The MethaneSAT mission: A new approach to quantifying area and point source methane emissions

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Oral

On 04 March 2024 MethaneSAT successfully detached from the SpaceX Transporter-10 rideshare mission rocket that carried the emissions-monitor into a sun-synchronous orbit at ~595 km. The groundbreaking satellite is designed to help protect the Earth's climate by accelerating reductions of methane emissions. Commissioned by MethaneSAT LLC, a subsidiary of the Environmental Defense Fund, MethaneSAT will map and quantify CH4 emissions from regions accounting for over 80% of global oil and gas production. Secondary objectives include observations of agriculture and urban areas.

The MethaneSAT mission aims to fill the critical data gap between global mapping satellites (low spatial resolution, moderately high precision), and point-source missions (high spatial resolution, but small field of view and low precision). MethaneSAT's target observations will consist of a wide observing swath (~220 km @ nadir), a high spatial resolution (~140 m x 400 m), and a low detection threshold (~2, 4 ppb precision @ 1.5 km2), enabling quantification of both concentrated as well as diffuse area-aggregate emissions associated with oil and gas production regions.

MethaneSAT's two imaging spectrometers (CH4/CO2: 1598-1683nm; O2: 1249-1305nm) were built by Ball Aerospace (now BAE) and integrated onto a spacecraft bus provided by Blue Canyon Technologies. Flight-system level ground calibration and characterization were completed during Q4 2023 ahead of installation into the Transporter-10 rocket in early 2024. Commissioning & on-orbit calibration activities are now underway with first light images planned for early Q2 2024.

An airborne precursor instrument, MethaneAIR, was successfully deployed in July/August 2021 aboard the NSF/NCAR Gulfstream V, and aboard a dedicated jet platform in 2023 when over 80% of US onshore oil and gas production regions were imaged. These measurements have been used to develop and challenge the trace gas retrievals and flux algorithms needed to complete the MethaneSAT mission. Additional flights are planned for July/August 2024 in support of MethaneSAT validation.

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