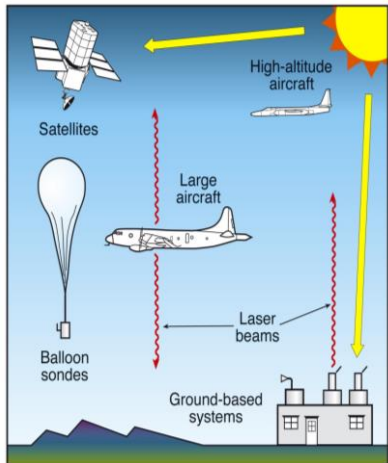


R. Van Malderen¹, H.G.J. Smit², R. Blot³, T. Leblanc⁴, C. Vigouroux⁵, I. Petropavlovskikh⁶, F. Hendrick⁵, M. Vanroozendael⁵, A. Cede⁷, T. Hanisco⁸, O. Cooper⁹, and WG members

¹ RMI, Uccle, Belgium, ² FZJ, IEK-8, Jülich, Germany, ³ Laboratoire d'aérodologie (LA), Toulouse, France, ⁴ JPL/Caltech, Wrightwood, USA, ⁵ BIRA, Uccle, Belgium, ⁶ CIRES & NOAA/GML, Boulder, USA, ⁷ Luftblick, Innsbruck, Austria, ⁸ NASA/GSFC, Greenbelt, USA, ⁹ NOAA/CSL, Boulder, USA

What are the differences between the vertical tropospheric ozone distributions measured by different ground-based instruments and how can we harmonize the different data sets for tropospheric ozone (trends) assessment?

Tropospheric ozone profiling techniques



Established Techniques :

- **Ozonsondes:** Electrochemical balloon-borne sondes
- **Lidar:** UV-DIAL = Differential Absorption Lidar in UV spectrum
- **FTIR:** Fourier Transform Infra-Red of solar absorption spectrum
- **IAGOS:** UV Photometer aboard In-Service Aircraft
- **Brewer/Dobson Umkehr:** measuring intensity ratios at spectrophotometer UV wavelength pairs

New Techniques:

- **MAX-DOAS:** Multi-Axis Differential Optical Absorption Spectroscopy
- **Pandora:** DOAS technique with Pandora UV-VIS spectrometer

Internal consistency within the networks

- **Harmonization** of operating procedures/correction algorithms at/between different sites
- **Quality assessment:** uncertainty estimates (random vs. systematic), quality flags, traceability to common standard?
- **Data archiving:** versioning? Natural coordinates!
- **Achievements** so far:
 - **ozonsondes:** 6 more sites homogenized ($\pm 10/50$ remaining), standard operating procedures published
 - **IAGOS:** internal consistency paper published in AMT, simulation chamber comparison of IAGOS-CORE UV-photometer and reference photometer for ozonsondes
 - **Lidar:** TMF data has been updated with new data processor, OHP will follow
 - **FTIR:** flagging applied to the NDACC data
 - **Brewer/Dobson Umkehr:** 5 Dobson Umkehr sites have been homogenized (paper submitted to AMT), 1 to go. Updated uncertainty estimation of the retrievals.

External consistency: intercomparison

- cross **intercomparison** of data among different networks, but also with satellites/models
- characterization and evaluation of instrumental **drifts** among the different datasets

External consistency: intercomparison (continued)

- study the **spatial and temporal representativeness** of ground-based free tropospheric measurements, in collaboration with TOAR-II satellite and reanalysis focus groups
- **development** of free-tropospheric ozone retrieval algorithm with MAX-DOAS & Pandora at and comparison with other ground-based free tropospheric ozone data

Future research topics

- support TOAR-II satellite ozone focus working group to determine drifts and biases between satellite ozone retrievals
- assessment of the tropospheric ozone distribution and trends of tropospheric ozone.

<https://igacproject.org/hegiftom-focus-working-group>

