

## **Satellite Formaldehyde Observations with S5P TROPOMI. Improvements and limitations**

**I. De Smedt, N. Theys, C. Lerot, H. Yu, J. Vlietinck, F. Romahn, P. Hedelt, Z. Cheng, k. Chan, D. Loyola, M. Van Roozendael, QA4ECV: A. Richter, S. Beirle, H. Eskes, K.F. Boersma, NID4VAL: G. Pinardi, C. Vigouroux, B. Langerock, MPC VAL: S. Compernelle, K.-U. Eichmann, J.-C. Lambert**

### **Abstract**

Formaldehyde (HCHO) is a reactive gas, which is mostly formed in the atmosphere during the oxidation chain of a large number of hydrocarbons emitted at the surface from natural or anthropogenic sources. Therefore, long-term measurements of HCHO columns allow monitoring and constraining hydrocarbon emissions.

The instrument TROPOMI has been launched in October 2017 onboard the S5P platform. It performs daily global measurements of the Earth's atmosphere with a spatial resolution and a signal to noise ratio that exceed by far the previous nadir UV-VIS spectrometers. With an overpass time in the early afternoon, TROPOMI extends and improves the measurements of its predecessor OMI, launched in 2004. The retrieval algorithms of the OMI HCHO QA4ECV product and of the TROPOMI HCHO operational product have been developed and validated in parallel. They share most of their settings and auxiliary data.

We present the 3 last years of tropospheric HCHO measurements with TROPOMI and compare them with the OMI 15 years' time series. We compare the detection limit of both instruments. We present the validation of both datasets with a large network of MAX-DOAS and FTIR ground-based instruments. Some events of the 3 last years are highlighted using TROPOMI observations, such as large wildfires and the lockdown due to the COVID crisis. Finally, the remaining limitations of HCHO observations with TROPOMI are discussed.