IAF EARTH OBSERVATION SYMPOSIUM (B1)
Mitigating the Climate Crisis from Space (6)

Author: Mr. Tristan Laurent
France

Dr. Etienne Le Coarer
Institut de Planet. et d'Astrophysique de Grenoble IPAG/PLANETO, France
Mr. Thomas Hurot
Absolut System, France

GESAT CONSTELLATION: FIGHTING CLIMATE CHANGE BY MEASURING METHANE EMISSIONS FROM SPACE

Abstract

While carbon dioxide (CO2) is the main contributor to climate change, it is not the only anthropogenic greenhouse gas. Methane (CH4) is a potent greenhouse gas: its warming effect is 80 times greater than that of CO2. Most of it comes from human activity (oil and gas exploitation, mining industry, agriculture and landfills). Fortunately, methane has a short lifetime in the atmosphere, so reducing the amount of methane released will have a rapid, positive and visible impact on the climate change.

Solutions to measure methane emissions globally are needed to monitor, understand and predict climate change. These solutions will become a necessary tool for regulators to enforce emission rules, and for industry to limit pollution. A constellation of space-based instruments is the best suited solution for this task, thanks to its global coverage and rapid revisit. Existing space methane measurement instruments can detect methane leaks over 100 kg/h, but most emissions are too small to be seen: more than 50

Absolut Sensing is building GESat, the first european nanosatellite constellation dedicated to methane detection. The objective is to be able to detect methane emissions as low as 50 kg/h thanks to a novel instrument concept and the use of an infrared detector cooled to cryogenic temperatures.

The instrument is based on a miniaturized hyperspectral short wave infrared imager with a 25 m ground sampling distance and a sub-nanometer spectral resolution. To achieve these resolutions while maintaining a usable signal to noise ratio, detector readout noise and dark noise need to be minimal. The solution is to cool the focal plane to cryogenic temperatures.

The enabling technology is CRYASSY, an integrated dewar detector cryogenic assembly (IDDCA) developed by Absolut System. Based on a pulse-tube cryocooler, this miniaturized cryogenic system offers high performance and low vibrations in a compact form factor. Designed for smallsats and nanosats, it enables the use of a wide range of high performance, low noise infrared detectors for SWIR, MWIR and LWIR applications previously limited to bigger platforms.

Absolut Sensing will provide an end-to-end service to allow regulators and emitters worldwide to assess and reduce emissions. Daily measurements from our proprietary constellation will be fused with other third-party data to generate methane concentration and emission maps delivered in real time via an API.