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Improved mapping of tropospheric air quality gases based on the Copernicus Sentinel 5 Precursor/TROPOMI mission

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Scheduled for launch in summer 2017, the Sentinel 5 Precursor (S5P) mission having onboard the TROPOMI payload will fly on a sun-synchronous polar orbit and provide daily global early-afternoon observations of a number of key atmospheric trace gases at the unprecedented spatial resolution of 7x3.5 km^2. By the early 2020's, S5P will be complemented by geostationary observations from the Sentinel 4 UVN instrument to be delivered at hourly resolution over Europe, and by mid-morning global observations from the low-earth orbiting Sentinel 5 mission. Altogether these missions will form a constellation serving the needs of the Copernicus Atmospheric Monitoring Services (CAMS).

Owing to their unprecedented spatial resolution and spectral performance, TROPOMI/S5P and the subsequent Sentinel 4 and 5 missions will significantly push forward monitoring capabilities addressing anthropogenic and natural emissions of air quality-related trace gases. They will also extend the long-term datasets from past and existing UV-Vis sensors (GOME, SCIAMACHY, OMI, GOME-2, OMPS). In this presentation, we explore the potential of S5P to improve on several aspects of the monitoring of tropospheric pollutants, with a focus on the short-lived species NO_2, SO_2 and HCHO. Based on algorithms designed at BIRA as part of TROPOMI/S5P and S4/S5 level-2 development projects, and their application to the current OMI and GOME-2 sensors, we illustrate and discuss the expected ability of the new sensors to detect smaller scale point sources with better accuracy and selectivity. The retrieval challenges associated with higher resolution measurements are also addressed.