



Profiling Airborne Microwave Radiometer

A powerful tool for atmospheric research and observations

Boulder Environmental Sciences & Technology

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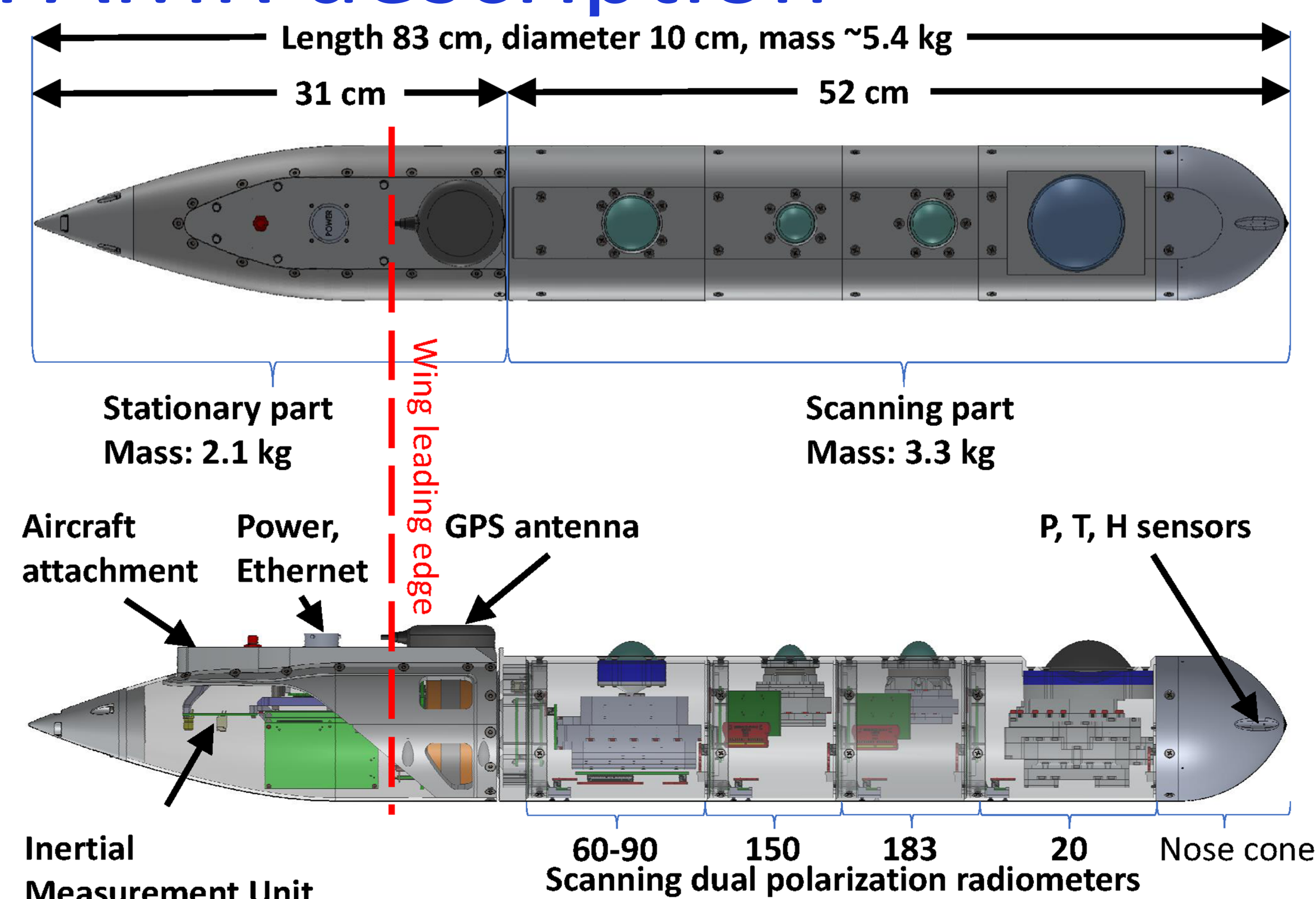
What atmospheric experiment doesn't need information about thermodynamic (temperature and humidity) profile?

What cloud experiment is not concern with cloud liquid water content?

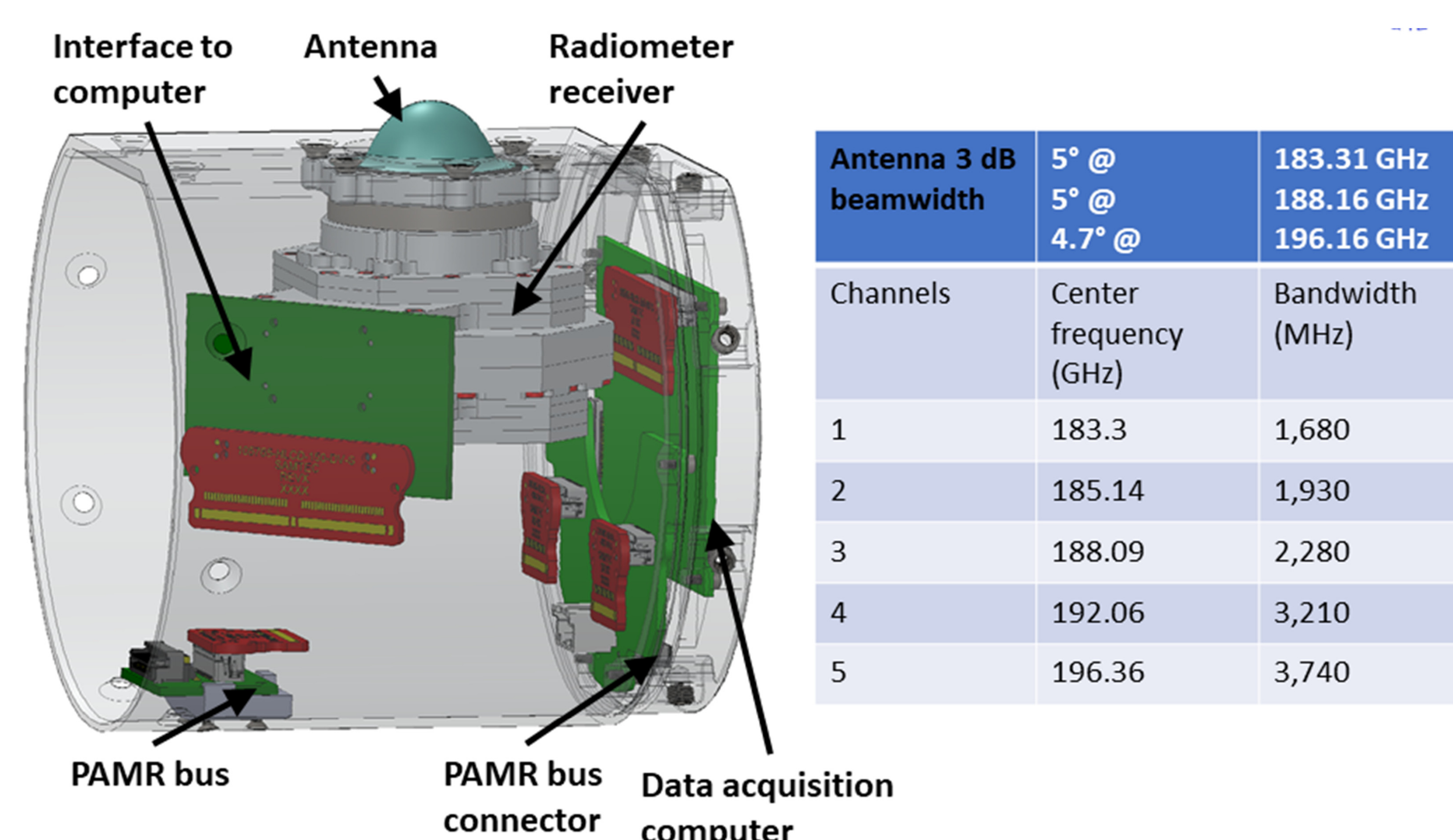
What atmospheric experiment doesn't need information on integrated water vapor (total precipitable water)?

PAMR provides these essential measurements and more!

PAMR description



183 GHz PAMR module

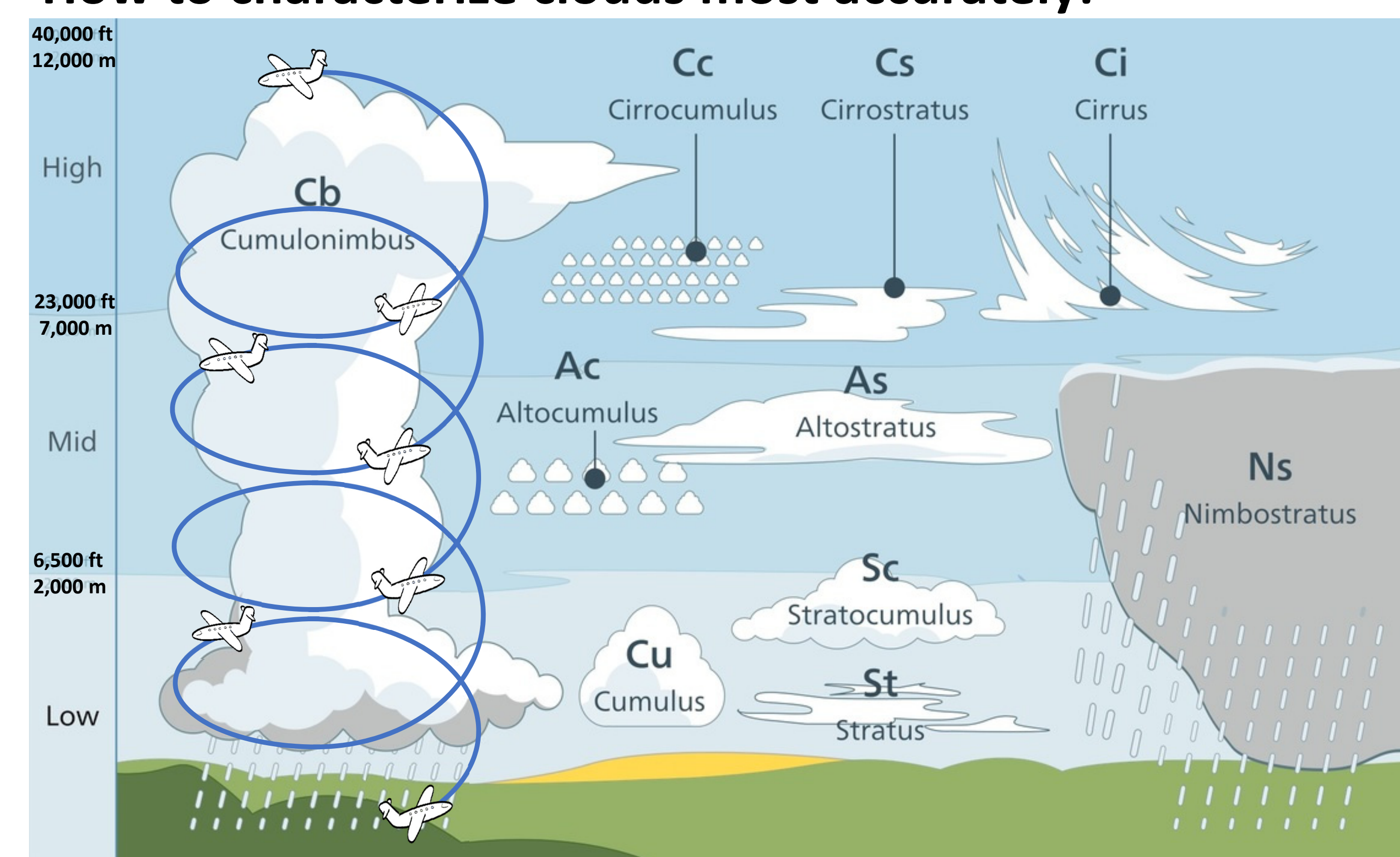


Measurements

Microwave radiometers provide the following measurements in all atmospheric conditions (including cloudy or misty conditions).

- Temperature profile
- Humidity profile
- Integrated liquid water content (clouds)
- Integrated water vapor
- Cloud particle phase
- Particle diameter
- Icing condition detection – supercooled liquid

How to characterize clouds most accurately:



Measurement of the integrated liquid water and total precipitable water during a spiral ascent allows to retrieve not only integrated values, but also very accurate, high resolution cloud liquid water and humidity profiles.

Specifications

- Operating temperature range: -40°C to +40°C
- Power consumption: ~75W
- Nominal voltage: 28 VDC
- Current: ~2.7 A
- Voltage range: 18 – 36 VDC
- Mass: ~5.4 kg
- Power & Ethernet connection to aircraft

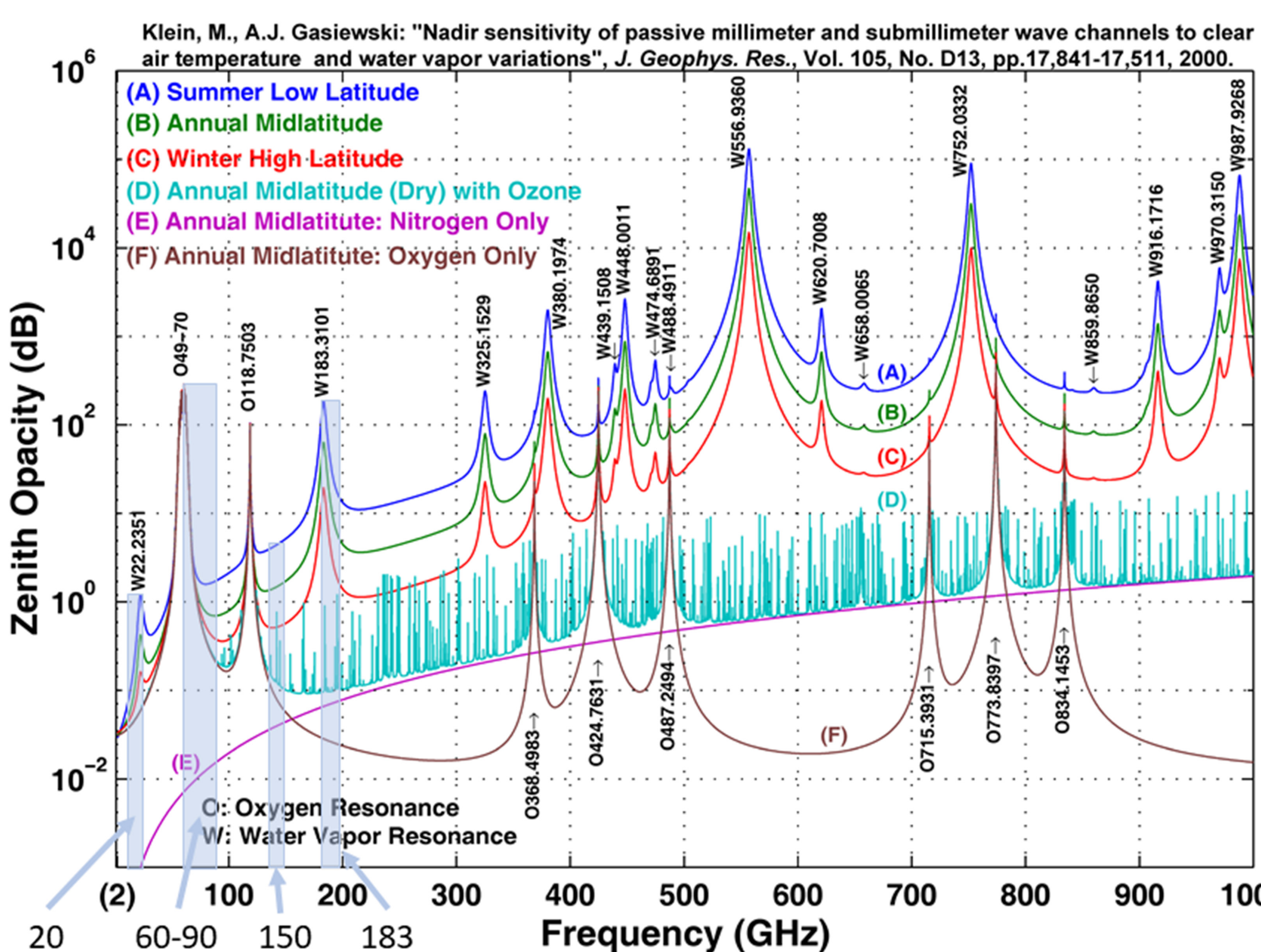
Innovations

- Integrated solution, each component is optimized for a radiometer
- Improved radiometer sensitivity – better resolution
- Improved calibration – better radiometer accuracy
- Modular design – each radiometer unit works independently
- Modular design – new units can be developed and added
- PAMR requires only power from the aircraft
- All supporting data (IMU, GPS, ambient) are observed by PAMR
- Small volume and low mass – less than 5.4 kg
- Less than 75 Watts power consumption
- Mass production leads to lower price

DOE ARM ArcticShark UAS is an ideal platform for the PAMR.



PAMR channels



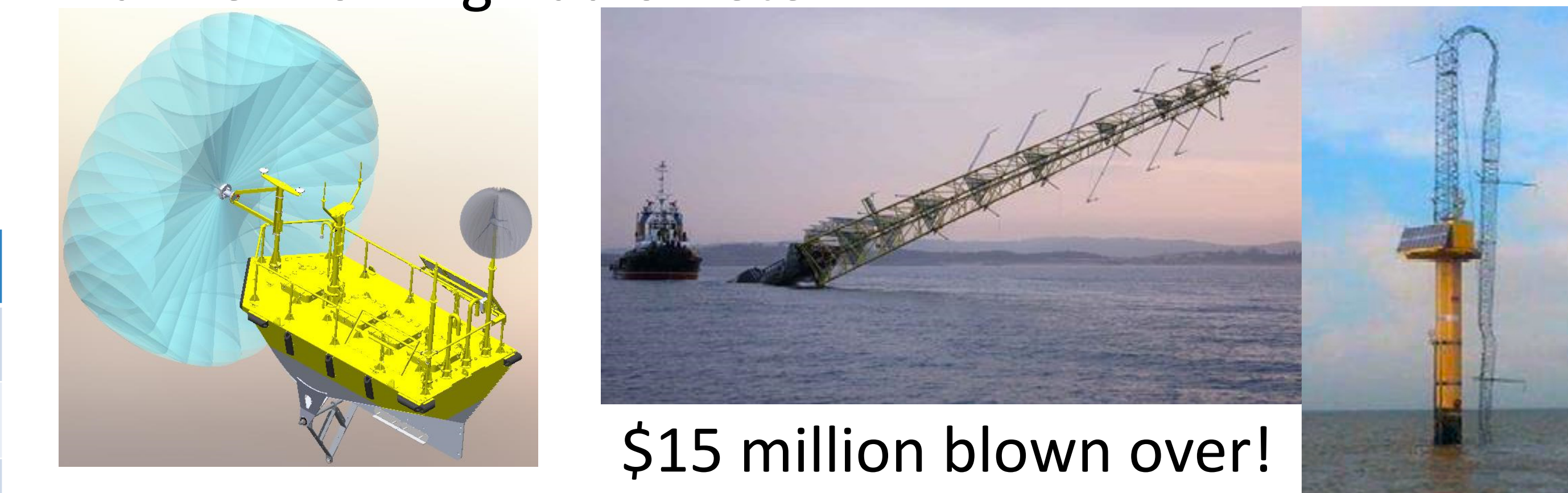
Data Acquisition Board

Specifications	
Mass (g)	21
Dimensions (mm)	75 x 48 x 7
Operating Temp (°C)	-40 to +85
Voltage (V)	4.5 to 17
Power Dissipation* (W)	1.62
* at 12V	

- Dual-core 204 MHz processor
- microSDHC card up to 64 GB
- SPI interface up to 20 Mbps
- 10/100T Ethernet
- Integrated FPGA with 8k discrete elements and DSP blocks
- 24 Analog-to-Digital channels (18-bit resolution) 1.6 Msps

Related work

Marine Profiling Radiometer



Deployable antennas for CubeSats and small satellites

