

Development of Solar Backscatter Satellite Instrumentation in Europe: New science enabled by OMI and TROPOMI

Pieter Levelt

New ACOM Director, NCAR/UCAR
The Royal Netherlands Meteorological Institute
and Delft University of Technology

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Abstract:

In the 19th and 20th century the chemical composition of the atmosphere changed drastically as a result of human activities. The recently deceased Dutch Nobel Prize winner Paul Crutzen therefore referred to this time period as the Anthropocene: the geological epoch during which humans have significant impact on Earth's geology and ecosystems. The rapid worldwide growth of megacities, and its associated strong increase in air pollution, is a clear example of this. Such developments will continue in the coming decades, despite the recent re-enforcement of the climate agreement in Paris (2015), in which the reduction of greenhouse gas emissions has been put on the agenda. Even the current global COVID-19 crisis, which led to unprecedented lockdown measures resulting in a significant reduction of air pollution and CO₂ emissions, is not expected to lead to a long-term emission reductions that will benefit air quality and climate change. Nevertheless, we can learn from this crisis, not only in terms of atmospheric chemistry, but also in measures we can take to successfully improve our air quality.

In the last decades our capability to measure the chemical composition of the atmosphere with satellites did grow tremendously. With the innovative Dutch satellite instruments OMI and TROPOMI daily global maps of air pollution and greenhouse gases are measured on sub-urban spatial resolution. These instruments revolutionized our capability to measure air pollution from space.

In this seminar I will give an overview of the development of solar backscatter satellite instrumentation in Europe, focusing on OMI and TROPOMI, alongside with the new science that has been enabled by these instruments. Results from recent research, investigating the presence of COVID-19 related footprints in air quality by exploiting the NO₂, SO₂, CO, HCHO and CHOCHO observations of the TROPOMI instrument, will be discussed. An outlook will be given on expected developments in satellite observation capabilities in the next decades to come, what developments I foresee that will improve our understanding of emission sources, and new areas to study, like Africa.

Live webcast: <https://operations.ucar.edu/live-acom>