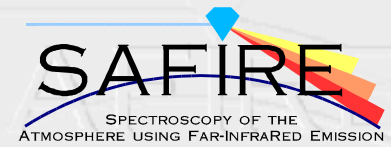


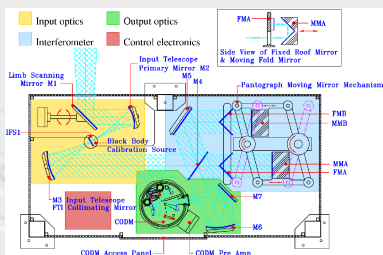
SAFIRE/A Measurements of O₃, HNO₃ and N₂O Vertical Distribution for MIPAS-ENVISAT validation

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The SAFIRE/A spectrometer after installation onboard the M55 Geophysica stratospheric aircraft



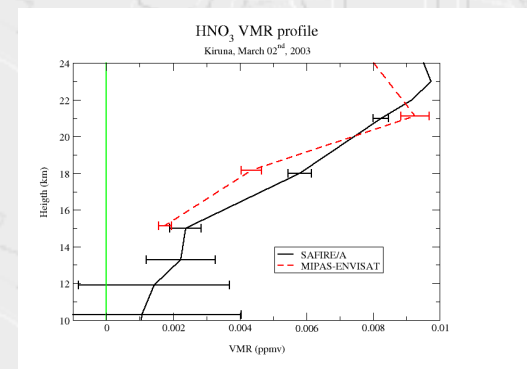
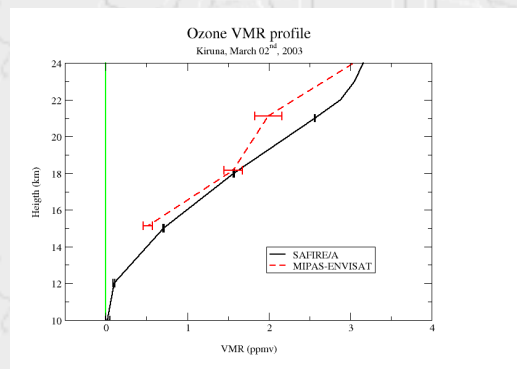
Schematic of the SAFIRE/A Fourier transform spectrometer optical layout

Instrument type	polarising FTS
Dimensions	1800 x 880 x 650 mm
Weight	387 kg
Observation technique	limb-sounding
Acquisition time	12-24-48-96 s
Number of detection channels	2
Operating spectral range	10-250 cm ⁻¹
Spectral resolution	0.004 cm ⁻¹
Spectral signal-to-noise ratio	> 500
Vertical field of view	0.57°
Flight altitude	~ 20 km
Vertical resolution	~ 1.5 km

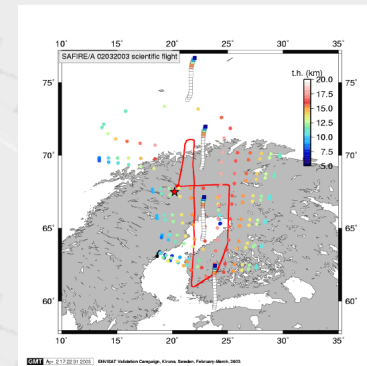
Main characteristics of the SAFIRE/A Fourier transform spectrometer

The SAFIRE/A (Spectroscopy of the Atmosphere by using Far-Infrared Emission / Airborne) Fourier transform spectrometer has been part of the core remote-sensing chemistry payload that was flown onboard the M-55 Geophysica high altitude aircraft during two mid-latitude campaigns carried out in July and October 2002, and an arctic campaign performed in February-March 2003 with the aim of validating the level-2 products of the ENVISAT chemistry instruments.

Specific tasks of the SAFIRE/A limb sounding observations have been the validation of MIPAS O₃, HNO₃, N₂O and H₂O vertical distribution in the altitude range between the aircraft altitude (approx. 20 km) and the tropopause level. Results of measurements performed during an arctic and a mid-latitude flight are presented here. Vertical VMR (Volume Mixing Ratio) profiles acquired by SAFIRE/A are compared with those obtained by different in-situ sensors during the ascent and descent phases of the flight for an internal consistency check. Comparisons with the MIPAS-ENVISAT data for these target species are discussed and all the relevant information useful for their validation is highlighted.

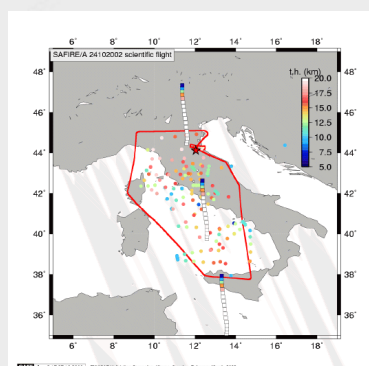
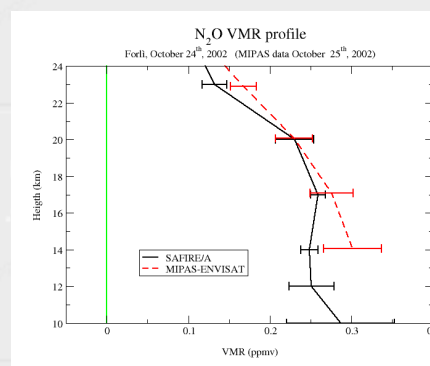
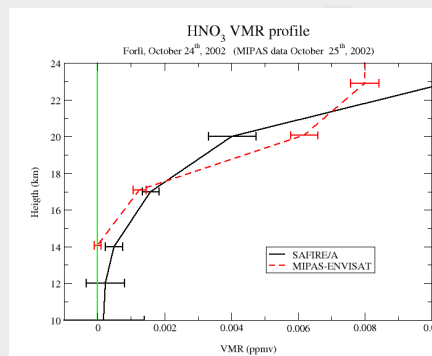
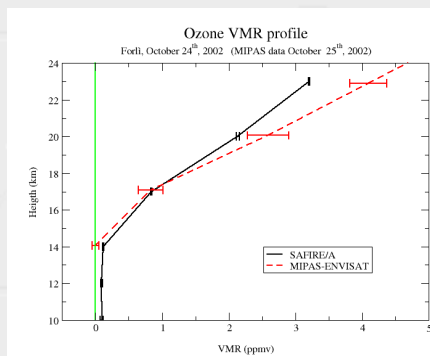


In the above graphs is shown a comparison between Ozone and Nitric Acid vertical VMR profiles measured by MIPAS-ENVISAT and retrieved from SAFIRE/A data acquired during the arctic flight of March 2nd, 2003 performed from Kiruna airport, Sweden. The location of actual measured points, both for SAFIRE/A and MIPAS-ENVISAT are plotted on the flight path map, the color code shows the tangent point altitude for each measurement. Data comparison has been performed between MIPAS data and the nearest SAFIRE/A limb sounding sequence.

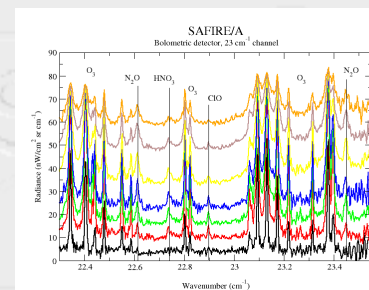


Flight path of the M55 Geophysica during the arctic flight of March 2nd, 2003, from Kiruna, Sweden.

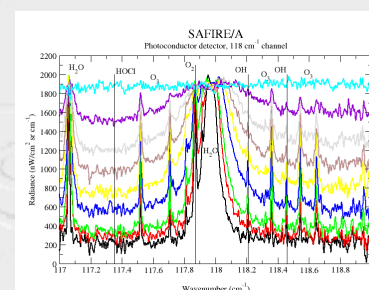
In the graphs below a similar comparison is performed between SAFIRE/A data obtained during the October 24th, 2002 mid-latitude flight performed from Forlì airport (Italy). In this case, due to unavailability of MIPAS-ENVISAT data for the same day, the MIPAS data shown are from the next day, October 25th.



Flight path of the M55 Geophysica during the mid-latitude flight of October 24th, 2002, from Forlì, Italy.



A typical limb sounding sequence of atmospheric emission spectra acquired by SAFIRE/A with the long wavelength channel (22 cm⁻¹).



A similar limb sounding sequence of spectra acquired with the short-wavelength channel (118 cm⁻¹).