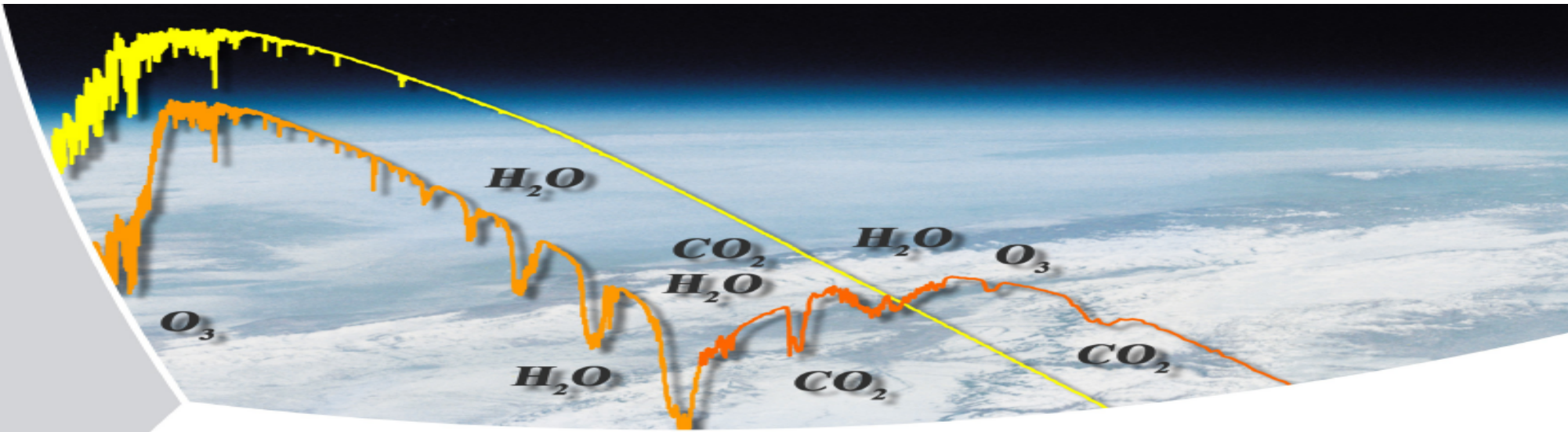

Tropospheric *BrO*: current status

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Outline

- comparison of the intermediate results not affected by clouds
- ideas how to circumvent cloud problem

BrO_{TROPO} retrieval in short

- take total *BrO* column: SCD_{TOTAL}
- calculate VCD_{STRATO}, AMF_{STRATO}, AMF_{TROPO}
- VCD_{STRATO}: climatology depending on:
  - total ozone (proxy for the stratospheric dynamics)
  - NO_2^{STRATO} (photochemistry)
- *AMF*: dependence on:
  - viewing geometry, albedo, clouds, *BrO* profile shapes
- get BrO_{TROPO} as

$$VCD_{TROPO} = \frac{SCD_{TOTAL} - VCD_{STRATO} \cdot AMF_{STRATO}}{AMF_{TROPO}}$$

- apply filtering:
  - $Cloud\_Fraction(CF) < 0.4$; $AMF_{TROPO} > 0.5$ (to provide only results where SCIAMACHY sensitive enough)

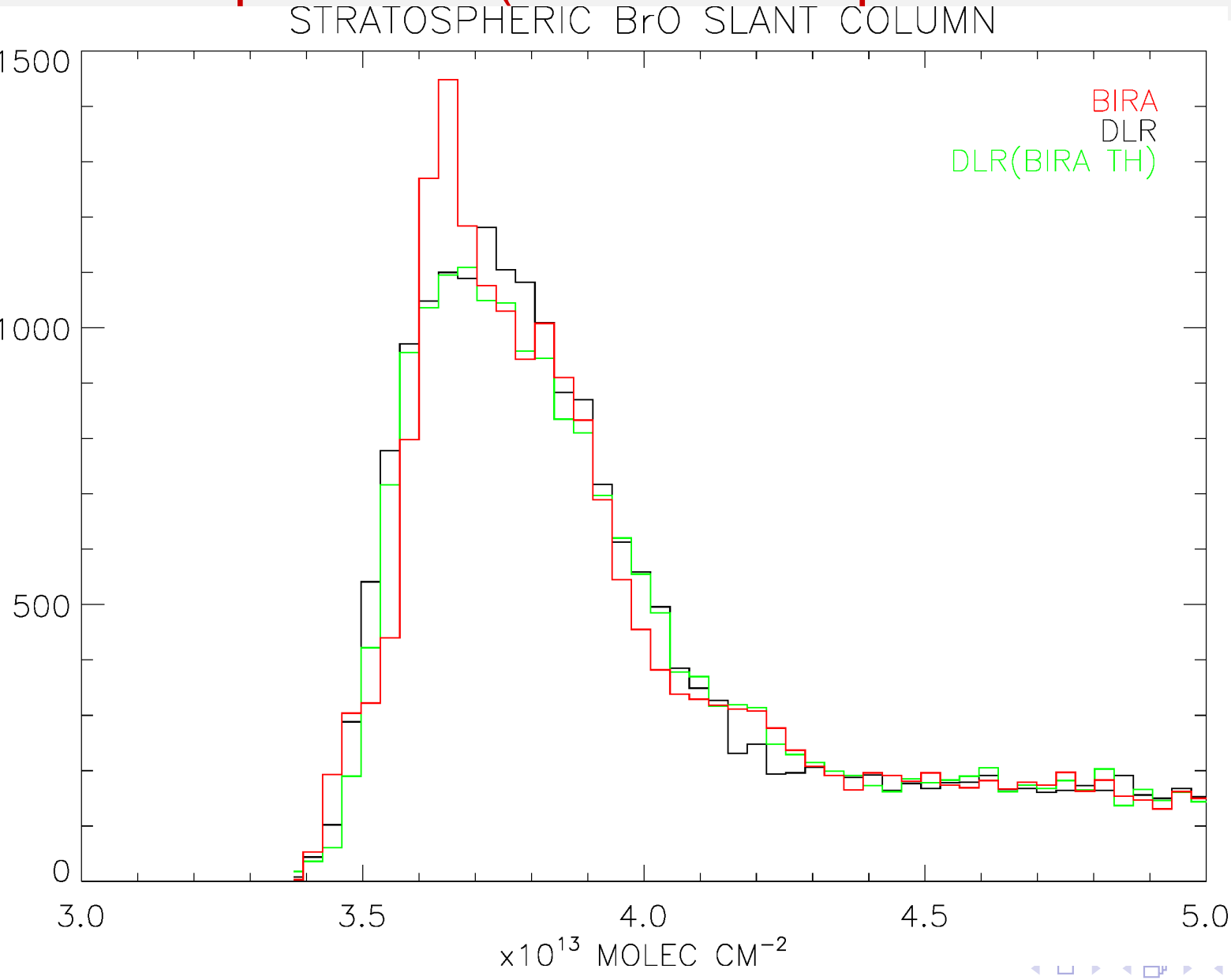
Stratosph. *SCD* ("final"stratosph. intermediat. product)

- since the last PM the calculation of the

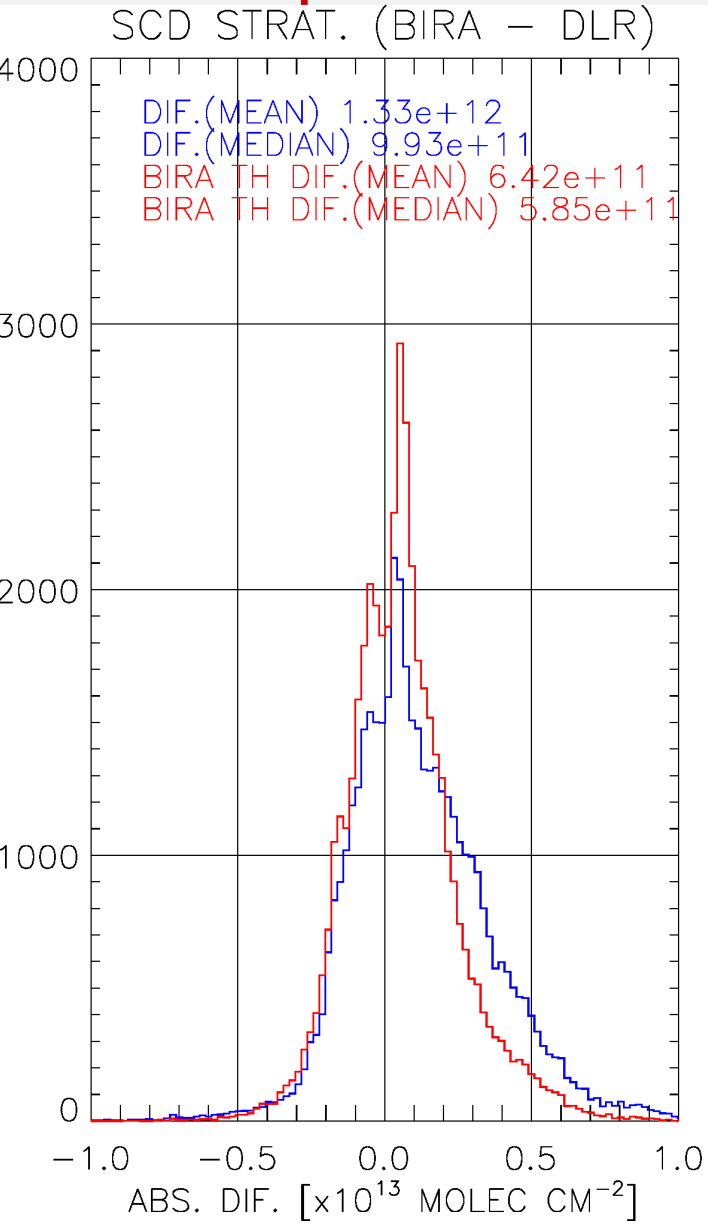
$$SCD_{STRATO} (= VCD_{STRATO} \cdot AMF_{STRATO})$$

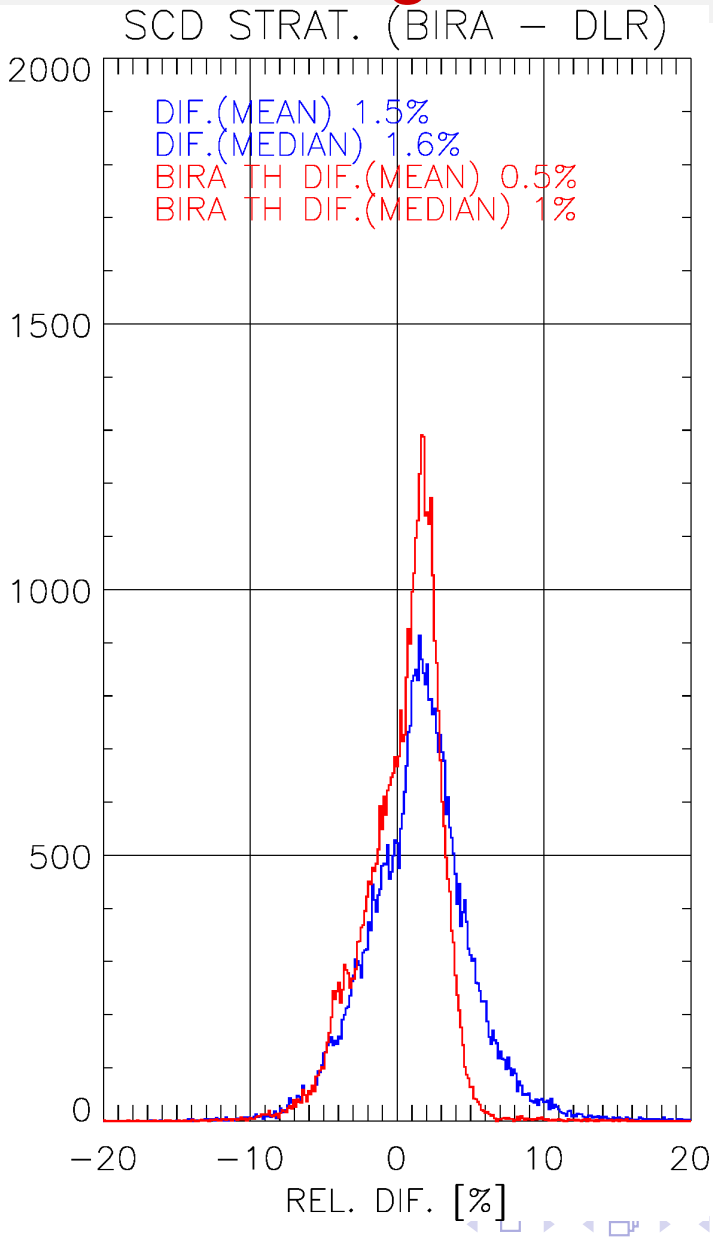
  has been further optimized:
  - special cases (like spurios O_3 or NO_2 values) handled, etc.
- results (SCD_{STRATO}) are checked for the test day - 20 April 2008
- all pixels (no CF filtering)

Stratosph. *SCD* (“final”stratosph. intermediat. product)

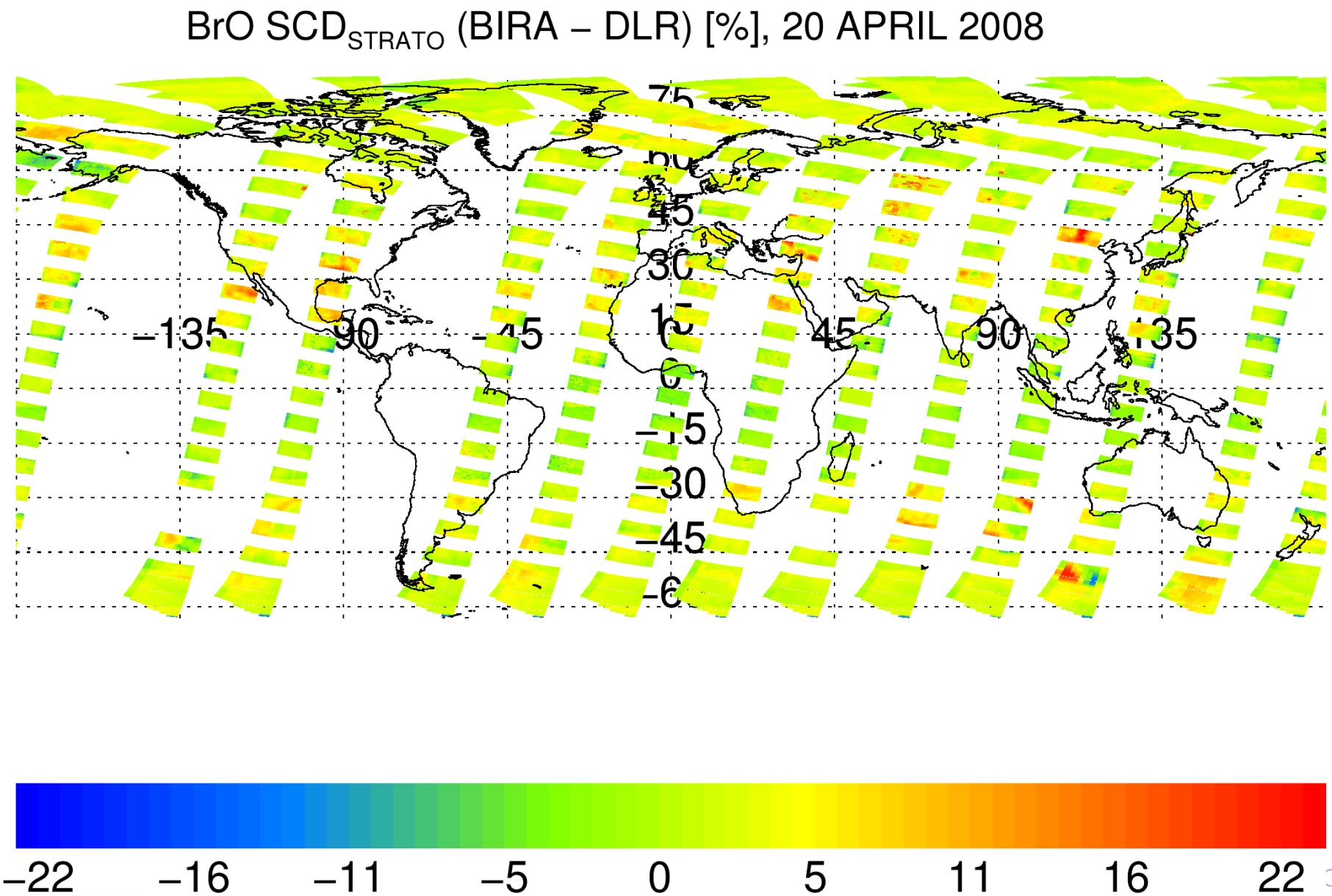


Stratosph. *SCD*: differences histograms





Stratosph. *SCD* (map of differences)

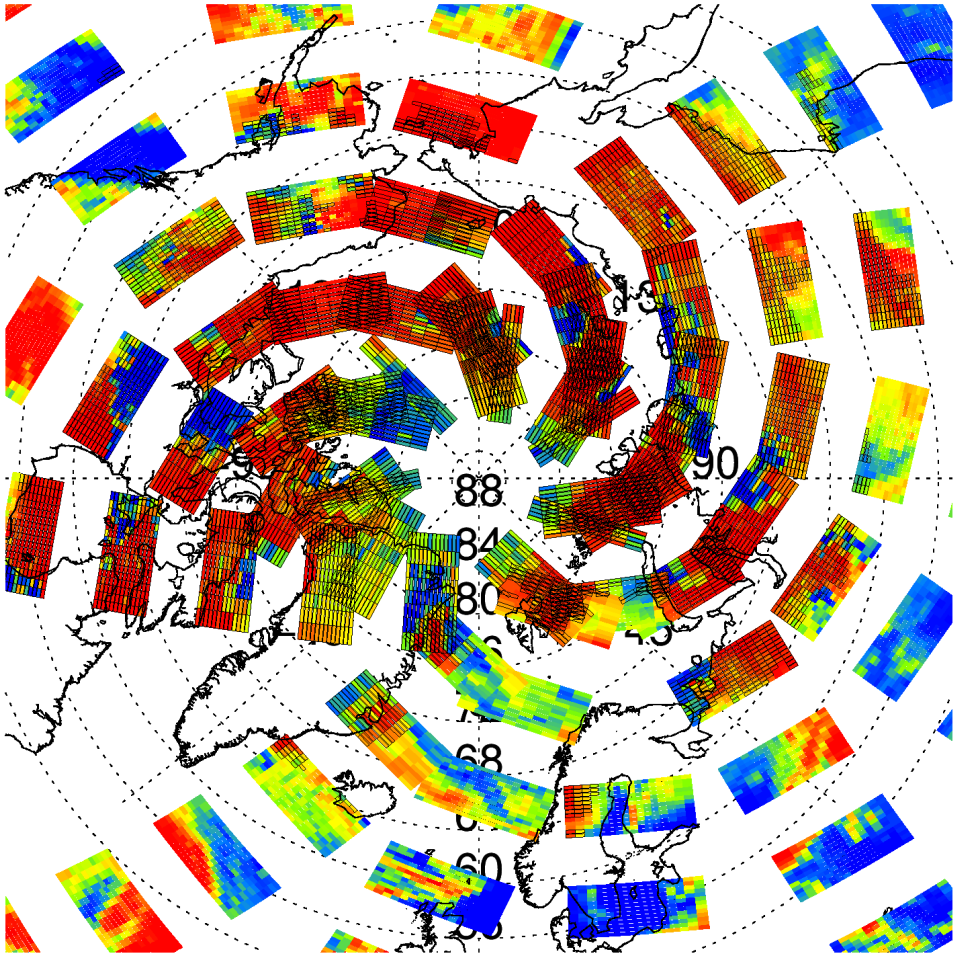


Stratosph. *SCD* Summary

- correctness of *BrO* stratospheric climatology handling in the (prototype of the) operational processor checked
- final stratospheric intermediate product - SCD_{STRATO} - is compared with the BIRA results (one test day - 20-APR-2008)
- 87% of pixels agrees within 5%
- almost all discrepancies can be explained by different tropopause height climatologies used (tropopause height determines lower range of *BrO* profile integration)
- nevertheless, DLR prefers to stick to the “IUP”TH climatology used in the NO_2^{tropo} retrieval
- remaining (minor) differences should most probably be attributed to ways *BrO* stratospheric climatology handled (interpolation methods, etc.)

Cloud Problem: Reminder

CLOUD FRACTION (OCRA), ICE (FRESCO), 20 APRIL 2008

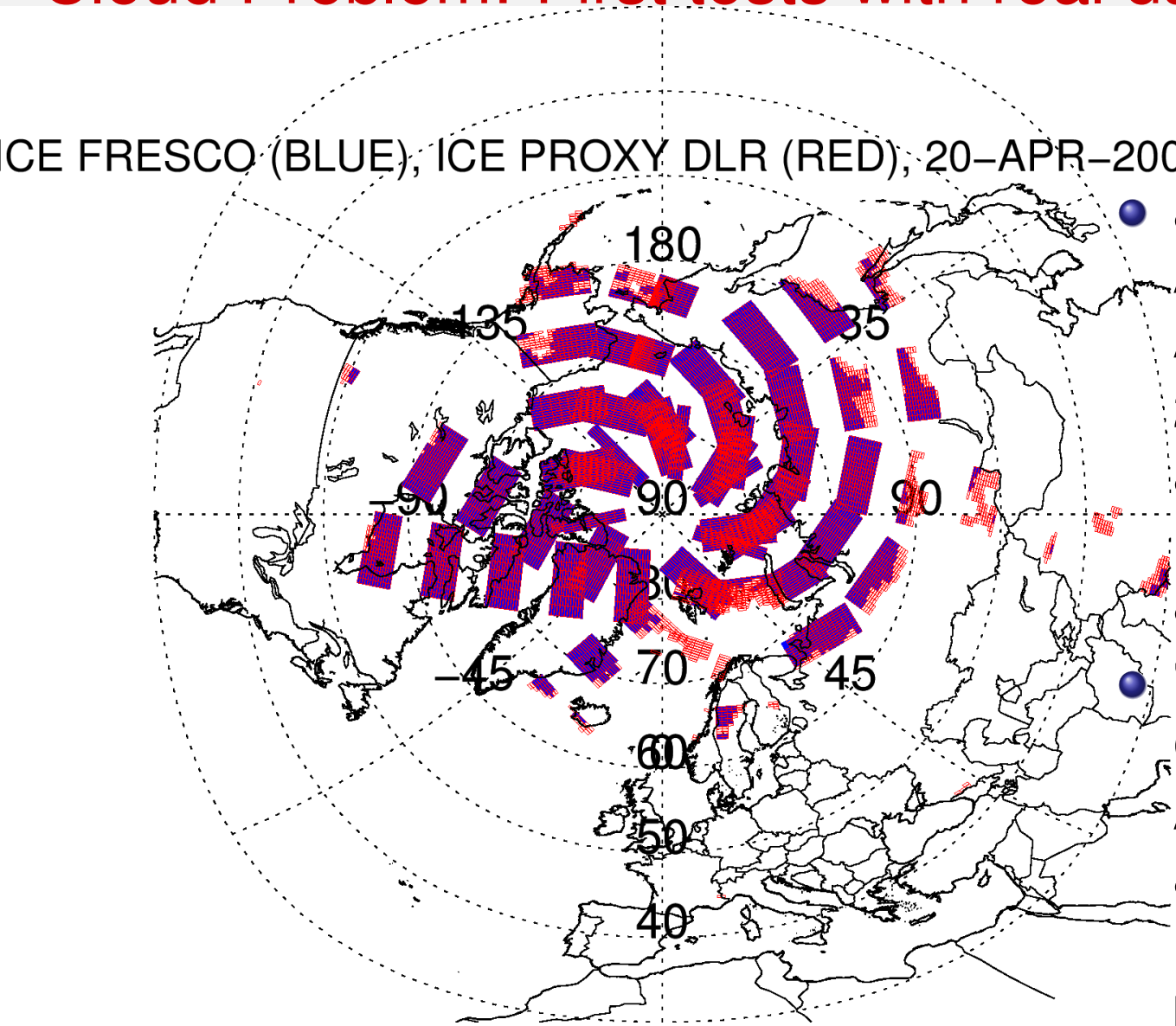


- snow/ice pixels (as identified by FRESCO) marked by black rectangles
- despite of SPICI, lot of snow/ice covered pixels (especially in polar regions) identified by OCRA as clouds and have to be filtered out

Way to circumvent the cloud problem

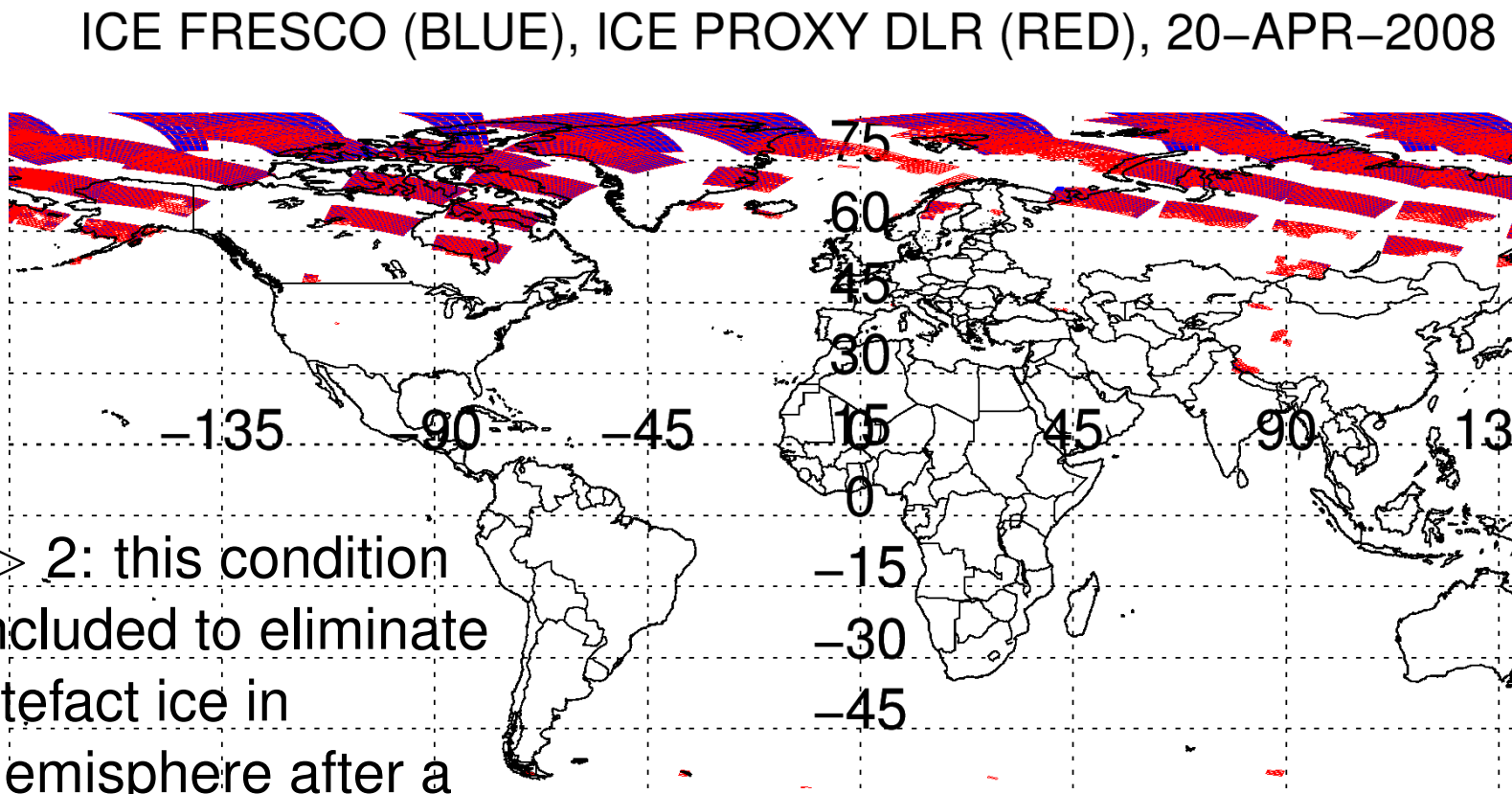
- include additional criteria to prevent pixels erroneously identified as clouds from filtering out:
- apply $CF < 0.4$ only in tropics. In mid-/high latitudes check also:
  - *Cloud_top_height* (for snow/ice pixels SACURA almost always gives -99 i.e."error")
  - *Cloud_optical_depth*
  - Cloud flags, Aerosol parameters (from Clouds and Aerosol MDS):
    - for snow/ice pixels SACURA does almost always not converge (*Cloud_Flag_2* $=$ *FALSE*) or number of iterations exceeded (*Cloud_Flag_3* $=$ *FALSE*)
    - for snow/ice pixels the retrieved surface albedo at 380 nm (*Aerosol_Parameter_2*) > 0.1
  - *Tropopause_height*
- tests which (combinations of these) parameters are most effective are still on-going

Cloud Problem: First tests with real data



- applying $|LAT| > 30$) AND ($ALBEDO > 0.1$) AND ($NO_2^{STRATO} > 2 \cdot 10^{15} \frac{molec}{cm^2}$) very good agreement with FRESCO ice results achieved
- "DLR" ice over the Caucasus, the Alps, the Aleutian Islands, although not present in FRESCO set, is plausible

Cloud Problem: (NO_2^{STRATO} condition)



- $NO_2^{STRATO} > 2$: this condition has to be included to eliminate probably artefact ice in Southern Hemisphere after a long polar day
- that is why "photochemical" cut-off using NO_2^{STRATO}