Hayoung
Park
Climate Lab, Graduate School of Environmental Studies, Seoul National University, South Korea
Jinyoung Shin, Nara Space Technology Inc., South Korea
Geuk-Nam Kim, Nara Space Technology Inc., South Korea
Jae-Pil Park, Nara Space Technology Inc., South Korea
Jaemin Hong, Climate Lab, Graduate School of Environmental Studies, South Korea
Seongwhan Lee, Nara Space Technology Inc., South Korea
Jungkyu Lee, Nara Space Technology Inc., South Korea
Kwangwon Lee, Nara Space Technology Inc., South Korea
Dong Yeong Chang, Climate Lab, Graduate School of Environmental Studies, South Korea
Yu-Ri Lee, Climate Lab, Graduate School of Environmental Studies, South Korea
Young-Jun Choi, Korea Astronomy and Space Science Institute, South Korea
Sujong Jeong, Climate Lab, Graduate School of Environmental Studies, South Korea
Oral
With the increasing demand for reliable Monitoring, Reporting, and Verification (MRV) systems in the global effort to mitigate anthropogenic greenhouse gas emissions, space-based monitoring has emerged as a prominent technology. Methane (CH4) is the second-most abundant anthropogenic greenhouse gas with a global warming potential of approximately 21 times greater than that of carbon dioxide (CO2) over a 100-year period. Thus, effective monitoring of methane emissions is crucial for establishing a dependable MRV system and ultimately achieving reductions in anthropogenic emissions.
In this study, we introduce the first Korean spaceborne methane monitoring project, Narsha. The Narsha project is a collaborative effort involving Nara Space Technology Inc., the Climate Lab of Seoul National University, and the Korea Astronomy and Space Science Institute. This project aims to develop and operate a methane observation microsatellite to detect and quantify methane emissions at a local scale from point sources.
The first Korean methane monitoring satellite of the Narsha Project is scheduled for launch in 2026 and will operate as part of a Low Earth Orbit (LEO) constellation. The primary payload comprises of a hyperspectral imager operating in the Short Wave Infrared (SWIR) spectrum, specifically detecting the weak methane absorption band between 1630-1675 nm. With a spectral resolution of approximately 0.1 nm, a ground sampling distance (GSD) less than 30 m, and a swath width of approximately 12 km at an altitude of 500 km, this imager enables the detection of point-source methane emissions at a local level, even amidst complex environmental backgrounds such as forests and urban areas. In addition, the satellite consists of on-board processing capabilites which include cloud detection and a high-speed communication system to ehance the accuracy of methane estimation and to streamline data processing.
As the first-ever satellite for the purpose of detecting and estimating methane emissions at a local scale, the Narsha project aims to support the development of a robust MRV system. This project aims to develop a satellite that provides reliable and timely point-source methane monitoring data to achieve the goal of reducing anthropogenic emissions of greenhouse gases.

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