EARTH OBSERVATION SYMPOSIUM (B1)
Earth Observation Applications and Economic Benefits (5)

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IDENTIFICATION AND CROSS-CHECKING OF LARGE POINT SOURCE SO2 EMISSIONS IN EUROPE USING OMI RETRIEVALS

Abstract

European SO2 emissions from large points sources (LPS) were cross-checked with satellite SO2 measurements from the Ozone Monitoring Instrument (OMI) on NASA's EOS-Aura satellite, averaged over a period of several years. Coordinates of the top-100 individual LPS in Europe were taken from the TNO point source database and corresponding OMI SO2 plots (ca. 100 x 100 km) were made. From the top-10 emitters in the LPS database, only ca. 50% was clearly identifiable. To interpret this surprising mismatch we compiled corresponding OMI NO2 plots and investigated on a plant by plant basis. This supported various improvements in the representation of LPS in the TNO-MACC emission inventory used in the GMES Atmospheric Core Service.

Some plants had shifted from coal to gas and were no longer (large) SO2 emitters but could be clearly identified in the OMI NO2 retrievals. In some cases the coordinates of the LPS were incorrect or allocation of emission to a LPS within the country was incorrect. In the latter case, the national SO2 emission was maintained but the location of emission should be adjusted. It was previously demonstrated that individual sources (or multiple sources within 50 km) with annual SO2 emissions greater than about 70 kT y-1 produce a statistically significant signal in 5-year averaged OMI data. When we used this threshold to verify the European Pollutant Release and Transfer Register (E-PRTR) reported emissions, most plants with emissions larger than 50-70 kT y-1 could be identified.

Thus the use of OMI SO2 retrievals is a promising tool for monitoring and identification of LPS emissions, especially in regions were high quality emission data is missing. However, we also established that in the case of Europe LPS only account for 25-30% of the total annual SO2 emission. Combining the traditional emission inventory approach with novel satellite retrieval interpretations provides added value, which may increase when satellite data with a better sensitivity to SO2 become available.