

iMet-4 radiosonde: development history and steps toward GRUAN qualification

GRUAN ICM-11, Singapore

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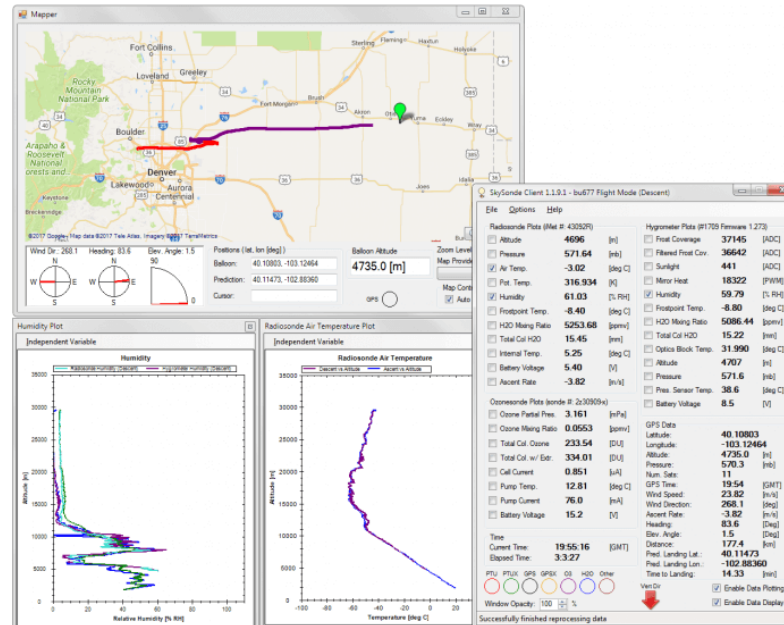
1. Introduction and history
2. Research and collaboration
3. Development and testing
4. Next steps for GRUAN

- Founded in 1997 in Grand Rapids, MI, USA
- iMet-1 introduced in 2005, iMet-2 introduced in 2009, iMet-4 in late 2017
- iMet-1 RSB developed for NOAA GMD to serve as X-Data carrier sonde compatible with any receiver

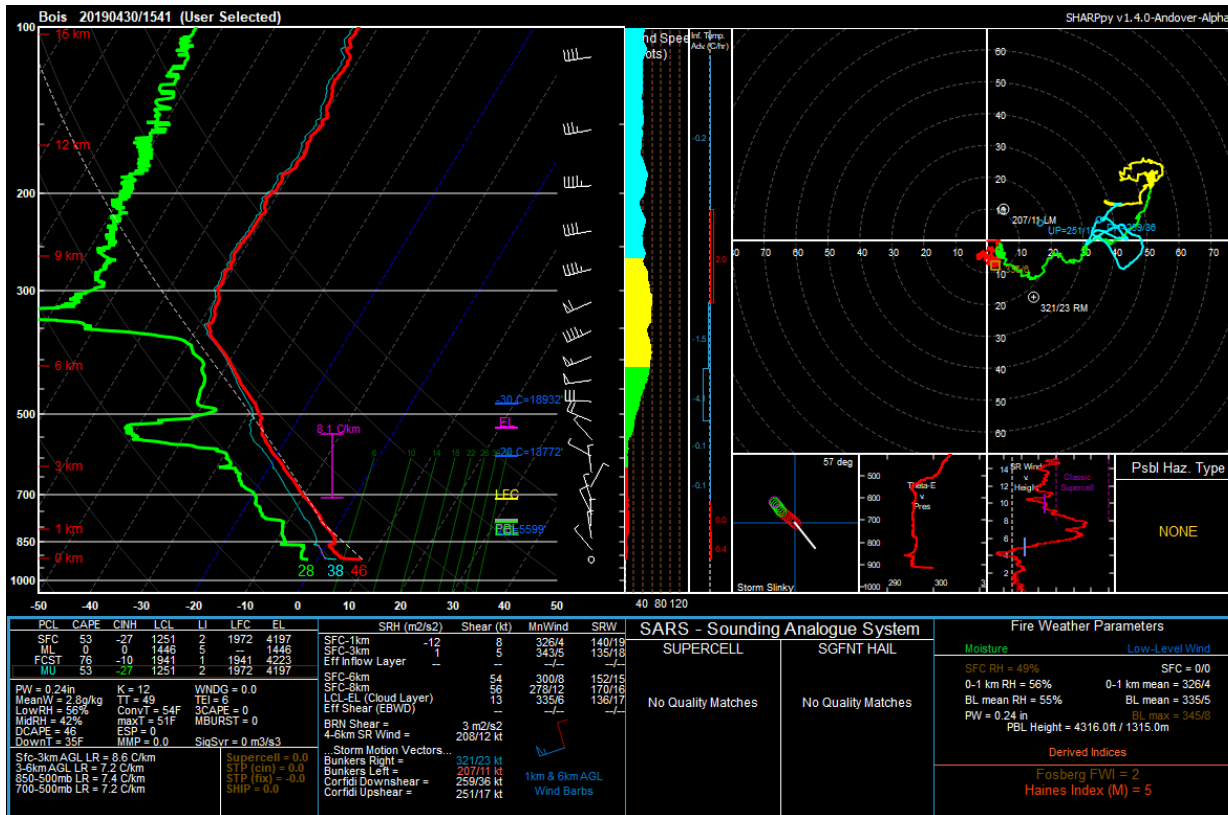


iMet-4 RSB Compatible with NOAA SkySonde

- Open Bell-202 transmission
- Serial data cable
- XData: Ozone, FPH, SLWC, POPS, etc.



- Customized solutions
- SHARPPy message implemented 2019



Modernize the iMet-1

- Simple push-button operation
- Lightweight design (~120g) with reduced footprint

Enhanced Sensors

- Pressure sensor standard
- Hydrophobic AT coating
- Digital RH
- Temperature measured at the RH sensor



Dual radiosonde flights

- Second-by-second comparisons
- 600g balloons
- 60m train

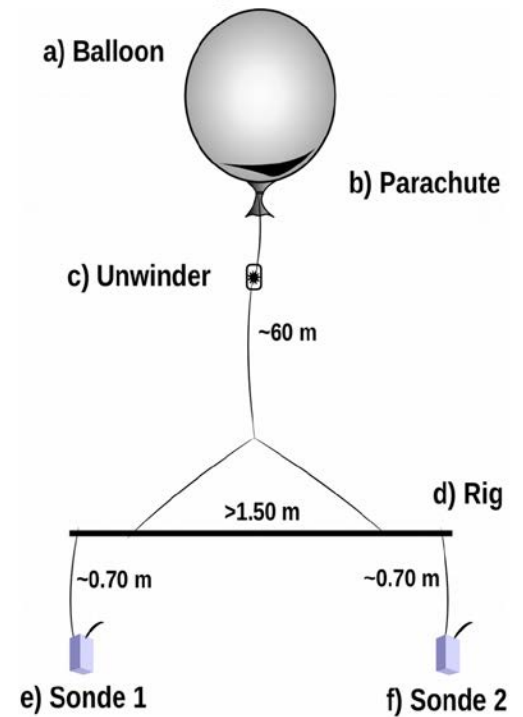


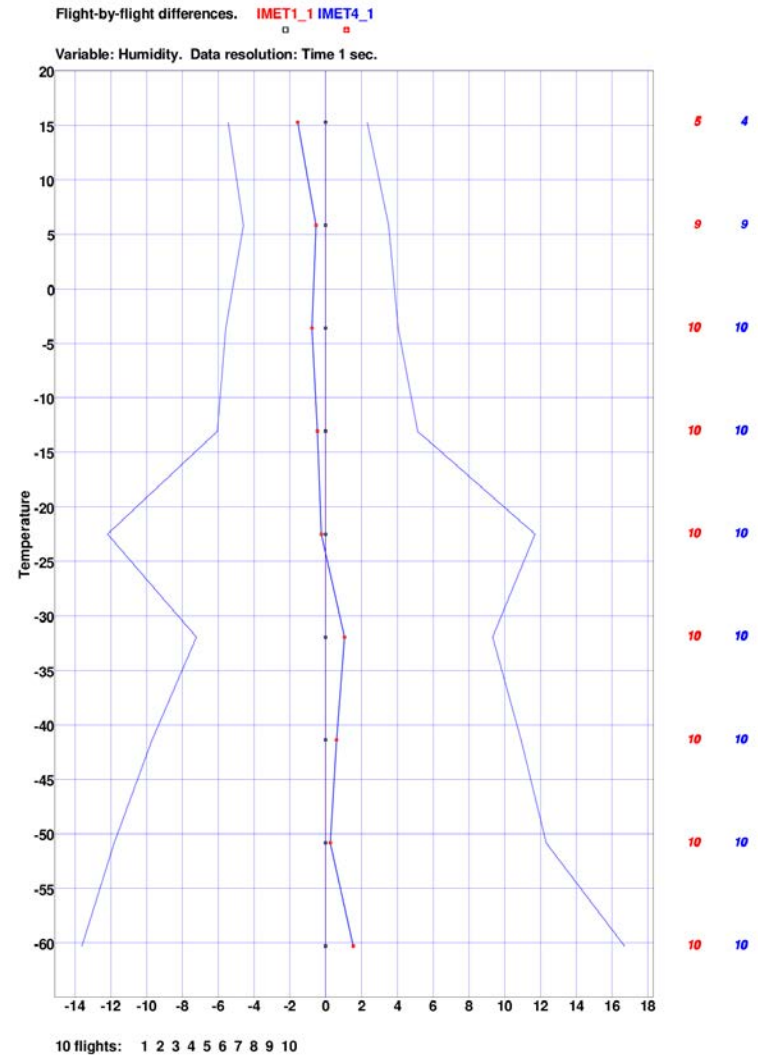
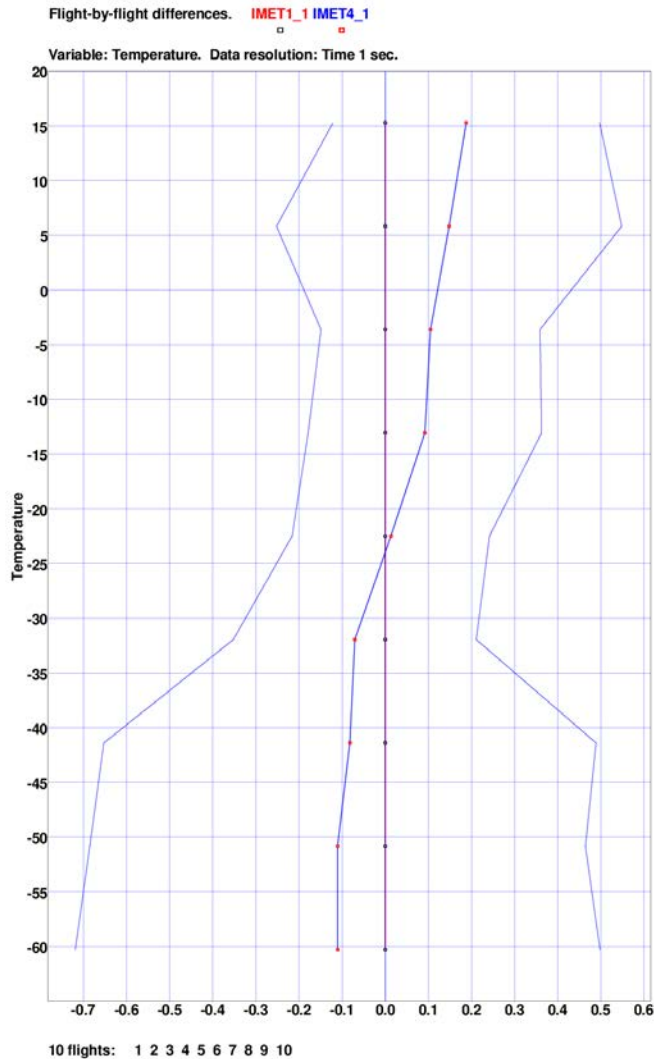
Figure 4: The recommended setup

15 inter-comparison with the iMet-1 in 2017

- Data continuity and improvements
- Tested in different environments

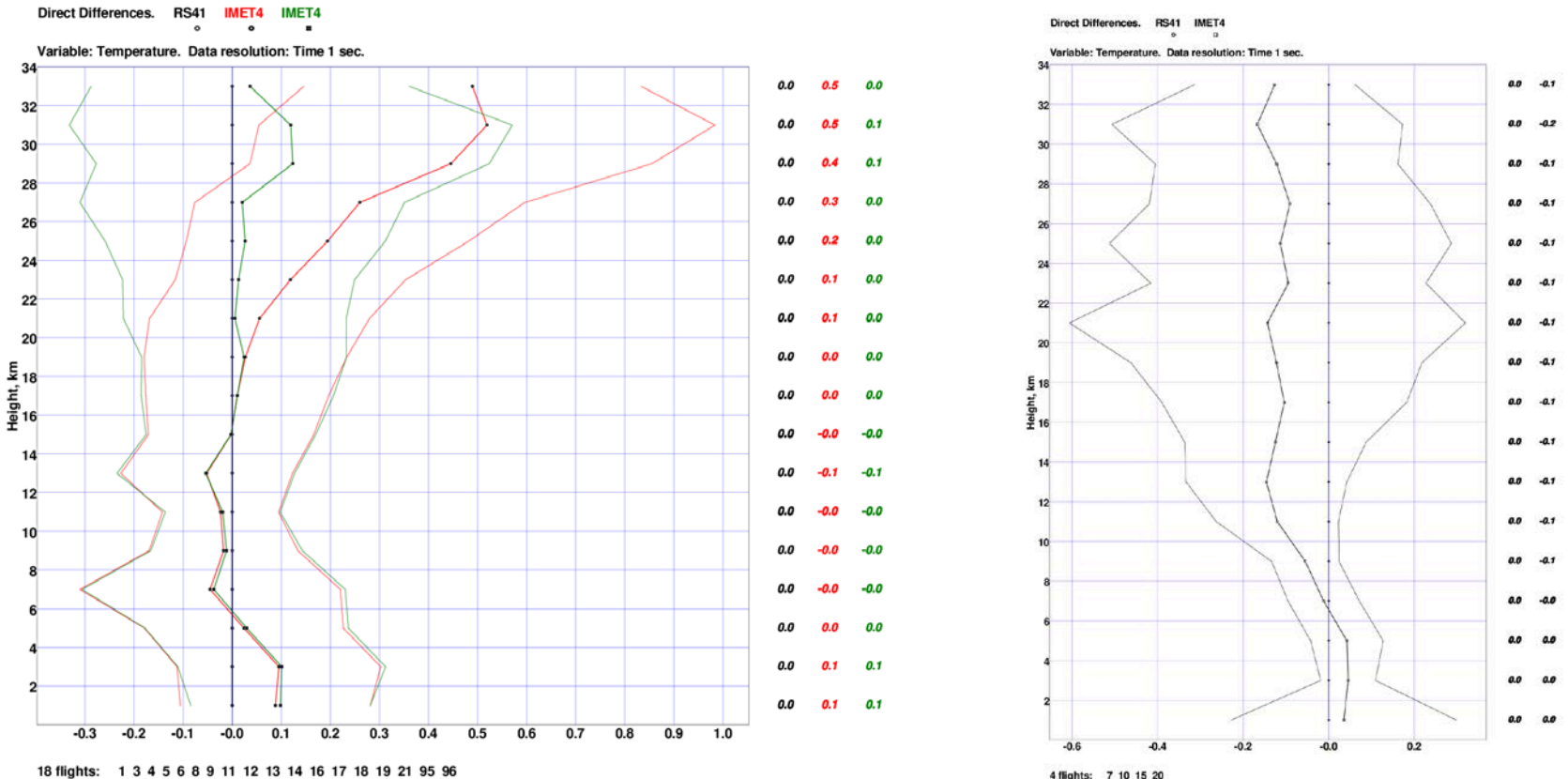
InterMet Flight	Flight Number	Day/ Night	Date	Cloud Cover (oktas)	Low Cloud	Middle Cloud	High Cloud	Present Weather
F34	1	Day	05/05/2017	5	None	Ac	Ci	Fair
F35	2	Day	05/05/2017	7	Cu	As, Ac	NA	Fair
F37	3	Day	05/08/2017	0	None	None	None	Fair
F42	4	Day	05/10/2017	7	Sc	NA	NA	Fair
F33	5	Day	05/04/2017	8	None	Ns, As	NA	Rain before or after
F44	6	Day	05/16/2017	5	Sc	As	Ci	Rain before or after
F46	7	Day	05/19/2017	8	St	As, Ns	NA	Light rain during
F49	8	Day	06/04/2017	8	St	As, Ns	NA	Light rain during
F57	9	Day	06/20/2017	8	None	As, Ns	NA	Moderate rain during
F50	10	Day	06/05/2017	8	St	None	None	Fog/Drizzle/Mist
F36	11	Night	05/05/2017	4	None	Ac	None	Fair
F38	12	Night	05/08/2017	2	None	None	Cs	Fair
F41	13	Night	05/10/2017	7	None	Ac	NA	Fair
F43	14	Night	05/11/2017	8	NA	As	NA	Light rain during
F48	15	Night	05/25/2017	8	None	As, Ns	NA	Light rain during

iMet-1/4 Continuity



2018 Inter-comparison at Colorado State University

- 22 flights in different conditions



- Temperature: solar adjustments to match RS41 for now
- RH
 - Remove RH cap
 - Improve the time-response
 - Measure RH temp down to -100C
- Winds
 - Reduce vector wind smoothing



Next steps for GRUAN(TN 4)

- Technical document commensurate with GRUAN-TN2
 - Finalize RH sensor design
 - Testing in collaboration with Howard University at Beltsville site and NOAA's Sterling, VA testing facility
- Peer reviewed paper
- Measurement system ready to be adopted at at least one GRUAN site: Boulder and Beltsville use our iMet-1 RSB
- Central processing facility
- Beta release data stream
- Data stream reviewed for appropriateness

- **Colorado State University**
 - Paul Ciesielski, Russ Schumacher, Sue VandenHeever
- **Howard University (Beltsville)**
 - Belay Demoz, Ricardo Sakai, Dave Whiteman
- **NOAA GMD in Boulder, CO**
 - Emrys Hall, Allen Jordan