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Tropospheric composition measurements with IASI: from emission sources to the long-range transport of pollution

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Even though atmospheric composition has been measured from satellites for several decades, providing invaluable information on our environment, the use of the infrared spectral range to probe the troposphere is relatively recent and not fully explored. IASI, the Infrared Atmospheric Sounding Interferometer onboard the MetOp-A meteorological satellite is a thermal infrared spectrometer that offers advanced performances in terms of spectral range and resolution, and spatial sampling and coverage. Operating in the nadir geometry with a cross-track scanning mode, it provides local (12 km ground pixel size at nadir) to global measurements twice a day, allowing for new classes of atmospheric species and processes to be studied.

This work surveys the capabilities of IASI to measure simultaneously a suite of gaseous species emitted from natural processes (wildfires, volcanoes) or from human activities (fossil fuel burning, agriculture), which are deeply involved in tropospheric chemistry and which, for some, directly impact on air quality. We highlight the potential of IASI to identify confined sources and to track the transport of pollution over long distances. A particular emphasis is given here to the measurements of reactive species in the boundary layer close to the source regions.