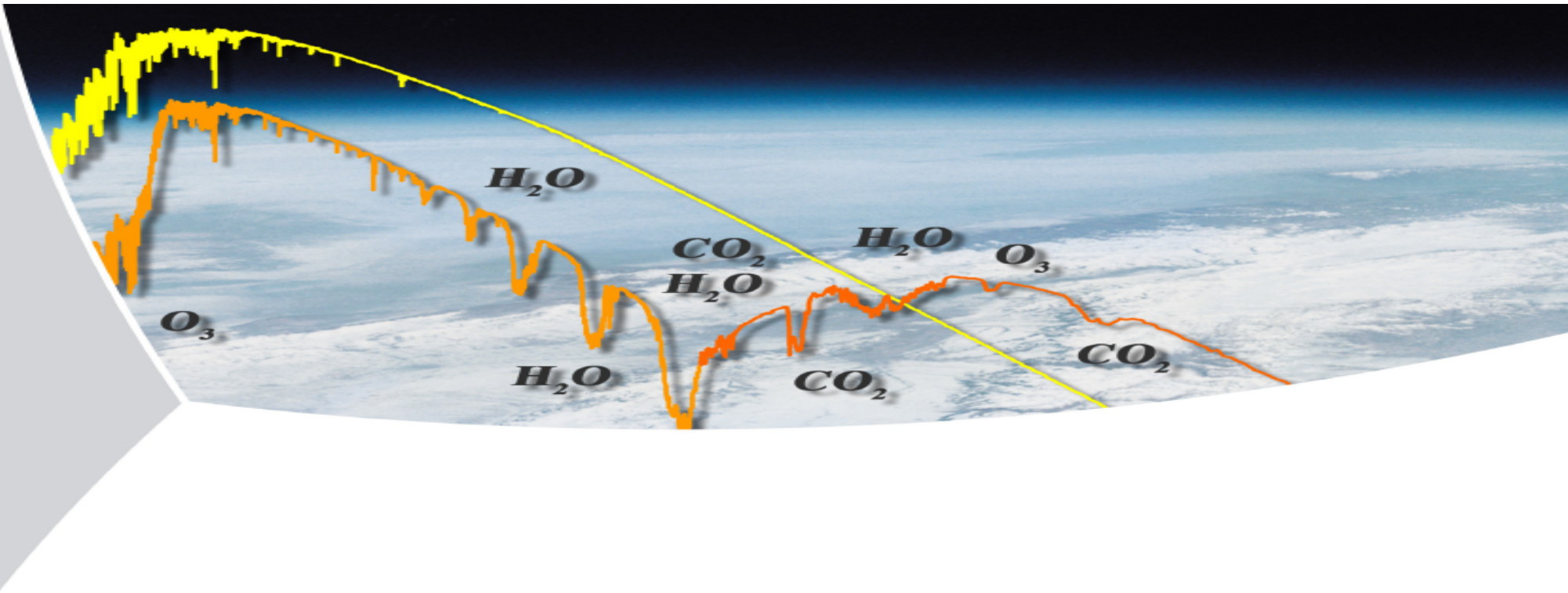


Check SCIAMACHY L2 v5.89

German Aerospace Center (DLR), Remote Sensing Technology Institute,
Oberpfaffenhofen, GERMANY

May 5, 2015

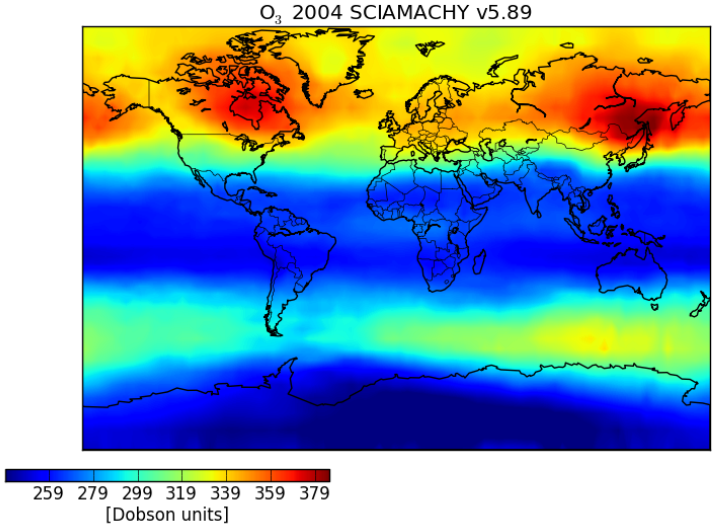
What is compared?

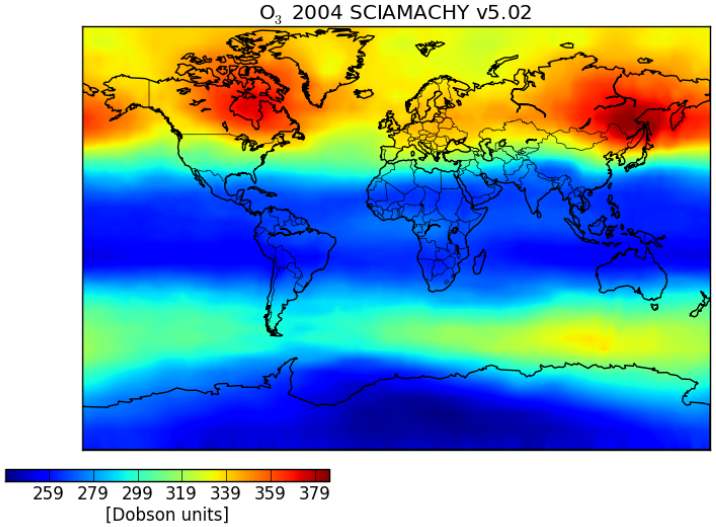
- L2v5.89: input L1 files processed by the latest gencal Version; L1-L2 processing done by the SGPv5.89 (processing time between 26-SEP and 17-OCT 2014)
- reference: the latest official ESA version (v5.02)

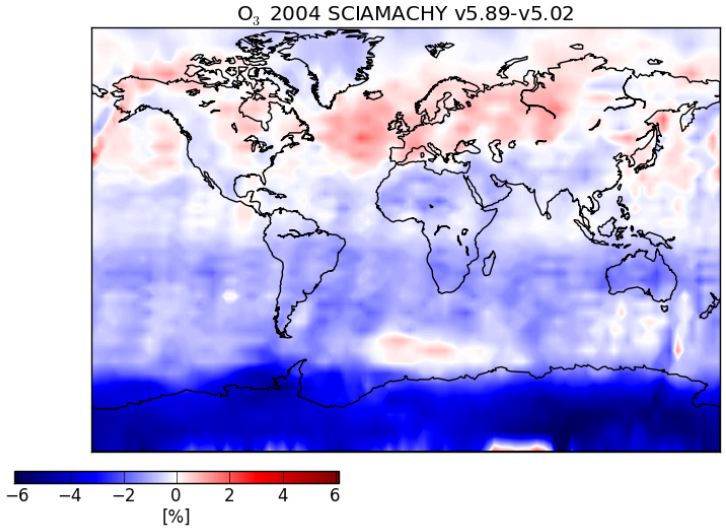
Methodology

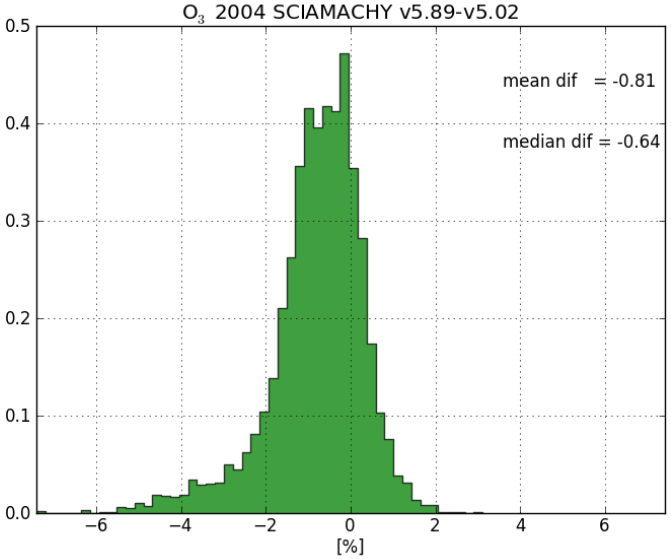
- comparison of annual means
- for products with the lowest spatial resolution (NO_2, *AAI*, *CloudFractions* and *CloudTopHeights*) monthly means are compared

Nadir Ozone


O_3 2004 SCIAMACHY v5.89
259 279 299 319 339 359 379
[Dobson units]

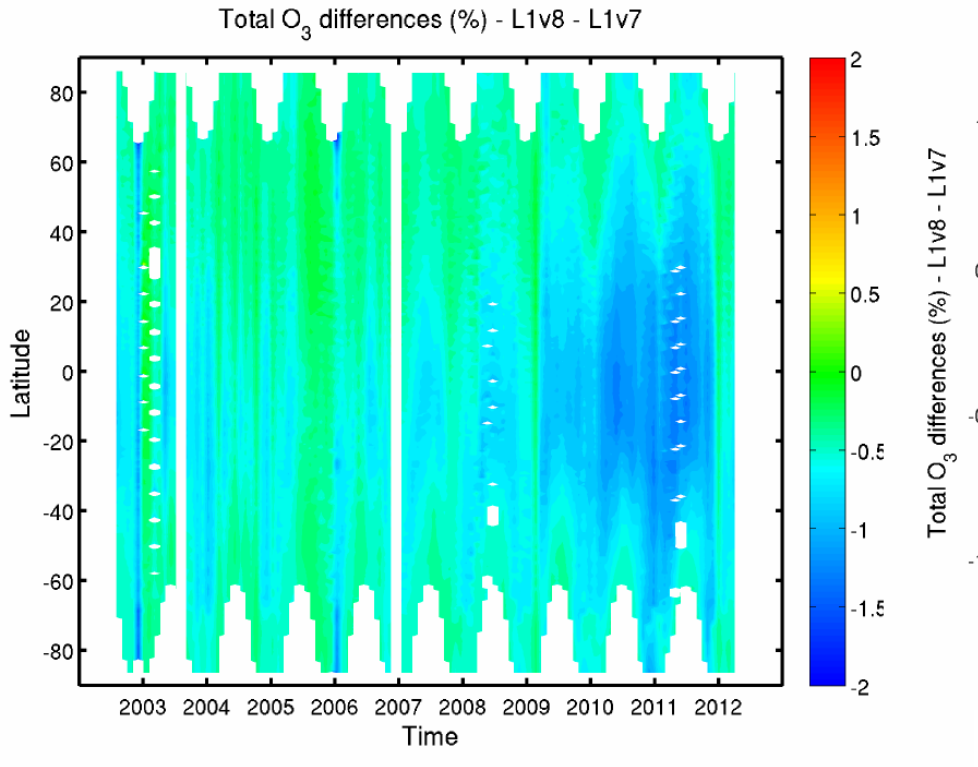

O_3 2004 SCIAMACHY v5.02
259 279 299 319 339 359 379
[Dobson units]

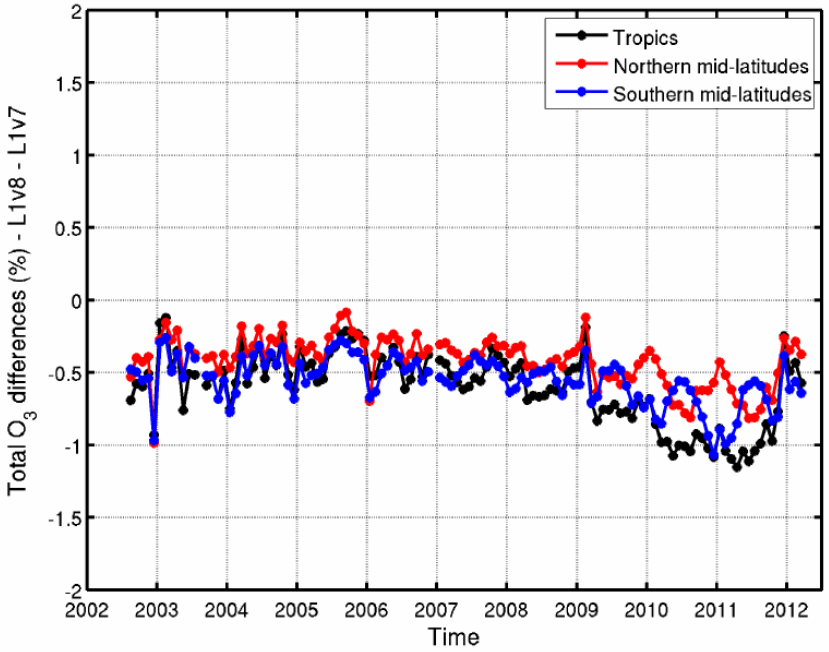

O_3 2004 SCIAMACHY v5.89-v5.02
−6 −4 −2 0 2 4 6
[%]


O_3 2004 SCIAMACHY v5.89-v5.02
mean dif = -0.81
median dif = -0.64
0.0 0.1 0.2 0.3 0.4 0.5
−6 −4 −2 0 2 4 6
[%]

Nadir Ozone

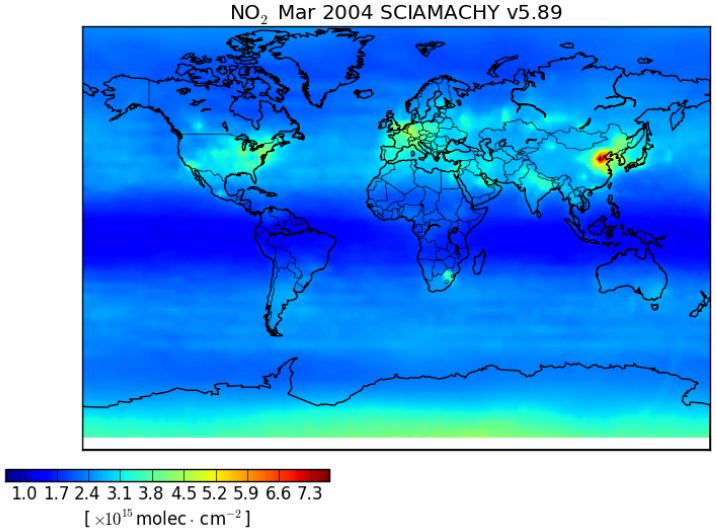
in agreement with the BIRA analysis

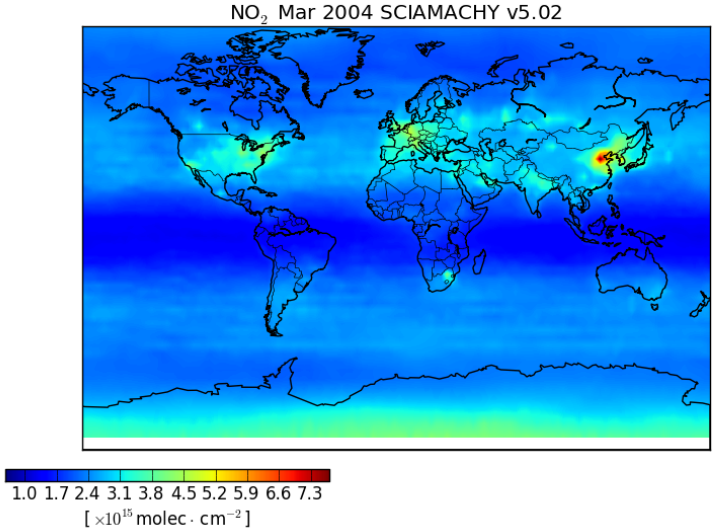


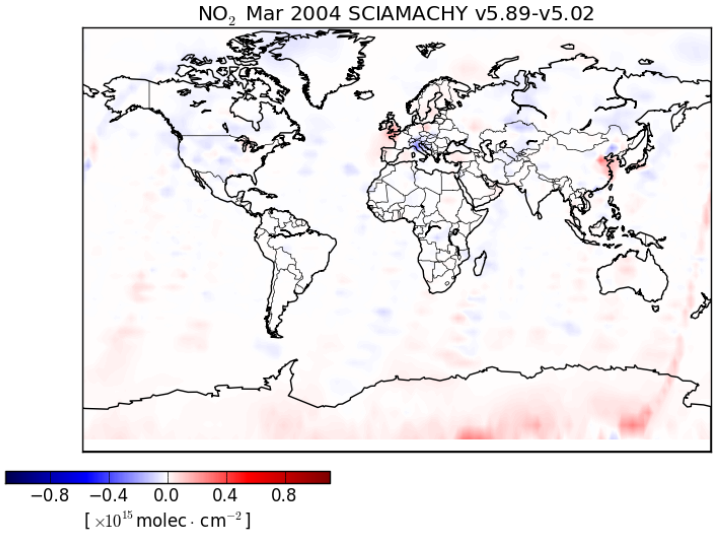


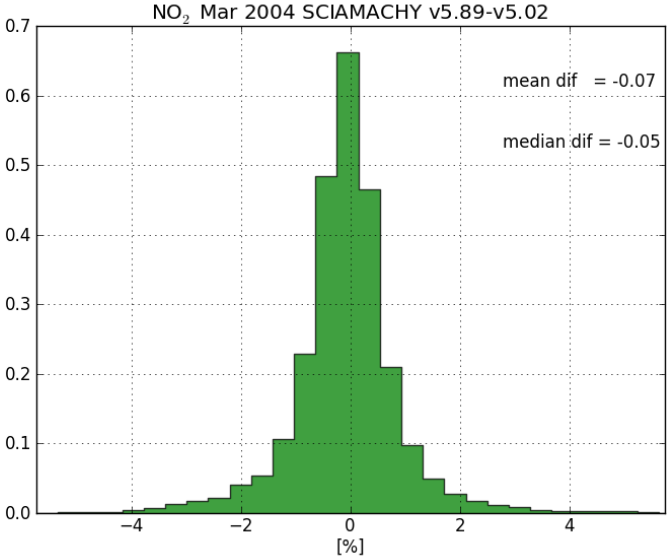
- The impact of the switch from L1v7 to L1v8 appears to be mostly a bias of ~-0.5%.
- Differences slightly increase after 2009 in Tropics.
- Is this an improvement or not?

Nadir NO_2 (March)

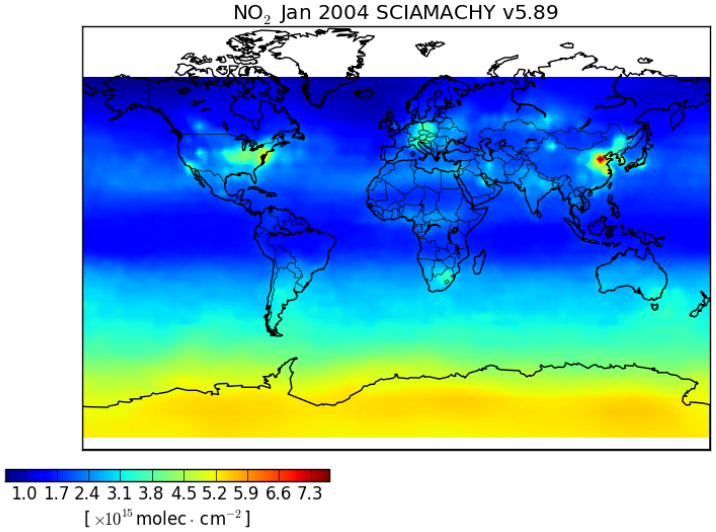


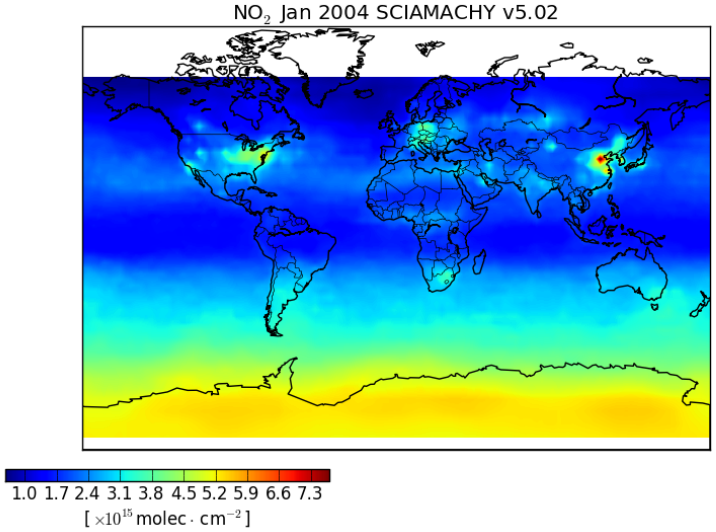


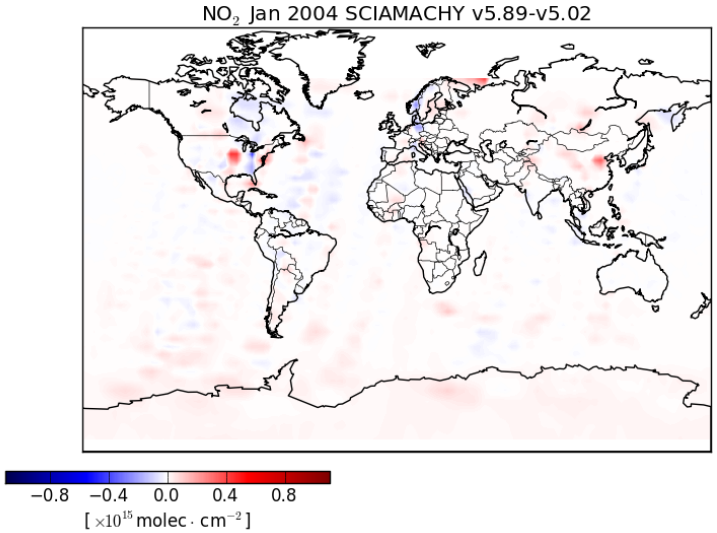


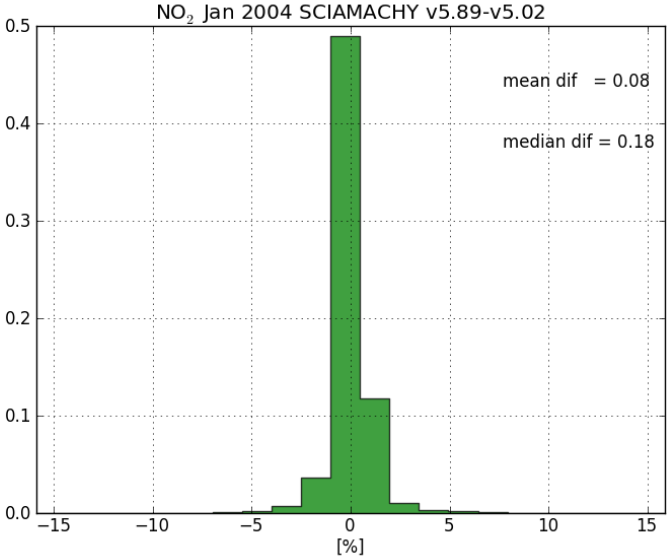


Nadir NO_2 (January)

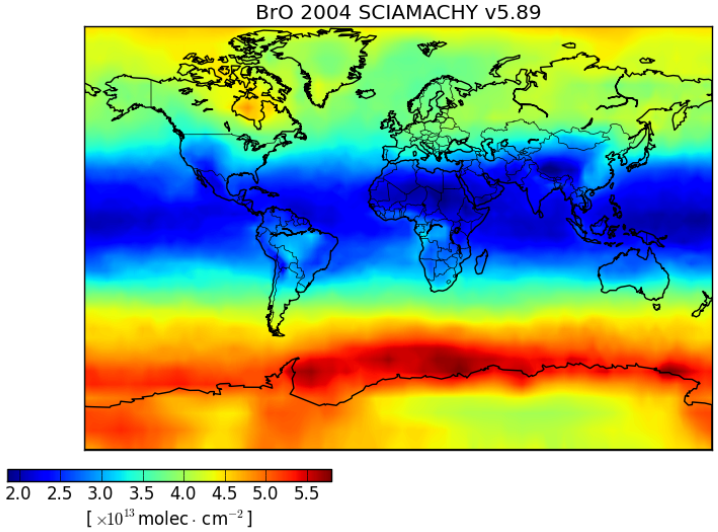


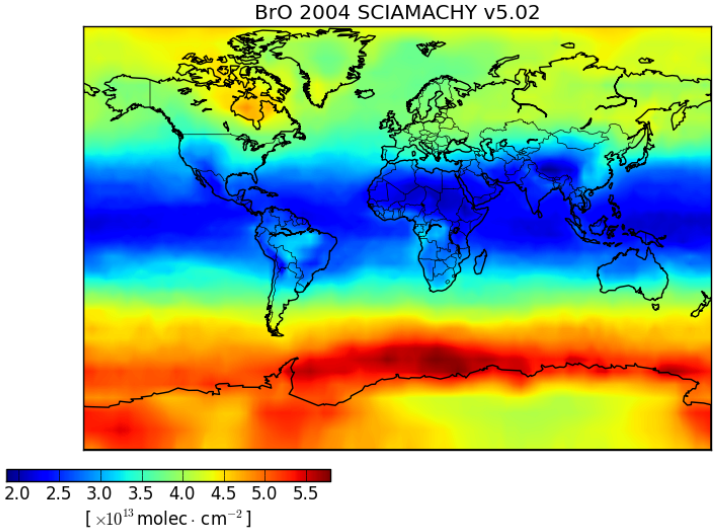


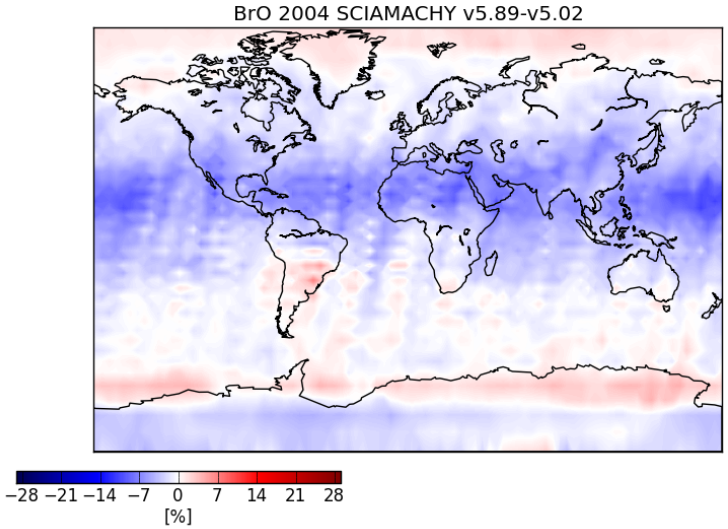


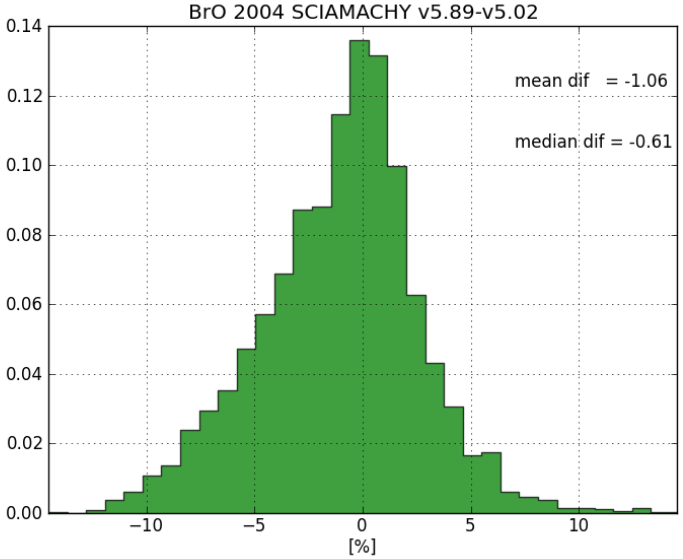


Nadir Bromine Monoxide

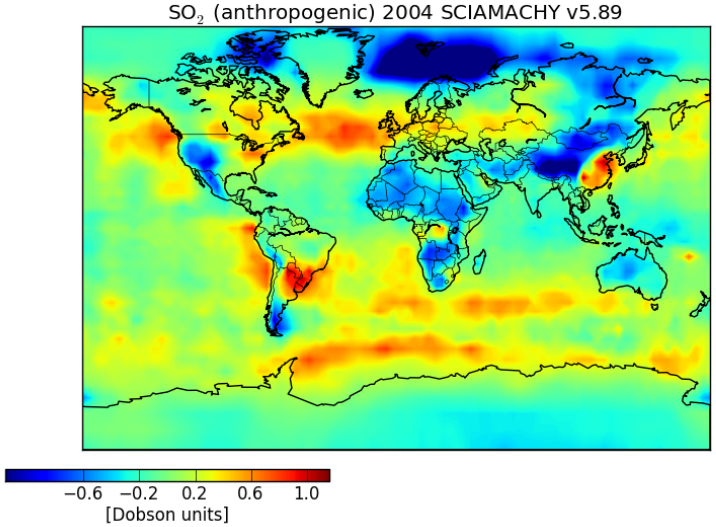


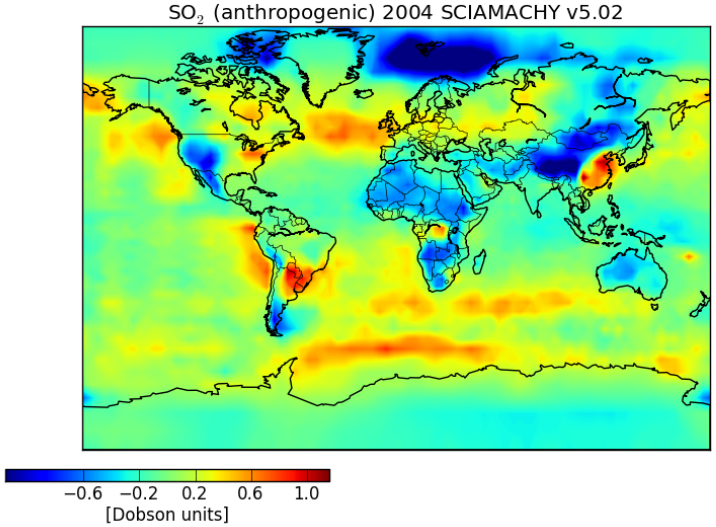


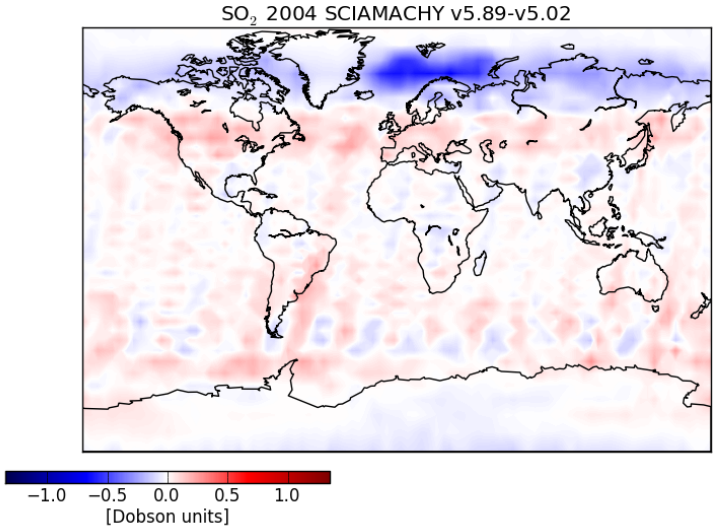


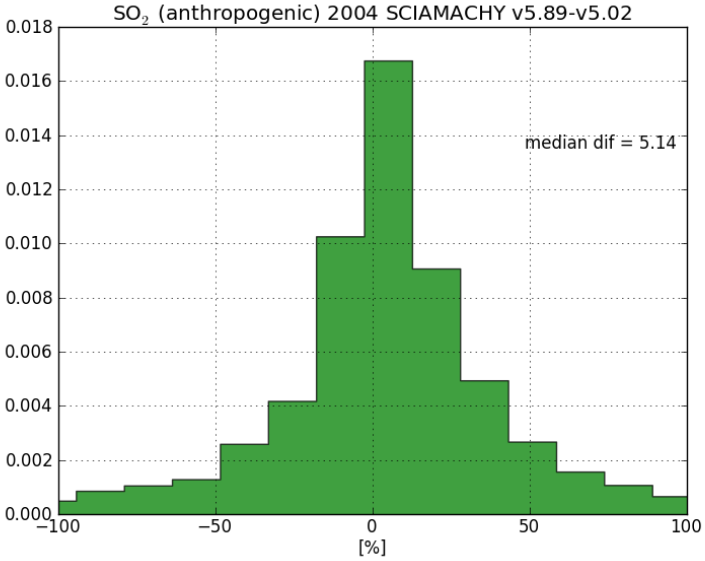


Nadir Sulphur Dioxide





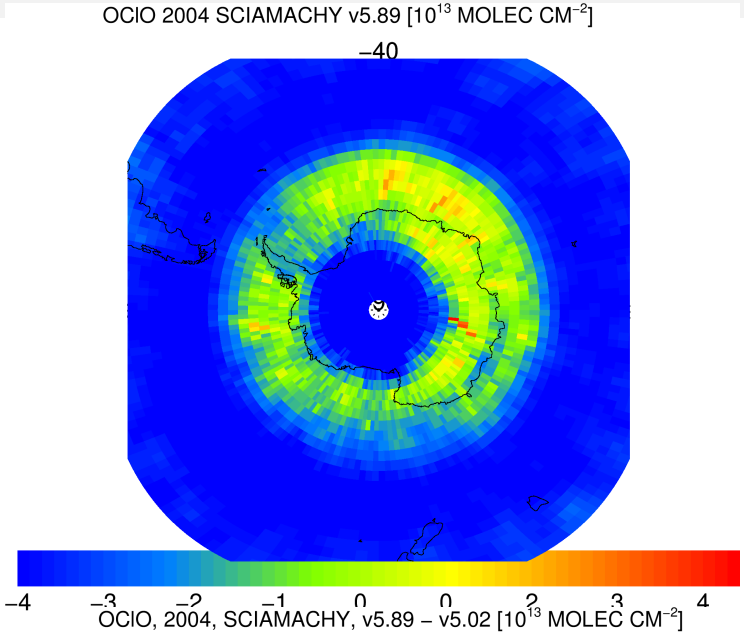


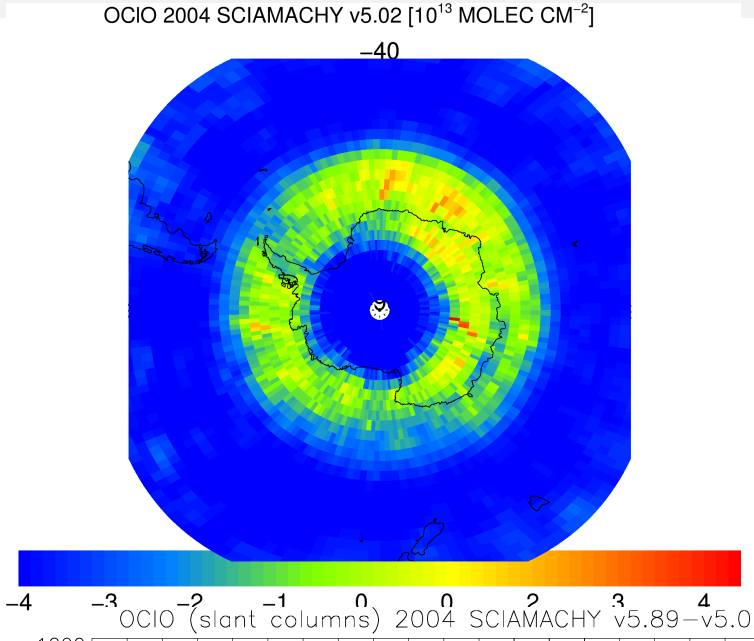


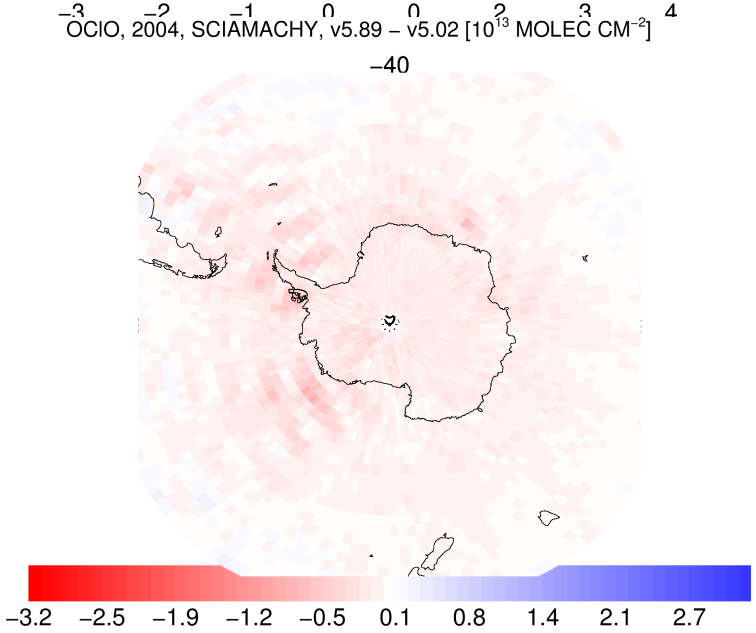
Nadir Sulphur Dioxide

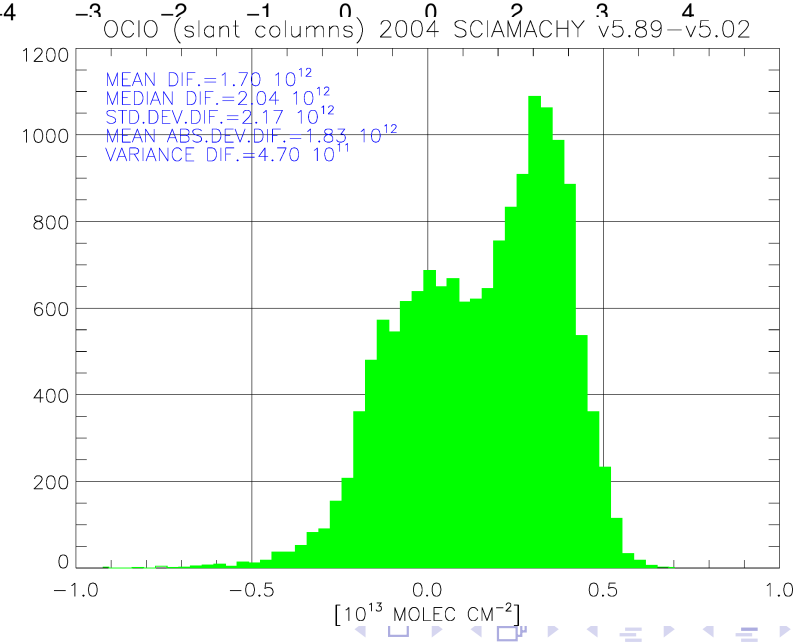
- similar quality of v5.89 as before
- same picture for "volcanic" product

Chlorine Dioxide (Slant Columns)





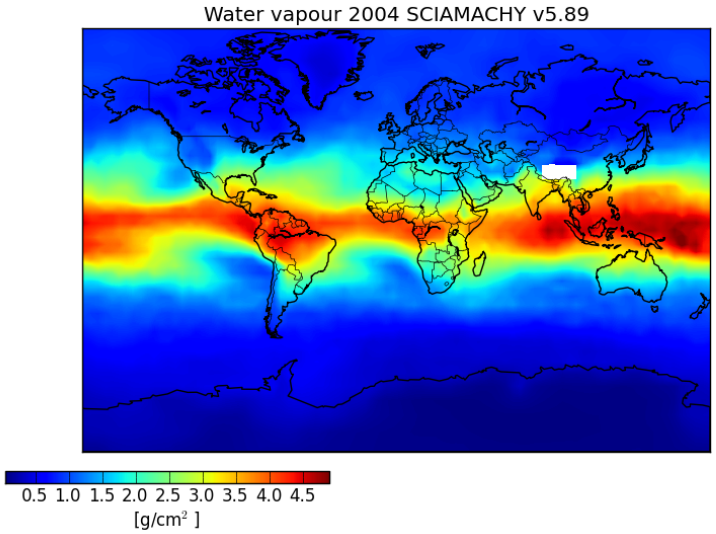


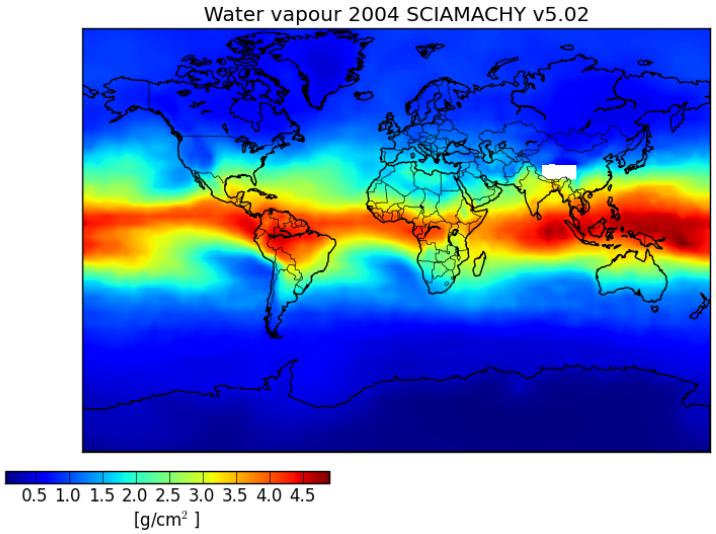


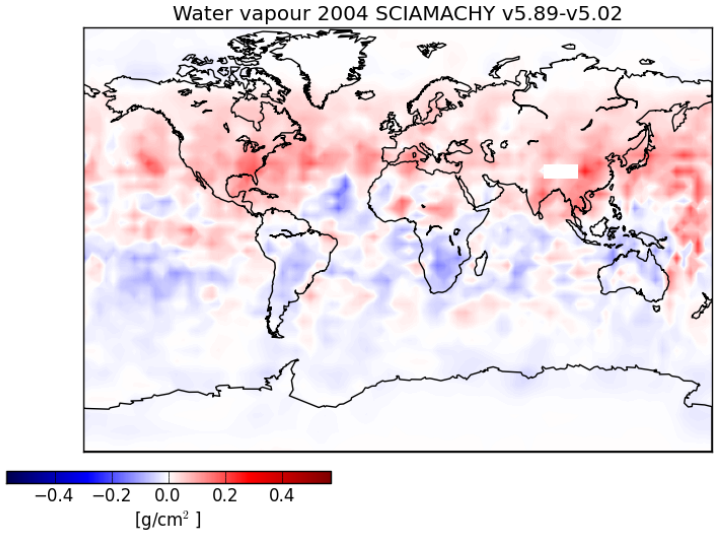
Chlorine Dioxide (Slant Columns)

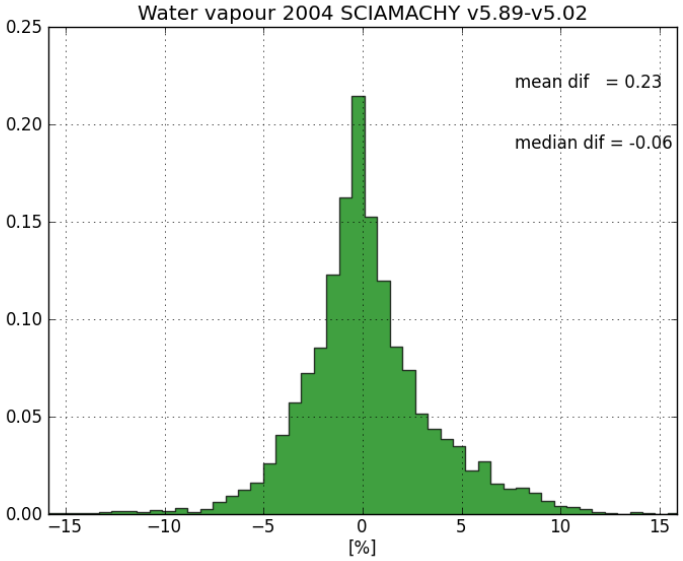
- small differences
- v5.89 slant columns are less negative except over Antarctica
- chlorine activation in Antarctica well captured in both data sets

Water Vapour







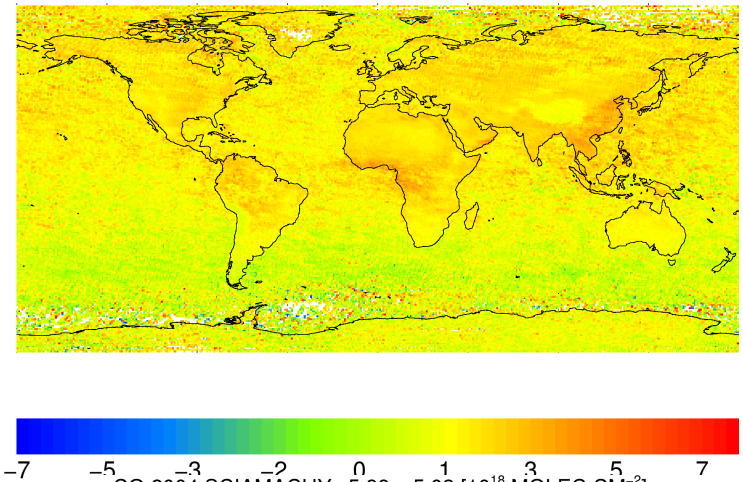


Water Vapour

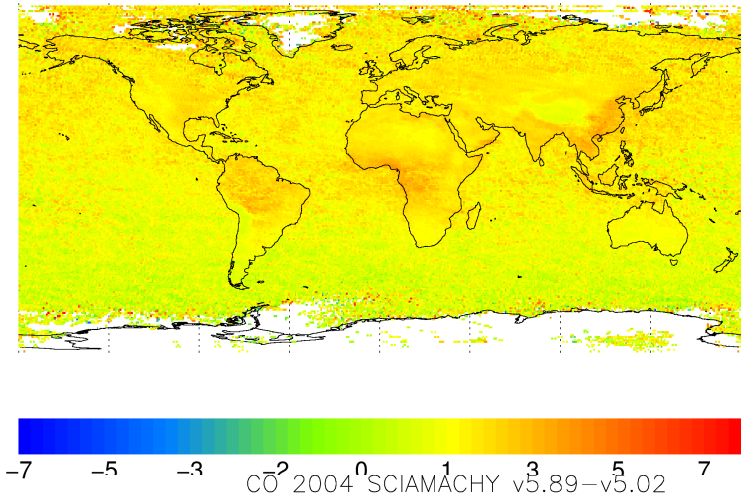
- new data set is slightly more humid in the Northern Hemisphere
- and drier in the South Hemisphere
- reason unknown

Carbon Monoxide

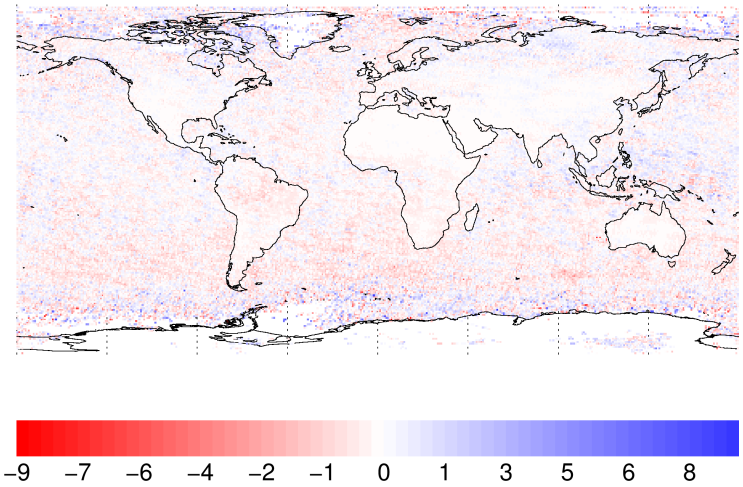
CO 2004 SCIAMACHY v5.89 [10^{18} MOLEC CM^{-2}]

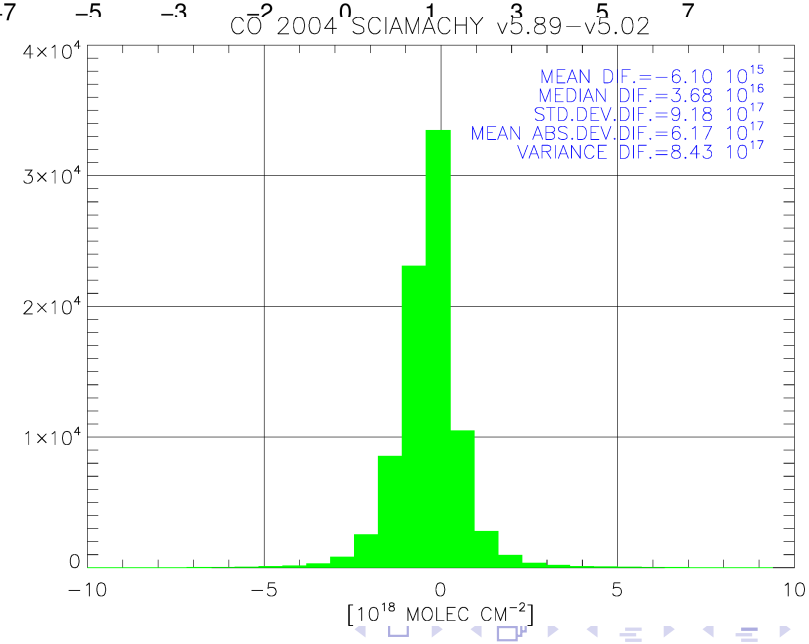


CO 2004 SCIAMACHY v5.02 [10^{18} MOLEC CM^{-2}]



CO 2004 SCIAMACHY v5.89−v5.02 [10^{18} MOLEC CM^{-2}]

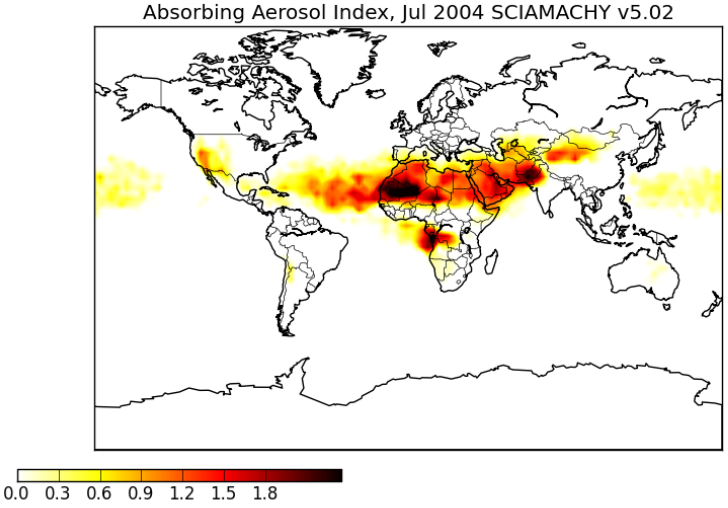


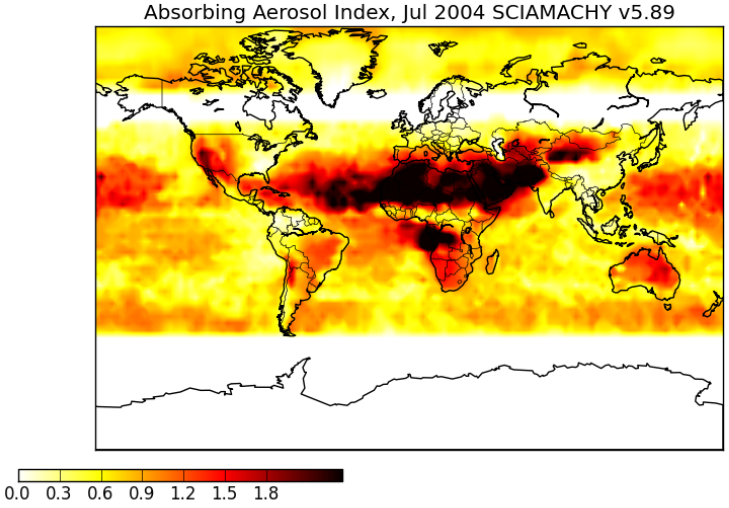


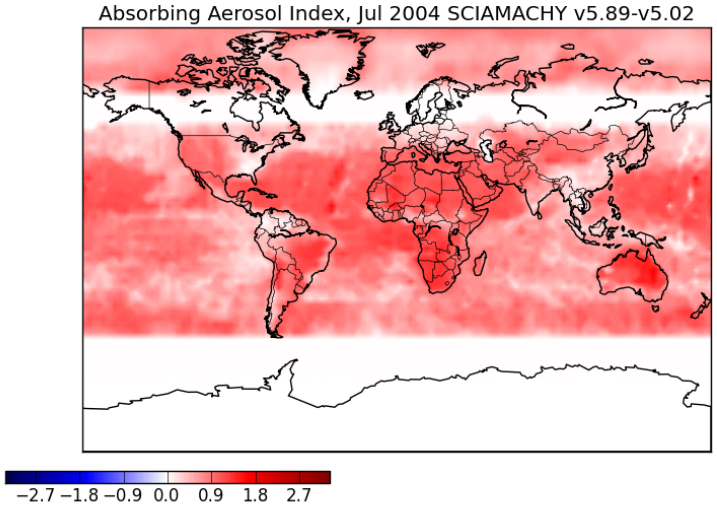
Carbon Monoxide

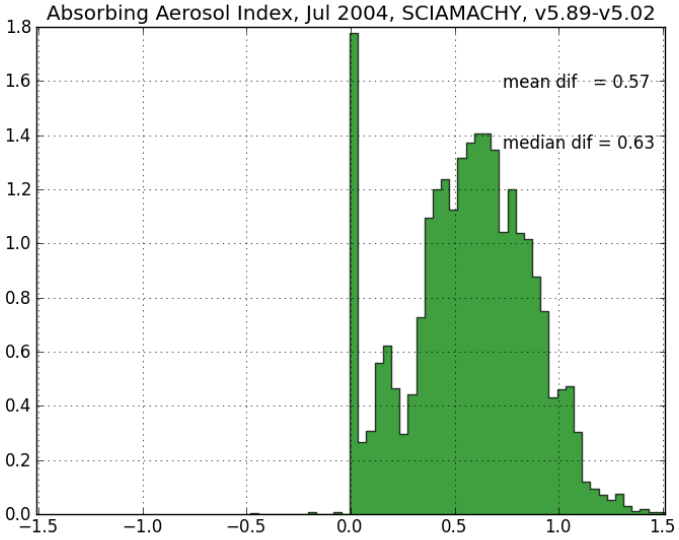
- more useful pixels in the new data set
- large scatter in the SAA region
- small differences between the data sets

Absorbing Aerosol Index (July)

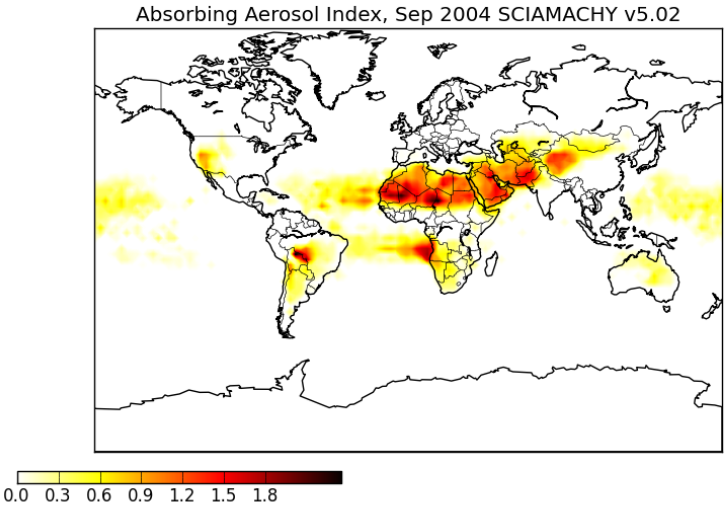


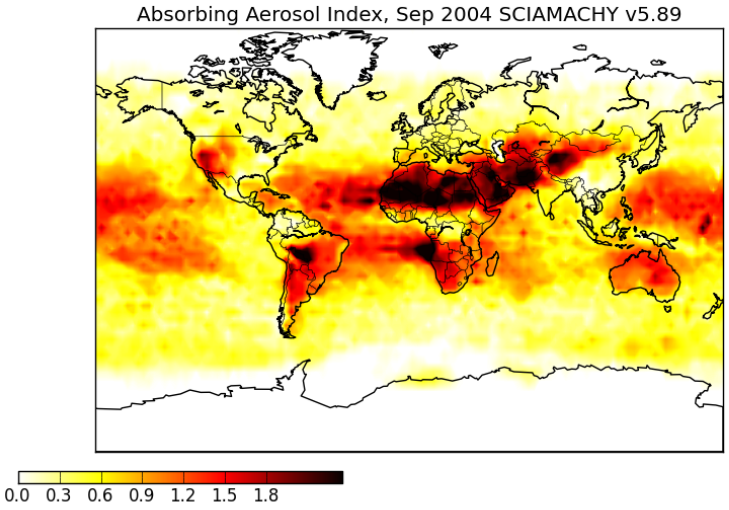


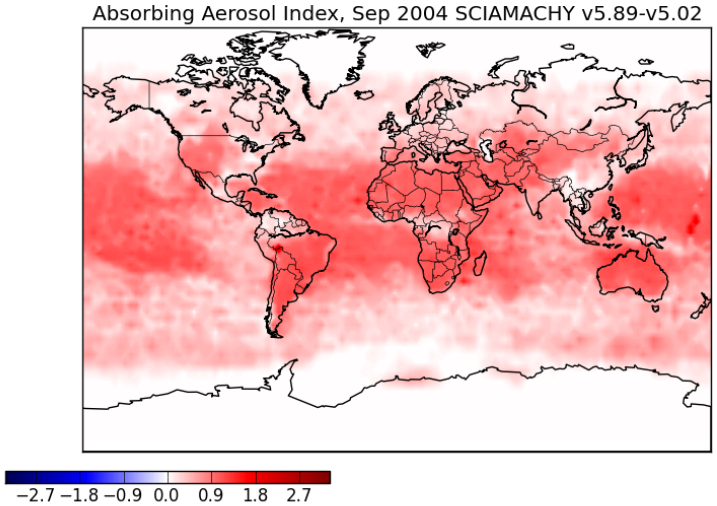


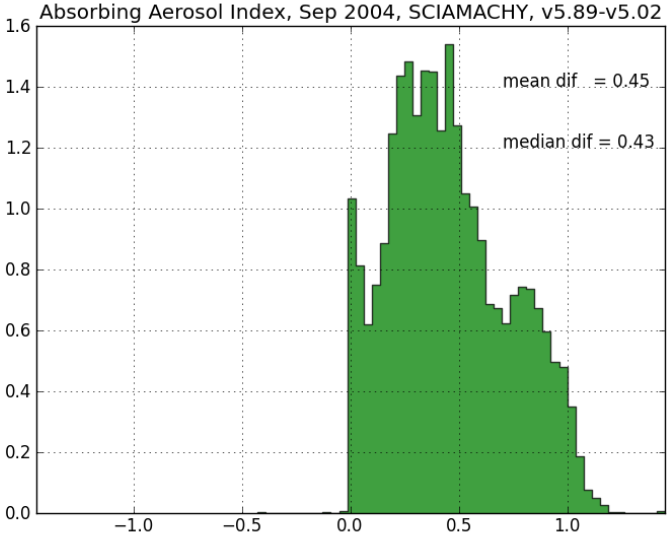


Absorbing Aerosol Index (September)





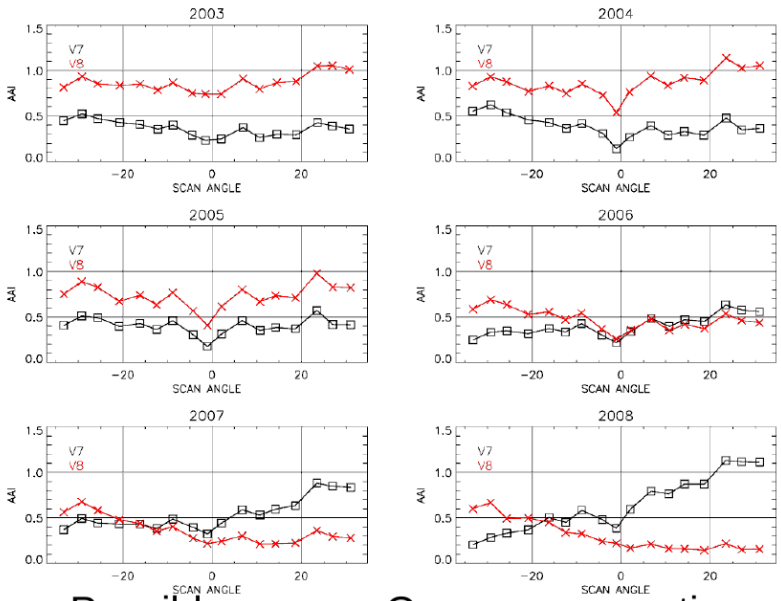


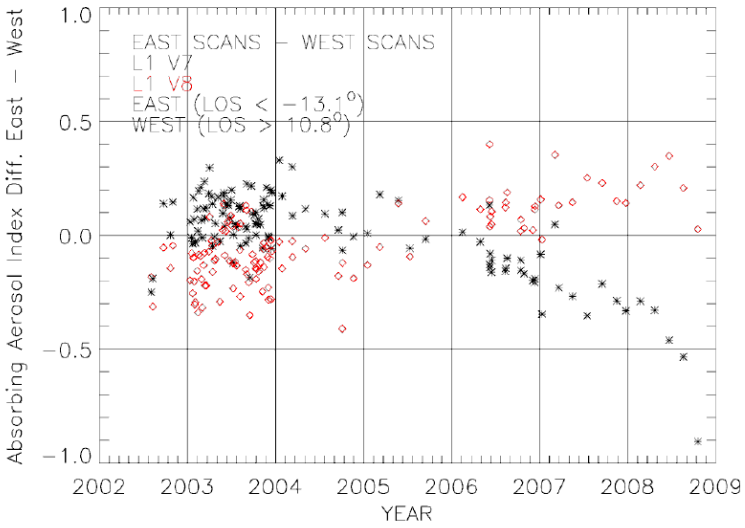


Absorbing Aerosol Index

already known: after the update from L1v7 to L1v8 reduced scan angle dependence, but increased absolute values of AAI especially at the beginning of the mission

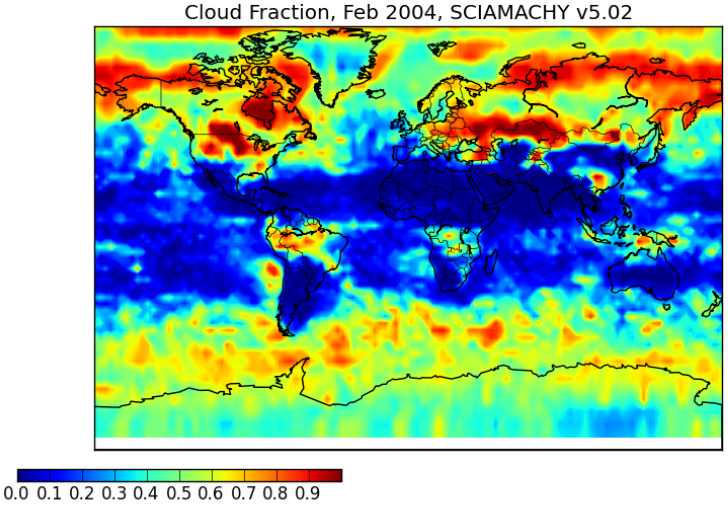
- Problem: AAI based on L1V8 still shows some scan angle dependence (smaller than for V7, but with different sign)

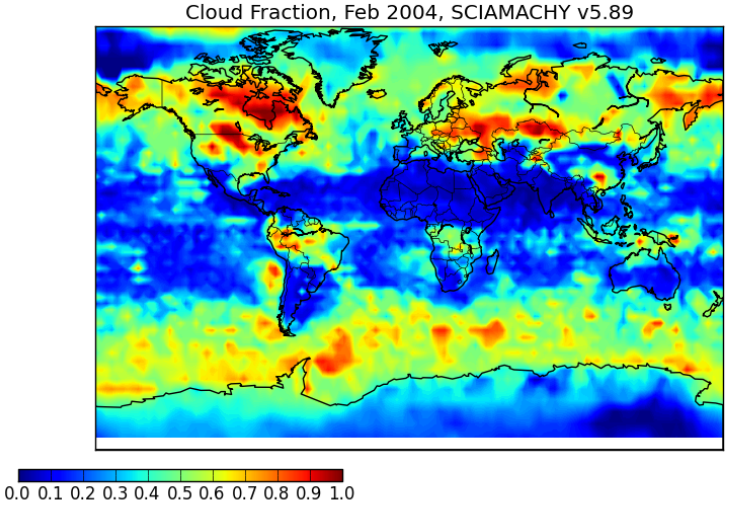


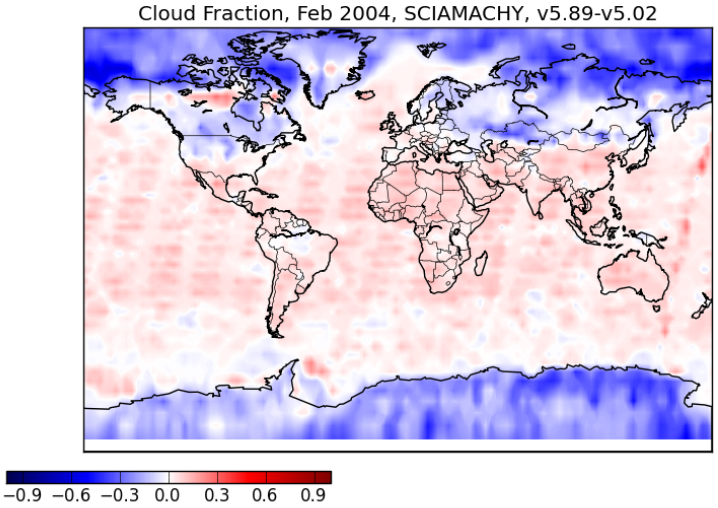


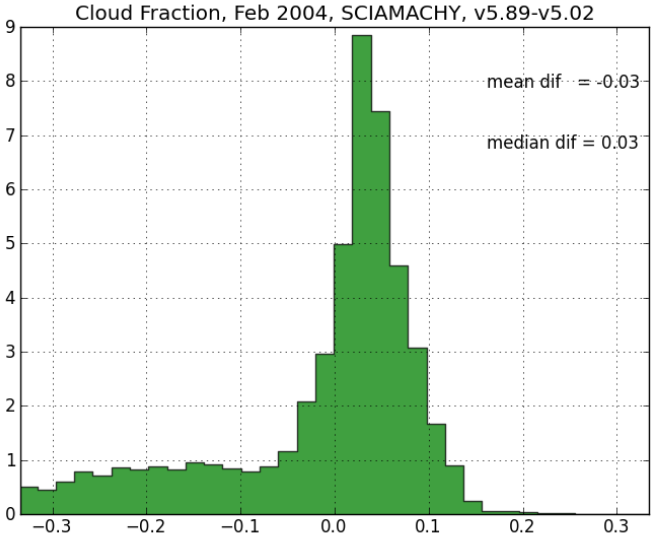
- Possible reason: Over-compensation of scan angle dependence by new degradation correction
- Way forward: Product is improved compared to V5, so add remaining issues in README file and investigate problem further for L1V9 / L2V7 in follow-on project.

Cloud Fraction (February)

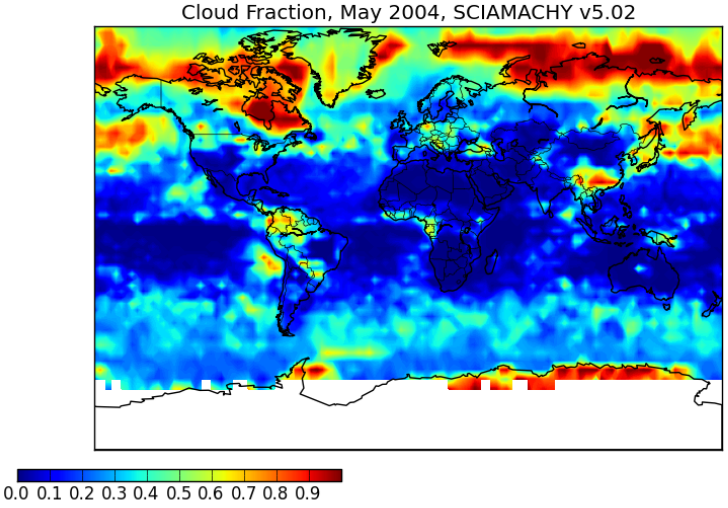


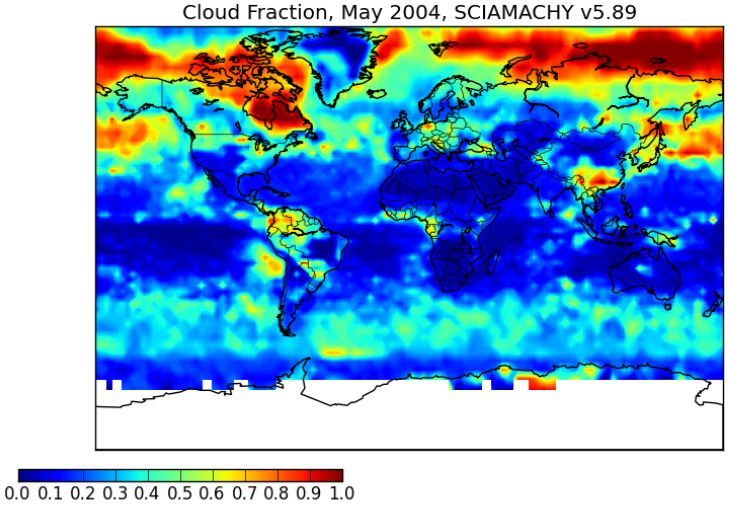


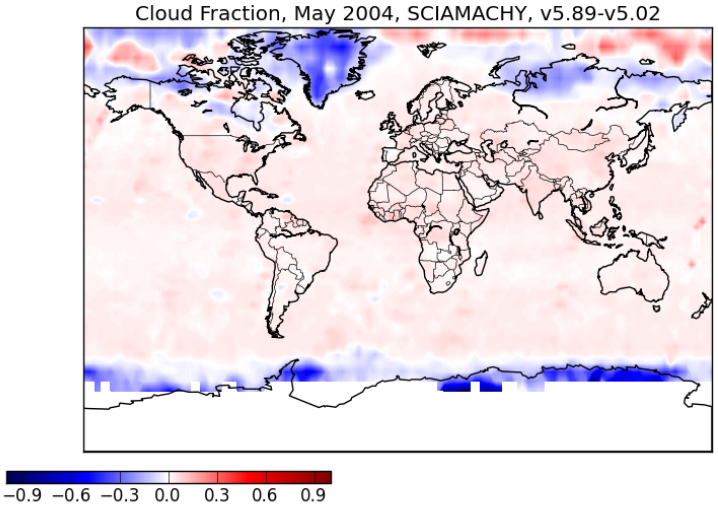


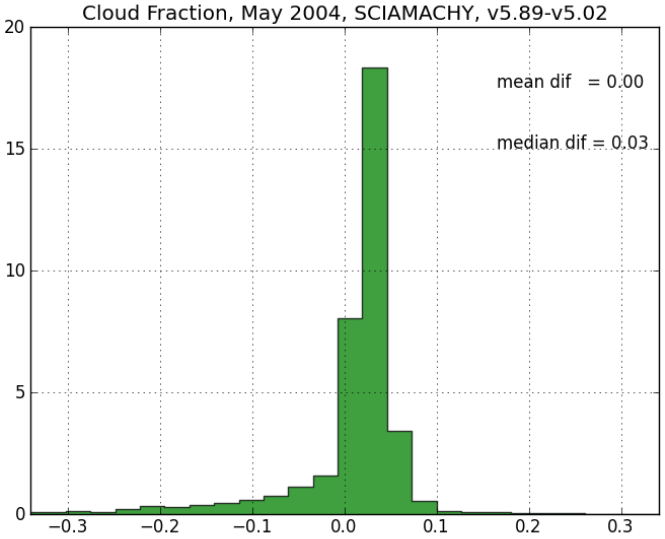


Cloud Fraction (May)





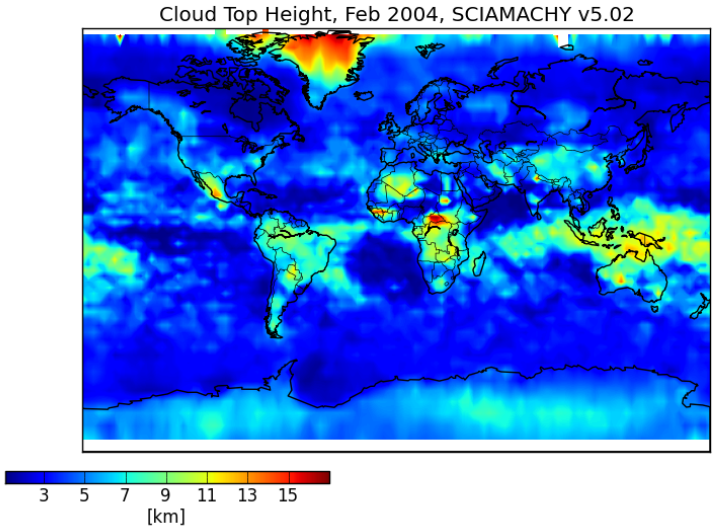


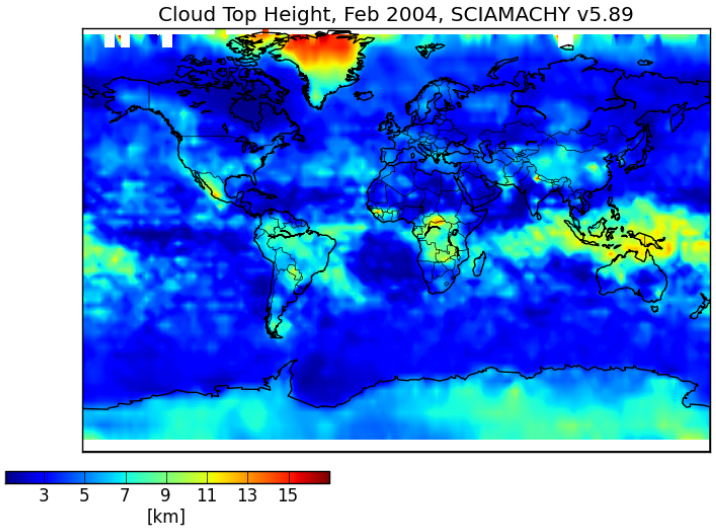


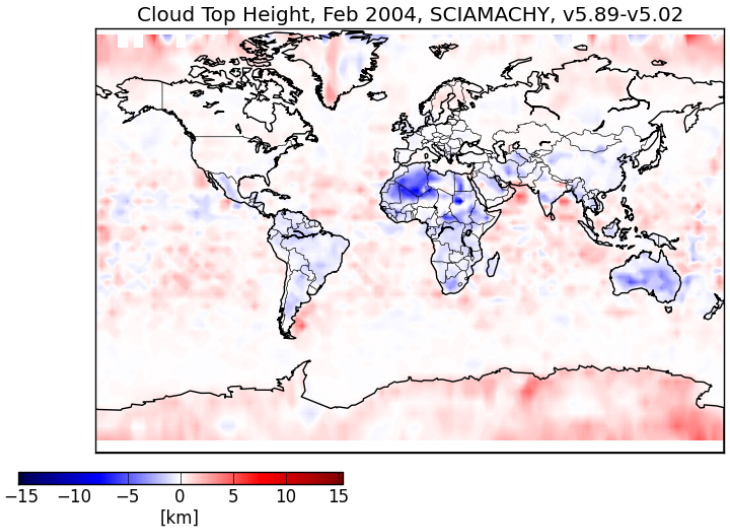
Cloud Fraction

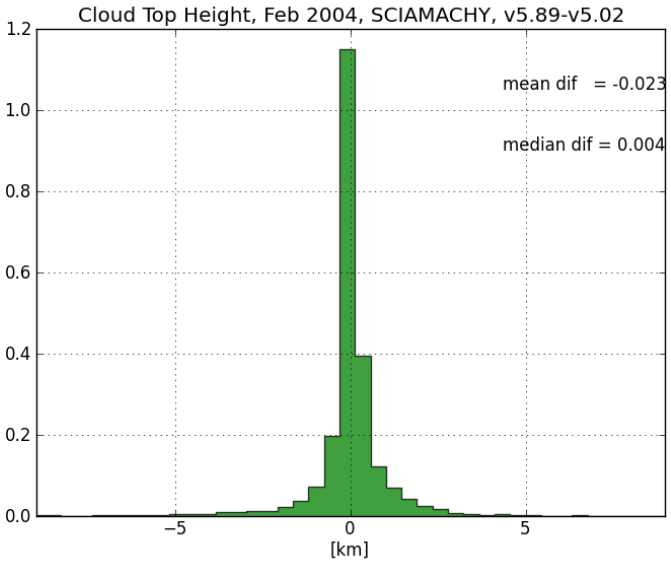
- modified SPICI algorithm now better distinguishes between clouds and ice/snow covered areas
- cloud fractions in v5.89 are significantly smaller over Greenland, Antarctica (almost all over a year)
- Arctic, Siberia, Canada (during snow seasons only)

Cloud Top Height (February)

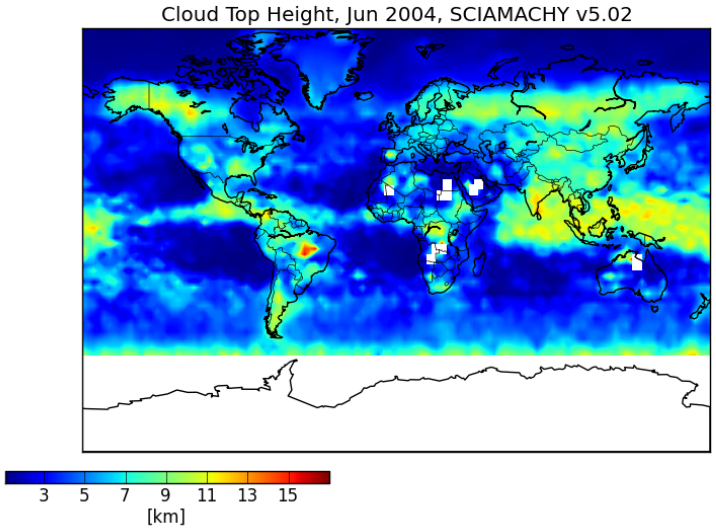


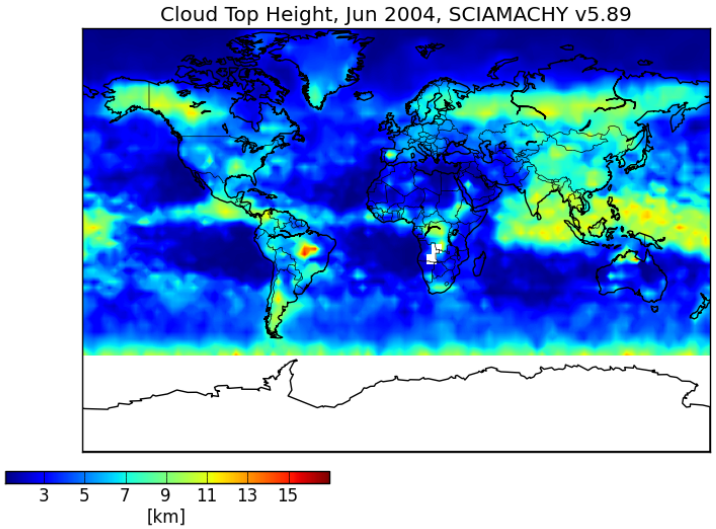


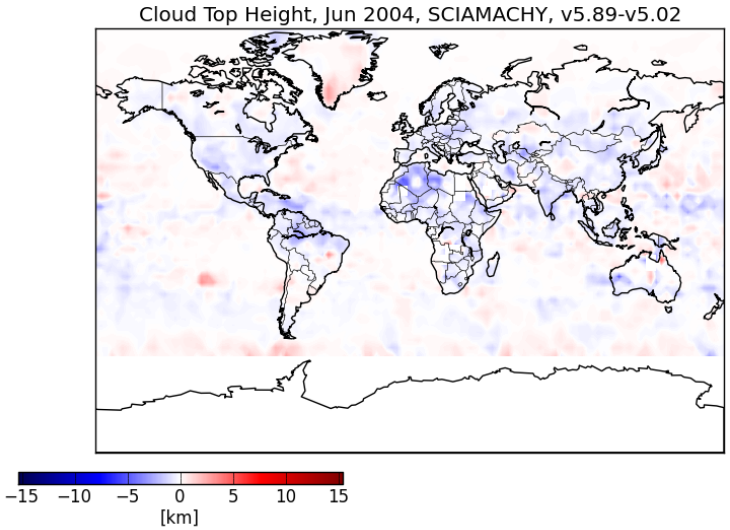


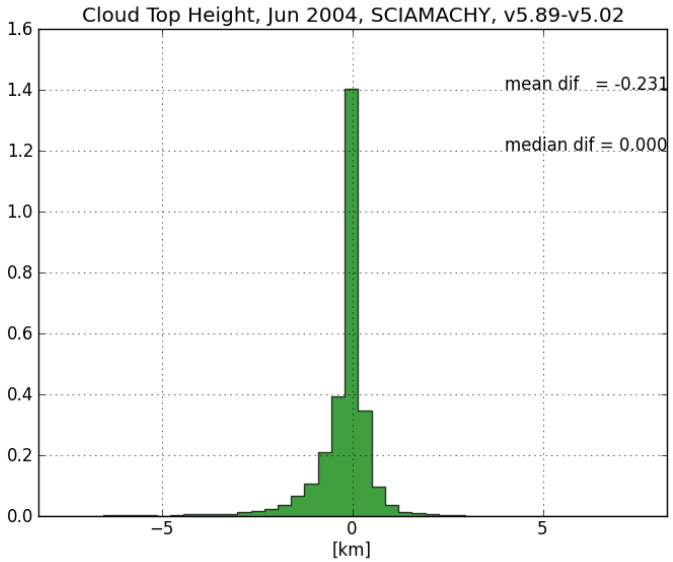


Cloud Top Height (June)





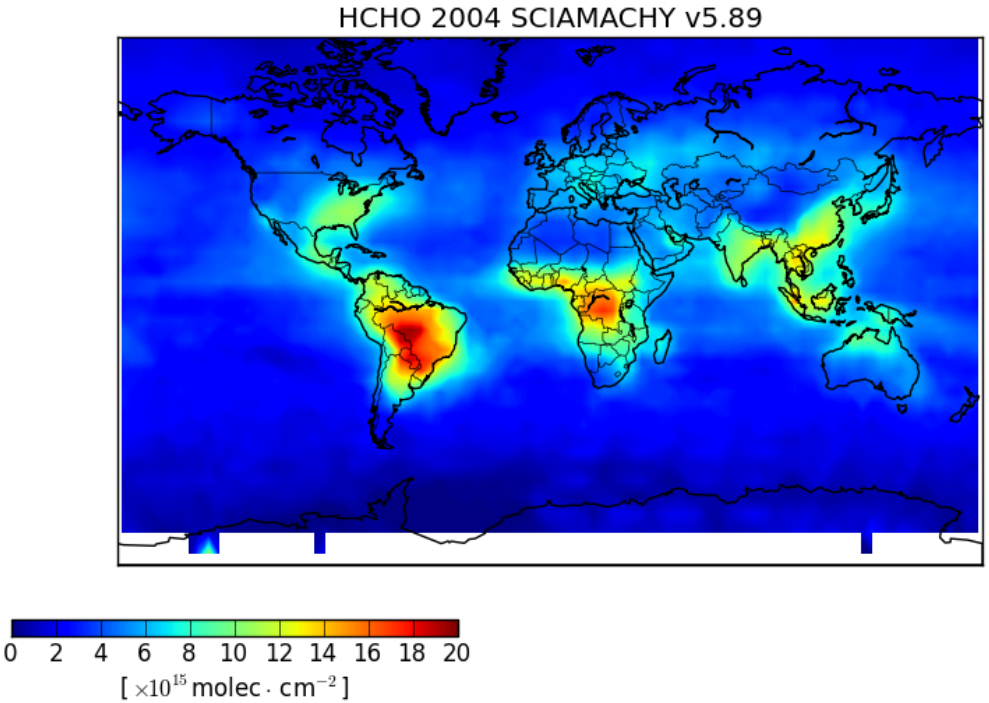


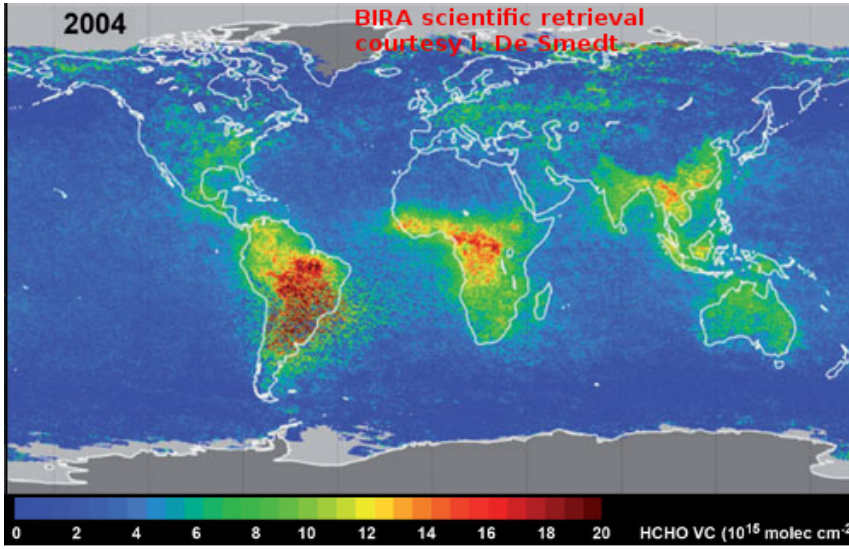


Cloud Top Height

- larger differences between the two data sets over areas with low cloudiness (Australia, Sahara), where SACURA is unstable

New products: formaldehyde (HCHO)

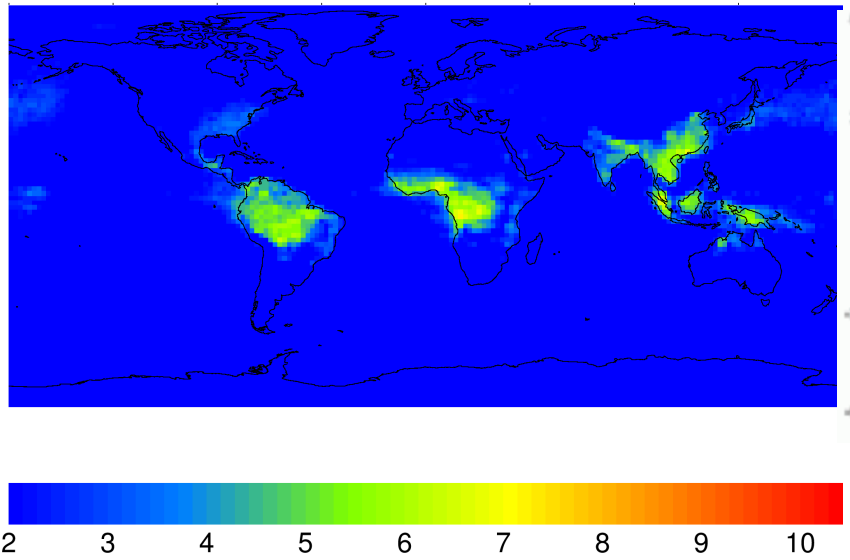


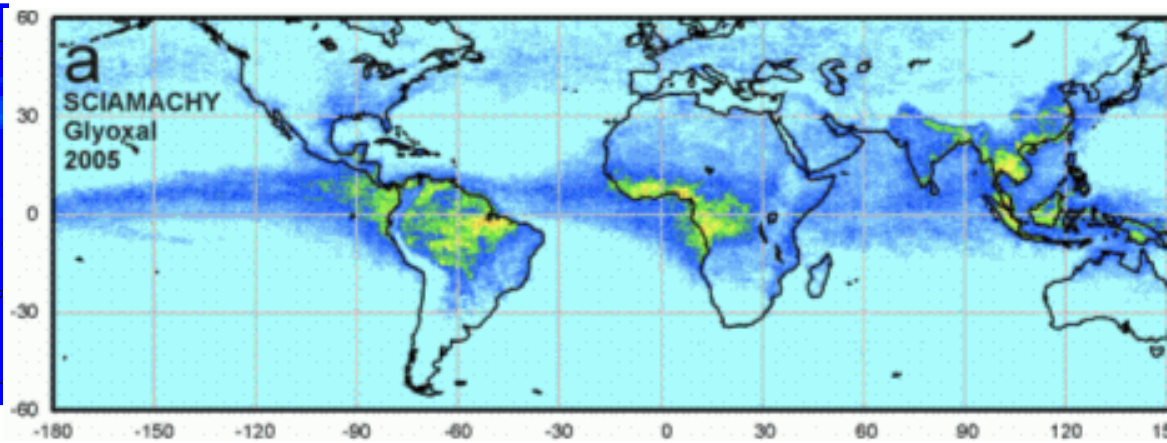


- all HCHO source regions perfectly captured by the SGP
- very good agreement with the BIRA scientific results

New products: glyoxal (*CHOCHO*)

CHOCHO 2004 SCIAMACHY v5.89 [10^{14} MOLEC CM^{-2}]

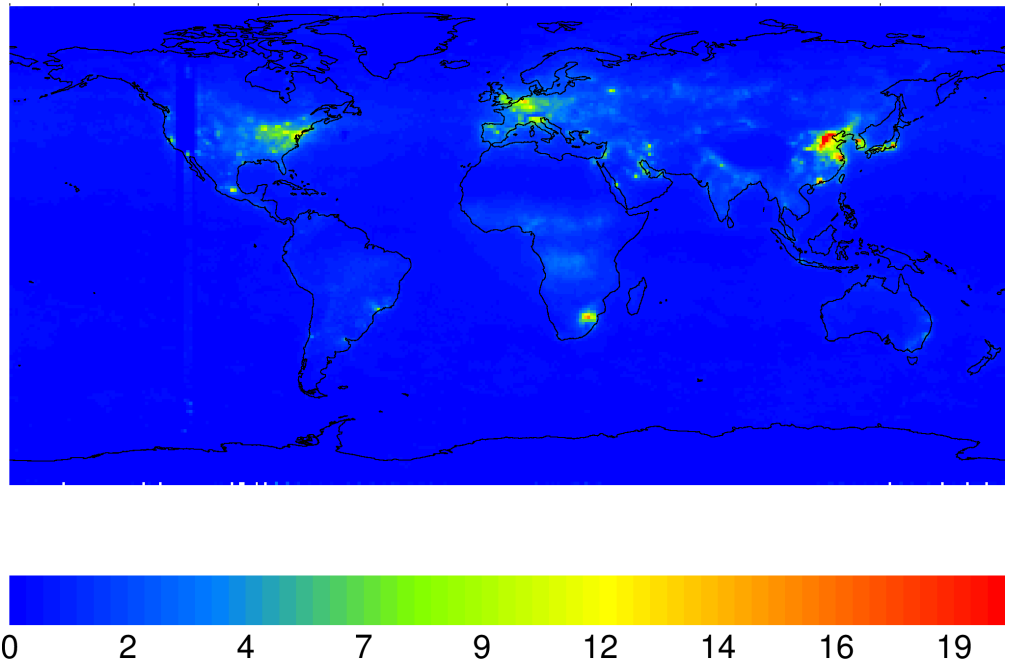


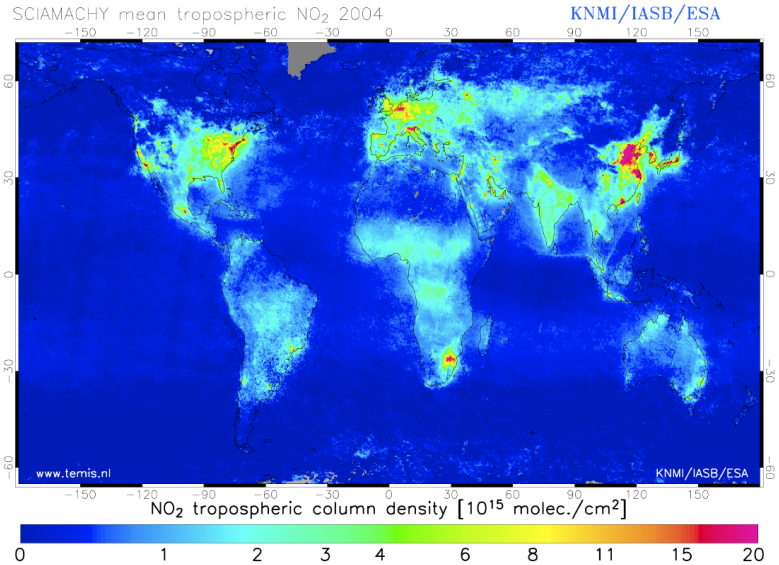


- all *CHOCHO* source regions perfectly captured by the SGP
- very good agreement with the IUP scientific results

New products: tropospheric nitrogen dioxide (NO_2)

TROPOSPHERIC NO_2, 2004, SCIAMACHY v5.89 [10^{15} MOLEC CM^{-2}]





- product is successfully verified vs the scientific algorithm
- good agreement with the TEMIS product (note that TEMIS team uses slightly different retrieval approach)

Summary

- all products processed by the SGPv5.89 are in good shape
- no show-stoppers found
- O_3 by 0.6-0.8% lower as compared with the SGPv5.02
- larger differences in *CloudFraction* due to the modified SPICI algorithm
- noticeable differences in *CloudTopHeight* over areas with low cloudiness (Australia, Sahara), where SACURA is unstable
- increase of *AbsorbingAerosol_Indices* after the L1v7-L1v8 update. But reduced scan-angle dependence
- more "good" pixels in *CO* product
- less negative *OClO* background slant columns (in areas without chlorine activation)