The MethaneSAT Mission

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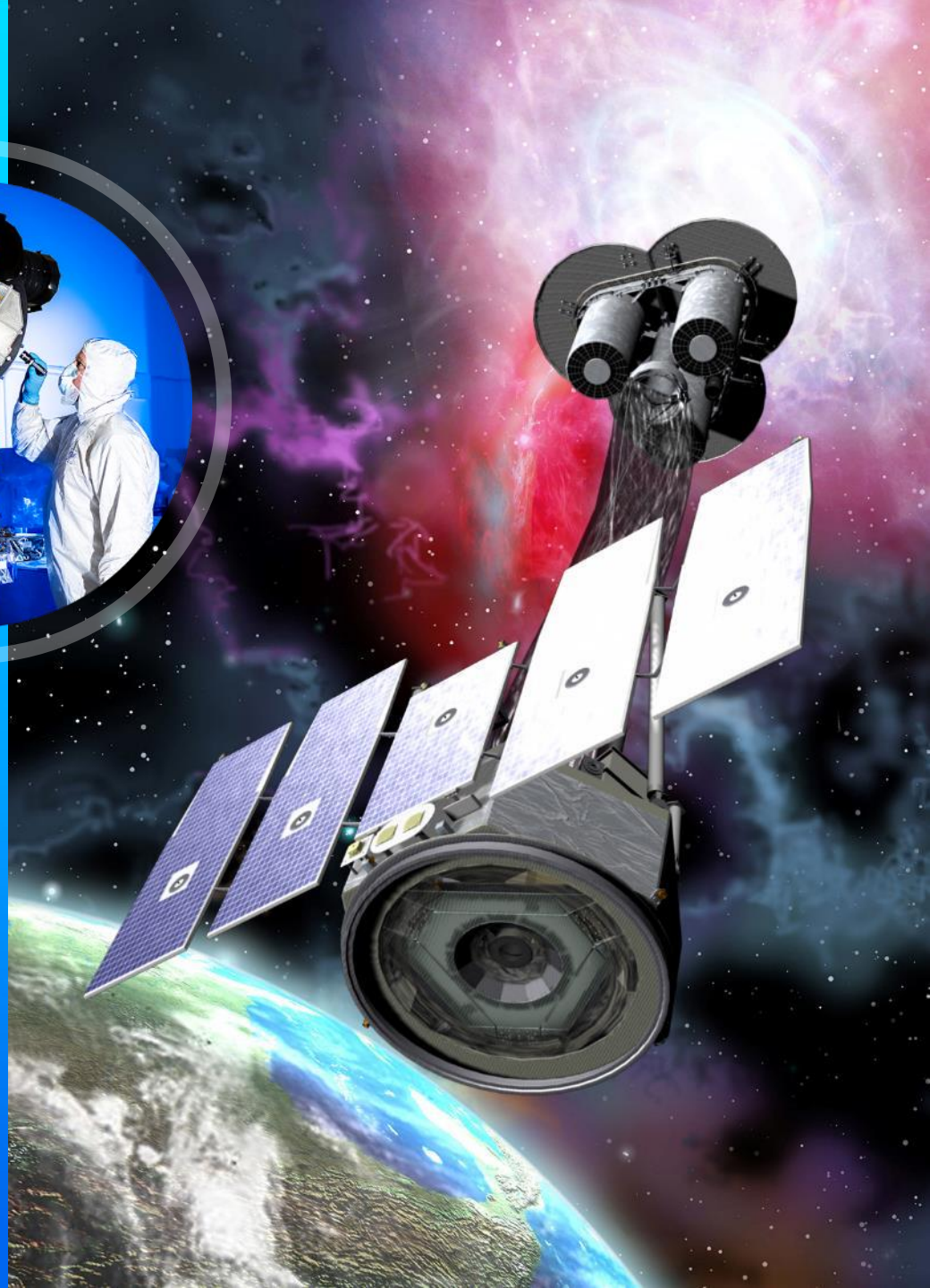


THE METHANESAT MISSION OBJECTIVE

Reduce methane emissions from oil and gas sector by 45% by the end of 2025

The Flight System will make measurements to support this objective.

- Why Methane: It has a shorter atmospheric lifetime compared to carbon dioxide, so has a faster impact on short-term warming
- Why now: The International Energy Agency has estimated that as much as 75% of fugitive methane emissions from oil and gas production could be reduced using presently available technologies, and much of that at no net cost as the recovered methane is a valuable commodity.

MISSION REQUIREMENTS

Goal is to fill the gap between global mapping satellites (low spatial resolution, moderately high precision) and point-source missions (high spatial resolution, but small field of view and lower precision)

- High spatial resolution – to accurately locate and attribute major emission hot spots and provide highly resolved area emissions;
  - MethaneSAT ground resolution is 100m x 400m per pixel
- A wide observing swath – to capture total regional emissions and provide the upwind data necessary for quantitative geostatistical inverse modeling of emission rates;
  - MethaneSAT swath width is ~200km when pointed nadir at 526km altitude
- Low detection threshold – to quantify the small gradients in diffuse area-aggregate emissions so detection threshold is low and effectively all emissions can be quantified;
  - MethaneSAT detection threshold is ~2pbb @ 1.5 km^2
- An agile platform – to accurately target emission regions off nadir, enable frequent target revisit and to enable critical calibration targeting maneuvers.
  - MethaneSAT can point up to 40° off-nadir

HOW DO WE COLLECT THE REQUIRED DATA

- Map targets over the globe
- 307 targets cover over 90% of global oil and gas production
- Optimize which targets are collected based on several metrics
  - Weather
  - Time since last capture
  - Geometry of capture
  - Constraint violation

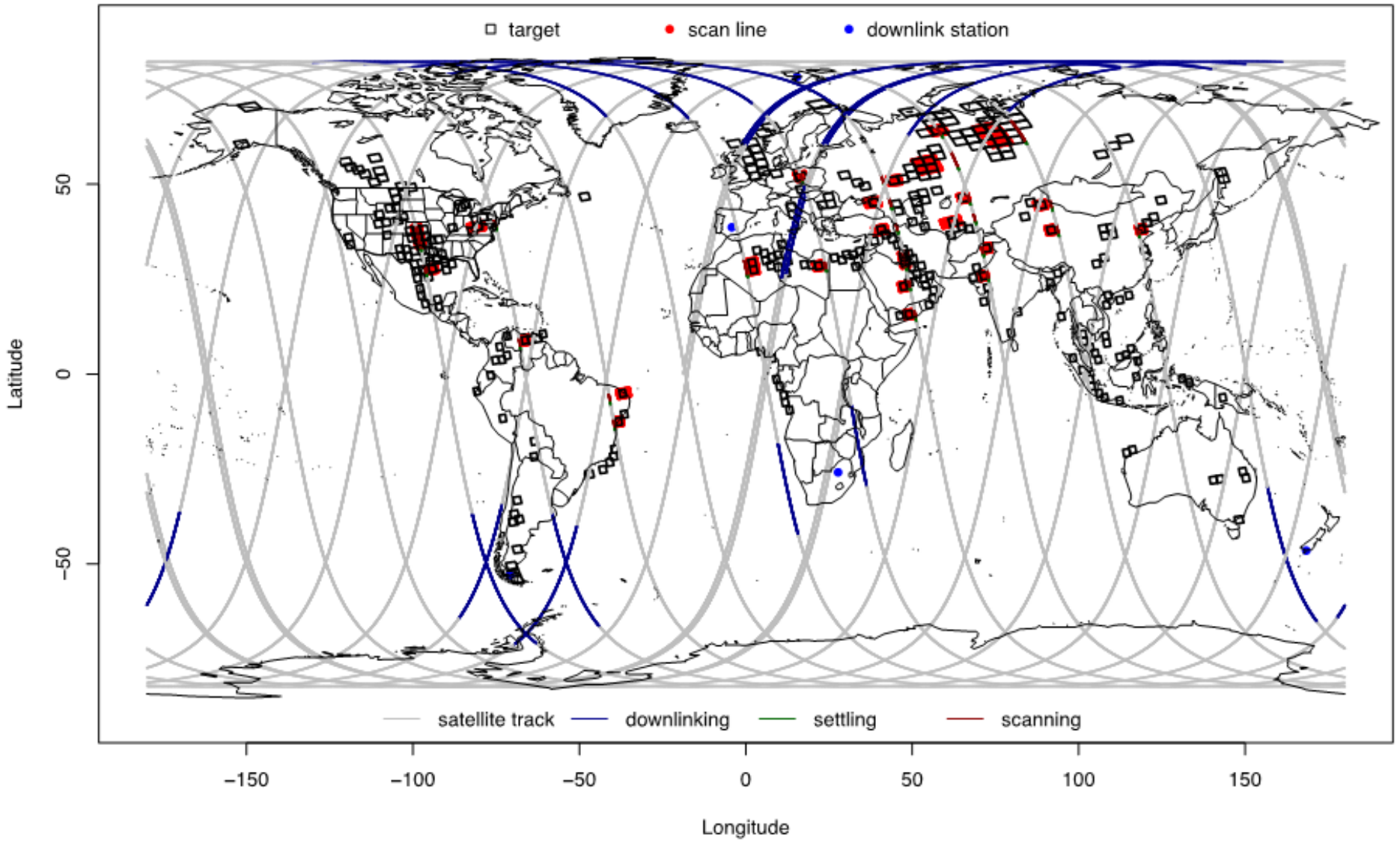
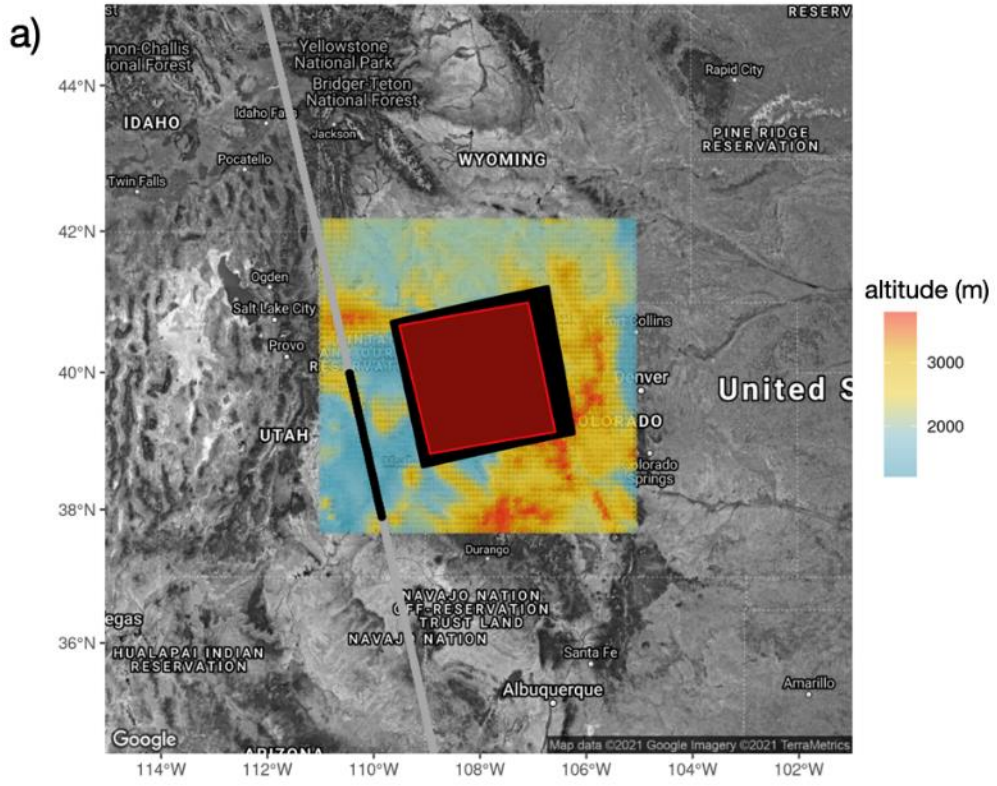
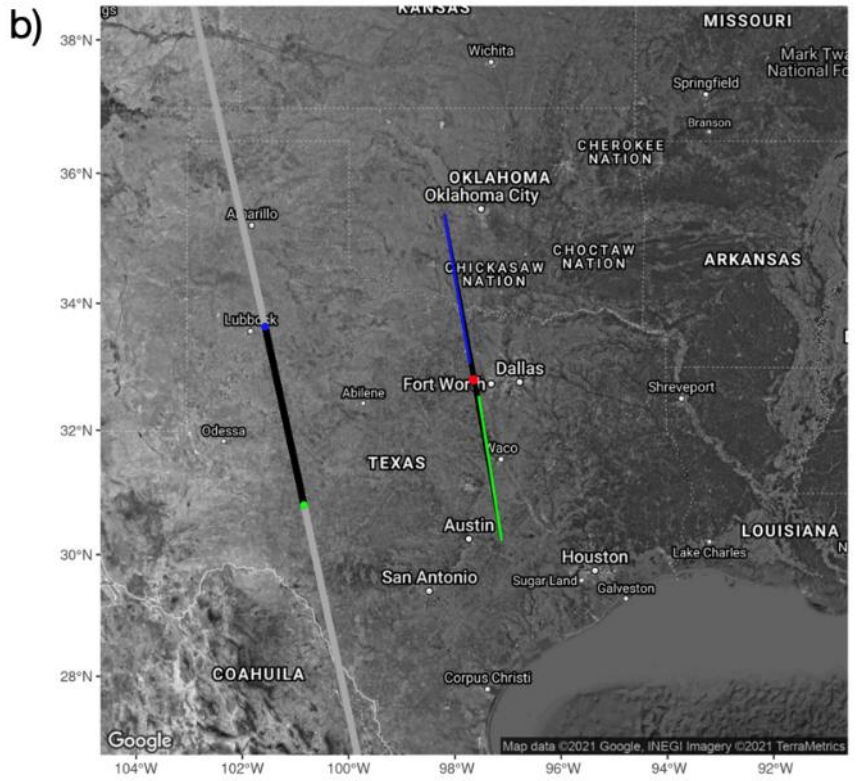


IMAGE CAPTURE

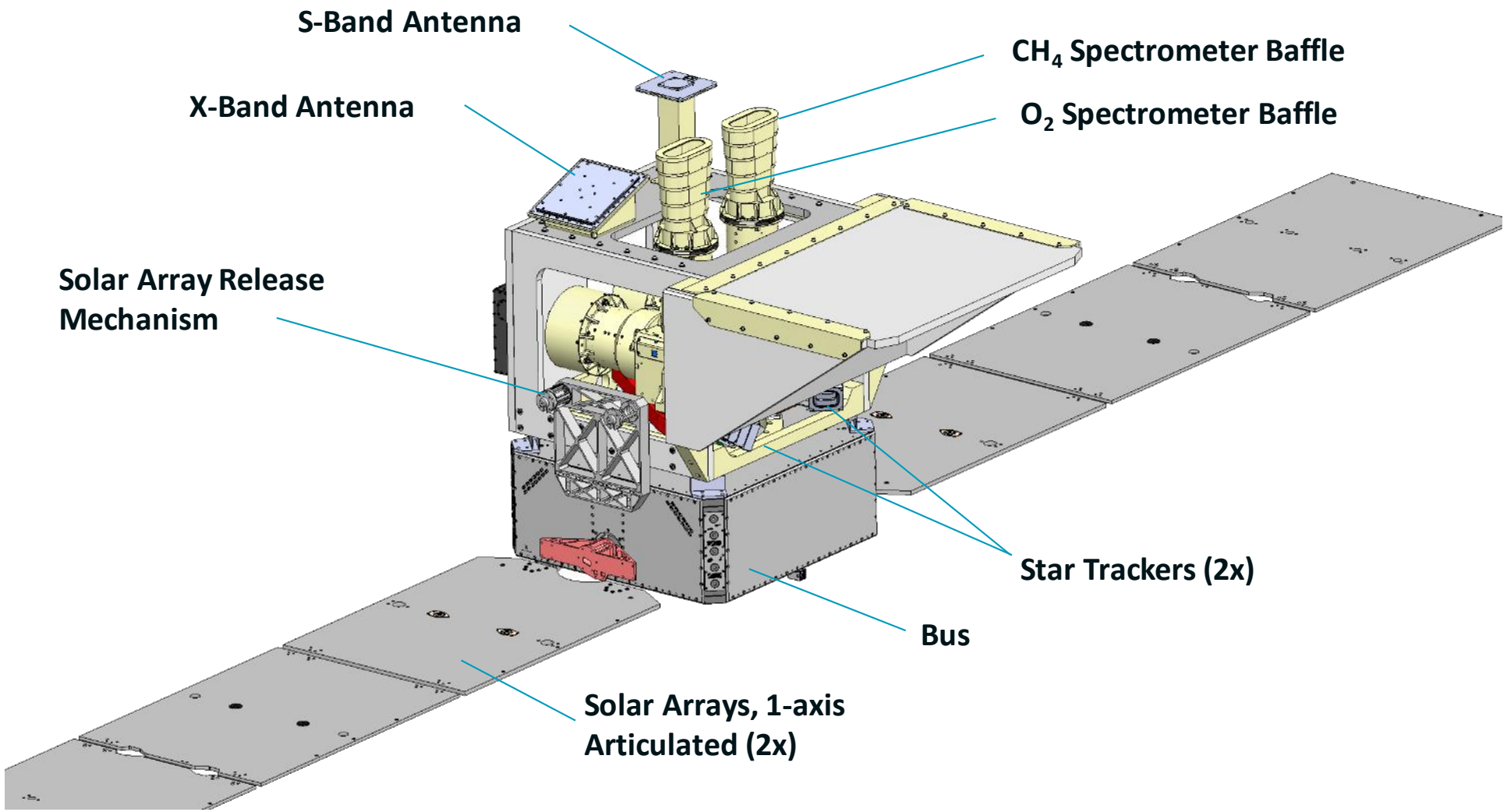
Standard target capture sweeps along track



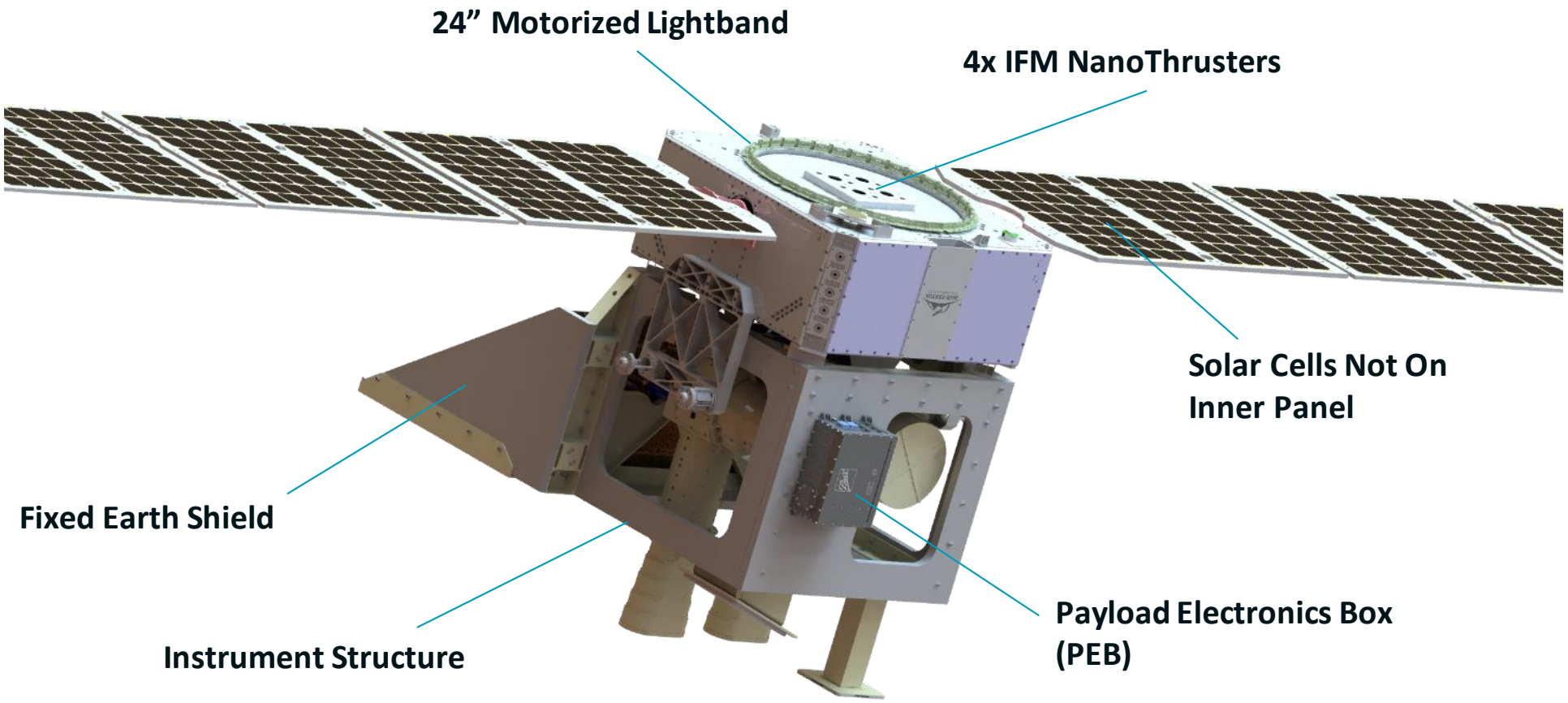
A vicarious calibration sweeps every pixel over the same location



SPACECRAFT CONFIGURATION (1 OF 2)



SPACECRAFT CONFIGURATION (2 OF 2)

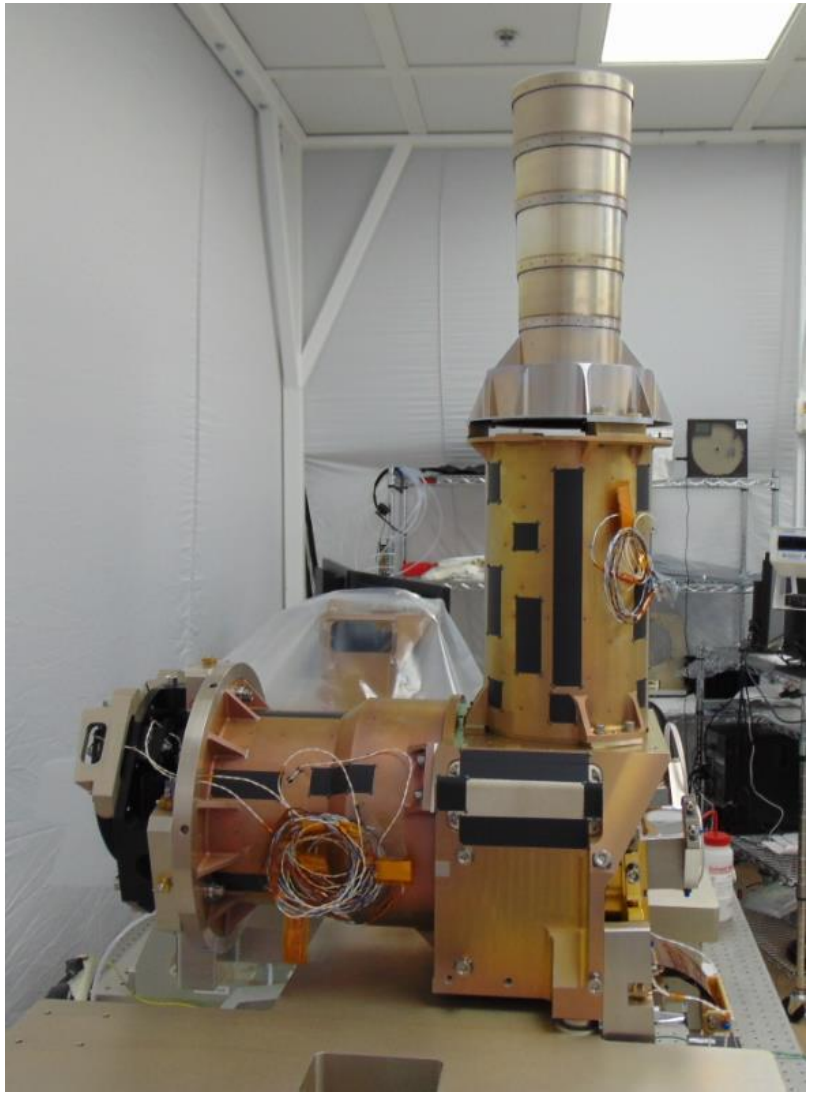


FOCAL PLANES AND ELECTRONICS

MECHANICAL AND OPTICS

- Spectrometers are a Littrow design
- Sensors have common objectives, and share materials within the spectrometers
- Sensor wavelengths
  - O2: 1249 – 1305 nm
  - CH4: 1605 – 1683 nm

- The oxygen spectrometer is complete
- Completed vibe test with spectrometer, objective, and focal plane
- Methane spectrometer is in alignment



CONCLUSIONS

- A mission and instrument were designed that support the mission objectives
- The instrument and bus are in fabrication and test
- The MethaneSAT mission is on-track for launch in Q4 of 2022

The MethaneSAT mission is poised to provide the data to reduce Methane emissions