Geophysical Research Abstracts
Vol. 19, EGU2017-12684, 2017
EGU General Assembly 2017

Unaccounted variability in NH3 agricultutral sources detected by IASI contributing to European spring haze episode

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Ammonia (NH3), which main source is agriculture, is an important precursor gas for particulate matter concentrations. For the first time, we derived ammonia emissions from space, using NH3 total columns from the IASI instrument onboard Metop-A, at a high resolution (grid-cell of 0.5° x 0.5°, at a daily scale), for the European spring haze episode of March 2014, 8th to 15th. During this period, IASI reveals higher NH3 emissions than in the European reference EMEP inventory over Central Europe (especially over Germany, Czech Republic and eastern France), exhibiting in addition a large day-to-day variability. This suggests emissions due to punctual spreading practices, that are difficult to anticipate with an inventory-based approach.

The increase or NH3 emissions, that could reach +300% locally, leads both to an increase of NH3 and PM25 surface concentrations and conducts to a better comparison with independent measurements (in terms of bias, root mean square error and correlation). The robustness of this preliminary study is promising for future quantification of NH3 emission estimates by atmospheric inversions.