3.071 Ammonia revealed from space: from industrial and agricultural point sources to global trends.

Early Career Scientist

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Abstract:

Ammonia (NH_3) is presently high on the political agendas, mainly because it severely deteriorates air quality through particulate matter formation, affecting human health by increasing mortality and morbidity. In this work, we use IASI satellite retrieved NH_3 measurement to identify, categorise and quantify world's NH_3 emission hotspots. In particular, using a spatial oversampling technique, we present a ten-year average, enabling us to identify over 200 agricultural and industrial hotspots with associated point sources. More than half relate directly to fertilizer industry, but also other industrial sectors emerge as major emitters of NH_3. While calculated satellite-based emissions over large source regions are generally in line with what is reported in bottom-up emission inventories, our results suggest a drastic underestimation of point sources, in particular of industrial and agricultural origin. Using IASI to track NH_3 emission changes, temporal analysis revealed rapid shifts in anthropogenic activities, such as the opening or closure of industrial plants. These results demonstrate that using NH_3 satellite data will be hugely beneficial for improving conventional bottom-up emission inventories. We also derive trends on the region and global scales over the extended period covered by the IASI mission (from end of 2007 up to now) using a reanalysed dataset, in order to avoid the discontinuities identified in the near-real time dataset. Distinct patterns of emissions are extracted over the ten years of space measurements and these are analysed in light of anthropogenic activities occurring on ground.