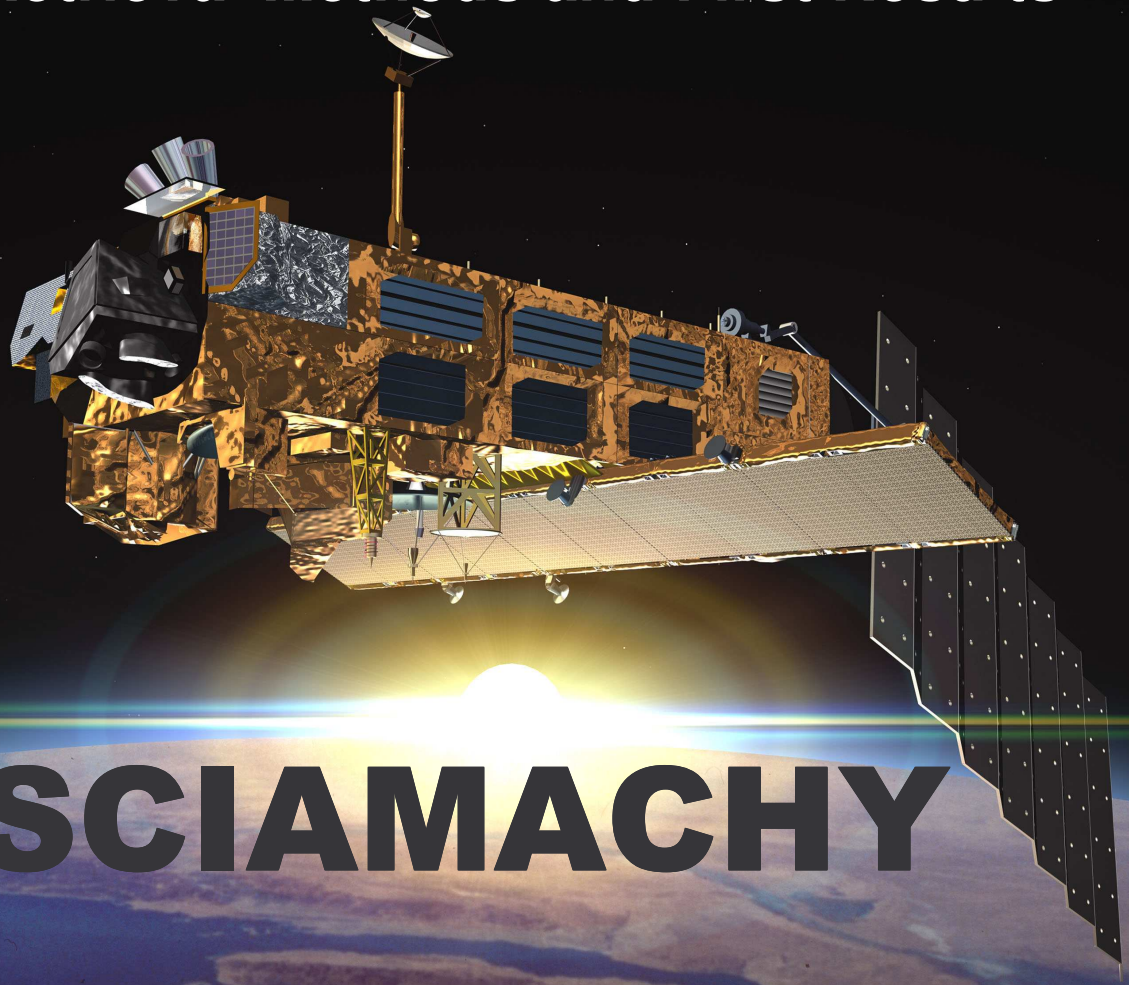
SCIAMACHY Solar Occultation Observations: Retrieval Methods and First Results



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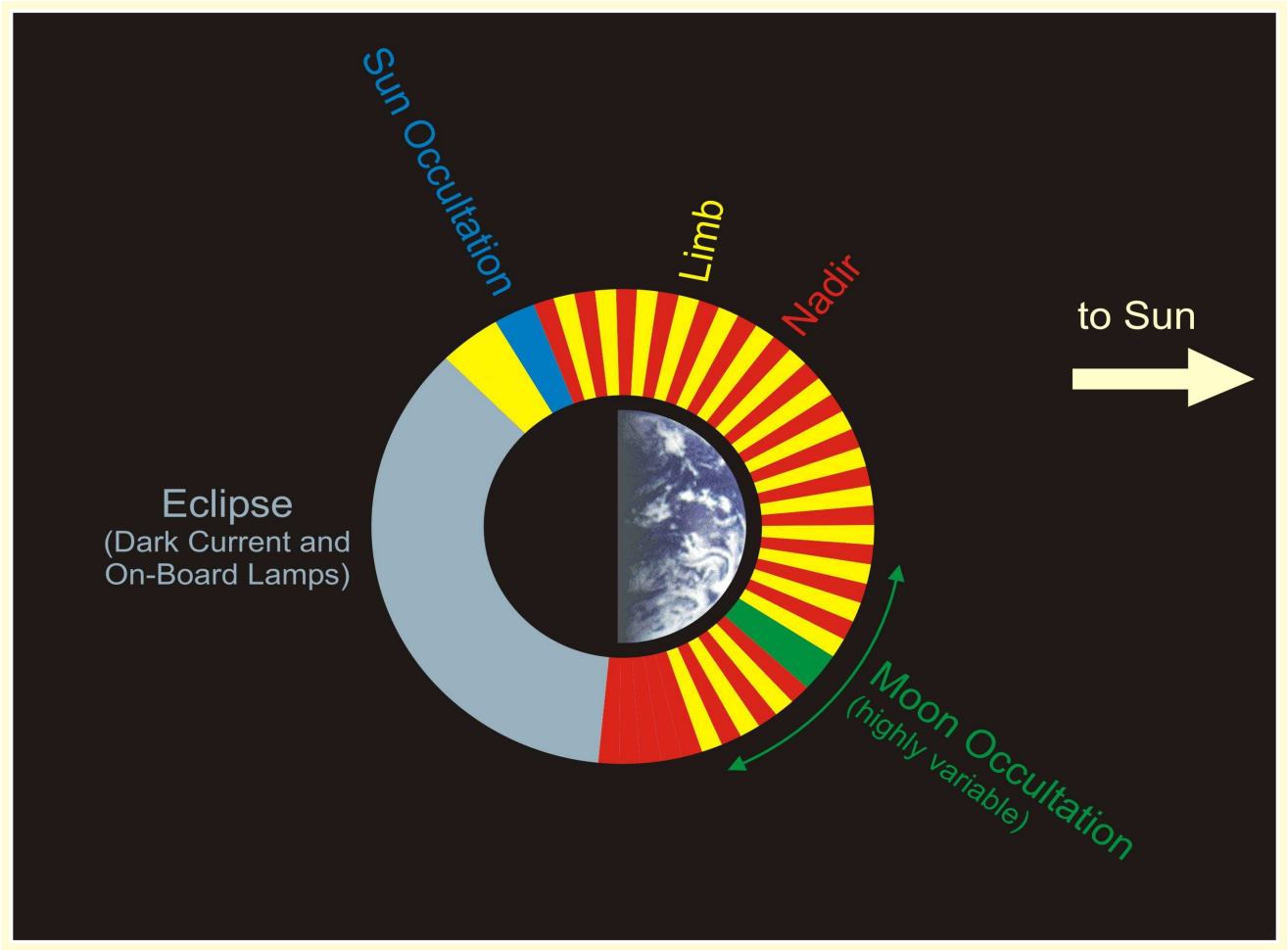

- **Polar, sun-synchronous orbit**
- **Calibration measurements on eclipse side**

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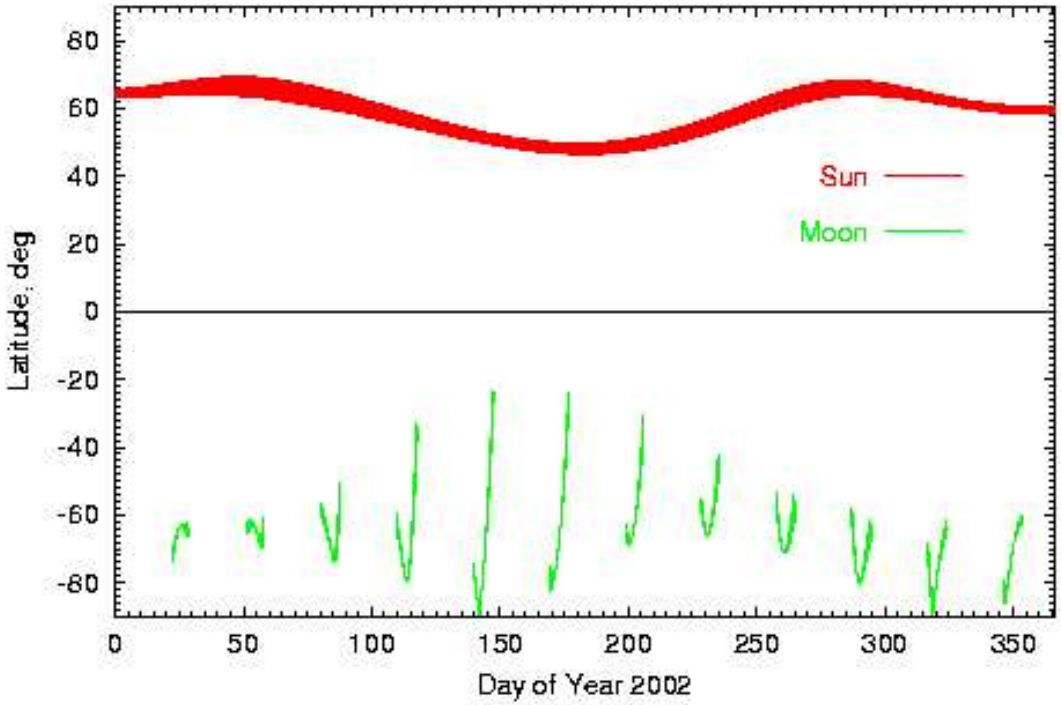
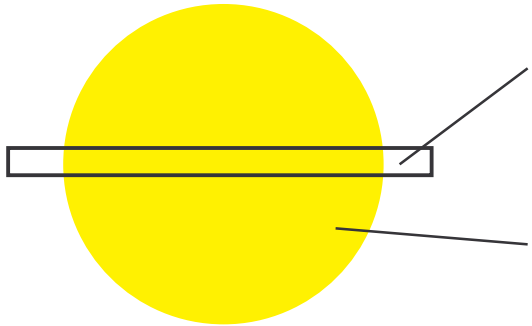
Occultation Geometry

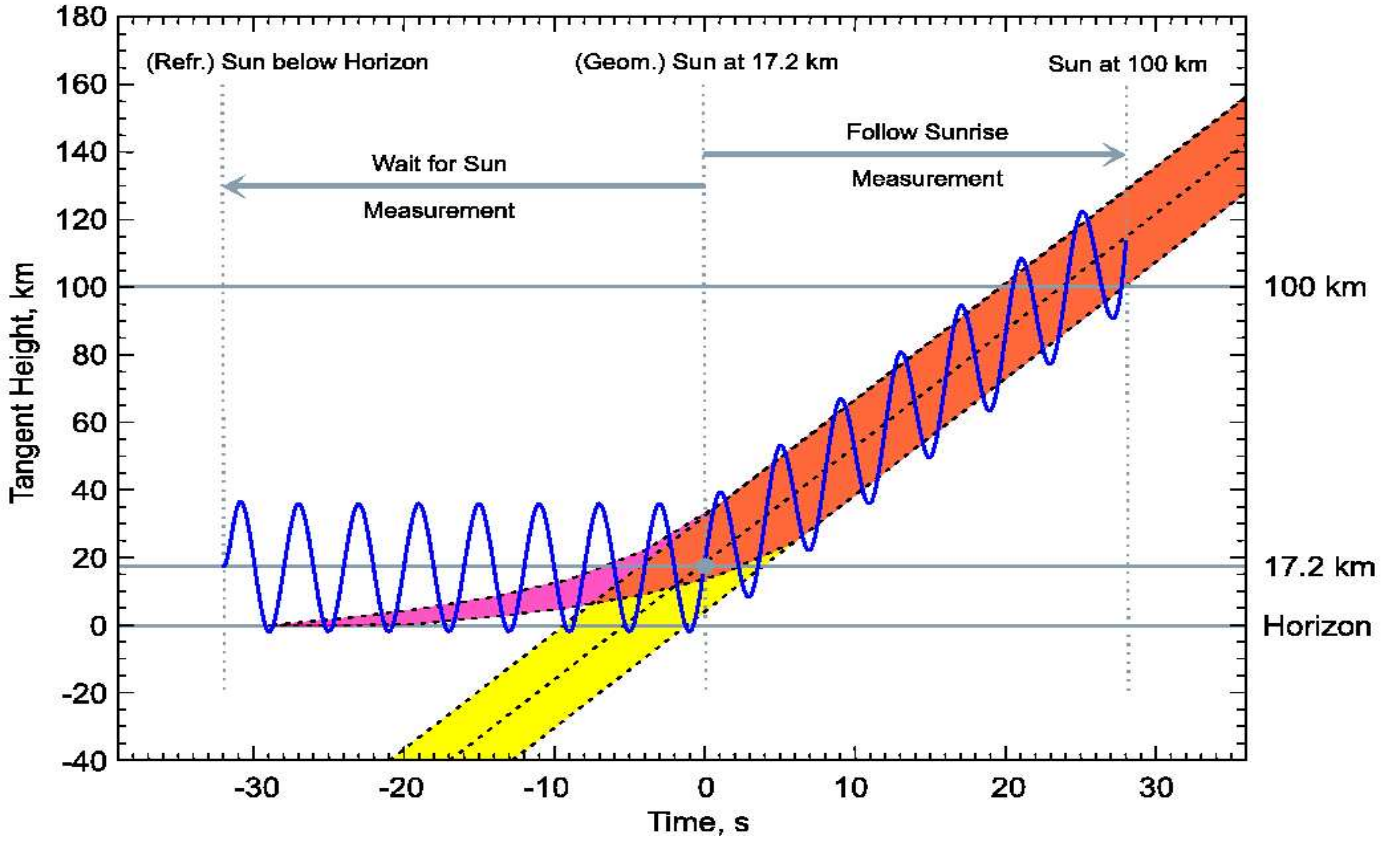


- **Solar occultations during sunrise (90°N – 65°N)**
- **Lunar occulations during moonrise (30°S – 90°S; about 1week/month)**



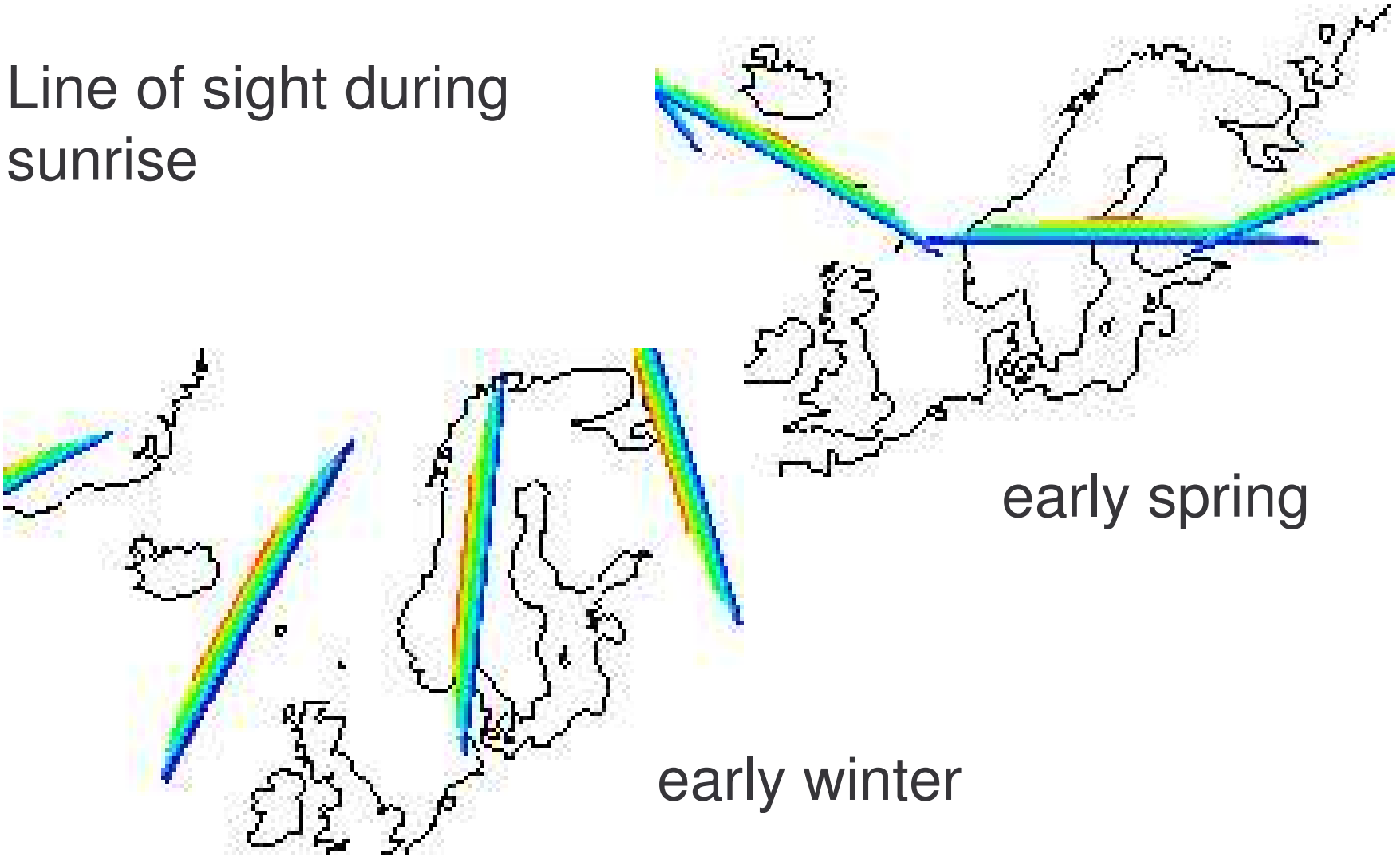
FOV: 0,7° x 0,045°

apparent solar disk diameter: 0,53°



SCIAMACHY Scanning Sequence

Line of sight during sunrise

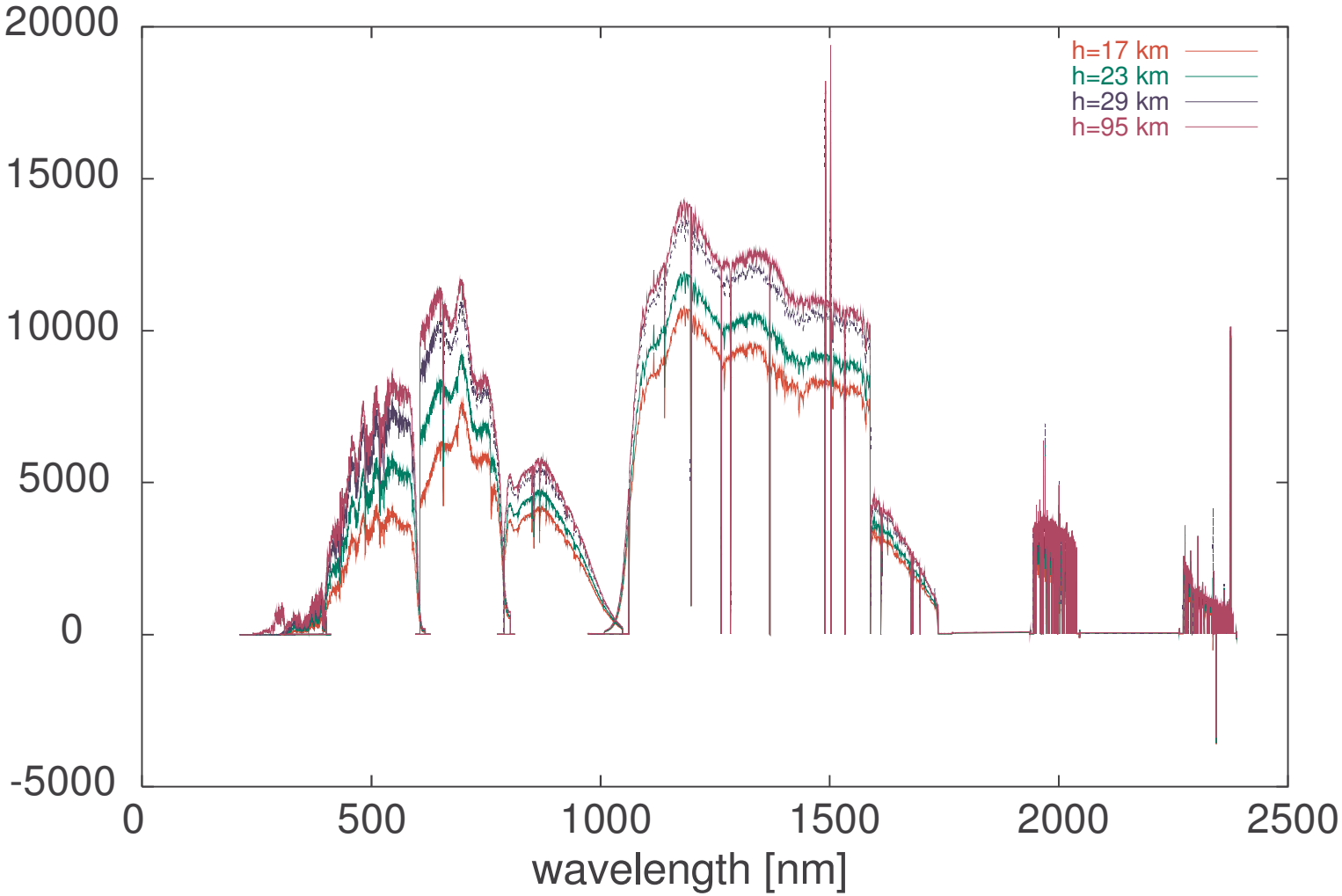


early spring

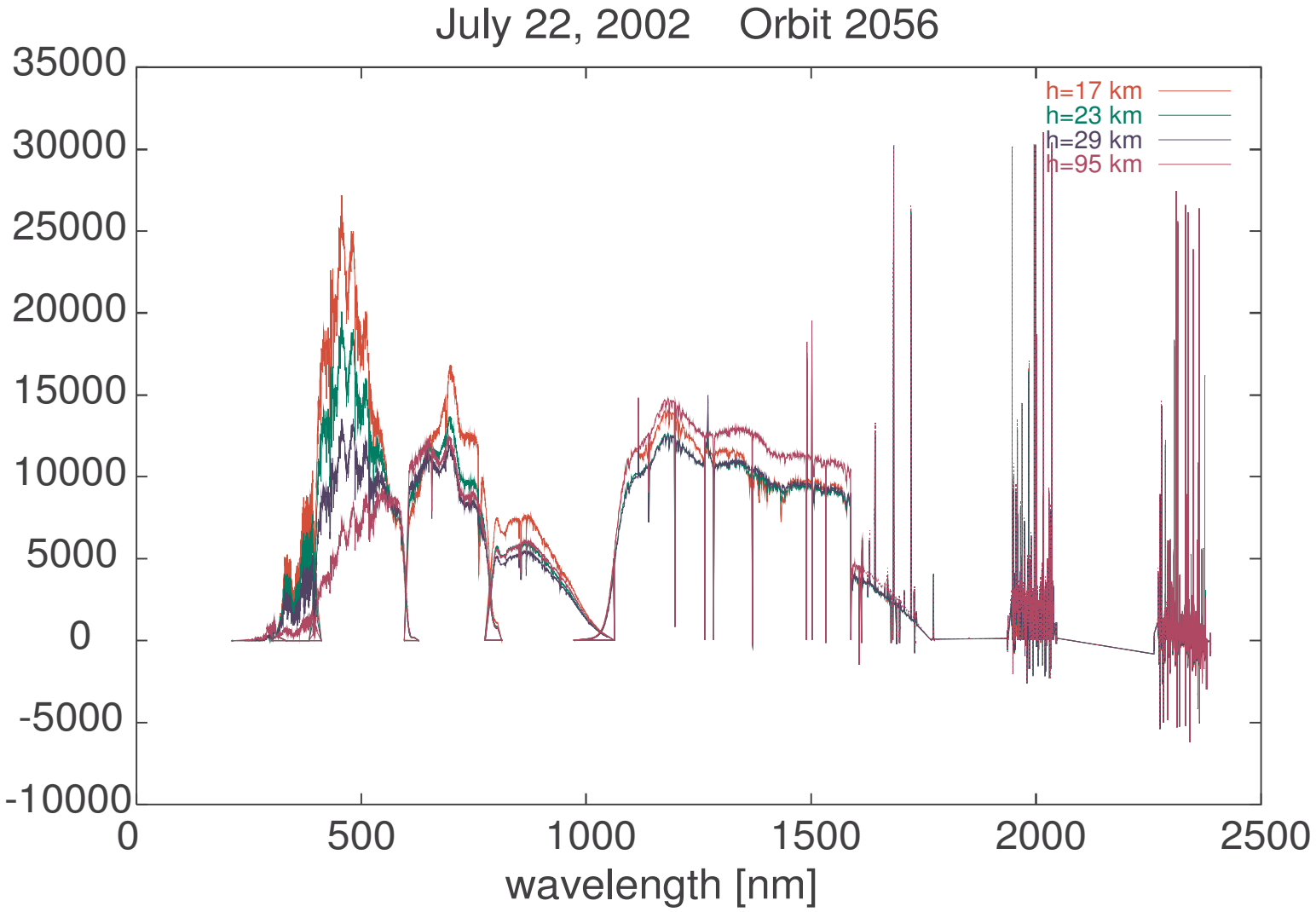
early winter

Lunar Occultation Observations

April 23, 2002 Orbit 762



Lunar Occultation Observations



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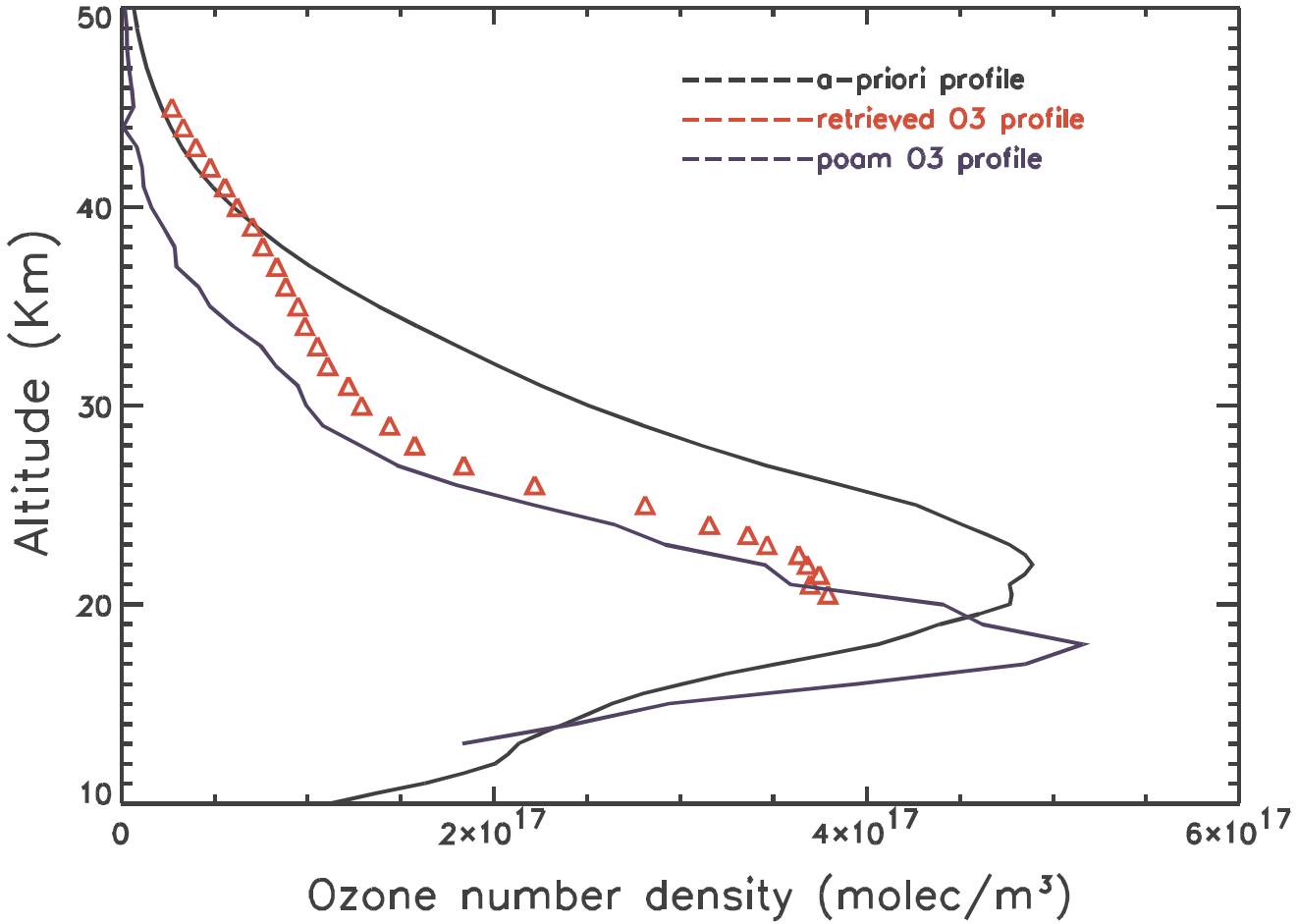
O_3 Comparison to POAM



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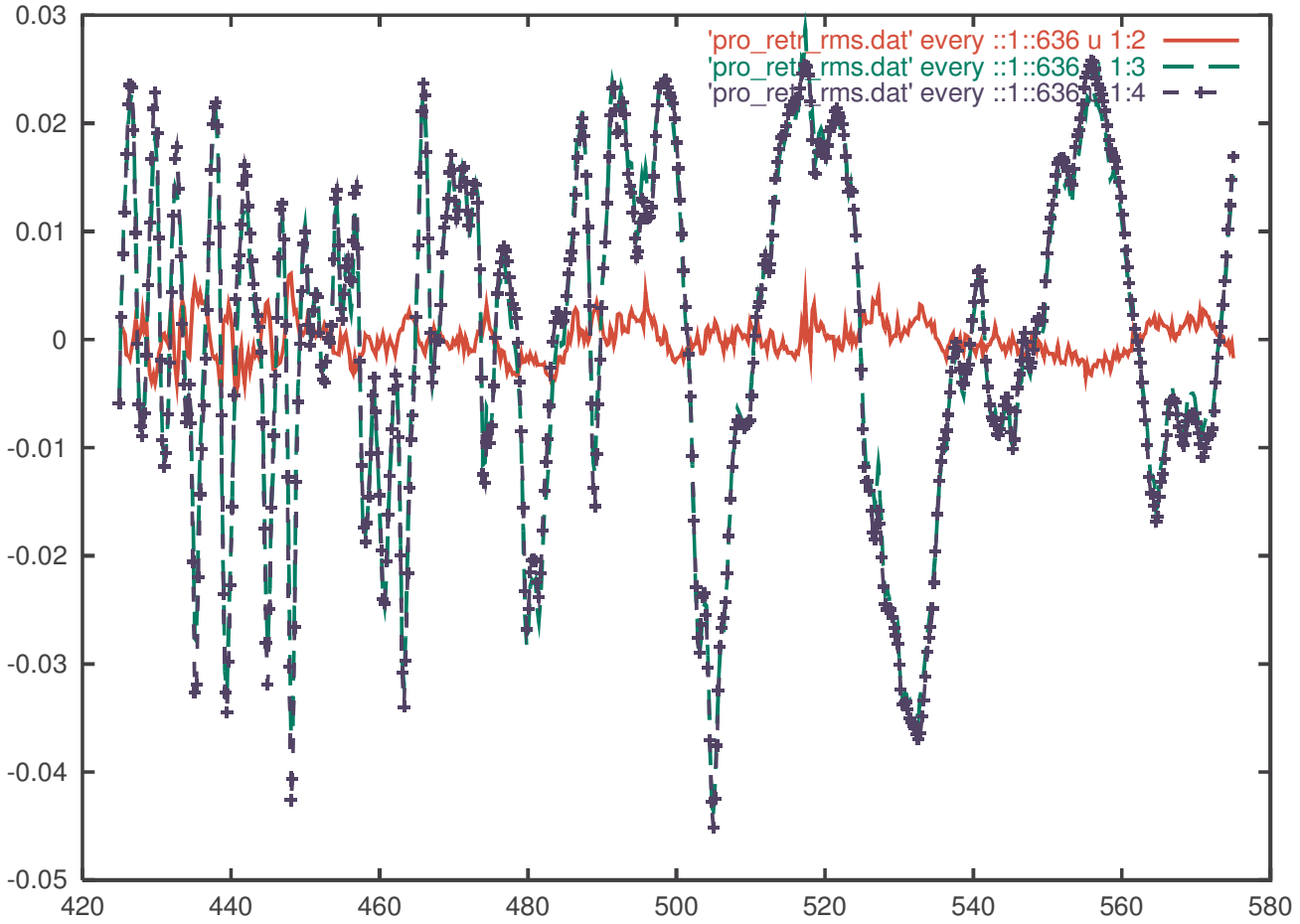
NO_2 O_3 Fit at 20 km height



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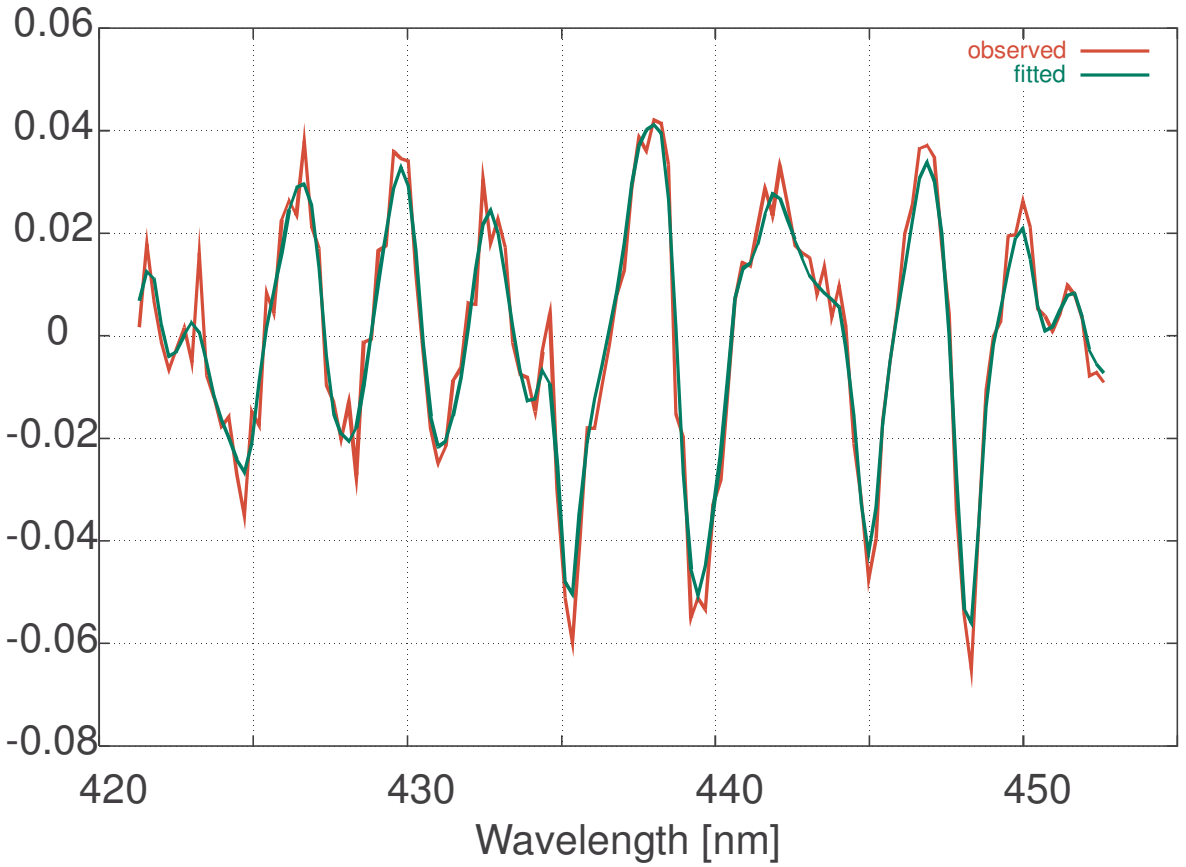
NO_2 Fit

height = 15.5 km, May 6 2002, 7:24 UTC, 52-55 N 183-184 E



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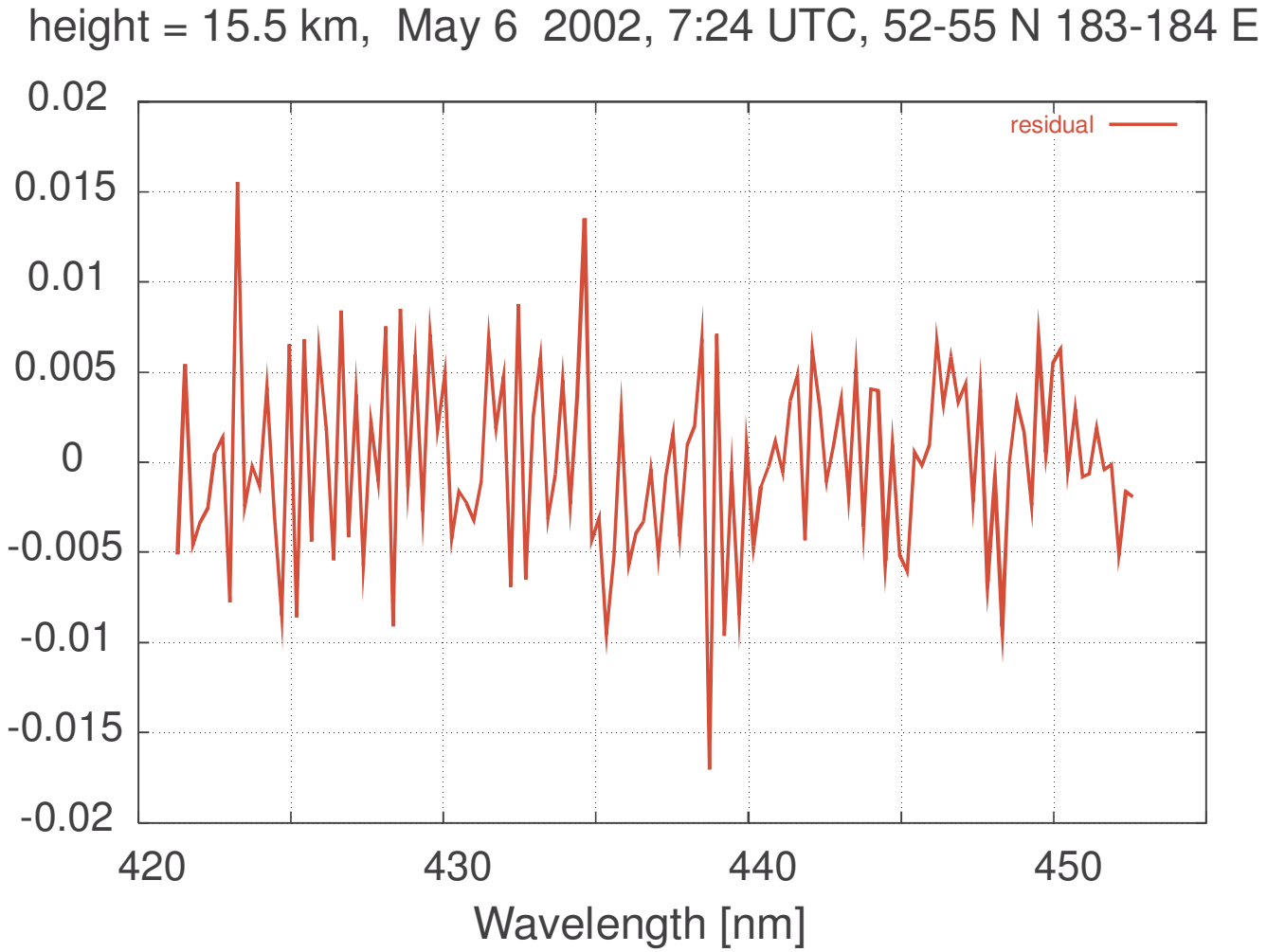
NO_2 Fit Residual



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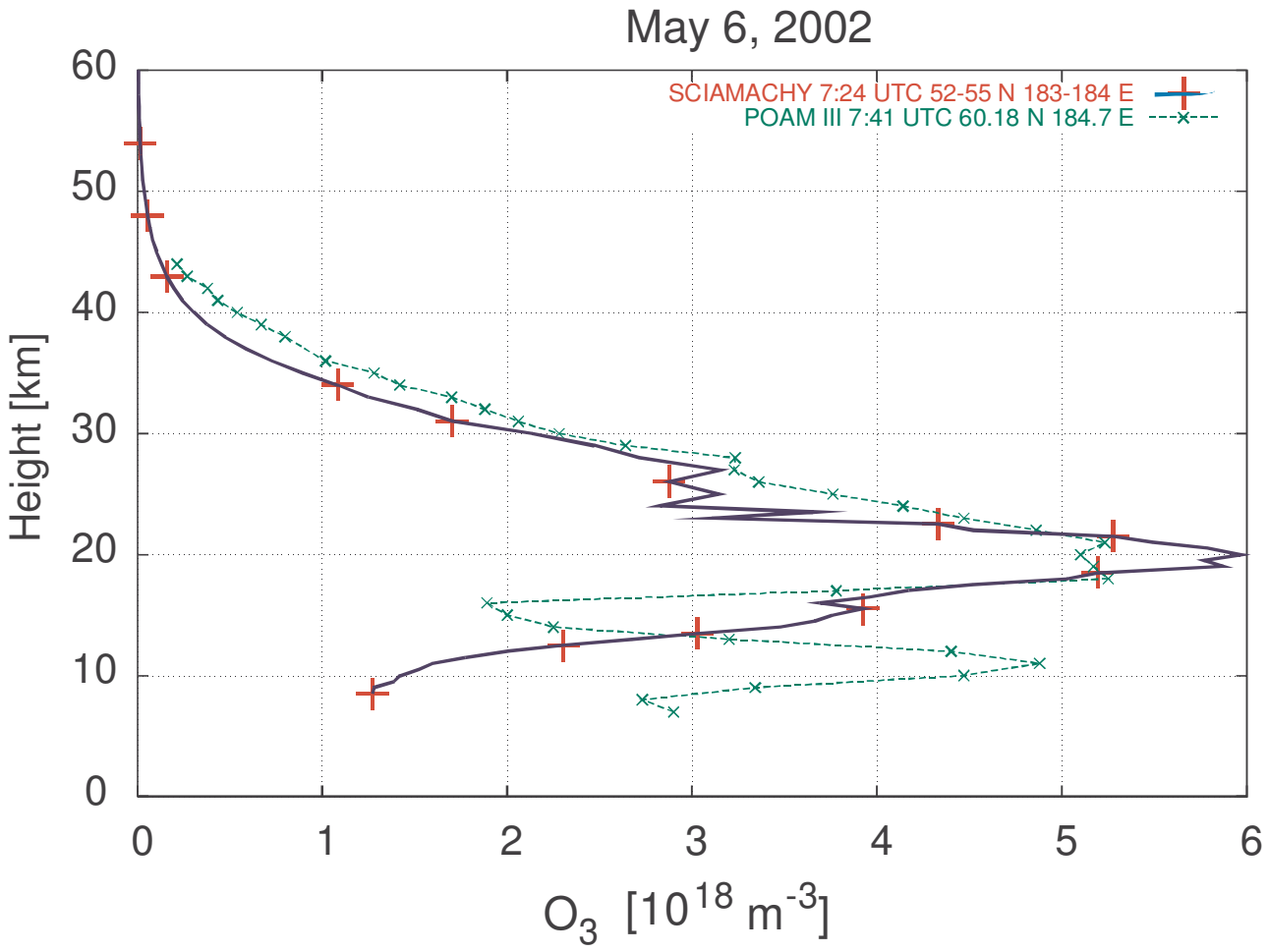
O_3 Profile in Comparison with POAM III



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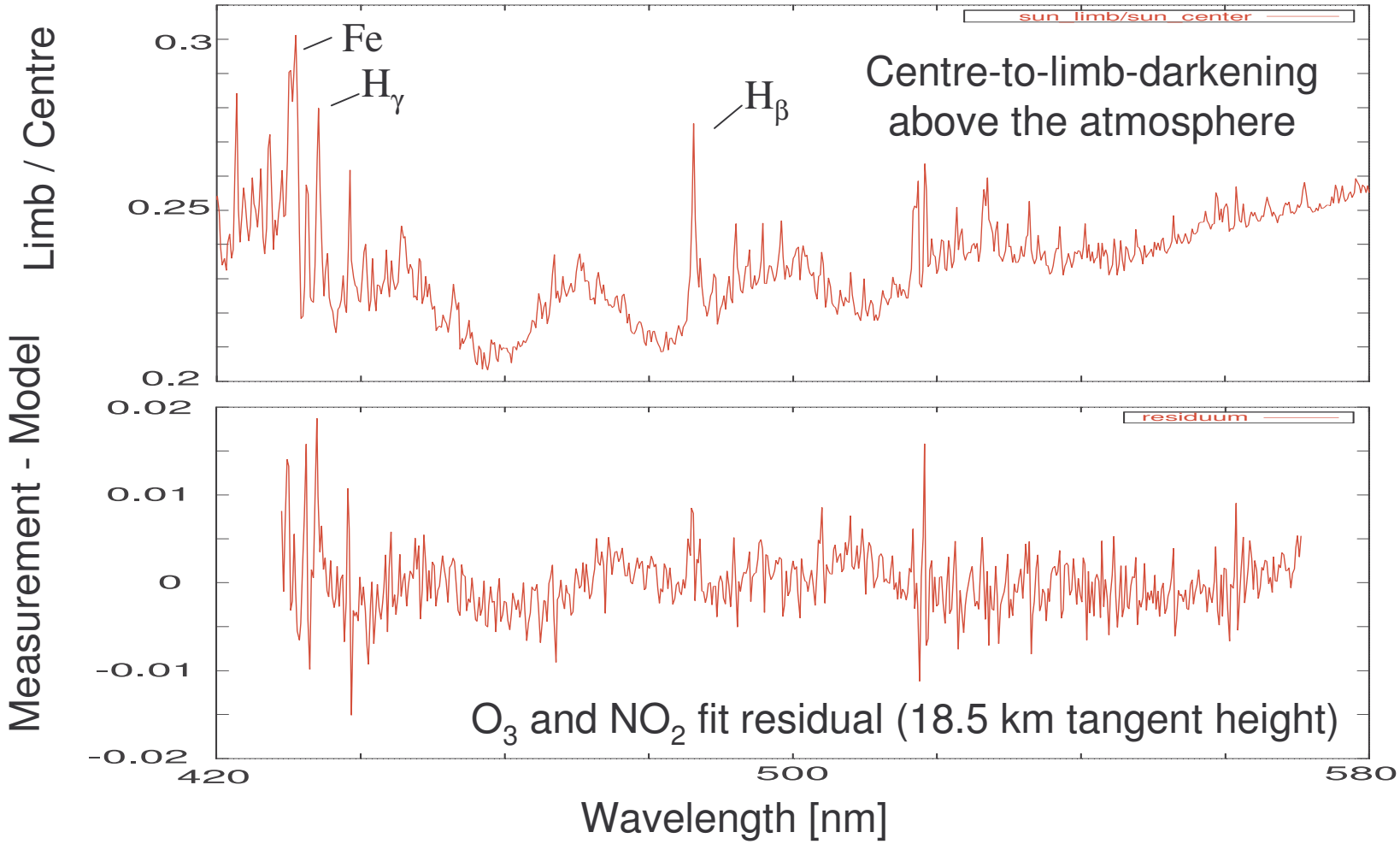
Fraunhofer Structure and Fit Residual



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Spectral undersampling in combination with:

- non-uniform filling of the slit due to scanning of the solar disk

- differently sloped continua in the ratioed spectra

- not ideal matching of reference solar spectrum
  (change of Fraunhofer lines towards the limb!)

- the Doppler shift

=> leads to Fraunhofer structures in the fit residuals

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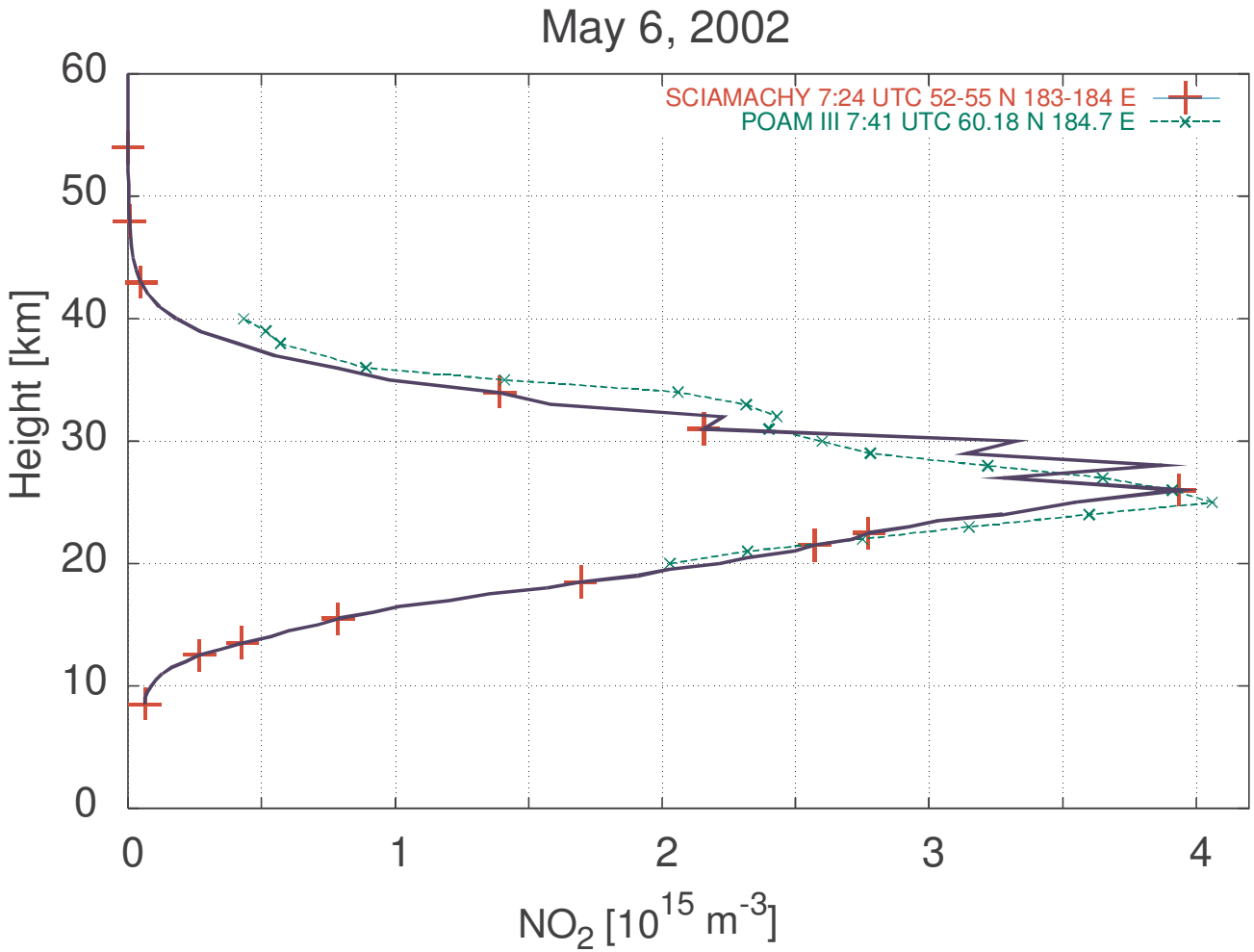
NO_2 Profile in Comparison with POAM III



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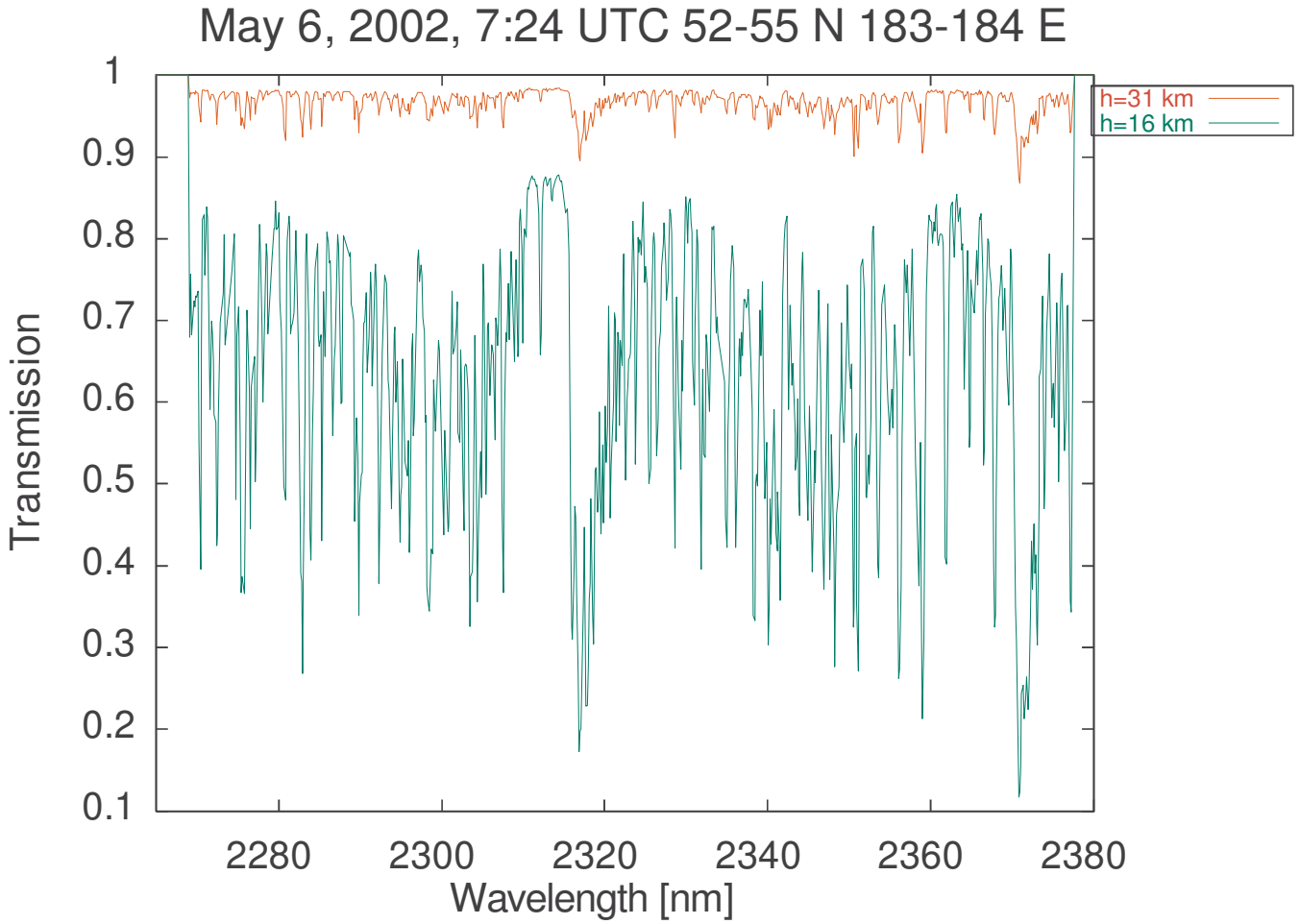
Transmission spectra (IR – channel 8)



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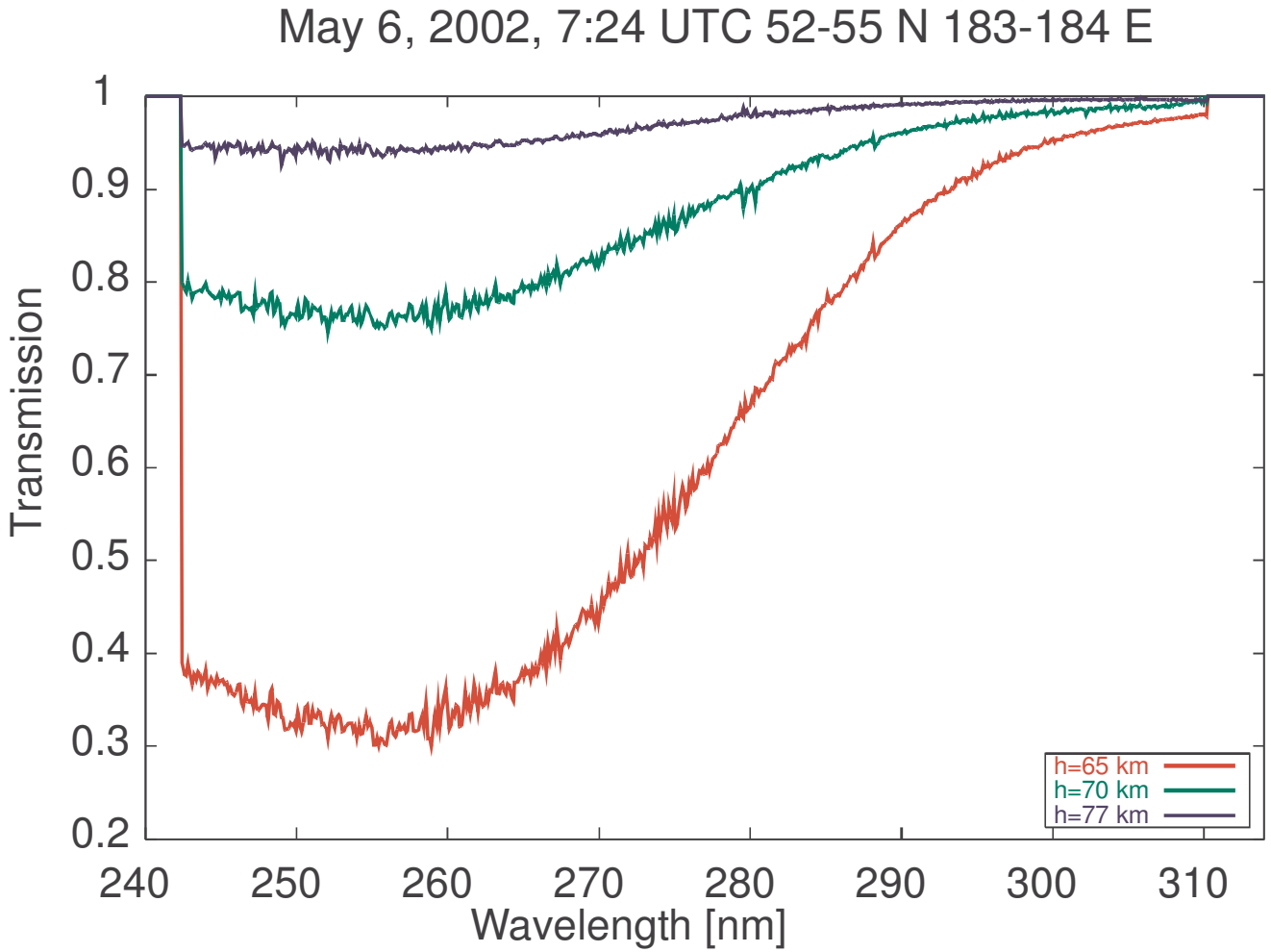
Transmission spectra (UV – channel 1)



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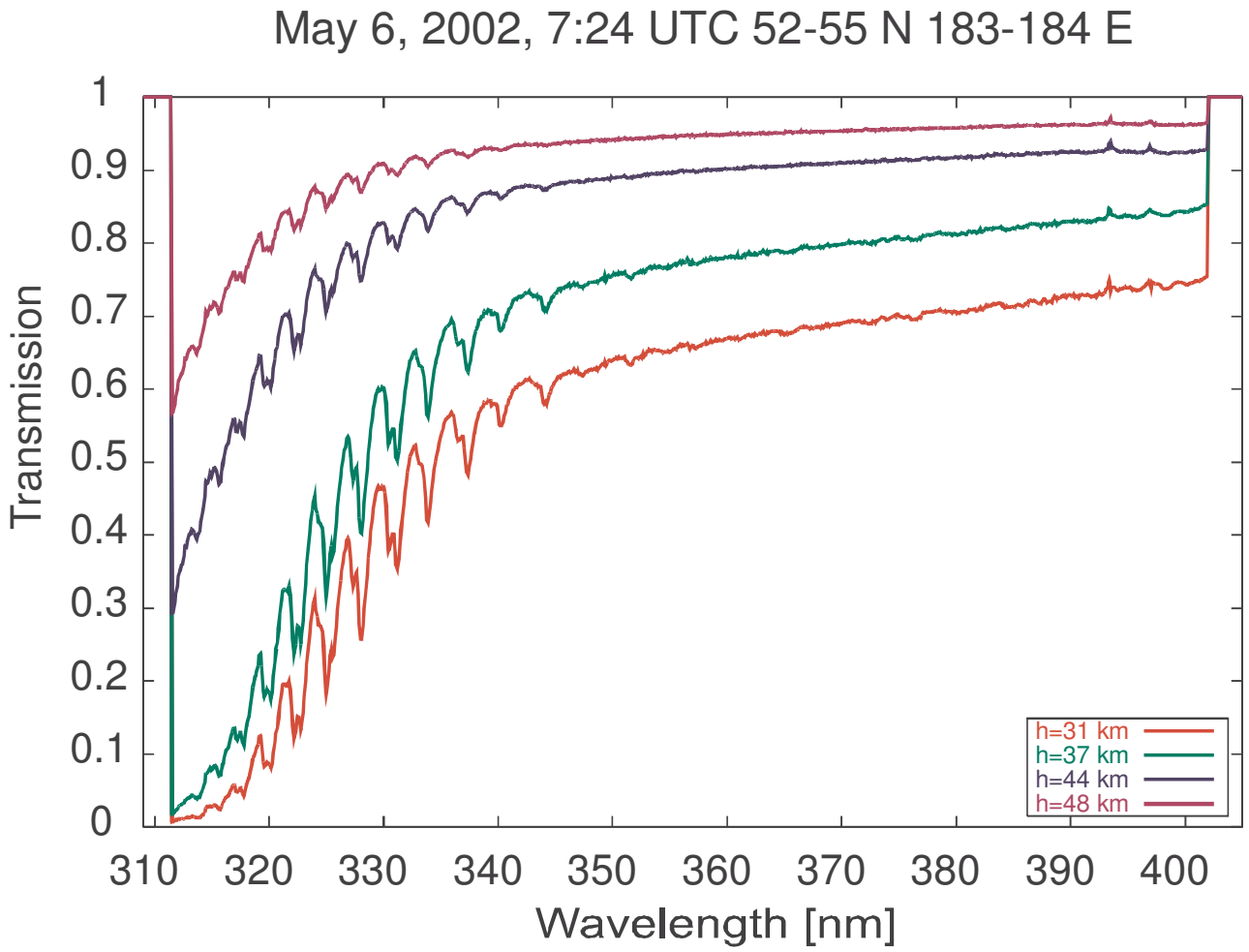
Transmission spectra (UV – channel 2)



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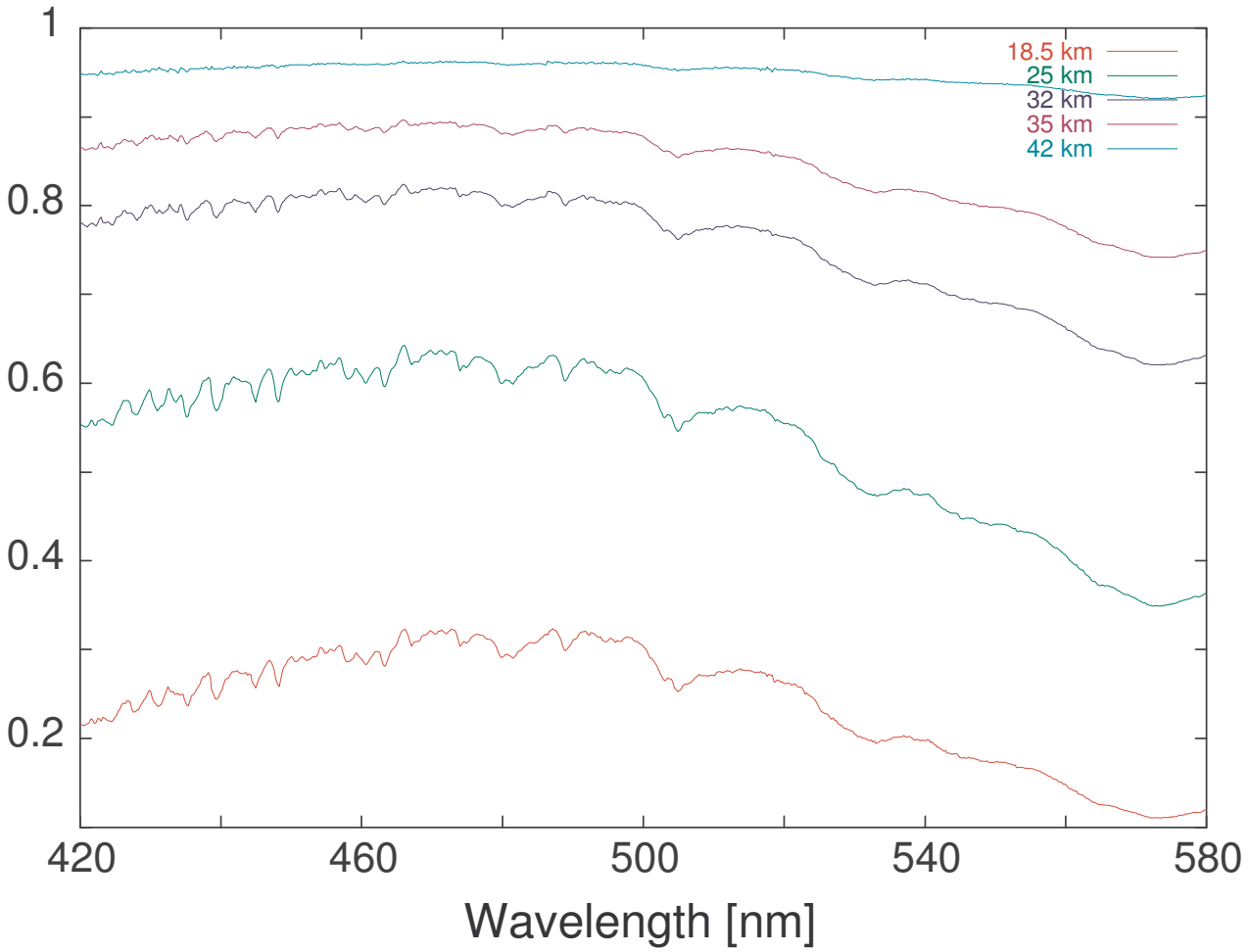
Transmission spectra (visible range)



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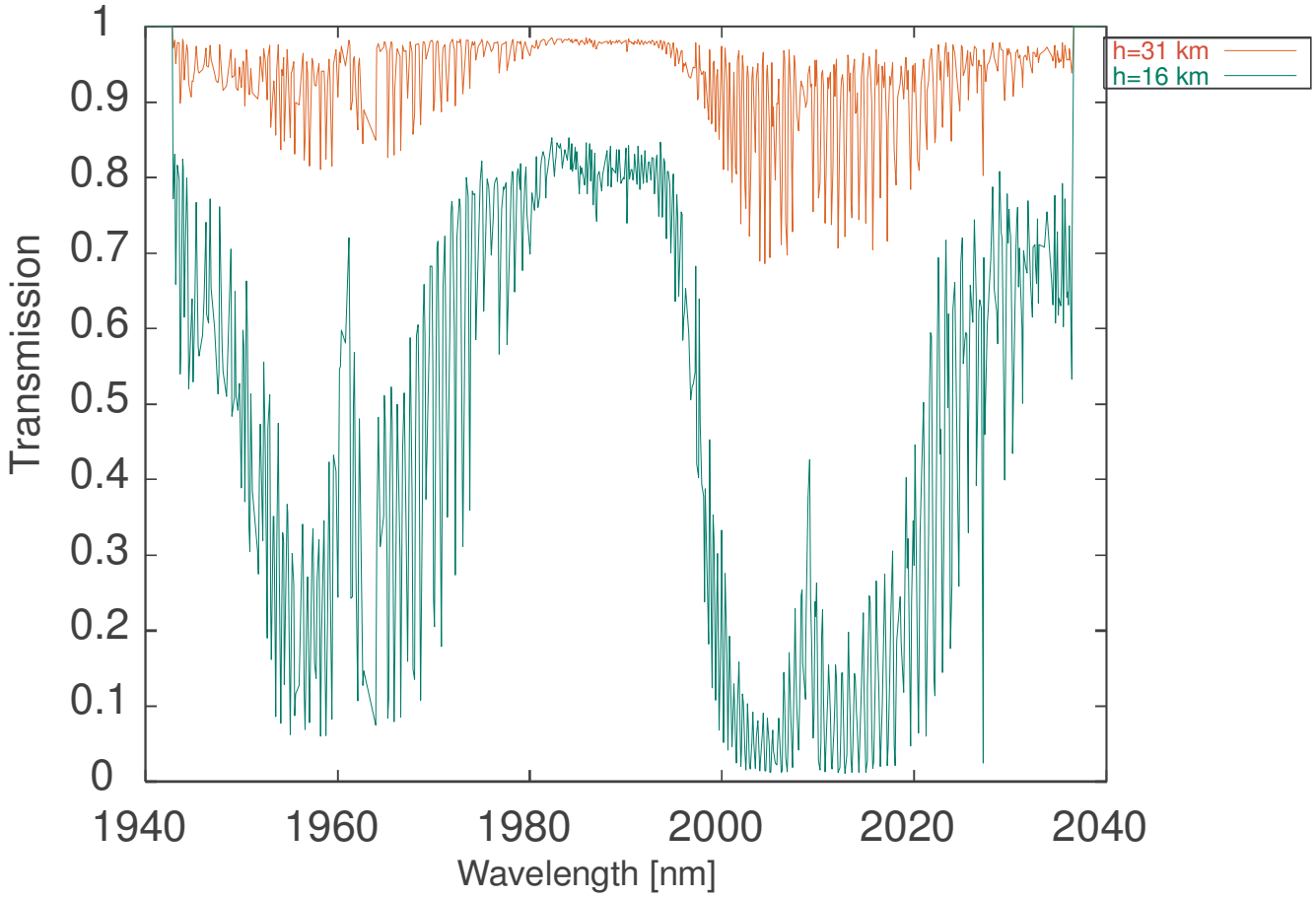
Transmission spectra (IR – channel 7)

May 6, 2002, 7:24 UTC 52-55 N 183-184 E



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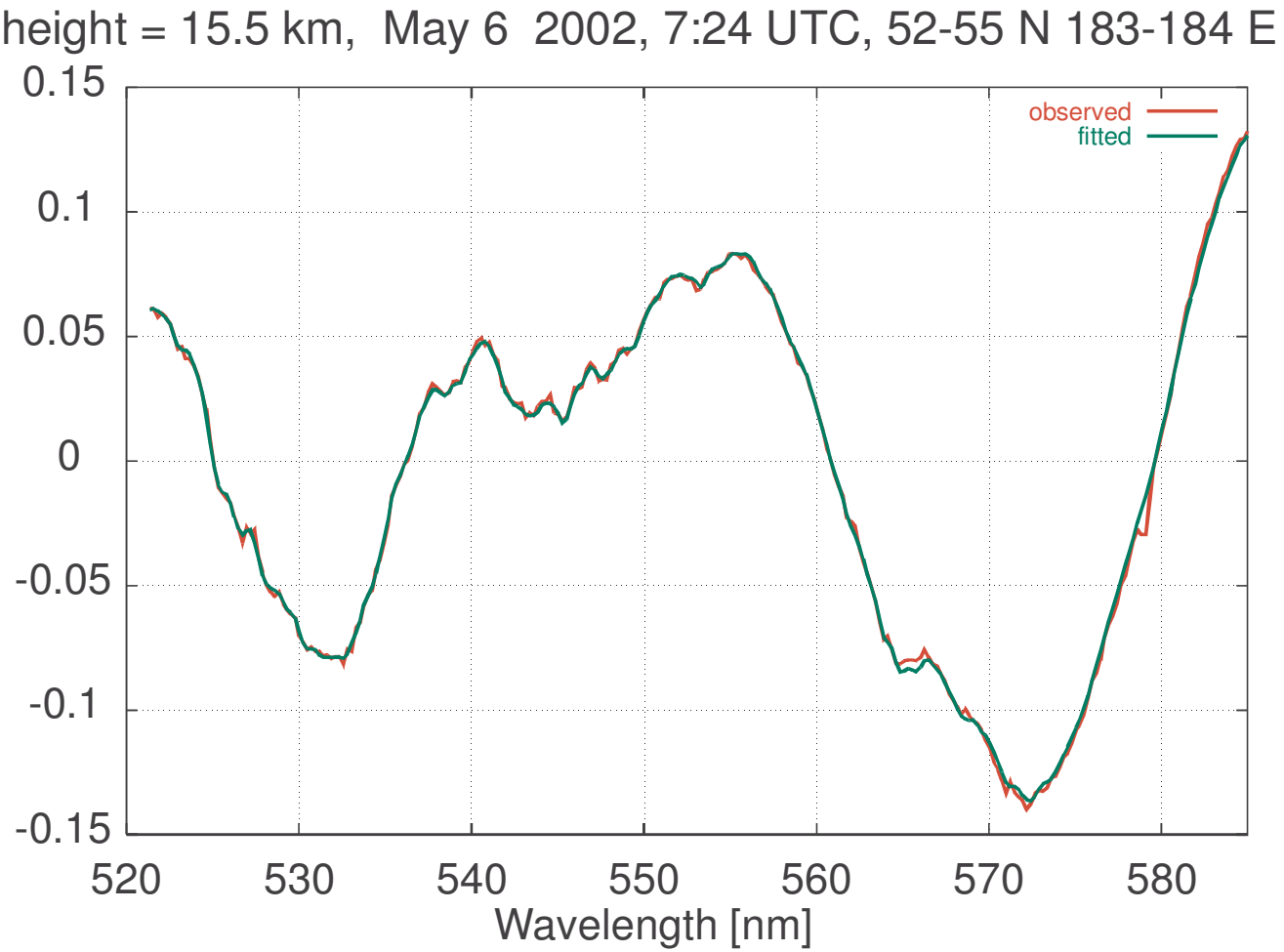
O_3 Fit



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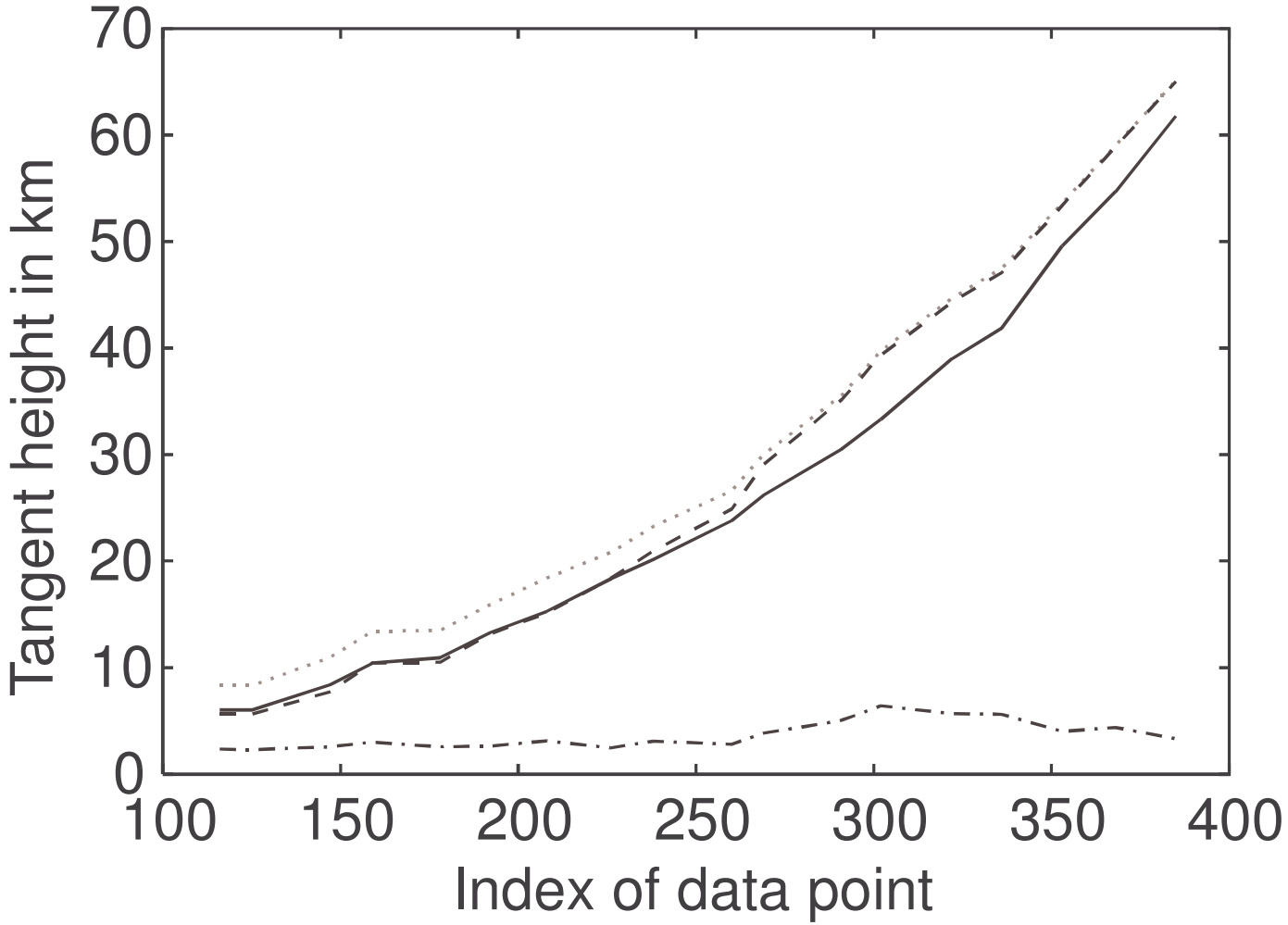
Tangent heights from O_2 and CO_2 retrieval



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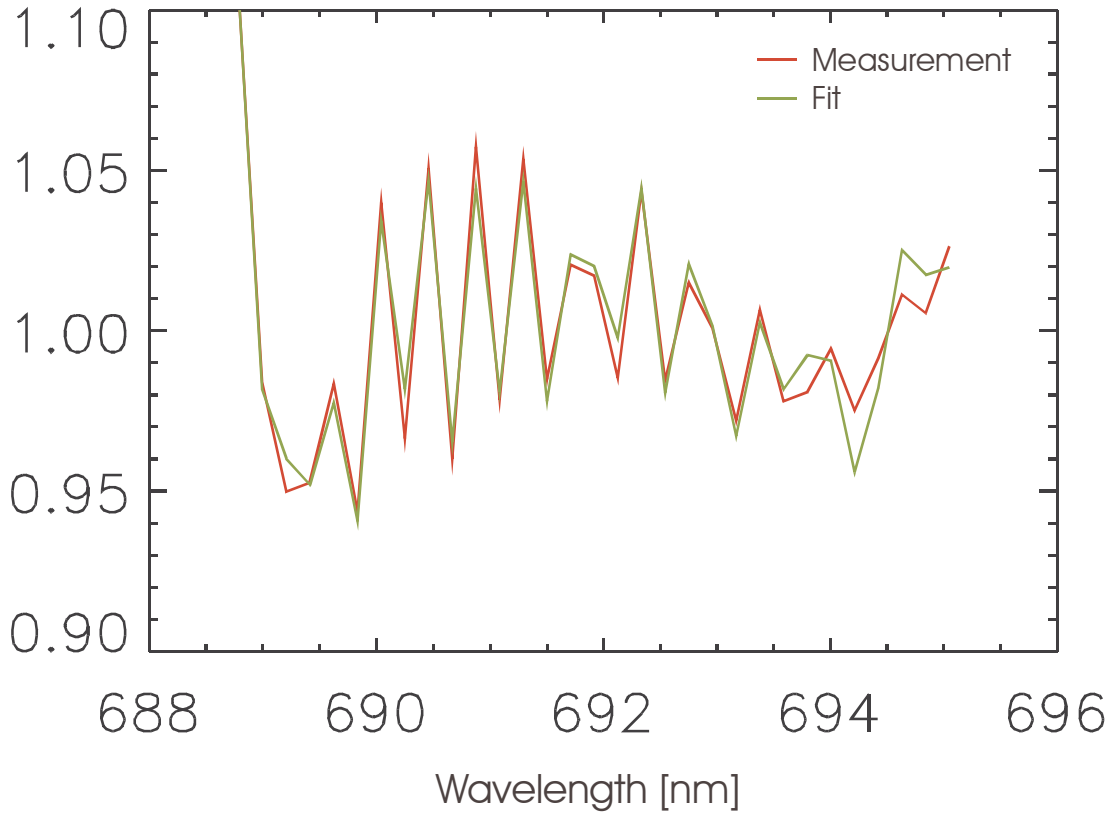
O_2 fit at 8 km tangent height



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O_2 fit residual at 8 km tangent height