RainCube

RainCube, a Ka-band precipitation radar in a 6U CubeSat

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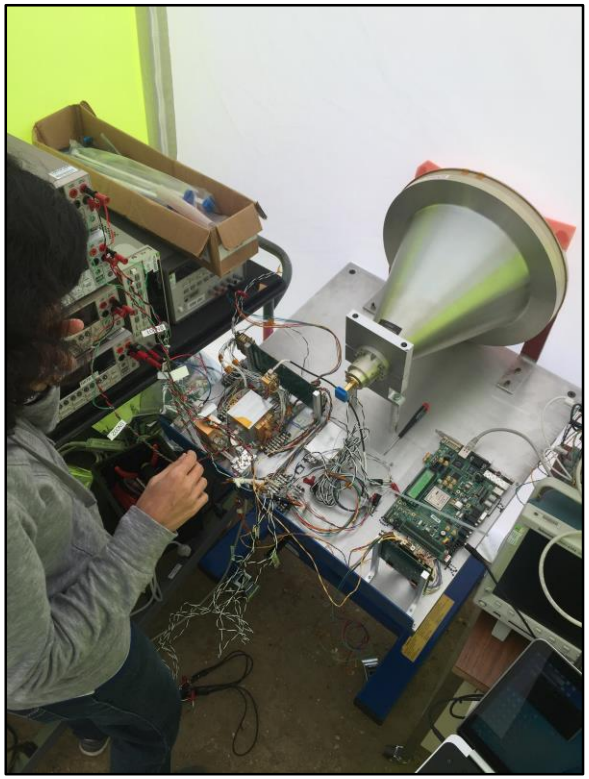
RainCube – Radar in a CubeSat

RainCube is a ***technology demonstration*** mission to enable ***Ka-band*** precipitation radar technologies on a low-cost, quick-turnaround platform.

- **Selected by ESTO through the InVEST-15 solicitation**
  - 6U CubeSat, with expected launch in 2018
  - Deployed from ISS with planned 3-month mission

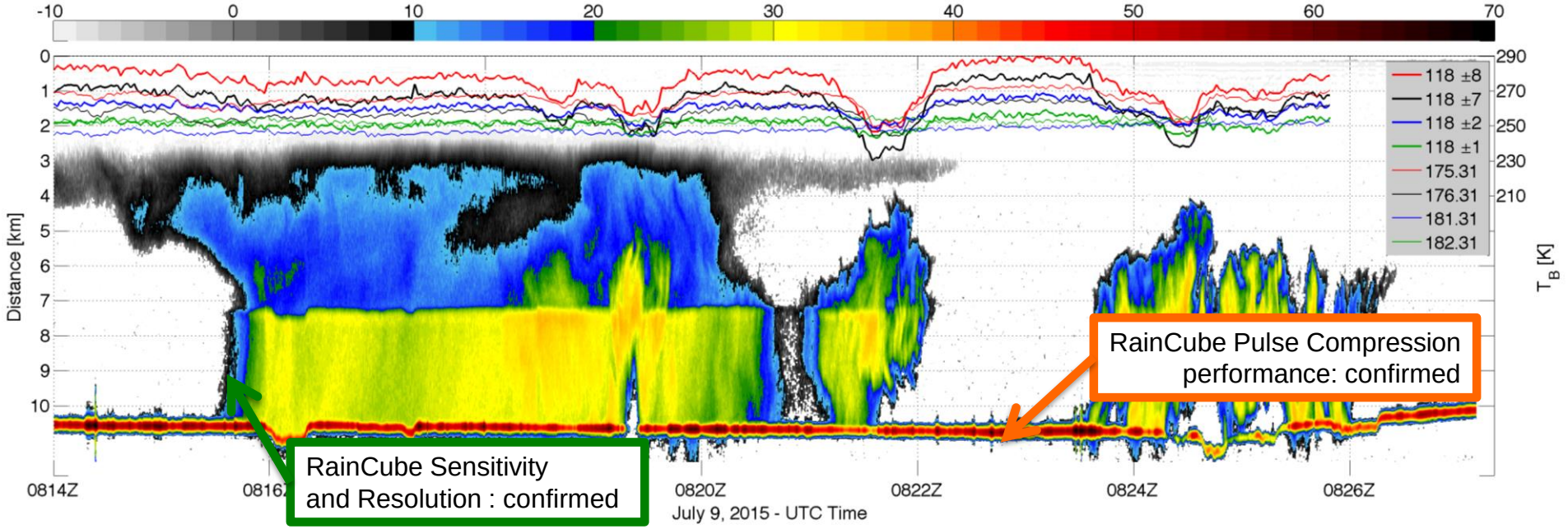
- **2 key mission objectives**
  - Demonstrate new technologies in Ka-band on a CubeSat platform
    - Miniaturized Ka-band Atmospheric Radar for CubeSats (miniKaAR-C)
    - Ka-band Radar Parabolic Deployable Antenna (KaRPDA)
  - Enable precipitation profiling radar missions for Earth Science



A novel atmospheric radar architecture

- **RainCube will demonstrate a precipitation profiling radar with reduced size, mass, and power**
  - Pulse compression → reduced transmit power
  - Offset IQ modulation from baseband to Ka band → fewer components & reduced power
  - Digital signal processing → optimal response

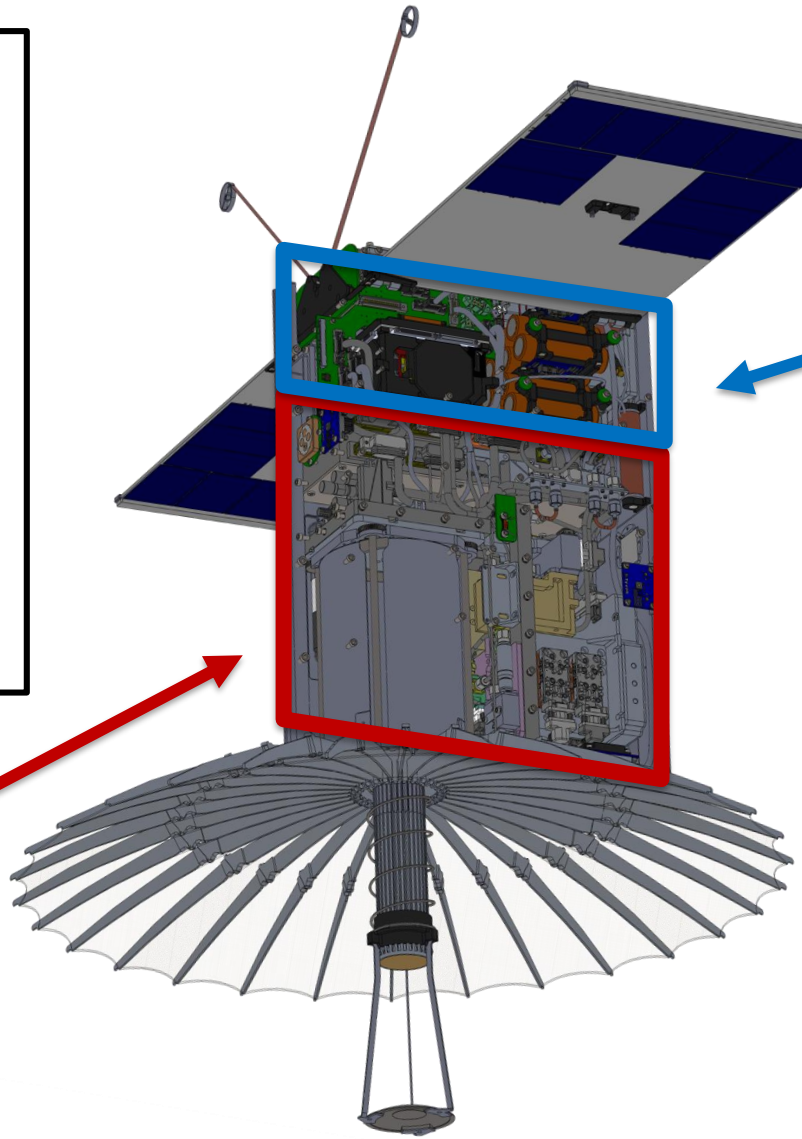
- **Critical elements were tested in a July 2015 airborne demonstration**



Tyvak is providing the spacecraft bus

Key Radar Requirements

- Vertically profile in 0-18 km altitudes
- 10 km horizontal resolution, 250 m vertical resolution
- 0.5m deployable antenna



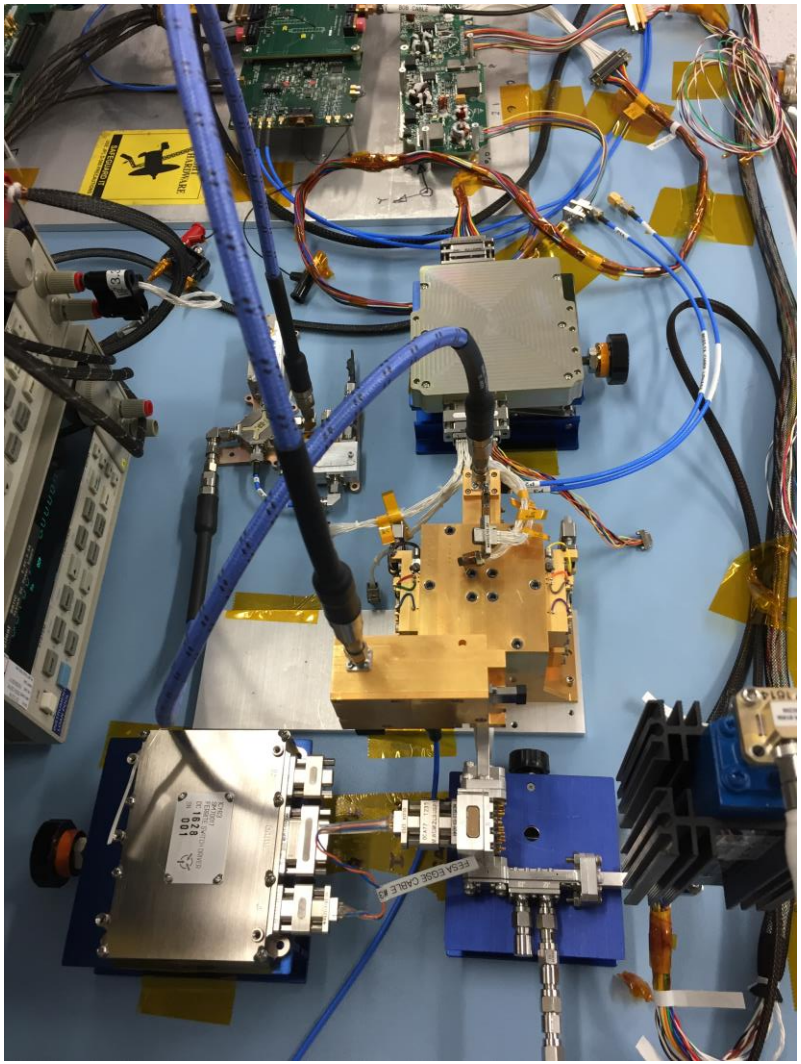
Bus (2U)

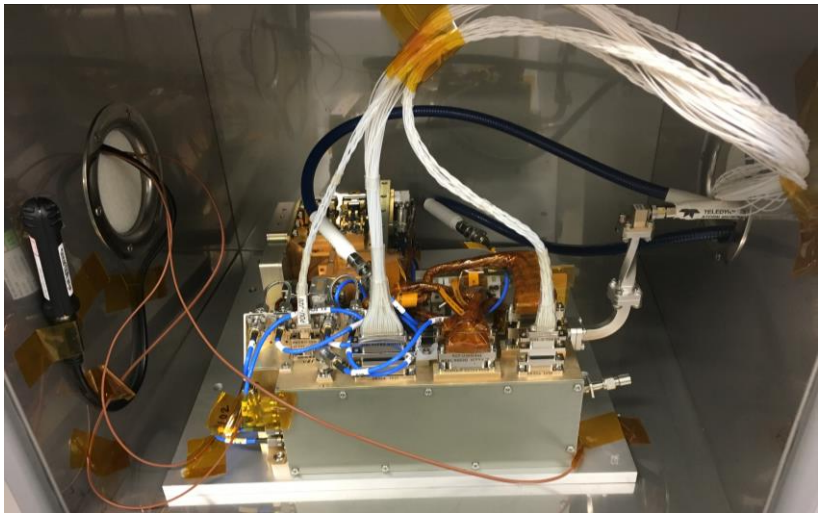
Radar (4U)

Key Bus Requirements

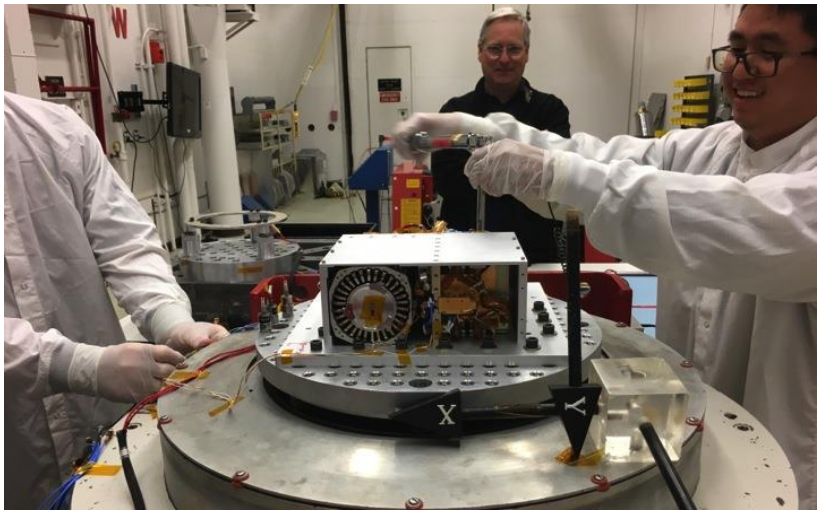
- Maintain a 25% radar duty cycle
- Operate through continuous orbits
- 12.1 Gb/week of payload data

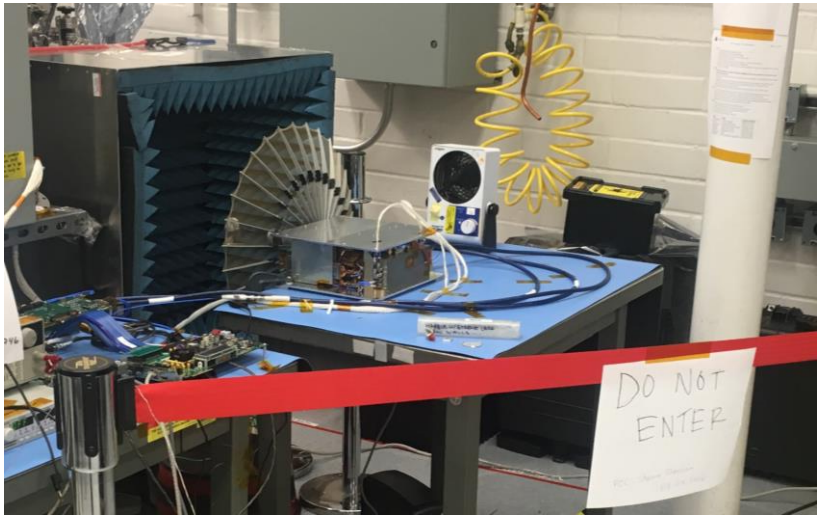
Radar assembly

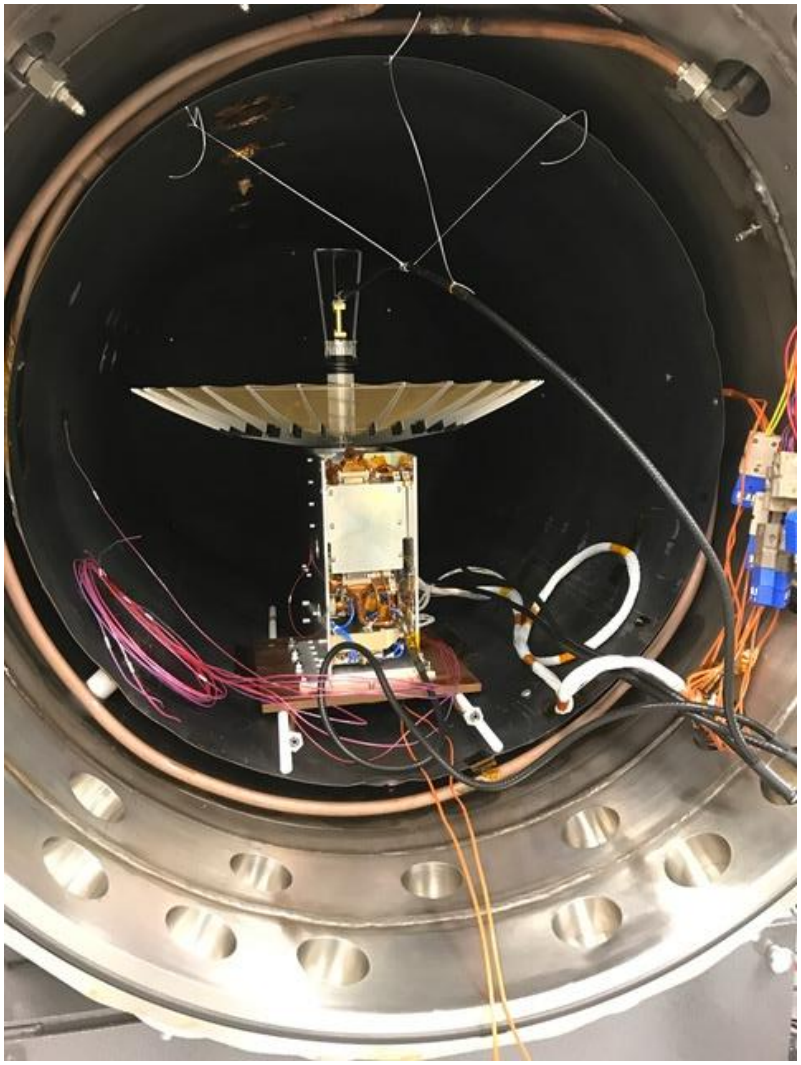




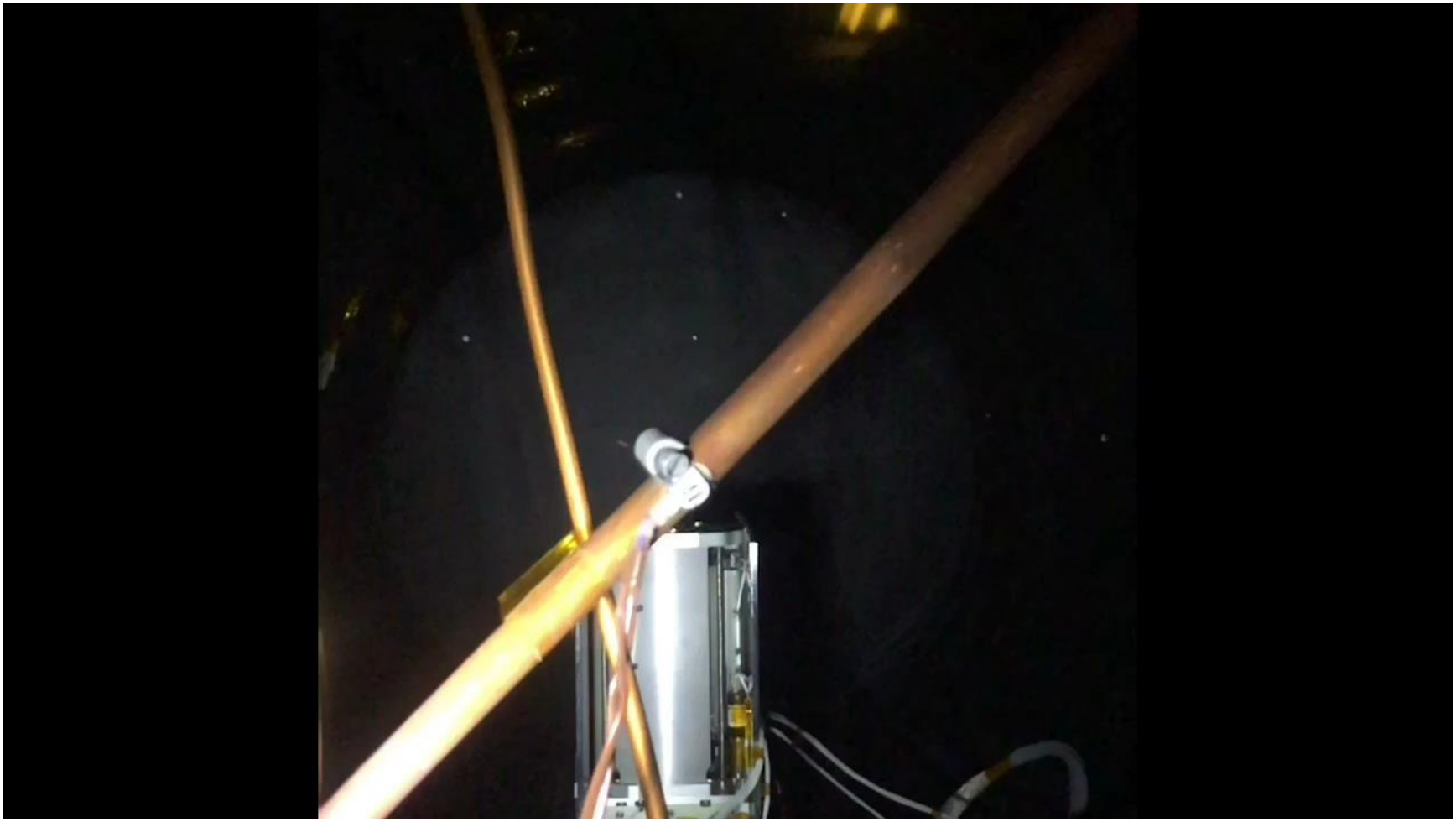
Radar environmental testing





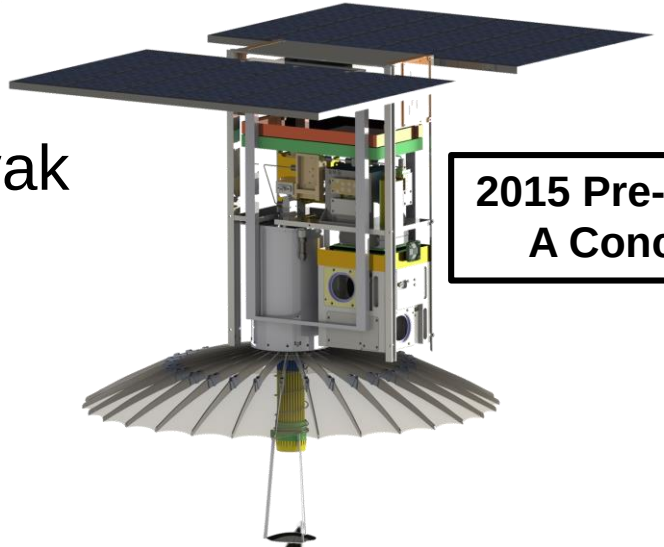


Antenna deployment

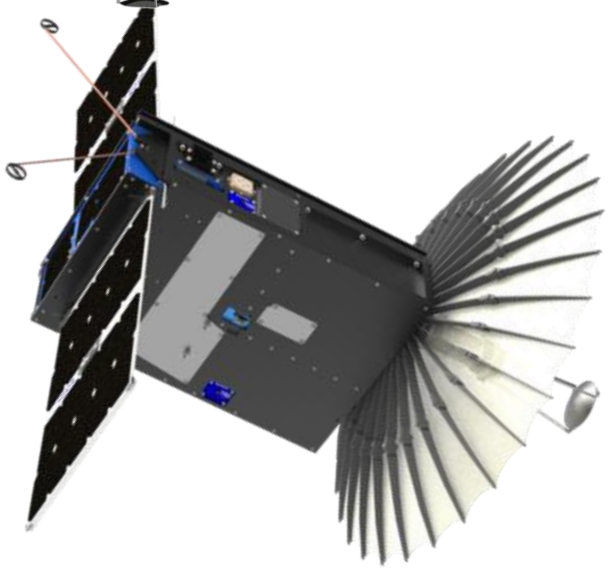


Upcoming milestones

- **May ‘17:** Radar delivery to Tyvak and begin of system I&T
- **Sept. ‘17:** Mission readiness review and delivery to storage
- **Mar ‘18 (est.):** Launch
- **May ‘18 (est.):** ISS deployment!
- **July ‘18 (est.):** Primary mission complete

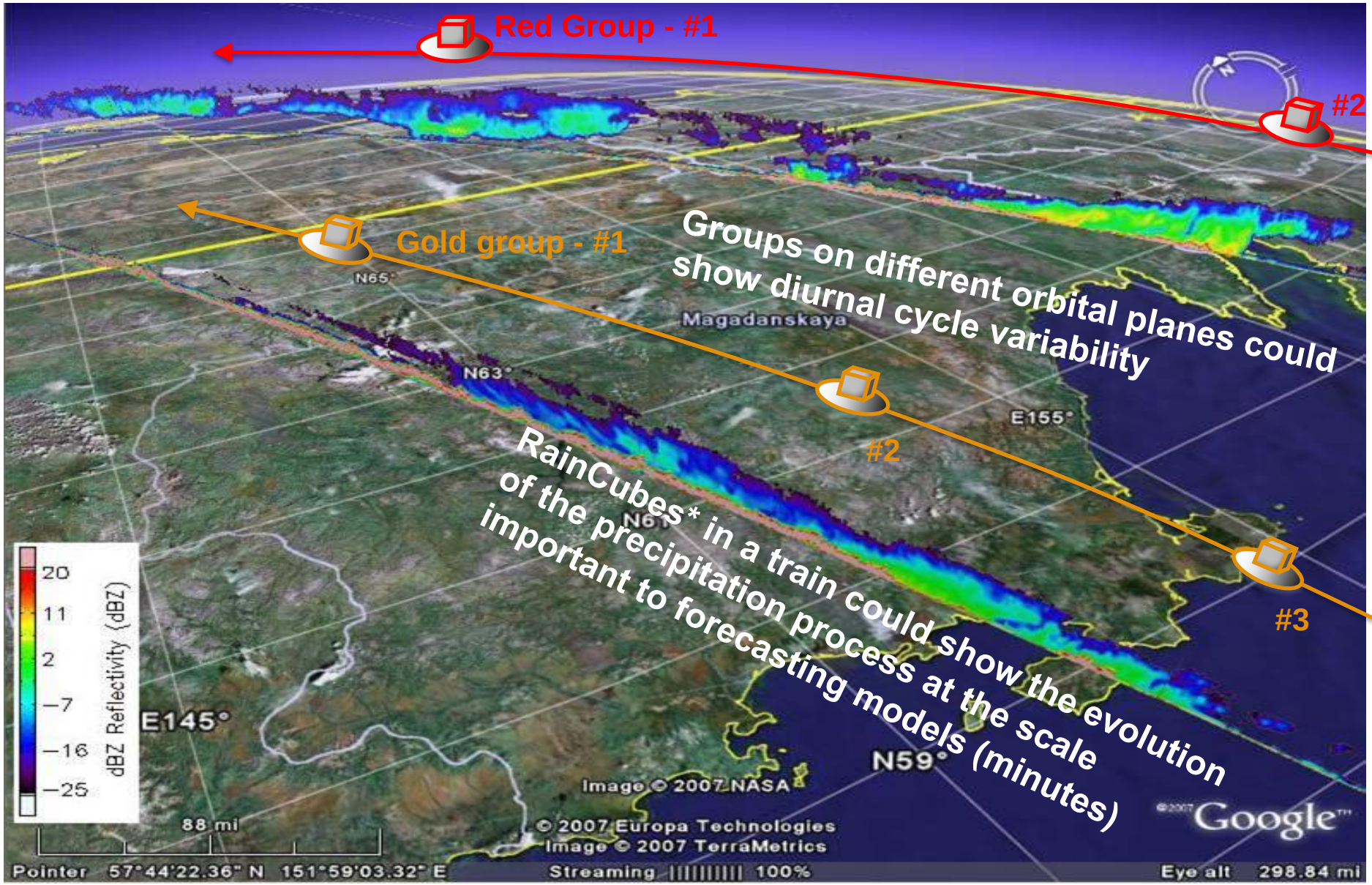


2015 Pre-Phase A Concept



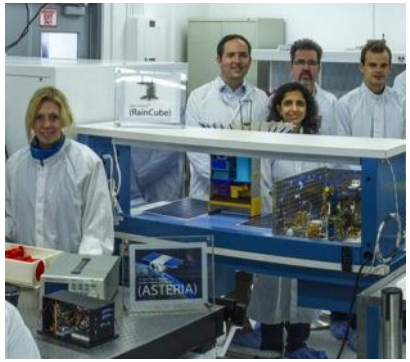
2017 Final Design

What could come after RainCube?

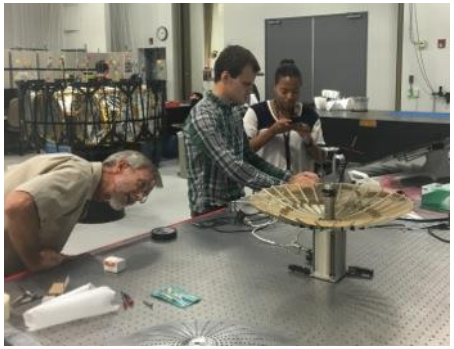


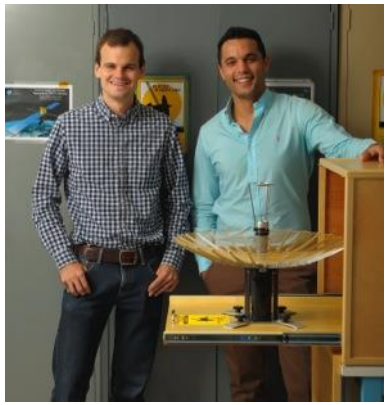
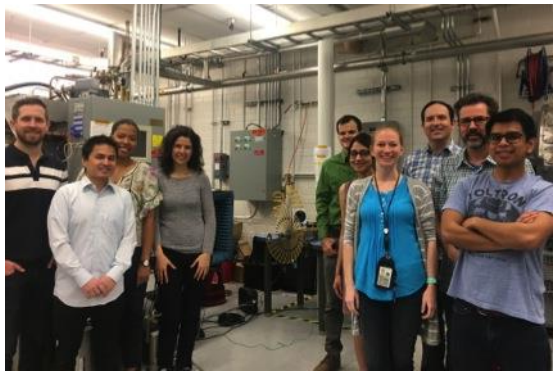
*Mission Concept – Pre-decisional – Planning and Discussion Purposes Only

Radar team hard at work








Questions?


RAINCUBE
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