

SAFIRE-B

Vertical Profiles of minor Atmospheric Constituents Measured from a Balloon Borne FIR Interferometer over the Mediterranean Region

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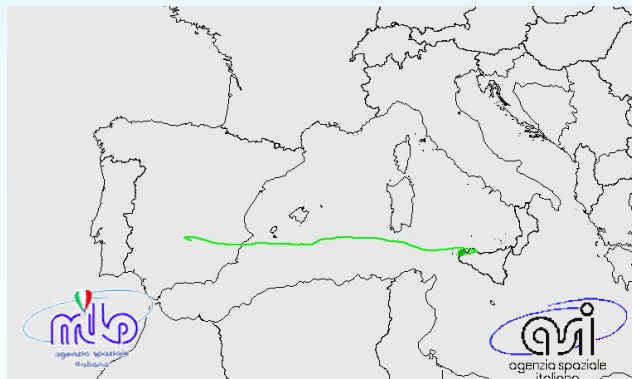
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- A Balloon-Borne FIR interferometer
- Limb Scanning from a float altitude of ~40 Km
- Observing at the frequencies 23 and 120 cm^{-1}



- Launched from Milo (Sicily) July 29 2002
by the Italian Space Agency
- Flight ended after 20 hours in Spain
- Due to weather conditions, no substantial MIPAS overpass were expected
- Data from the the 23 cm^{-1} are presented here
- Data from the 120 cm^{-1} will be analyzed soon

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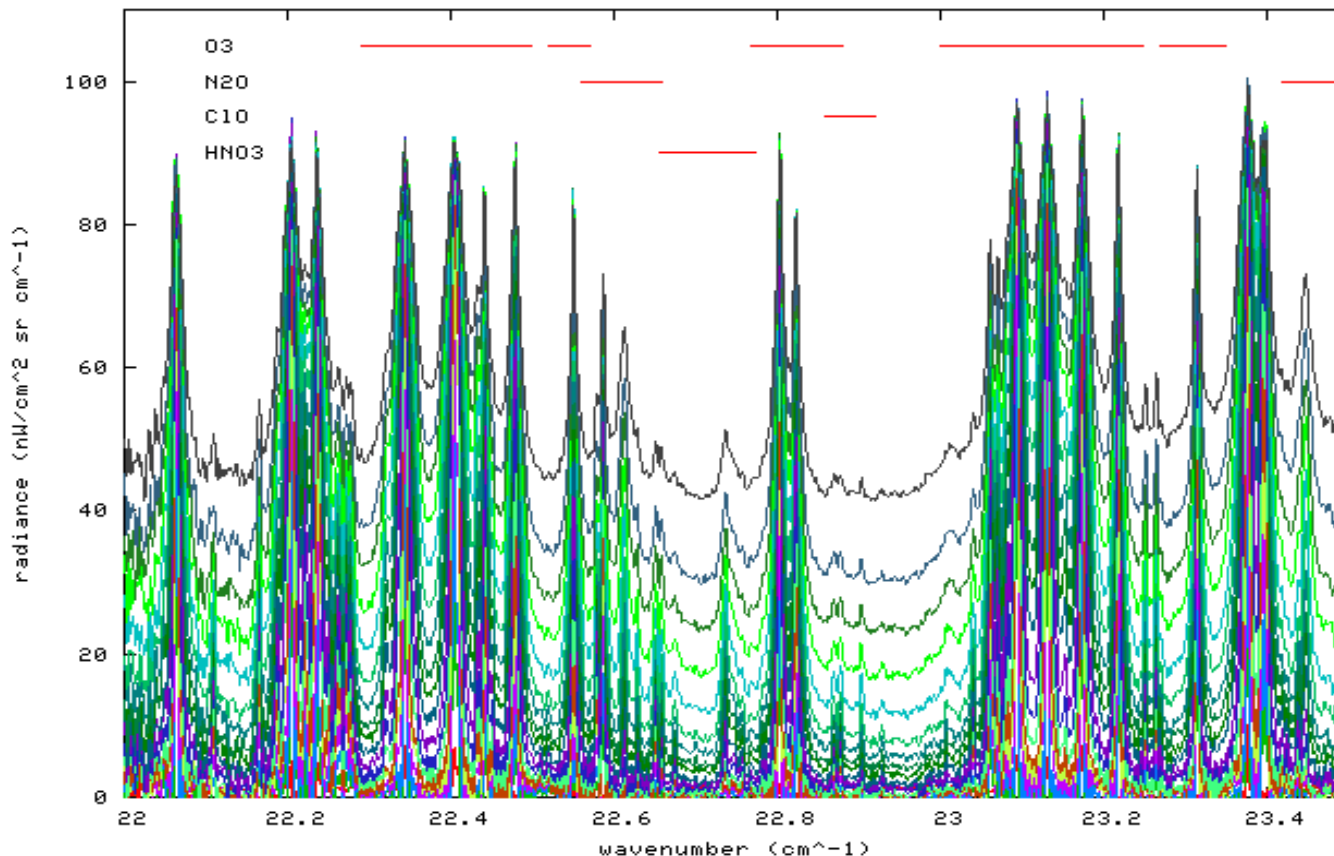


- 8 Hours of quality data.
- 8 Limb Scan Sequences ranging from $+1^{\circ}$ to -4.8° || 19 spectra per sequence.
- Data from the on board Data Storage were analyzed to get L1 products.
- Vertical profile retrieval has been done using the same package used by SAFIRE-A (Dev. in Bologna and based on the know-how of the near real time MIPAS inversion package written in Florence)
- Small Field of View (12 arc-min) let us use a grid of 1.5 Km. All data points are independent.
- Retrieval uses a "mild" Tikhonov regularization.

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Full sequence example [5]



A Full limb scanning sequence.

Altitude 39.8 Km

UTC 2:39

Lat. 37.6 N

Lon. 9.1 E

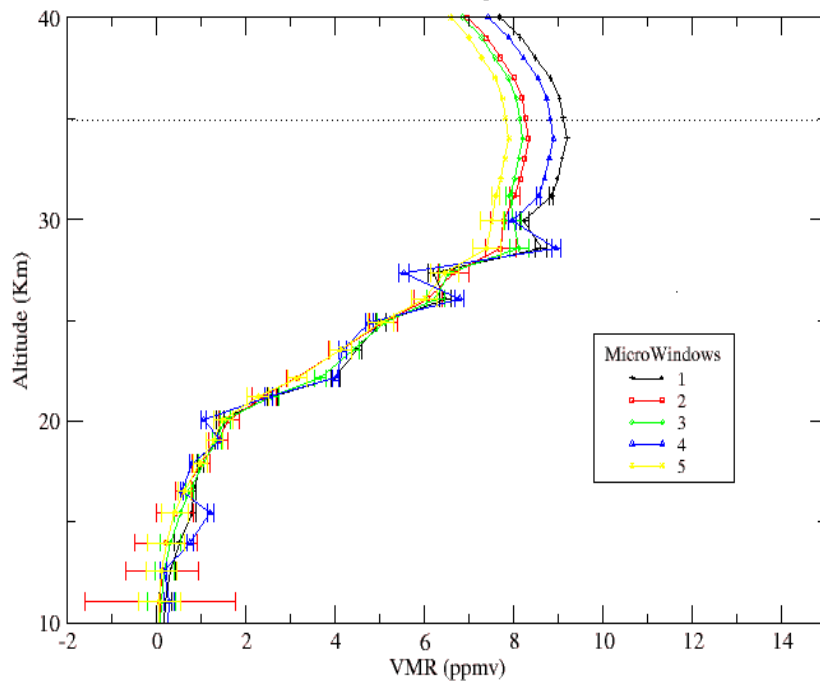
Microwindows of retrieved elements are shown in red

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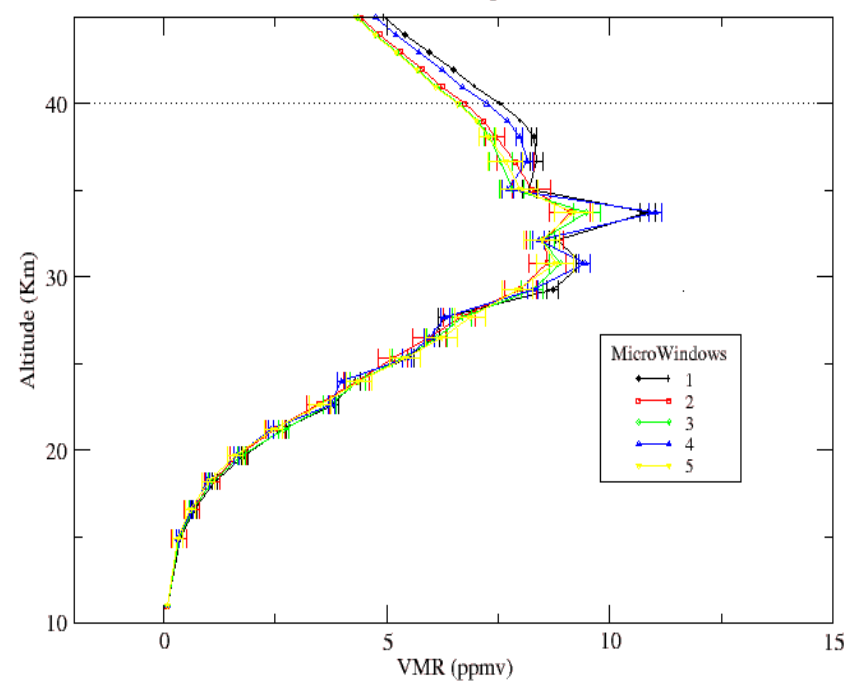
O₃ Profiles - Sequence 2

MW 1 through 5



O₃ Profiles - Sequence 8

MW 1 through 5

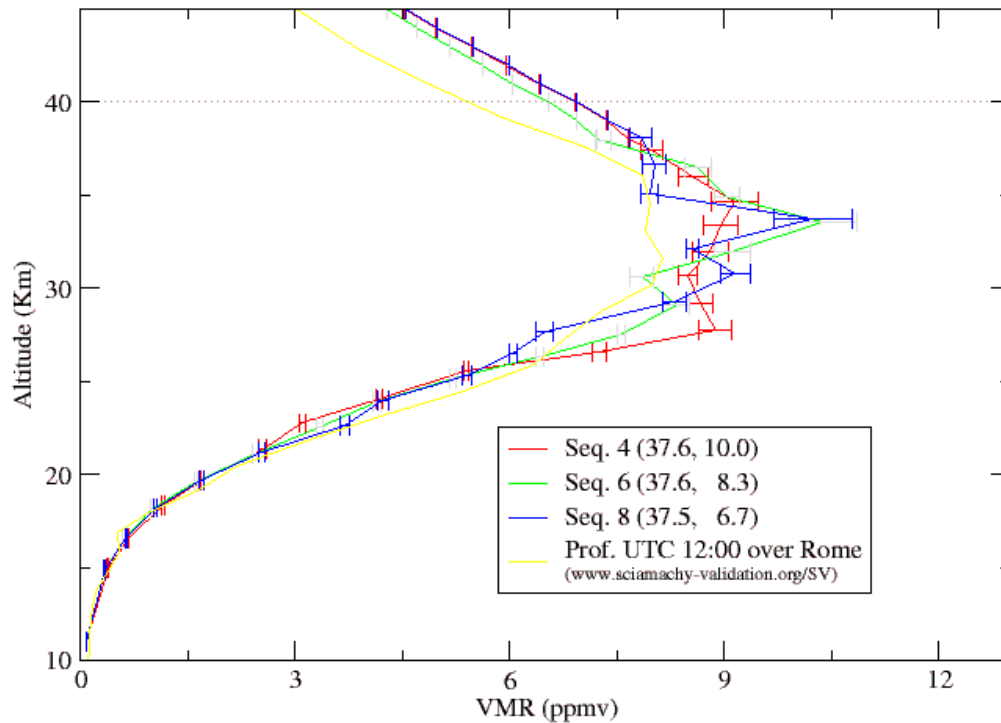


O₃ Retrieval consistency check: same sequence on different microwindows

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O₃ Profiles



O₃ Profiles

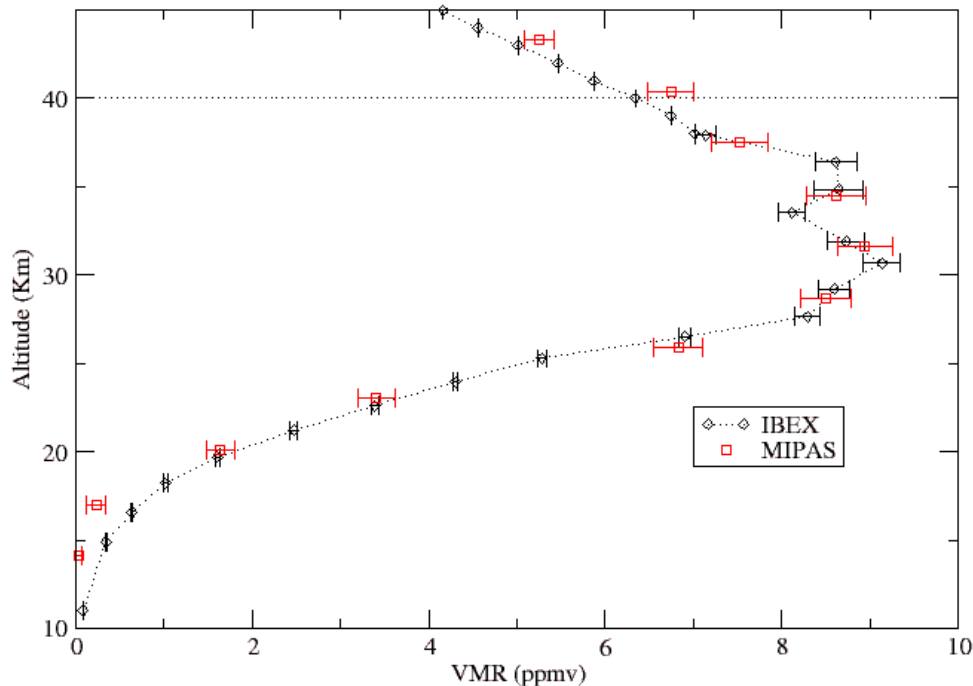
- 3 sequences are plotted
- An in situ measurement taken in Rome on the same day is reported (yellow).
- Structures in O₃ distribution are resolved

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O₃ Profiles (IBEX & MIPAS)

Orbit 2051, July 22, UTC 9:19, Seq. 15, lat 29.56, lon -22.7



O₃ Profiles & MIPAS

Safire-B Ozone profile is compared to MIPAS after altitude offset of 1.1 Km has been applied

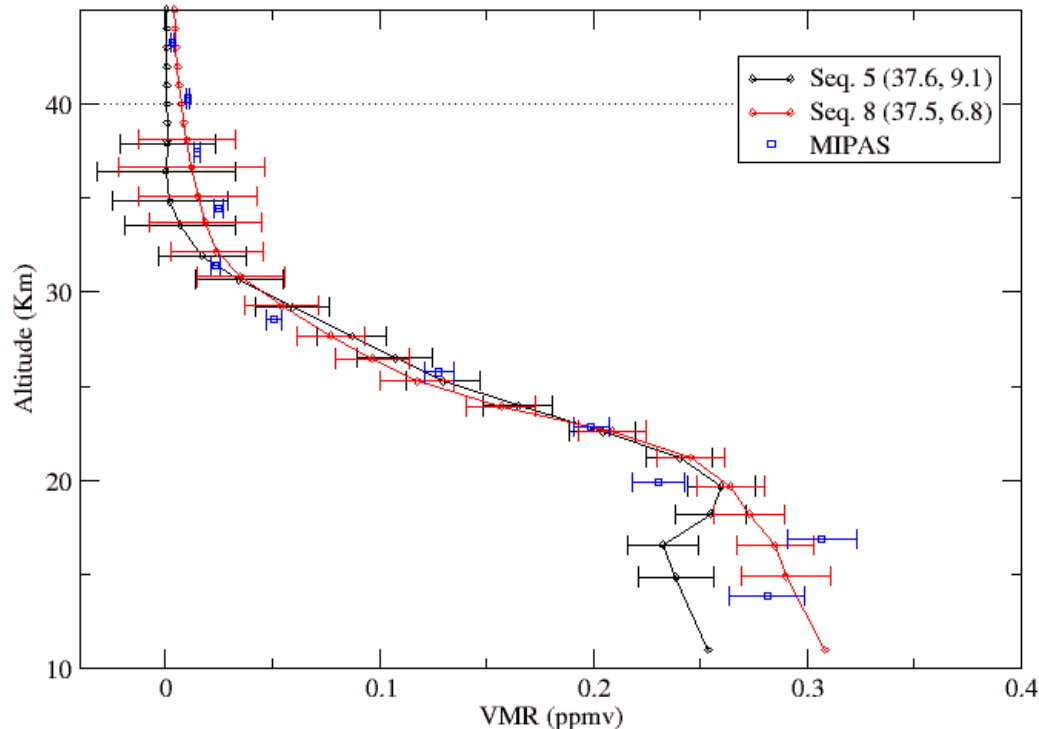
Better comparison will be done when MIPAS data for July 29 will be available

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N₂O Profiles & MIPAS

Orbit 2051, July 22, UTC 9:19, Seq. 11, lat 44.03, lon -20.7



N₂O Profiles & MIPAS

Two profiles are presented.

Retrieval is done on only one micro-window

Second MW is not used at the moment due to an O₃ lines.

Will be used in the second stage analysis

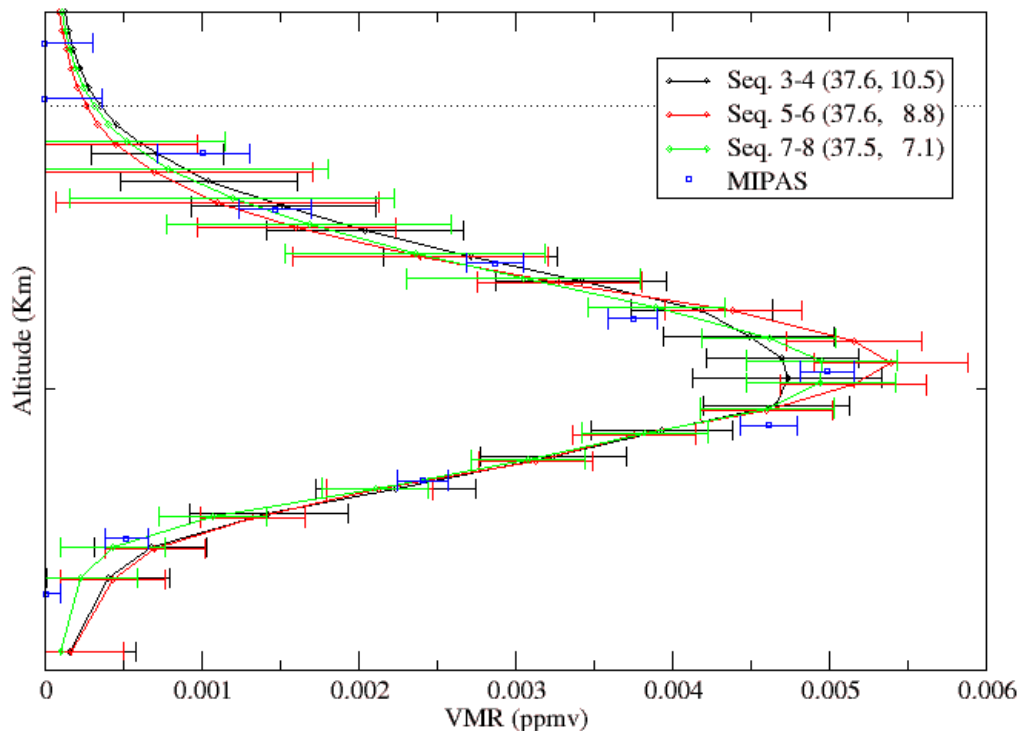
Planned consistency checks:
second MW & comparison with other exp. (SAFIRE-A)

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HNO₃ Profiles & Mipras

Orbit 2051, July 22, UTC 9:19, Seq. 15, lat 29.56, lon -22.7



HNO₃ Profiles & MIPAS

Three profiles are presented.

Each profile is the average of two.

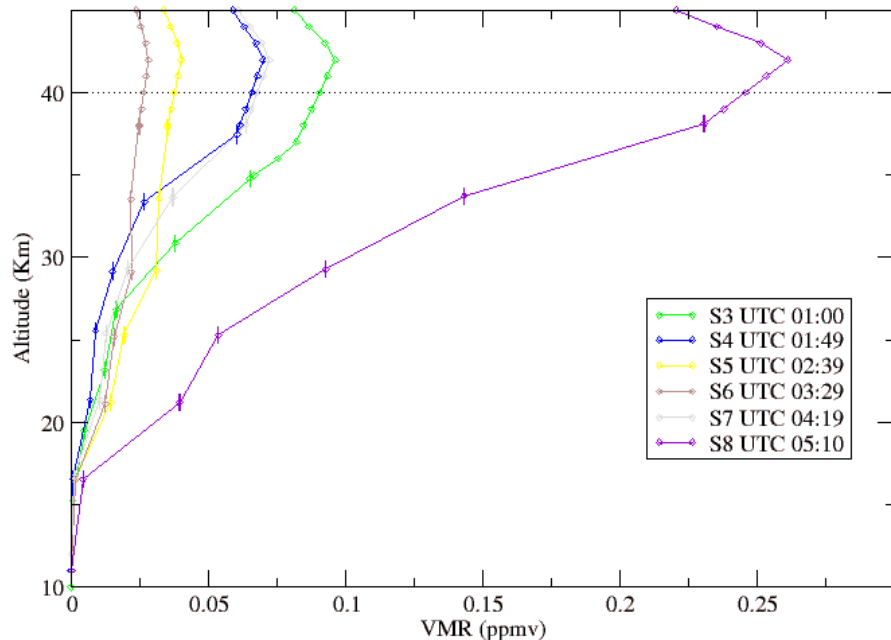
HNO₃ rotational emission lines are good calibrators (compared to vibrational lines)

Consistency check as for N₂O

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CIO Profiles



CIO Profiles

show a time dependence during the flight.

The relative abundance decreases during night to increase after sunrise.

The effect seen is in agreement with what is to be expected from photo-chemical models

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We presented a preliminary analysis

Second stage analysis will be carried out soon. It will include consistency checks with data from other experiments.

The high frequency channel data will be analysed (H₂O and HCl)

We acknowledge here the financial support of the Italian Space Agency and the technical support of people at the launch base

A great help came from colleagues, scientific and technicians, without who the flight could never have been done.