

CHEESEHEAD ISS SENSOR DATA SUMMARY

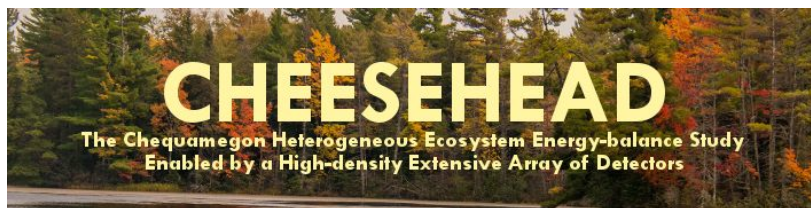
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Introduction

The CHEESEHEAD (Chequamegon Heterogeneous Ecosystem Energy-balance Study Enabled by a High-density Extensive Array of Detector) project focussed on boundary level meteorology

and interactions with complex forested landscapes. The project overview and details can be found at the [homepage](#). NCAR/EOL ISS operated a suite of meteorological sensors at the Park Falls, Wisconsin site within the Chequamegon National Forest. The observational period was from June 24, 2019 to October 11, 2019



Staff

ISS Lead Scientist and Contact: William Brown <wbrown@ucar.edu>

Lead Engineer: John Sobtzak

Technicians: Lou Verstraete, Elizabeth Bernhardt

Software Engineers: Gary Granger, Isabel Suhr

Data Managers: Matthew Paulus, Jacquelyn Witte

Websites

CHEESEHEAD Homepage: https://www.eol.ucar.edu/field_projects/cheesehead

ISS Operations at CHEESEHEAD: <https://www.eol.ucar.edu/content/iss-operations-cheesehead>

ISS Homepage: https://www.eol.ucar.edu/observing_facilities/iss

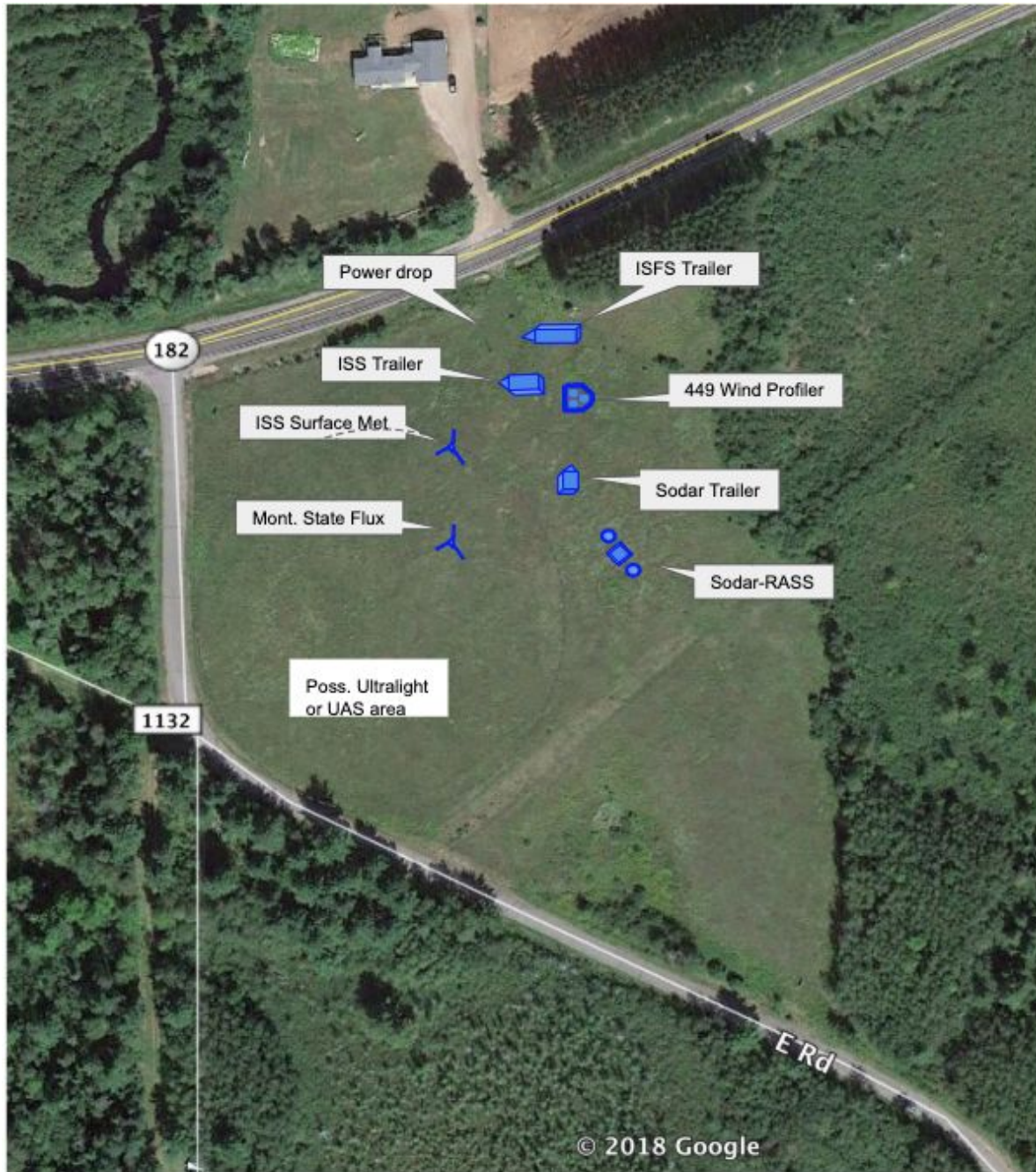
Sensors

Sensor	Brand
Radar Wind Profiler	NCAR/EOL 449 MHz Modular Wind Profiler
Radiosondes	Vaisala MW41 system / RS41 radiosonde
Sodar-RASS	Metek DSDPA.90-24
Ceilometer	Vaisala CL51
Surface Met. Obs.	Gill Wind Observer (2D sonic) at 10m Lufft WS300 (Temp/RH/Pressure) at 2m Vaisala PTB330 (Pressure) at 2m HSA Tipping bucket rain gauge Lufft WS800 (Wind/Precip/T/RH/P) at 3m
GPS Integrated Water Vapor	Trimble NetR8 with Vaisala WXT at 2m
Camera	Moonglow Technologies All Sky Cam ASC-N1 Webcam

Table 1. Suite of ISS instruments at the base trailer site.

Field Site

Below is a top down schematic of the terrain and instrument positions relative to the ISS1 base trailer. The ISS trailer location is at approximately +45.945810, -90.293870, and 463 m above sea level.



Sensor Data QC Summary

4.1 Radiosondes

At the base trailer (ISS1), 172 radiosondes were launched during the campaign. The typical launch schedule was daily at 1300 local time. There were 2 Intensive Operating Periods (IOP) where radiosondes were launched 4x per day: ~ 0520, 0700, 1300, and 1715. Included are two test flights launched prior to the official start of the campaign.

The radiosonde data archive and QC report can be found here:
<https://data.eol.ucar.edu/dataset/592.001>.

Contacts

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4.2 Camera

The All-sky camera photos and panoramic imagery can be viewed at the ISS operations [summary plots archive](#) - images shown are hourly. Photos are taken every 5 minutes during daylight hours.

Be advised that while the time stamps for the All-sky images are correct on all images, the time zone is actually UTC (not MST as is currently shown).

There are no issues with the webcam images, also taken every 5 minutes during daylight hours.

Dataset links: <https://data.eol.ucar.edu/dataset/592.007>
<https://data.eol.ucar.edu/dataset/592.005>

4.3 Surface Meteorological Observations

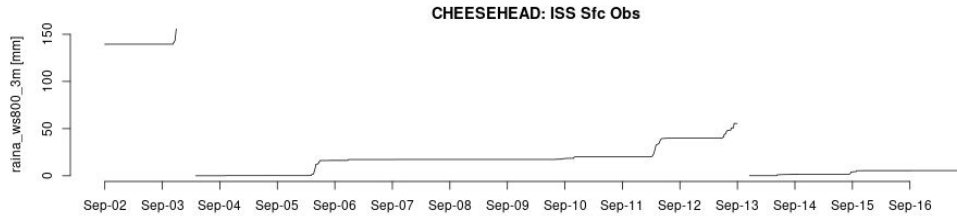
Overall, all sensors were working nominally and within expected values. No significant data issues were found with the Lufft ws300 at 2m or ws800 at 3m measurements of pressure, temperature, RH, their derived quantities, or global radiation measurements. No large gaps, spikes, anomalous data were observed. The few issues are noted below.

Dataset Link: <https://data.eol.ucar.edu/dataset/592.004>

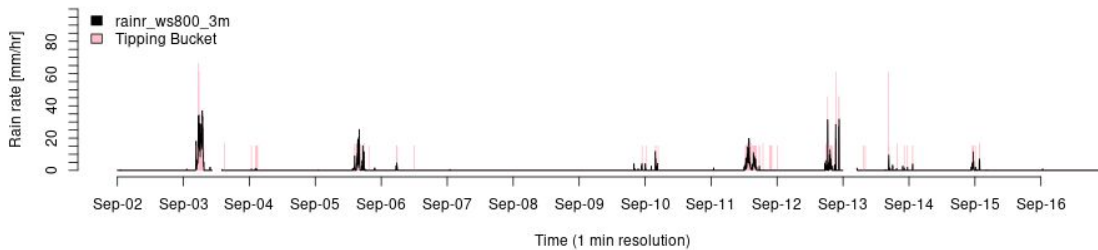
Rain Gauges

Rain accumulation is reported by the Lufft ws800, from which rain rates are calculated. A Tipping Bucket was also set up to generate rain rates.

- The rain accumulation resets to zero due to power failures. There are three recorded resets due to power outages caused by storms: 20 July, 3 September, and 13 September 2019. See plot below for an example.



- There are the occasional false tips in the Tipping Bucket rain rate (Plot below: pink) where no rain is observed by the Lufft. Tipping Bucket rates are also generally higher, and in some cases too high. It is suggested that users verify both sensor data are recording a measurement.

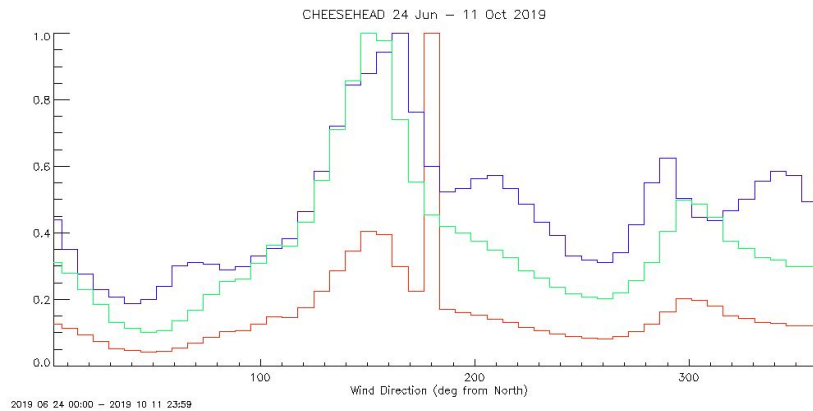


Gill 2D

- Gill 2D measurements were discovered to be offset by 180. This has been corrected in the final dataset. Note this offset has not been corrected in the preliminary dataset.

Lufft

- The ws800 wind direction data was corrected for reporting 180 degrees at zero wind speeds.



The blue histogram is from the Gill 2D at 10m, the red histogram is from the Lufft where the big peak at 180 degrees is obvious. The green histogram is the same Lufft data with zero wind speed points removed. As can be seen, the distribution with the zero speeds removed is well-aligned with the Gill (the differences are about what we'd expect between the 3m and 10m levels). These plots include about 158k samples over the whole campaign; about 16k zero wind samples were removed representing about 10% of the data.

- Note the accuracy of Luft is 0.3 m/s - not as accurate as the 2D Gill (accuracy is 0.02 m/s at 1m/s).

4.4 Ceilometer

- Although not explicitly defined in the netcdf metadata, missing values are defined as -999.
- The time variable is mislabeled and should be seconds since the Unix epoch (not minutes).
- The ceilometer functioned as expected. No large gaps, spikes, anomalous data were observed.

Dataset Link: <https://data.eol.ucar.edu/dataset/592.008>