Ozone pollution outbreaks over East Asia analysed by synergism of novel IASI+GOME2 multispectral satellite observations, models and in situ measurements

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Abstract

Advanced analysis of satellite observations is a new very promising approach to analyse the evolution and transport of tropospheric ozone pollution plumes at the regional scale. Recently, an innovative multispectral approach has been developed, which combines IASI IR observations and GOME-2 UV measurements (Cuesta et al., 2013). This unique multispectral approach allowed the observation of ozone plumes in the lowermost troposphere (below 3 km of altitude), for the first time from space. The current presentation will show the characterization of a major lowermost tropospheric ozone event over East Asia (including China and Japan), during the springtime of 2009, based on a unique synergism of innovative multispectral satellite observations, ground-based measurements and state-of-the-art regional model simulations. We will assess the dynamics of lower tropospheric ozone over East Asia, studying the associated transport patterns, meteorological conditions and atmospheric composition. A key question that will be addressed is the identification of the origin of the pollution outbreak and the evolution of photo-chemical production along transboundary transport.

1. Analysis of Ozone pollution over East Asia by IASI+GOME2 synergism with other observations and models

2. Lowermost troposphere ozone by IASI+GOME2

The estimation of ozone enhancement with IASI+GOME2 is in between the sensitivity enhancement towards the surface: AVK at the lowermost troposphere (<3km) peaks around 2 km over land.

Following the evolution of O, and CO on the blue square: from China (on 3-5 May), transported over the Korean Peninsula (6-7 May) and over the ocean and Japan (8-9 May)

The authors thank the laboratories of LATMOS/ULB (C. Clerbaux) for providing IASI measurements.

Global production and dissemination of IASI+GOME2 observations by the French data centre AERIS starting in 2016

New developments: three band TIR+UV+VIS ozone retrieval and multispectral retrieval of aerosols AEROMETOP

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4. Summary

The multispectral IASI+GOME2 satellite approach provides a new observational characterisation of ozone pollution

- Unique observations of ozone plumes around 2 km of altitude, in good agreement with ozonesondes and consistency with surface observations
- The synergism of IASI+GOME2 with models and in situ observations has proven to be a powerful tool for:
  - Analysing ozone pollution at Europe and East Asia, showing the 3D distribution of plumes and their evolution along transport
  - Correcting chemistry-transport models via assimilation

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