface Meteorology Products - **ISS2 Rogers Farm Site. Version 2.0**. UCAR/NCAR - Earth Observing Laboratory. <https://doi.org/10.26023/NVA8-OZ1W-T00H>. Accessed 26 Mar 2021.

2. UCAR/NCAR - Earth Observing Laboratory. 2021. NCAR/EOL ISS Surface Meteorology Products - **ISS3 York Airport Site. Version 2.0.** UCAR/NCAR - Earth Observing Laboratory. <https://doi.org/10.26023/A59Y-97JW-690V>. Accessed 26 Mar 2021.

Introduction

NCAR/EOL took surface meteorology measurements during the GRAINEX (The Great Plains Irrigation Experiment) field campaign between May 30, 2018 and July 30, 2018 in Eastern Nebraska near York and Lincoln, Nebraska [1]. The Integrated Sounding Systems (ISS) [2] operated sensors that measured surface meteorology parameters at two sites (1) Rogers Memorial Farm and (2) York Municipal Airport (Fig. 1). The suite of sensors operated at each site is listed in table 1. The precise locations of these suites is:

Rogers Farm ISS surface met: 40.84496°N 96.46804°W 373m

York Airport ISS surface met: 40.89187°N 97.62636°W 508m

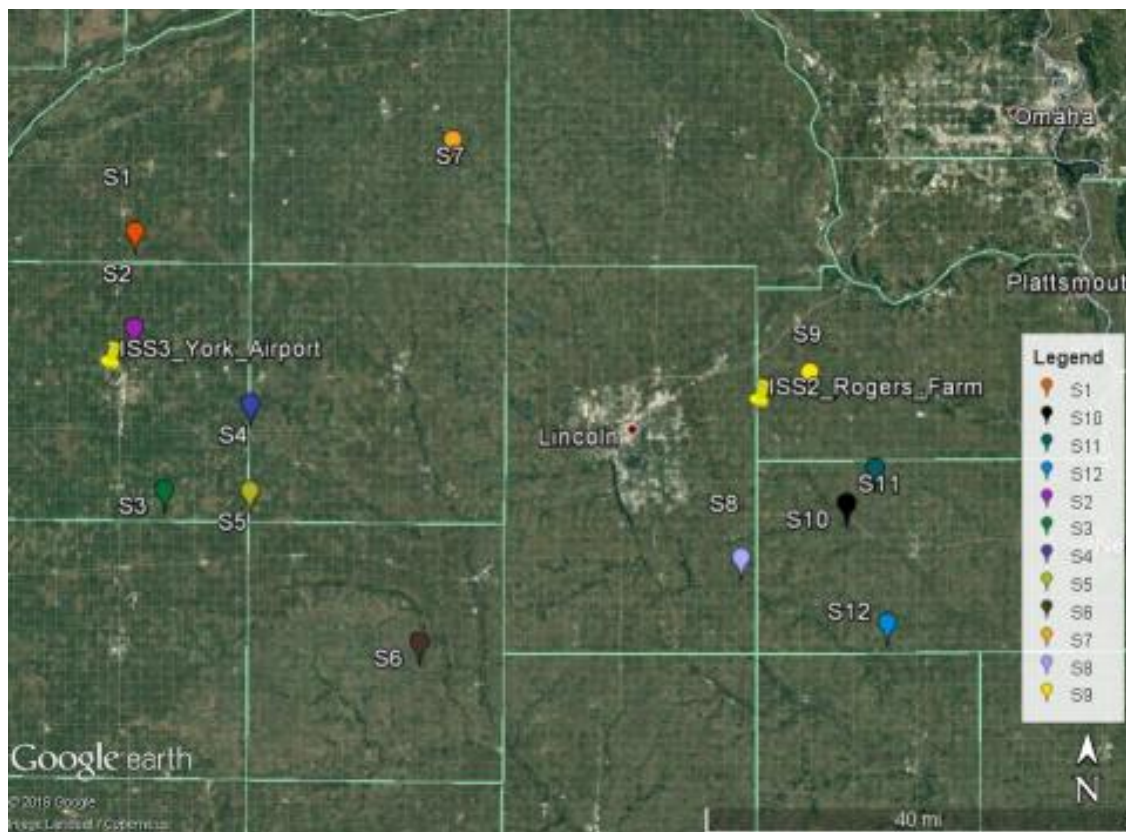


Figure 1: Map of the ISFS Tower Site and ISS Station Locations in SE Nebraska.

Sensor Suite

Brand	Height
Lufft WS700-UMB (Temp/RH/Pressure/precip)	3 m
Vaisala PTB210 (Pressure)	2 m
Hydro Services tipping bucket rain gauge	sfc
Hukseflux NR01 4-component radiometer	1 m

Table 1: Sensor suite operating at both ISS sites.



Figure 2: (from left) Hukseflux radiometer, surface rain gauge, and Vaisala PTB mounted at 2 m at the Roger's Farm site. This view is towards the north.

Known Data Issues

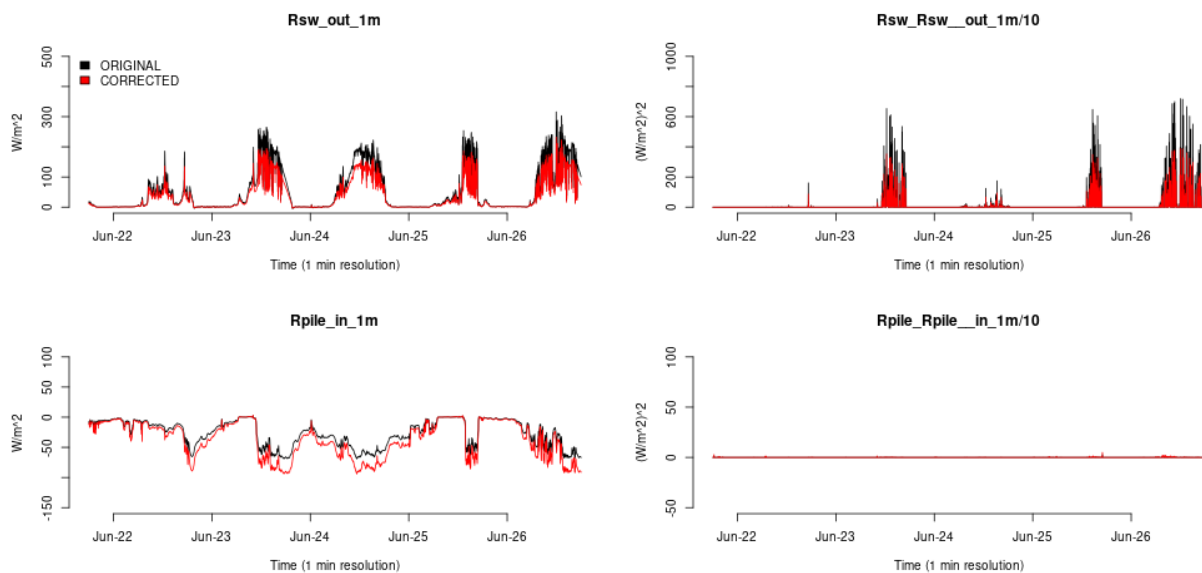
Hukseflux NR01 Issue First Documented 23 Dec. 2020

An error was discovered in the NR01 radiometer measurements. Coefficients provided by the manufacturer and unique to each sensor were swapped for the Rsw_out (outgoing shortwave radiation) and Rpile_in (radiant heat within the radiometer dome) parameters. This would also affect the derived parameter Rlw_in (incoming longwave radiation). Figure 3 below shows an example with the upper left Rsw_out, lower right Rlw_in, and it's cross correlation products before correction (black) and after correcting for this switch (red).

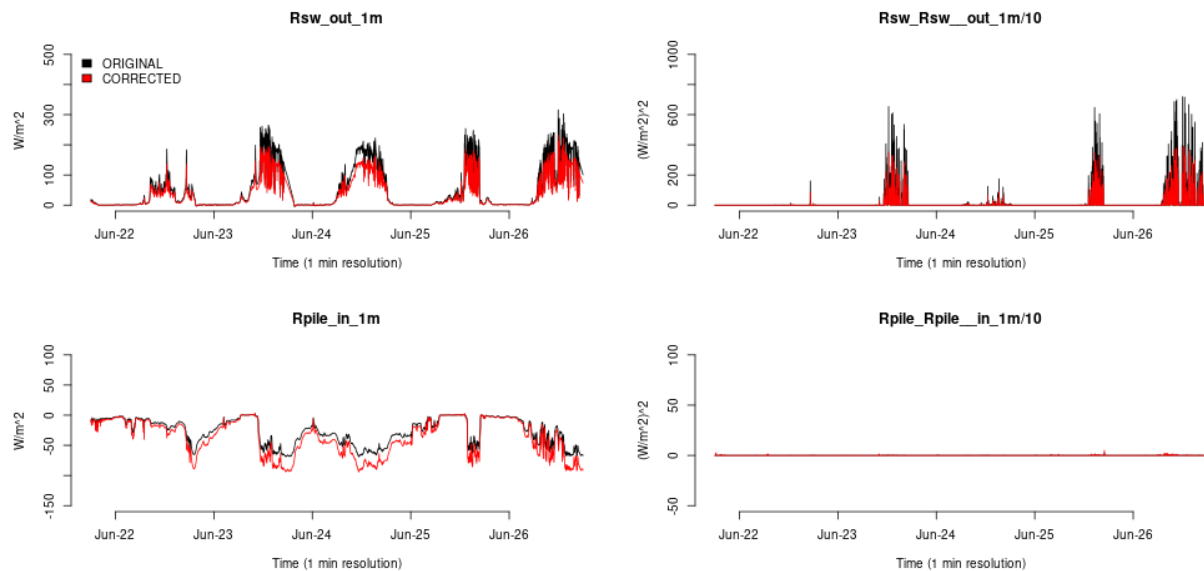
These measurements have been corrected for the 5-minute averaged data files (now version 2.0), and are available at the EOL Field Data Archive:

ISS2 Rogers Farm Site: <https://doi.org/10.26023/NVA8-0Z1W-T00H>

ISS3 York Airport Site: <https://doi.org/10.26023/A59Y-97JW-690V>



(a)



(b)

Figure 3: Corrections to the Hukseflux radiometer parameters before (black) and after (red) for (a) ISS2 site and (b) ISS3 site.

Fetch Issues

The primary concern when selecting the ISS sites were factors concerning the wind profilers, soundings, and logistical considerations such as access, power supply, and landowner activities. In addition, the surface met stations were cabled to the ISS trailers therefore there were limitations to where the sensors could be placed. As a result, the surface level fetch of both sites may be less than ideal.

The Rogers Farm surface station was on a grassy area adjacent to fields (figures 4 & 5). The fetch in most directions was across the fields, however there was a shed about 20 meters to the SSW (and another larger shed 75 m in the same direction) so winds from the south and southwest may be affected. There are also trees about 150 m to the east and southeast (figure 5). There is a USDA NRCS SCAN (US Dept of Agriculture Natural Resources Conservation Service Soil Climate Analysis Network) climate site 200 meters NE of the ISS tower. An analysis comparing measurements from that site with the ISS data is recommended, although the SCAN site will also be affected by the trees.

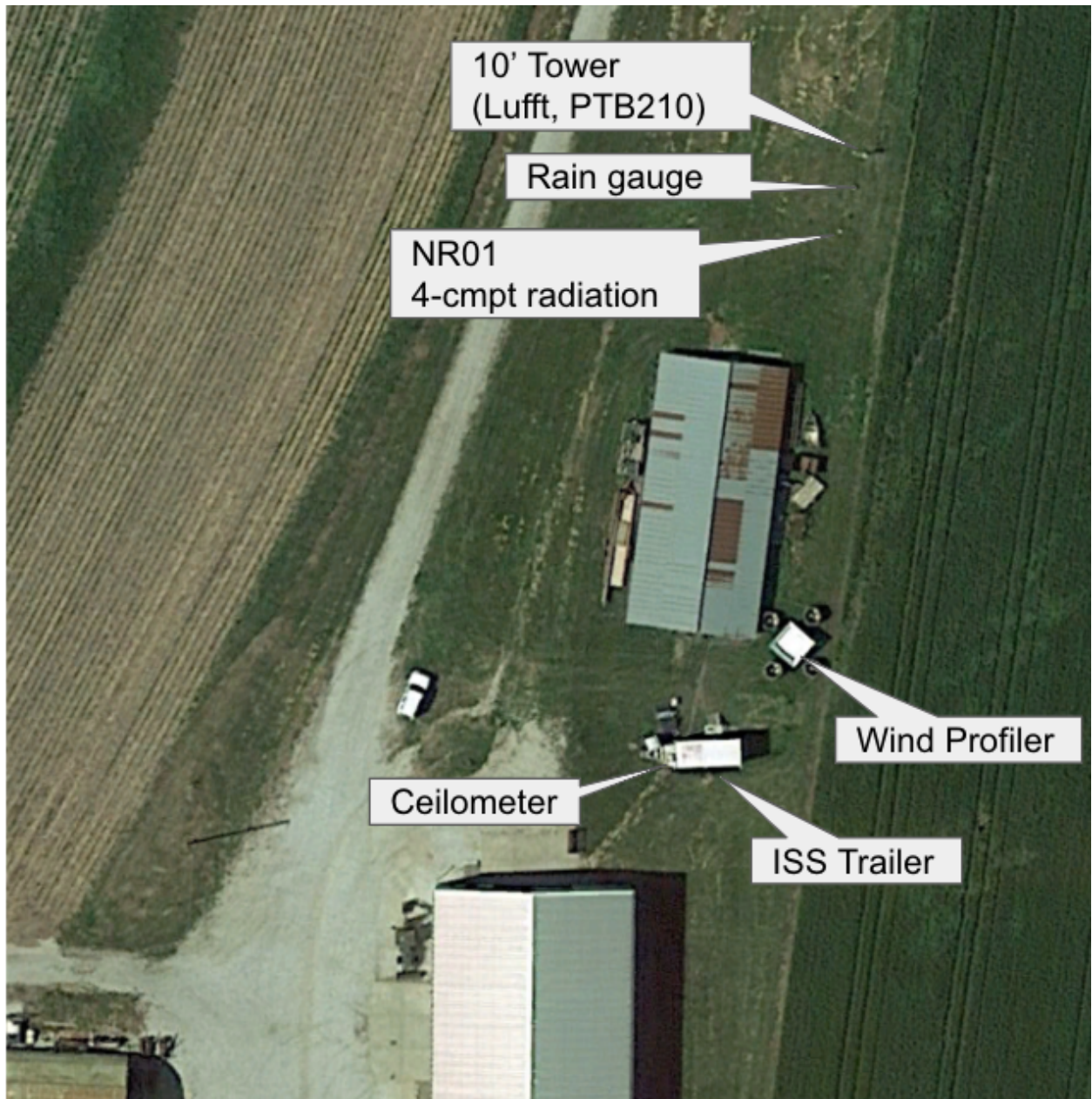


Figure 4: Google Earth view of ISS2 at the Rogers Farm site taken on 6/4/2018 during the campaign. The surface met tower was about 20 meters NNE of a 12m x 25m shed about 3 m high. The view is about 100 meters across.



Figure 5: Google Earth view of the wider area around the ISS2 site at Rogers Farm. The area shown is approximately 1 km across.

The York airport site had more artificial surfaces that may affect the fetch than the Rogers Farm site. Due to various logistical considerations the ISS was placed next to a large hanger (see figures 6, 7 & 8). The surface met station was approximately 30 meters northwest of Hanger C and there are further hangars parallel to that hanger including one about 100 m directly east of the tower. The main runway runs approximately north-south and is beyond the hangars, about 300 m east of the ISS. Winds from the east and particularly from the southeast

are likely affected by the presence of the buildings. During the day there may be some heating due to those and the surrounding concrete. There are fields to the west, including a pivot irrigated field about 140 meters to the south. The location of the airport AWOS station is shown in figure 7 (260 meters north of the ISS) and that data should be compared to the ISS surface met if fetch considerations are a concern.



Figure 6. Surface met. set-up at the York Airport site. Note the Hanger in the background. This view is towards the south.

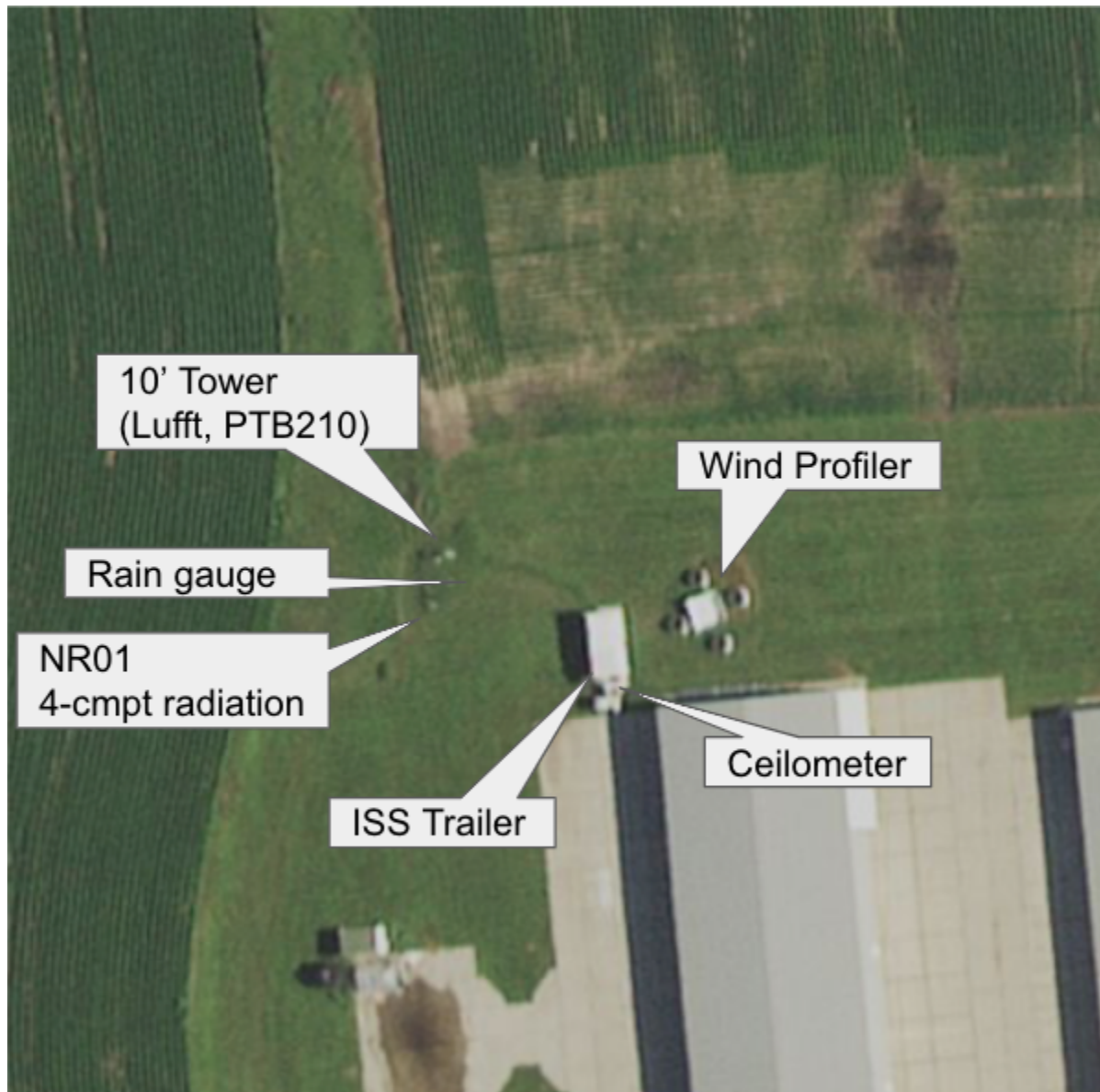


Figure 7. Apple Maps satellite view of ISS3 at the York airport site during the campaign. The 10' tower was about 30 meters from the northwest corner of Hanger C, which is about 20 m wide, 60 m long and 7 m high. This view is about 100 meters across.



Figure 8: A larger view of the area around the ISS site. The view is approximately 1 km across.

References

[1] GRAINEX

Homepage: https://www.eol.ucar.edu/field_projects/grainex

ISS GRAINEX page: <https://www.eol.ucar.edu/content/grainex-eol-iss-report>

Data Archive: https://data.eol.ucar.edu/master_lists/generated/grainex/

[Rappin, E., Mahmood, R., Nair, U.S., Pielke, R.A., Kaulfus, A., Brown, W.O., Oncley, S.P., Wurman, J., Kosiba, K., Santanello, J.A., Kim, E.J., Bindlish, R. 2019: The Great Plains Irrigation Experiment—Grainex. American Meteorological Society.](#)

[2] ISS Integrated Sounding System

Website: https://www.eol.ucar.edu/observing_facilities/iss

DOI: <http://dx.doi.org/10.5065/D6348HF9>

Reference: Parsons, D., W. Dabberdt, H. Cole, T. Hock, C. Martin, A-L. Barrett, E. Miller, M. Spowart, M. Howard, W. Ecklund, D. Carter, K. Gage and J. Wilson, 1994: "The Integrated Sounding System: Description and preliminary observations from TOGA COARE". *Bull. Amer. Meteor. Soc.*, 75, 553–567, doi:10.1175/1520-0477(1994)075.

[4] **NetCDF**: UCAR/Unidata netcdf web site:

<http://www.unidata.ucar.edu/content/software/netcdf/>

CONTACT

William Brown, NCAR/EOL

PO Box 3000, Boulder, CO 80307

wbrown@ucar.edu, Ph: 303-497-8774