Meter-scale retrieval of industrial methane emission using GHGSat's satellite constellation

Mathias Strupler1, Dylan Jervis1, Jason McKeever1, Daniel Varon1,2, David Gains1, Ewan Tarrant1, Joannes D. Maasakkers3, Sudhanshu Pandey3, Sander Houweling3,4, Ilse Aben3, tia Scarpelli5, Daniel J. Jacob2, and Stephane Germain1

1GHGSat Inc., Montreal, Canada (mas@ghgsat.com)
2School of Engineering and Applied Sciences, Harvard University, Cambridge, MA, USA
3SRON Netherlands Institute for Space Research, Utrecht, Netherlands
4Department of Earth Sciences, Vrije Universiteit Amsterdam, Amsterdam, Netherlands
5Department of Earth and Planetary Sciences, Harvard University, Cambridge, MA, USA

To reduce green house gases emissions, it is crucial to be able to give actionable feedback to industrial facility operators on their emissions. For this purpose GHGSat is building a constellation of satellites capable of monitoring and quantifying emissions from individual sites.

In 2016, GHGSat launched a demonstration satellite called GHGSat-D. It is the first and only satellite able to retrieve the methane column with a spatial resolution of less than 50 meters. We will present examples of detection and quantification of methane leaks in Central Asia using GHGSat-D. The retrieved methane column density shows plumes originating from known source locations and aligned with the local wind direction. The largest and most persistent of those sources was estimated to have an emission rate of 10-42 tons.h⁻¹, a magnitude comparable to the Aliso Canyon and Ohio blowouts. The complementarity of GHGSat's observations with other satellites observations will be highlighted using a comparison of GHGSat-D and Sentinel-5P in the same Central Asia region.

We will provide an update of GHGSat's constellation, with news from GHGSat-C1 (launch March 2020) and GHGSat-C2 (launch summer 2020). Lessons learned and improvements to the new satellites will be discussed. The anticipated vertical column density precision of GHGSat-C1 and C2 are 2% and 1% of background methane concentration respectively, compared to 13% for GHGSat-D. We will also introduce the data calibration and validation plans for the new satellites.
