TotalBrO: First results of a small solar occultation instrument for the stratosphere

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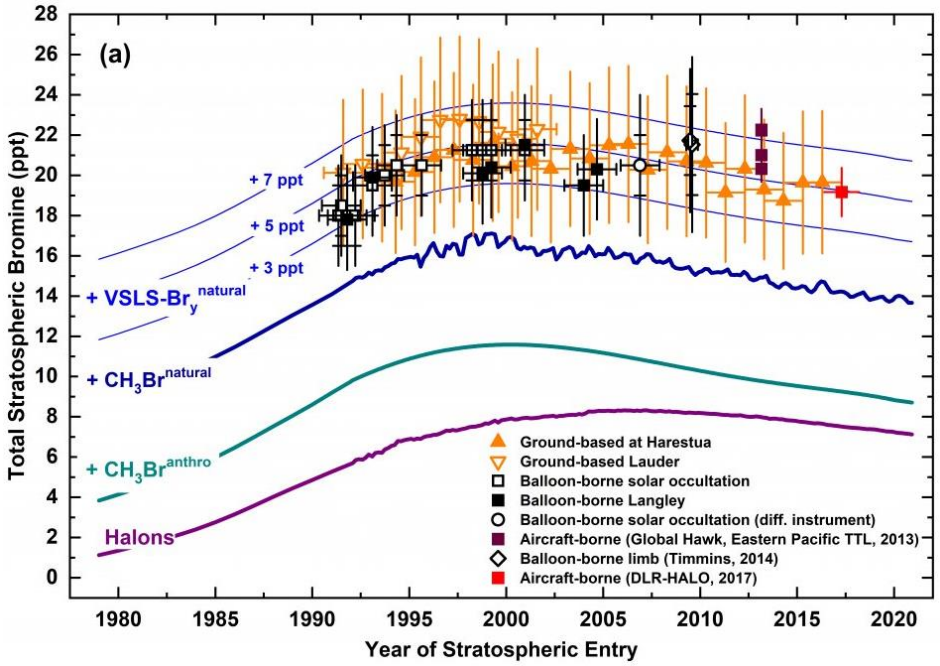
Motivation and goals: 1

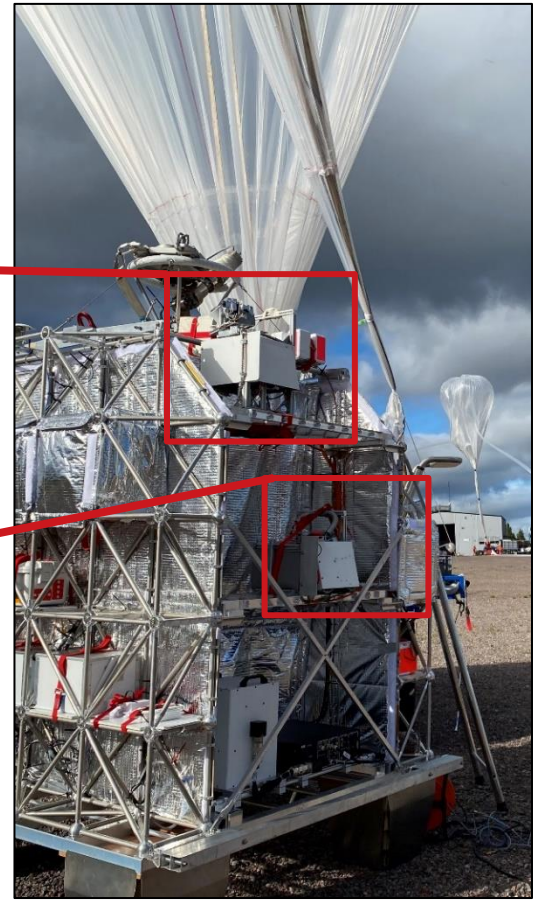
- Effective stratospheric ozone depletion by halogen oxides
- Target species: BrO, NO_2, O_3, IO
- Viewing geometry: solar occultation



[WMO, 2022]

KLIMAT Campaign: 2

- August 2021 in Kiruna, Sweden
- Acquisition of spectra during sunset and sunrise



Solar tracker:

- Precision:
  target range of ±0.05°
  corresponds to 2.8 σ
- Tracked SZA < 95°

Grating spectrometers:

- Resolution: FWHM ~0.5 nm
- UV: 300 – 400 nm
- VIS: 400 – 500 nm

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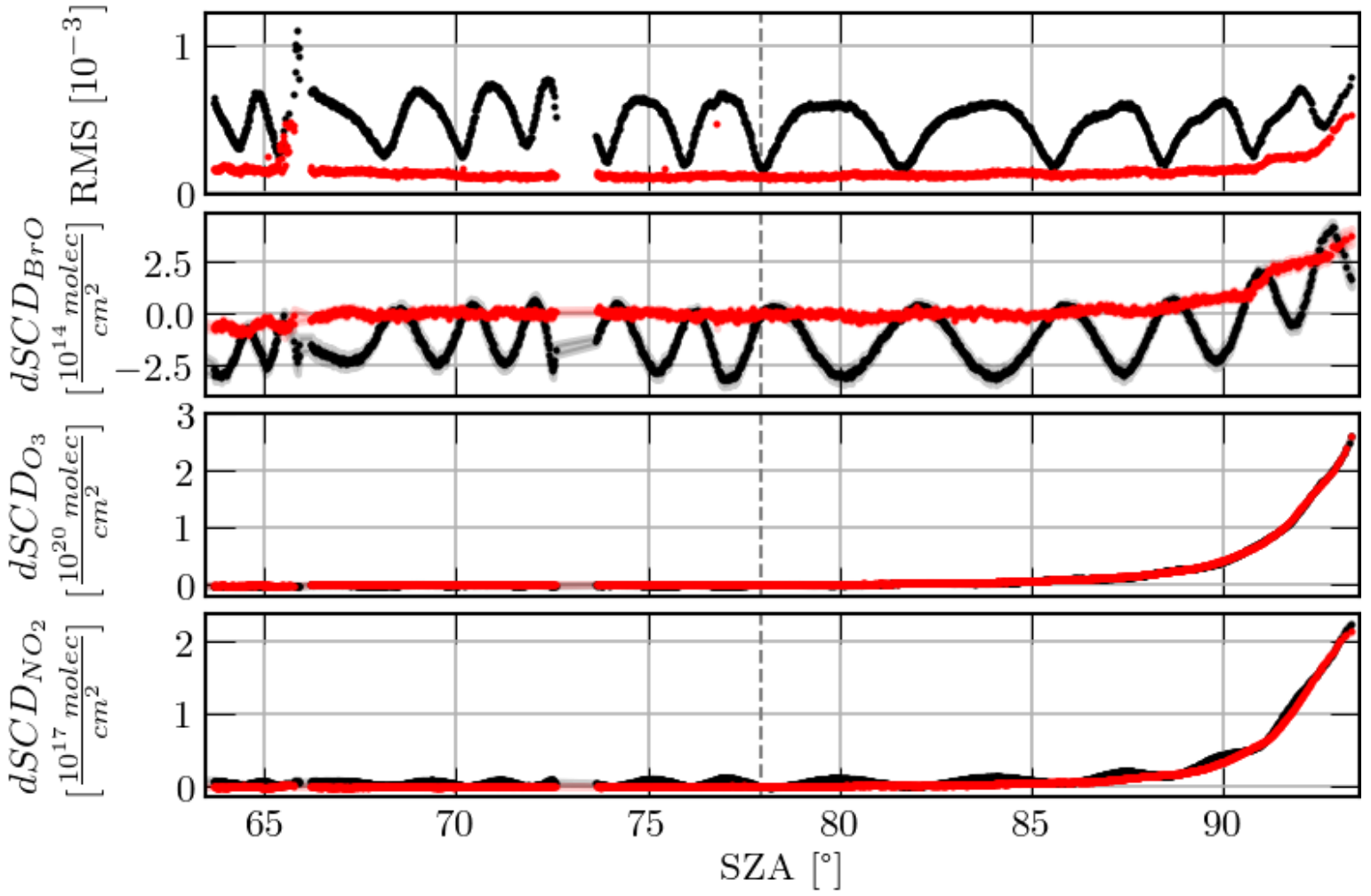
Preliminary results

UV BrO retrieval:

- Standard DOAS
  → instrumental instablilities
  linked to interplay of:
  - Tracker to fiber coupling
  - Thermal effects on optical parts
- Pseudo absorbers reduce waves
  → determined with PCA

Mixing ratio BrO above 32 km:

(14.2 ± 0.7) ppt



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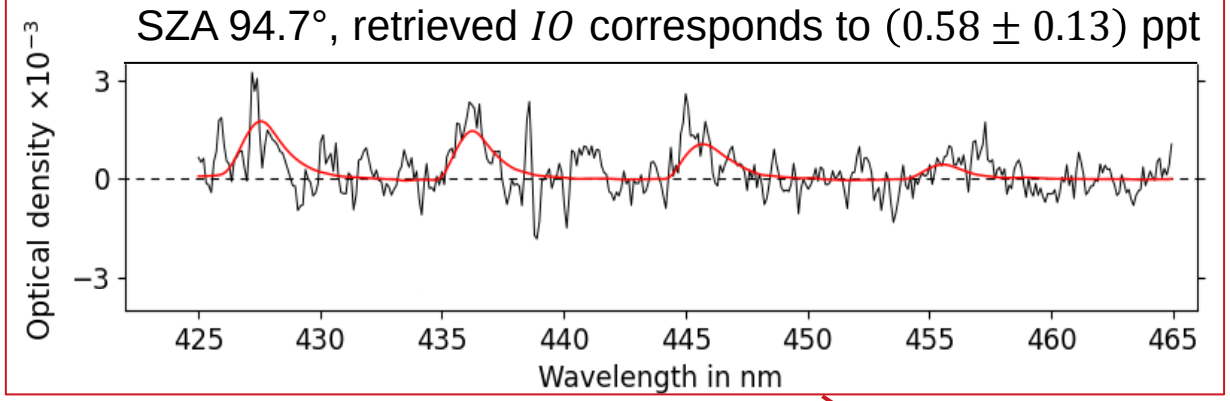
Preliminary results

VIS IO retrieval (ongoing):

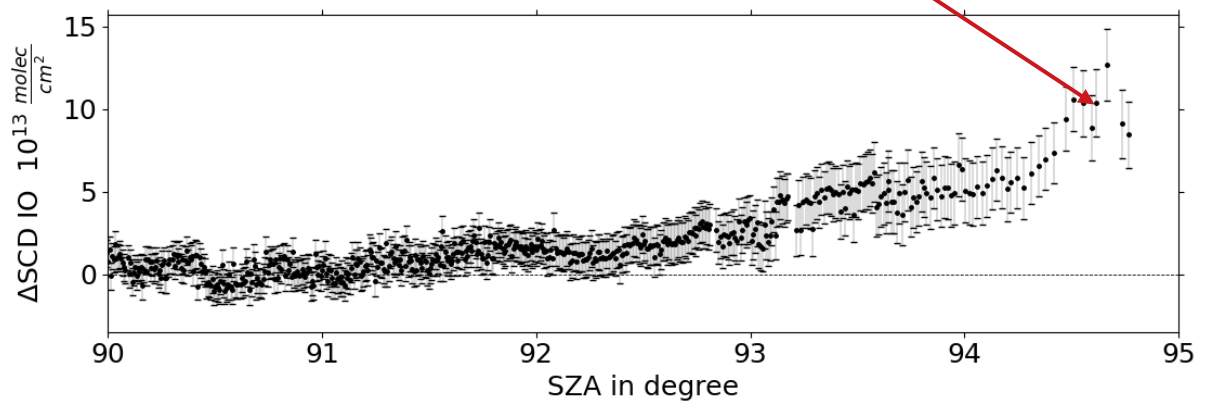
4

Presumably detection of IO

SZA 94.7°, retrieved IO corresponds to (0.58 ± 0.13) ppt

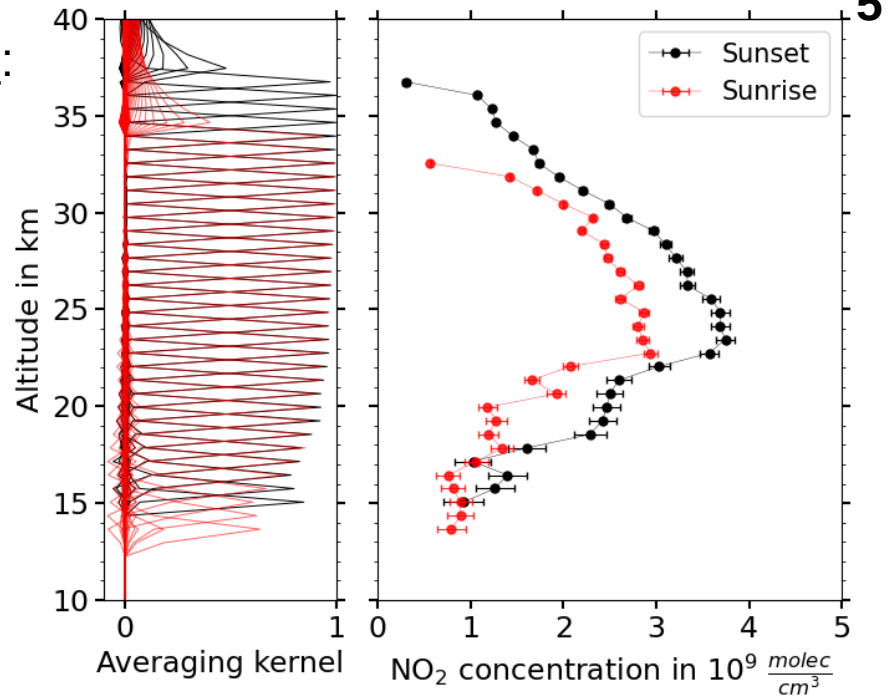


Sunset, IO trend with 2σ fitting error



NO_2 profiles:

5



Outlook:

6

- Campaign:
  August 2022 in Timmins, Canada
- Instrumental improvements

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