

Sonic Anemometry, Saltation Sensing, and Mars Boundary Layer Peculiarities

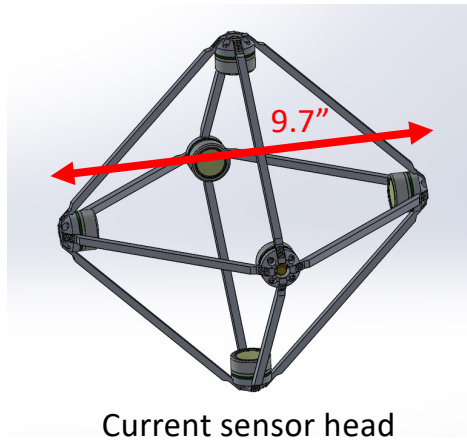
D. Banfield, NASA Ames Research Center

Sonic Anemometer:

- Currently in MATISSE maturation. TRL6 in 1 year
- 3-D winds, sensitivity ~ 0.05 m/s
 - 2-D also possible
- Temperature sensitivity ~ 0.1 K
- 20 Hz sampling rate
- ~ 0.5 kg, ~ 0.5 W
 - Power drops linearly with sampling rate
- Uses Capacitive Broadband Ultrasonic Transducers
 - Avoids some weaknesses of terrestrial sonics



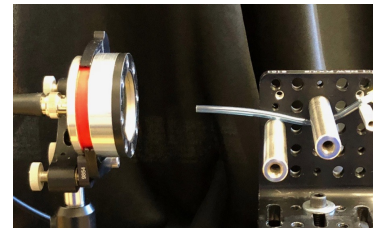
TRL5 prototype at Aarhus



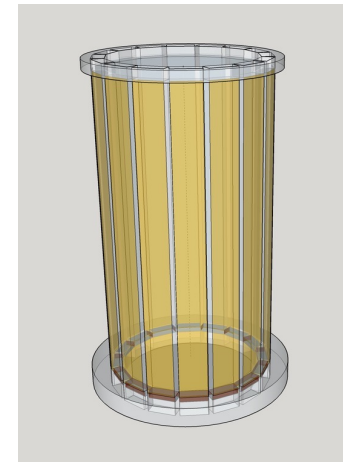
Current sensor head ("spider") design (265g)

Saltation Sensor:

- Designed to work with Sonic Anemometer
 - Shares back-end computer
- Uses similar capacitive transducers
 - Optimized for impact sensing
 - ~ 1 cm wide X ~ 10 -20 cm tall (to be refined)
- Can identify for each grain impact:
 - Time of impact
 - Speed of impact (to $\pm 30\%$)
 - Mass of grain (to $\pm 50\%$)
 - Height of impact (to ~ 1 cm)
- Up to ~ 1000 impacts/s
- TRL4 now, \sim TRL5 in 1 year
- MATISSE proposal being submitted
 - TRL6 late 2024



Developed "bb-gun" to calibrate it



Notional design of an array of sensors