Looking for more details?...
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7th Atmospheric Limb Conference LIMB-13
This presentation participates in the student award contest

- ALTIUS instrument -

Development of UV-Vis spectral imagers with Acousto-Optical Tunable Filters (AOTF)

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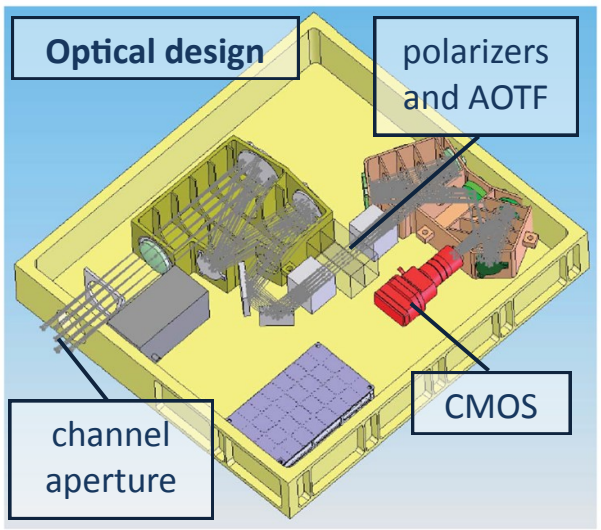
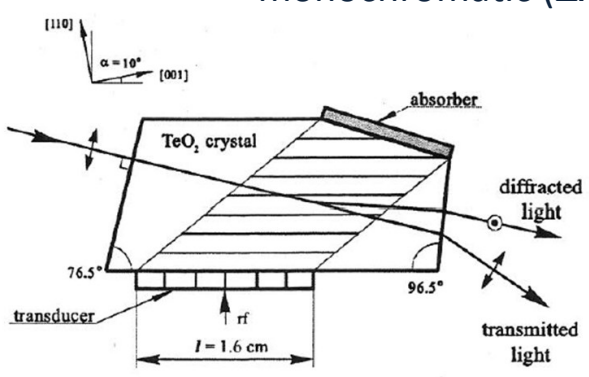
ALTIUS basics

Mission targets: measure the concentration of O_3 and other key species (NO_2, CH_4, H_2O, BrO, aerosols,...) with <1km vertical sampling between cloud top and stratopause, and a quick global coverage.

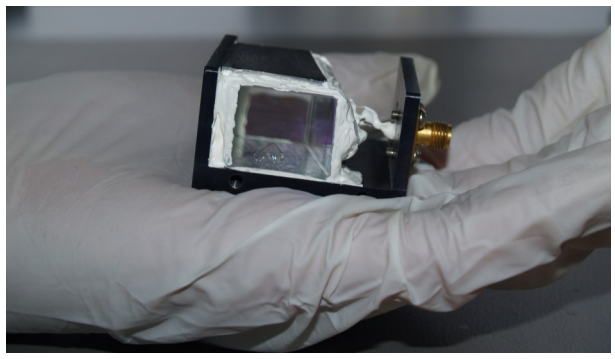
Measurement geometries: limb scattering observation in dayside, solar occultations at terminator and stellar/planet occultations in eclipse.

Instrumental concept: 3 independent spectral imagers (UV:250-450nm, Vis:450-900nm, NIR:900-1800nm) taking spectral snapshots of the limb at specific wavelengths allowing the retrieval of absorbing/scattering species.





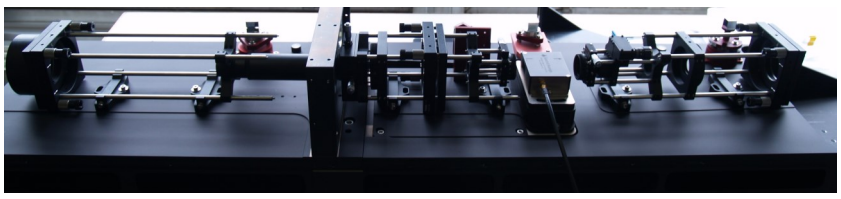
At the heart of each channel, an AOTF makes the limb image monochromatic (Δλ=0.5-5nm).



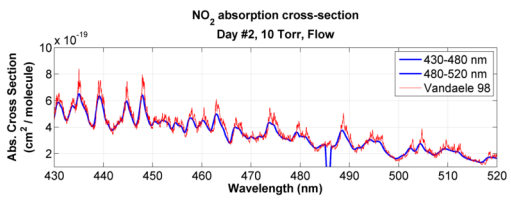
It relies on the momentum matching of light and sound in a birefringent medium.

Visible channel breadboard

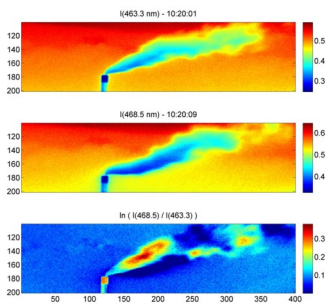
The visible channel spectral and imaging capabilities were assessed using COTS parts.

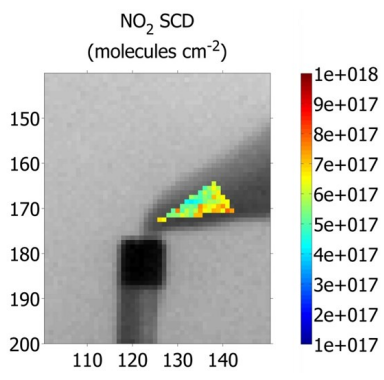


It was used in lab (NO_2 absorption cross section revealed acceptable spectral resolution)...



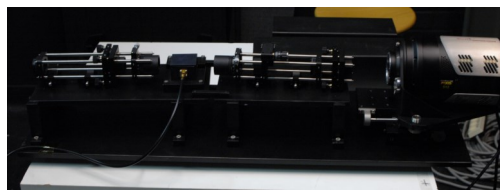
or in field campaigns (NO_2 remote sensing in smoke exhausted by an incinerator).

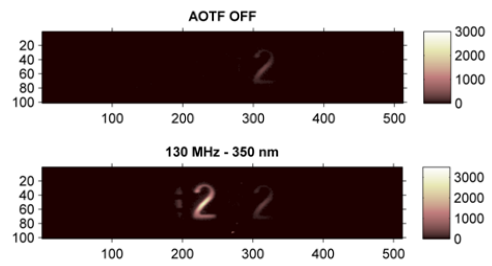


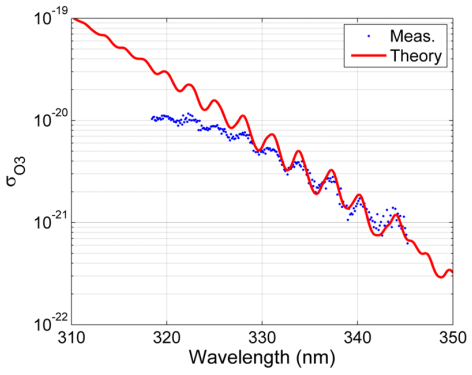


UV channel breadboard

Often considered as a less mature product, lab tests performed with a KDP AOTF from the Moscow State University demonstrated satisfying spectral and imaging quality.







Measurements of O_3 Huggins band illustrated the AOTF spectral resolution.

References:
- ALTIUS website : altius.oma.be
- Smokestack: Dekemper et al., Appl. Opt. 51, 2012.

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