SAOZ O_3 and NO_2 columns compared to TOMS - GOME - SCIAMACHY - OMI

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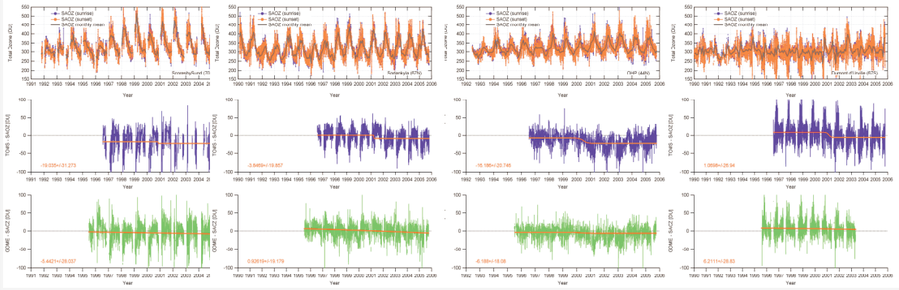
Systeme d'Analyse par Observations Zenithales (SAOZ)

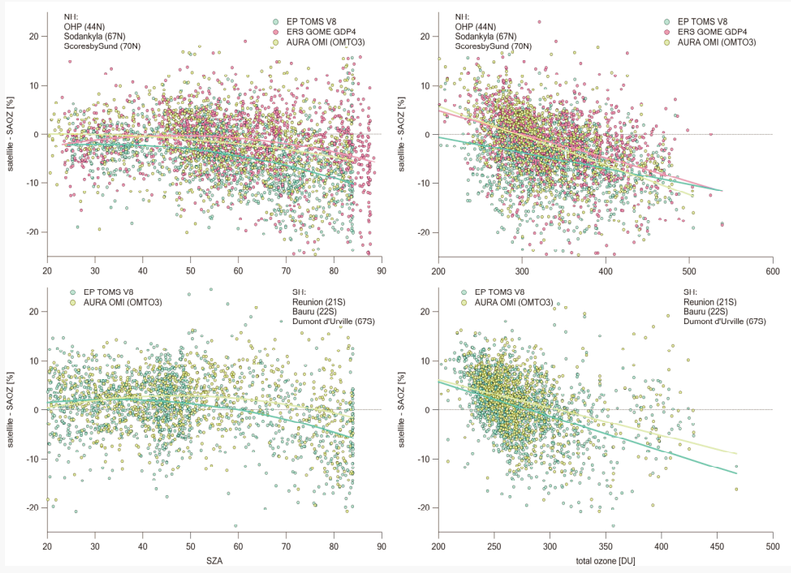
- Zenith sky measurements at twilight (86°<SZA<91°)
- Differential Optical Absorption Spectroscopy (DOAS)
- Ozone: 450-590 nm Chappuis Band, temperature independent
- NO_2: 400-550 nm
- NDSC qualified

Longterm comparison of SAOZ total O_3 with EP TOMS and ERS GOME over ScoresbySund (70N), Sodankyla (67N), OHP (44N) and Dumont d'Urville (67S)



- GOME: agreement with SAOZ +9/-6 DU (depending on station), over the whole period of simultaneous observations
- TOMS: agreement with SAOZ +9/-19 DU (depending on station), with a drop in TOMS ozone starting from 2001

Relative difference between SAOZ and satellite data (EP TOMS, ERS GOME, and AURA OMI) in 2004-2005 with respect to SZA and ozone column over northern and southern hemisphere



- SZA dependence: starting from ~60° in both hemisphere up to 5% for GOME and OMI (at 84°), and more for TOMS - up to 10% at 84°
- O_3 column dependence: underestimation of high ozone by TOMS, GOME and OMI

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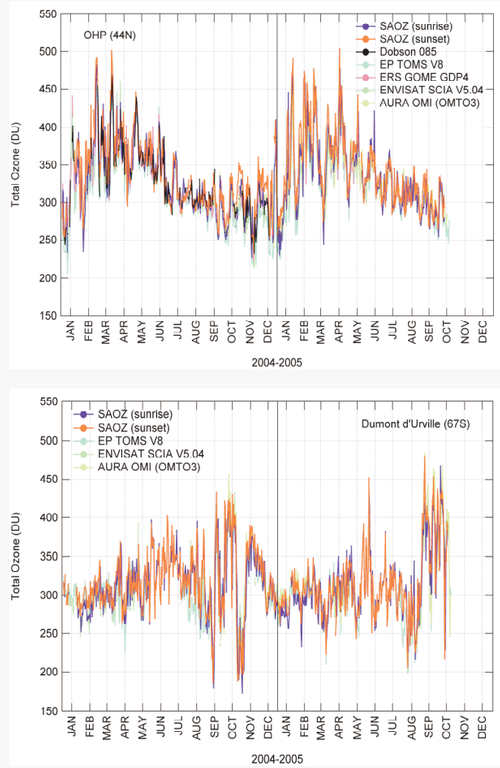
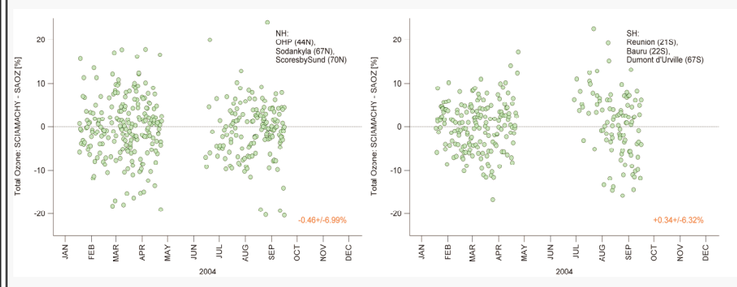
The SAOZ stations are part of the NDSC (Network for Detection of Stratospheric Changes).

Comparison of SAOZ total O3 with EP TOMS, ERS GOME, ENVISAT SCIAMACHY and AURA OMI in 2004-2005 over OHP (44N) and Dumont d'Urville (67S)



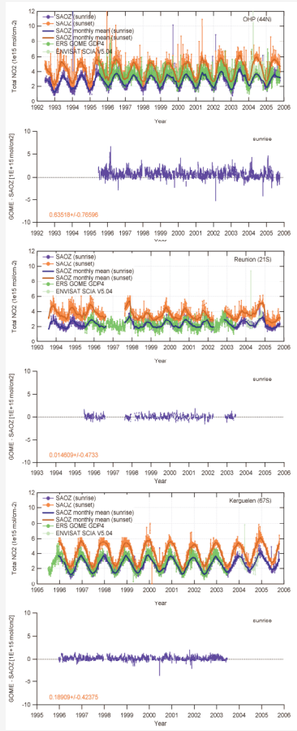
⇐ Similar agreement with SAOZ for GOME and OMI, better than for TOMS (in 2004-2005)

Relative difference between SAOZ and SCIAMACHY ozone in 2004 over northern and southern hemisphere



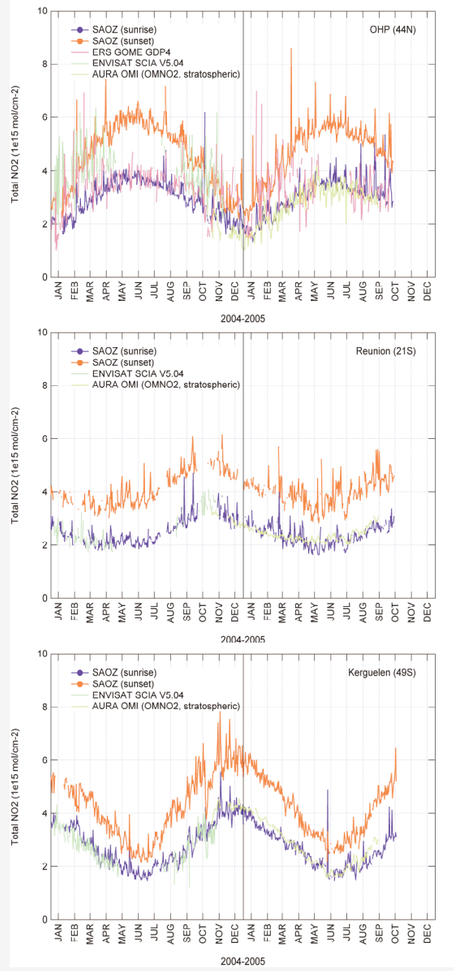
- Very limited data of correlative SCIAMACHY O_3 data available in 2004 - no data in June, some erroneous data removed in January, April, and October-November
- SCIAMACHY ozone column in 2004 agree with SAOZ by -0.5±7.0% and +0.3±6% on the average, for the northern and southern hemisphere, accordingly

Longterm comparison of SAOZ total NO_2 with ERS GOME over OHP (44N), Reunion (21S), and Kerguelen (49S)

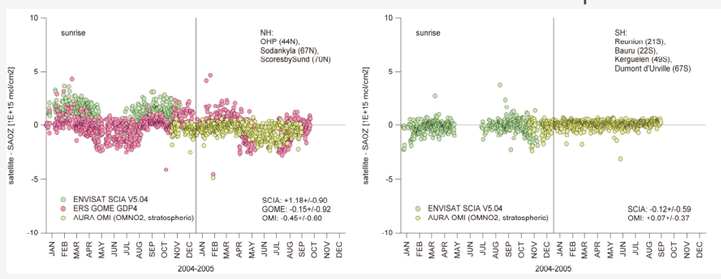


GOME NO_2 vertical column agree with SAOZ sunrise, average difference:
< $0.2 \cdot 10^{15}$ mol/cm² in the s. hemisphere,
and
< $0.6 \cdot 10^{15}$ mol/cm² in the n. hemisphere

Comparison of SAOZ total NO_2 with ERS GOME, ENVISAT SCIAMACHY and AURA OMI in 2004-2005 over OHP, Reunion and Kerguelen



Absolute difference between SAOZ and SCIAMACHY NO_2 in 2004-2005 over northern and southern hemisphere



- GOME: good agreement with SAOZ sunrise in the n. hemisphere, ~ $(-0.2\pm0.9)\cdot10^{15}$ mol/cm²; GOME<SAOZ sunrise in summer (no data in s. hemisphere in 2004-2005)
- SCIAMACHY: very good agreement in s. hemisphere, ~ $(-0.1\pm0.6)\cdot10^{15}$ mol/cm²; less in n. hemisphere: ~ $(1.2\pm0.9)\cdot10^{15}$ mol/cm² (no data in June 2004, and 2005)
- OMI: very good agreement in s. hemisphere, ~ $(0.1\pm0.4)\cdot10^{15}$ mol/cm²; good agreement in n. hemisphere, ~ $(-0.4\pm0.6)\cdot10^{15}$ mol/cm²; OMI<SAOZ sunrise in summer