

# Texas A&M University (TAMU) Radiosonde Metadata

MESO 18-19

## **PIs**

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## **1.0 Data set overview**

To support research activities during Meso 18-19, students and faculty from the TAMU Department of Atmospheric Sciences launched radiosondes from the campus of Texas A&M University in College Station, TX during the intensive observation periods (IOPs) that comprised the campaign from 1 November 2018 – 30 April 2019. This includes one training/shakedown IOP (IOP-0) and nine full IOPs (IOP1-9) as detailed in the Meso 18-19 EOL field catalog.

## **2.0 Instrument description**

Consistent with other university sounding sites in Meso18-19, TAMU used iMet-4 radiosondes for the majority of launches, with several iMet-4C sondes used in close proximity to lightning, as these are provided with additional electromagnetic protection by the manufacturer. Sonde data were copied via three ground stations (iMet 3050, iMet 3050A, and iMet 3150) for redundancy located on the 13<sup>th</sup> floor roof of the Eller Oceanography & Meteorology building on the northeastern side of the Texas A&M University Campus. The majority of archived data were received via the iMet3050A system, though several archived soundings use data received via the 3050 and 3150 systems if they had better signal reception resulting in a more complete sounding. The launch train consisted of 150-g or 200-g balloons with an attached parachute and dereeler, inflated with helium to attain a target vertical ascent rate of 300 m/min. Manufacturer provided calibration, accuracy, and resolution of measured variables is provided in Table 1.

### 3.0 Data collection and processing

All sondes were launched from a lawn on the northeastern side of the Texas A&M Campus in College Station, TX:

Launch Site Coordinates: 30.619N; 96.335W

Launch Site Elevation: 101 m above MSL (0 m AGL)

Receiving Antenna Coordinates: 30.617N; 96.337W

Receiving Antennae Elevation: 130 m above MSL (29 m AGL)

As this site is approximately 4 km from the Easterwood Airport, airport code KCLL is used for each TAMU sounding.

Sondes were generally launched every six hours during IOPs, with a few exceptions, with the sondes valid at 00, 06, 12, and 18Z in coordination with other Meso18-19 radiosonde sites. Sondes were typically released 45-60 minutes prior to their “valid” time. Surface observations of wind direction (streamer and compass); wind speed (handheld Kestrel weather meter); temperature, dewpoint temperature, wet bulb temperature, relative humidity (Kestrel and sling psychrometer); pressure (Kestrel) were taken at launch time at the launch site and compared with the radiosonde measurements. If thermodynamic surface observations agreed with the ancillary surface observations, the radiosonde-measured values were used as the surface observation.

Launches were all initialized, collected, and processed with iMet-OS-II software with no additional quality control performed. Post-processed data were initially saved to text files with a constant time interval of 5 s. These files were converted to SPC/SHARPPy format before uploading and archival.

### 4.0 Data format

The naming convention for each of the TAMU/KCLL sounding text files is:  
upperair.TAMU\_sondeYYYYMMDDHHmm.College\_Station\_TX\_SHARPPy.txt

For instance, the file:

upperair.TAMU\_sonde.201810311200.College\_Station\_TX\_SHARPPy.txt  
is for the sounding valid at 1200 UTC on 31 October 2018.

Text files are formatted in SPC/SHARPPy format with the following header and footer information:

```
%TITLE%  
KCLL YYMMDD/HHmm  
  
LEVEL HGHT TEMP DWPT WDIR WSPD  
-----  
%RAW%
```

Sounding data are arranged in six-column CSV format with a variable number of rows in descending pressure (ascending height) order: (1) Pressure [hPa], (2) Height above MSL [m], (3) Temperature [C], (4) Dewpoint Temperature [C], (5) Wind Direction [deg], (6) Wind Speed [kts].  
%END%

## **5.0 Data Remarks**

The majority of soundings were terminated once the radiosonde ascended above the 100-mb pressure level, though several soundings were terminated early due to signal loss, lightning disruption, or balloon burst. We also maintain a local archive of raw data files and handwritten notes/details regarding each sounding with exact launch times, specific hardware for the launch, etc., which can be provided upon request. For specific questions, please contact C. Nowotarski ([cjnowotarski@tamu.edu](mailto:cjnowotarski@tamu.edu)).

## **6.0 References**

See <http://www.intermetsystems.com> for full descriptions of hardware and software referenced herein.

**Table 1** – Manufacturer provided specifications for iMet-4/iMet-4C radiosondes (courtesy International Met Systems).

MEASUREMENTS		GEOPOTENTIAL HEIGHT	
Measurement cycle	1 Hz	Measurement range	Pressure derived SFC to 40 km
		Resolution	0.1 m
TEMPERATURE SENSORS	Glass Bead	Combined Uncertainty/Reproducibility <sup>1</sup>	
Manufacturer	Shibaura	1080 - 400 hPa	15 m / 10 m
Measurement range	+60°C to -90°C	400 - 10 hPa	200 m / 150 m
Resolution	0.01°C		
Response time: still air/ 5 ms <sup>-1</sup> (1000 hPa)	2 / < 1 sec		
Repeatability in Calibration	0.2 C	GEOPOTENTIAL HEIGHT	GPS derived
Combined Uncertainty/Reproducibility <sup>1</sup>		Measurement range	SFC to 40 km
> 100 hPa	0.5 C / 0.3 C	Resolution	0.1 m
< 100 hPa	1.0 C / 0.75 C	Combined Uncertainty/Reproducibility <sup>1</sup>	
Night flight	0.3 C / 0.3 C	1080 - 400 hPa	30 m / 15 m
Solar correction	≤ 1.2 C	400 - 3 hPa	60 m / 20 m
HUMIDITY SENSOR	Capacitive Polymer	WIND SPEED AND DIRECTION	
Manufacturer	IST	Resolution	0.1 m/s / 1 degree
Measurement range	0-100 % RH	Speed	
Resolution	0.1%	Combined Uncertainty/Reproducibility <sup>1</sup>	0.5 / 0.25 m/s
Response time		Direction	
@ 25C	0.6 seconds	Combined Uncertainty/Reproducibility <sup>1</sup>	1 degree
@ 5C	5.2 seconds		
@ -10C	11 seconds		
@ -40C	61 seconds		
Repeatability in Calibration	5 %	<b>TELEMETRY</b>	
Uncertainty/Reproducibility <sup>1</sup>		Transmission type	Synthesized
> 0 C	5% / 3%	Maximum Range	> 250 km
-40 to 0 C	5% / 5%	Frequency stability	± 2 kHz
PRESSURE <sup>2</sup>	Sensor	Deviation, peak to peak	6 kHz
Manufacturer	Measurement Specialties	Output Power	30 – 500 mW
Measurement range	1200 hPa - 10 hPa	Modulation	GFSK
Resolution	0.01 hPa	Data Rate	1200 Baud
Response time	0.5 milliseconds	Standard Frequencies	402, 402.5, 403, 403.5 404, 404.5, 405
Uncertainty/Reproducibility <sup>1</sup>		Custom Frequencies	Available
Whole range	2.0 / 1.5 hPa	GPS RECEIVER	
1200 - 400 hPa	1.0 / 0.75 hPa	Manufacturer / Type	U-Blox CAM-M8
400 hPa - 10 hPa	2.0 / 1.5 hPa	Cold Start Time	< 60 seconds (typical)
PRESSURE	GPS derived	<b>OPERATIONAL DATA</b>	
Measurement range	SFC to 3 hPa	Battery	Lithium
Resolution	0.1 hPa	Operating time	> 135 minutes
Uncertainty/Reproducibility <sup>1</sup>		Weight	120 grams
1080 - 400 hPa	2.0 / 1.5 hPa	Dimensions	Body (LWH): 139x67x31
400 hPa - 3 hPa	0.5 / 0.25 hPa		With boom (LWH): 235x67x31
		Calibration Stability	2 years

\* Subject to ground station, balloon size and atmospheric conditions

<sup>1</sup> All uncertainties expressed at a 95% confidence level

<sup>2</sup> Primary atmospheric pressure derived by GPS altitude

<sup>3</sup> GECOS Reference Upper-Air Network

Specifications subject to change without notice, Rev 10 171208