

SCIAMACHY Cloud Product Validation

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Contributions from:

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Introduction

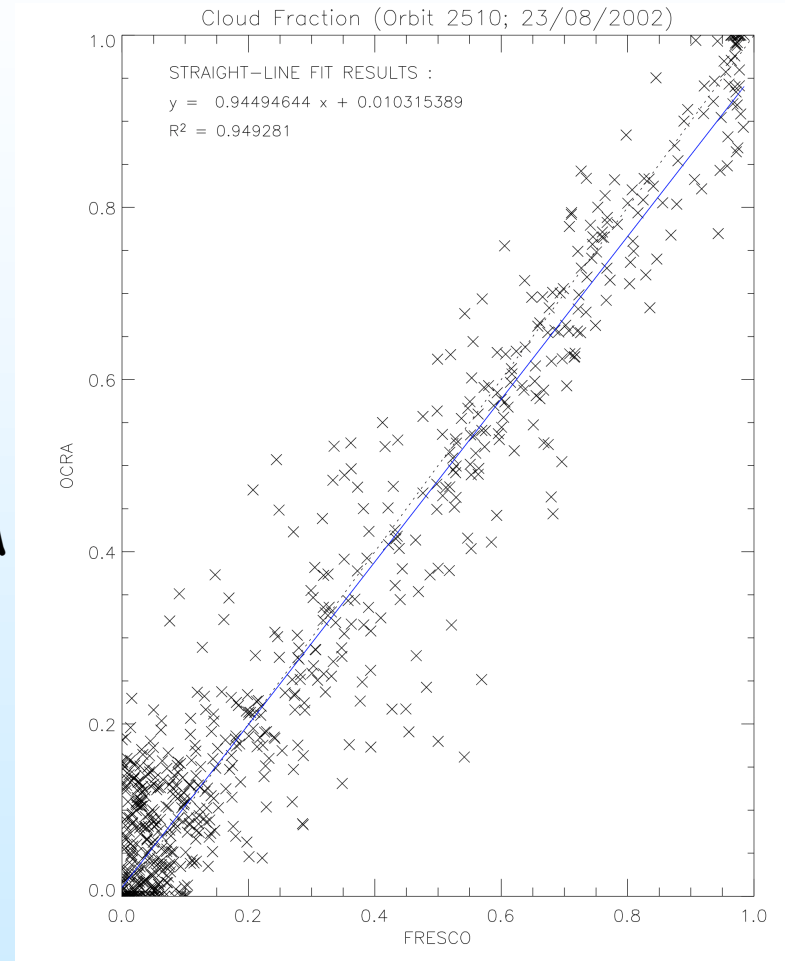
- Cloud detection is needed for cloud correction of SCIAMACHY trace gas column measurements.
- The *operational* L2 cloud fraction product is OCRA.
- There are also *scientific* cloud products: FRESCO, SACURA, HICRU, Cloud phase index.
- Comparison and validation results of both will be shown.

Overview of main SCIAMACHY cloud algorithms

Algorithm	Cloud product	Method	Data availability	Notes
OCRA (ESA/DLR)	☞ fraction	PMD scene colour	ESA level-2 product	
FRESCO (KNMI)	☞ fraction ☞ pressure	O ₂ A-band at 760 nm	All data available at www.temis.nl	☞ Part of TOSOMI ☞ R × 1.25
SACURA (U. Bremen)	☞ opt.thickn. ☞ pressure	O ₂ A-band	Some data processed.	
HICRU (U.Heidelb.)	☞ fraction	PMD scene colour	Some data processed.	

Comparison OCRA - FRESCO cloud fractions for verification orbit 2510 (23 Aug. 2002)

Correlation is very good. **OCRA**



FRESCO

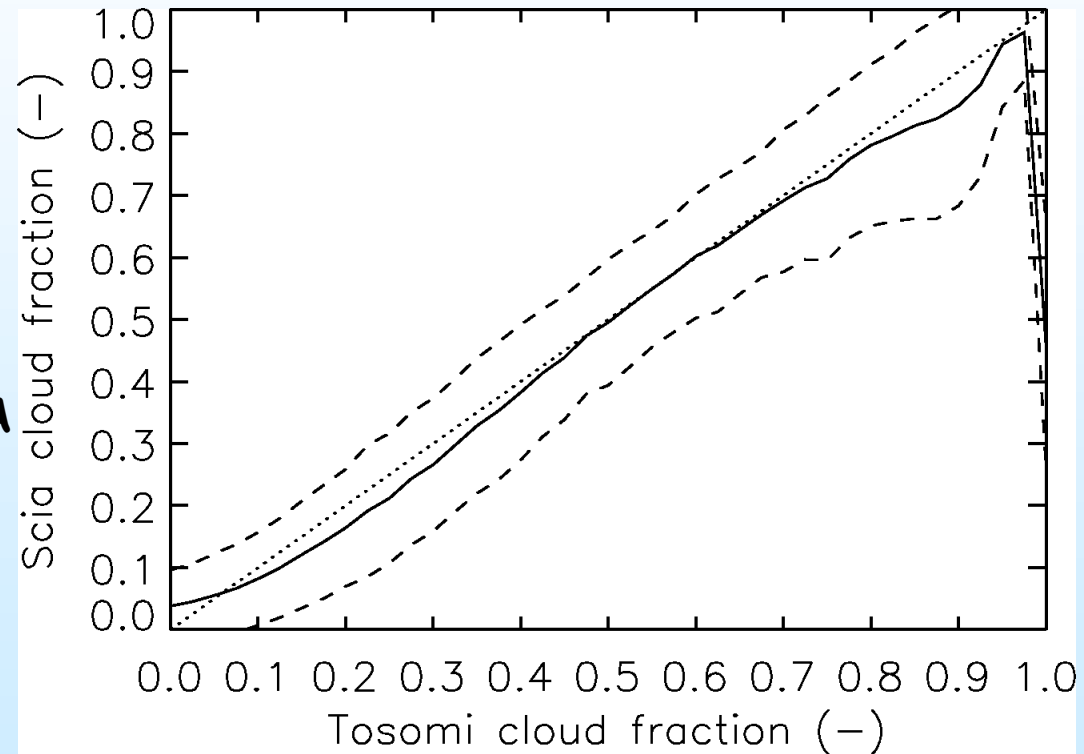
OCRA versus FRESCO for validation reference dataset

Conclusion:

Very good agreement between the two cloud fraction retrievals.
St.dev. is ~ 0.1 .

Problem for $c = 1.0$.
Due to FRESCO?
To be investigated.

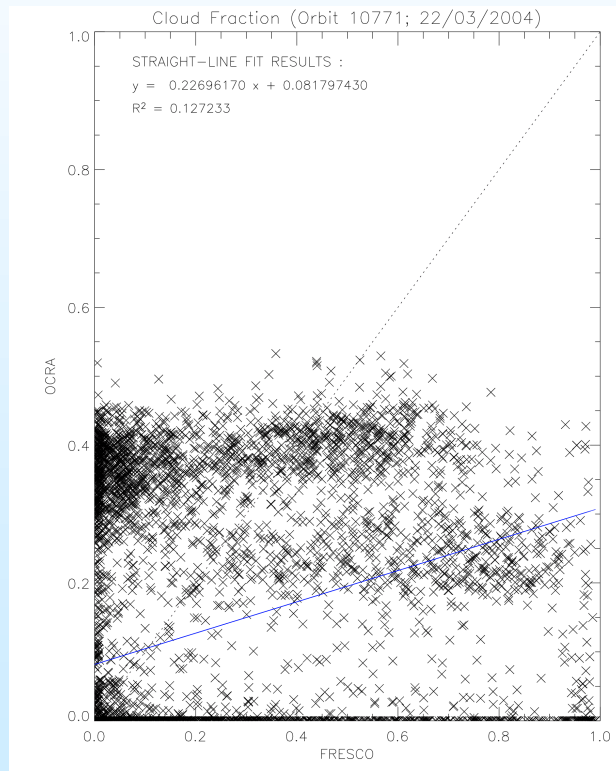
OCRA



FRESCO

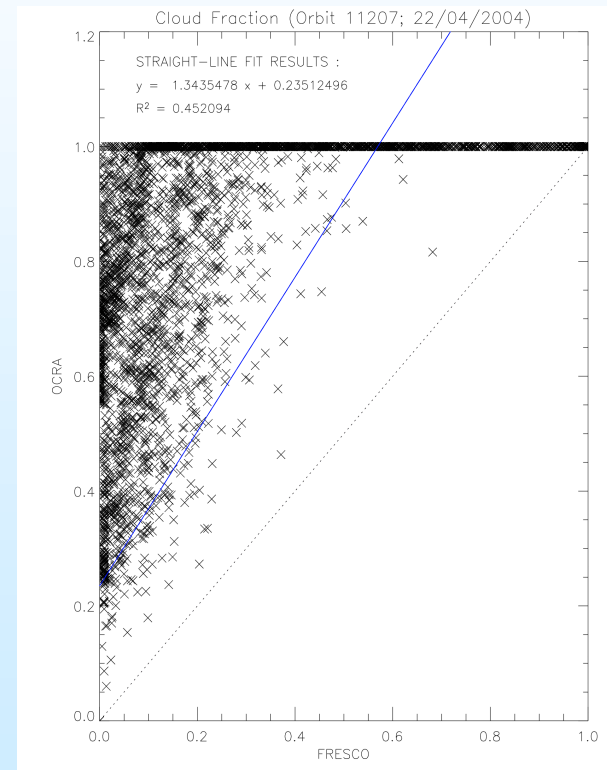
Cloud fraction comparison OCRA - FRESCO for two recent NRT orbits (22 March & 22 April 2004). Correlation is bad! Wrong range in OCRA.

OCRA



FRESCO

OCRA



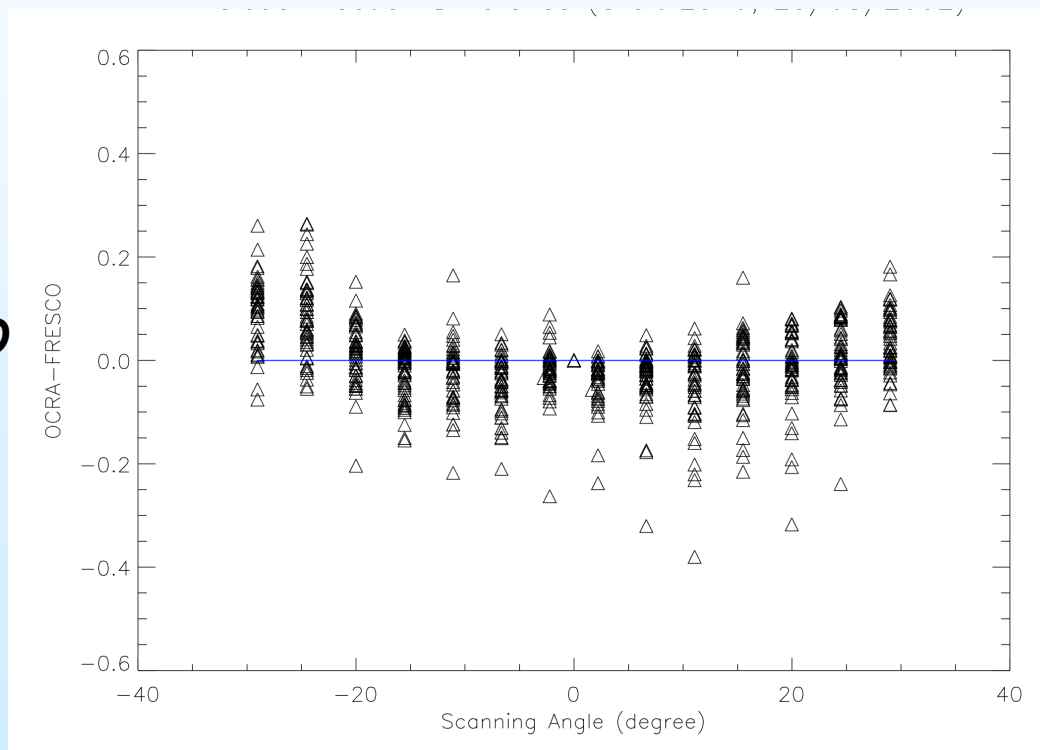
FRESCO

Reason: NRT processor initialisation file changes ?!

- The NRT level 1-2 processor was still not up to date on 22 April 2004.
- Since $22 < dateX < 28$ April 2004 a new initialisation file has been uploaded at the PDS.
This seems to have improved the OCRA product.
- But the L2 processor version number was unchanged!
- Also an NRT L1 processor change took place between 22-28 April 2004, without any notice to the users.

Scan angle dependence OCRA-FRESCO: Reason is $(1/\cos VZA)$ error in reflectance in OCRA.

OCRA - FRESCO



Scan angle

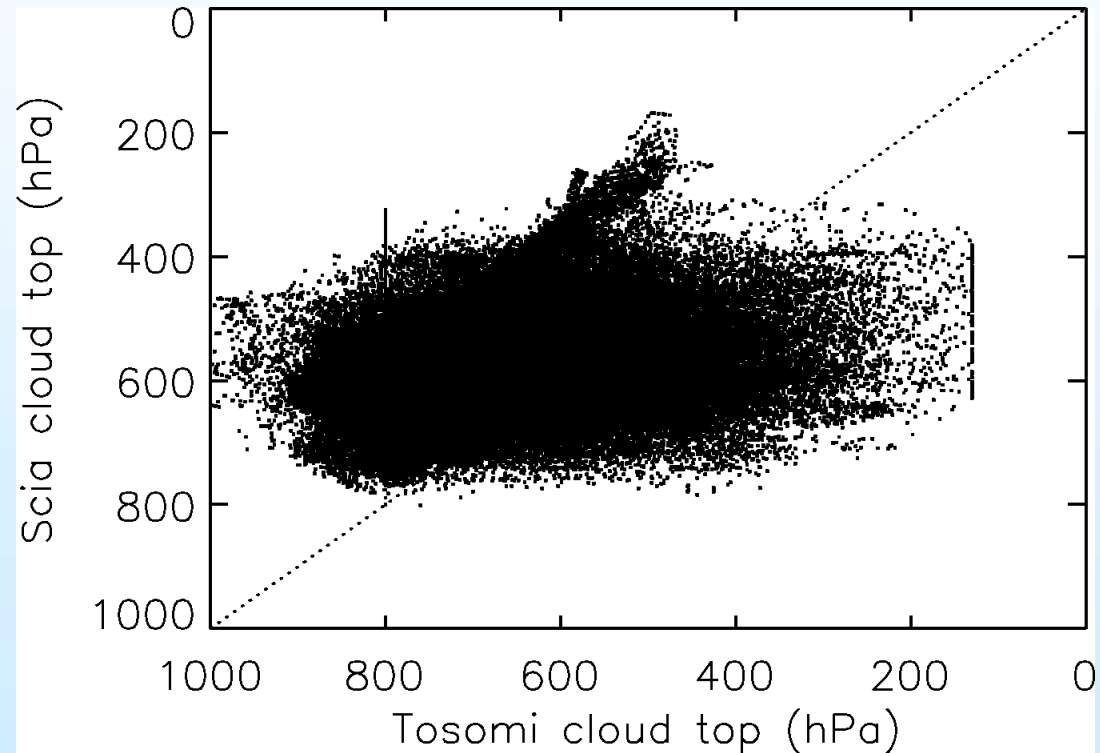
OCRA versus FRESCO cloud top pressure for validation reference states

Note:

FRESCO = retrieval

OCRA = climatology

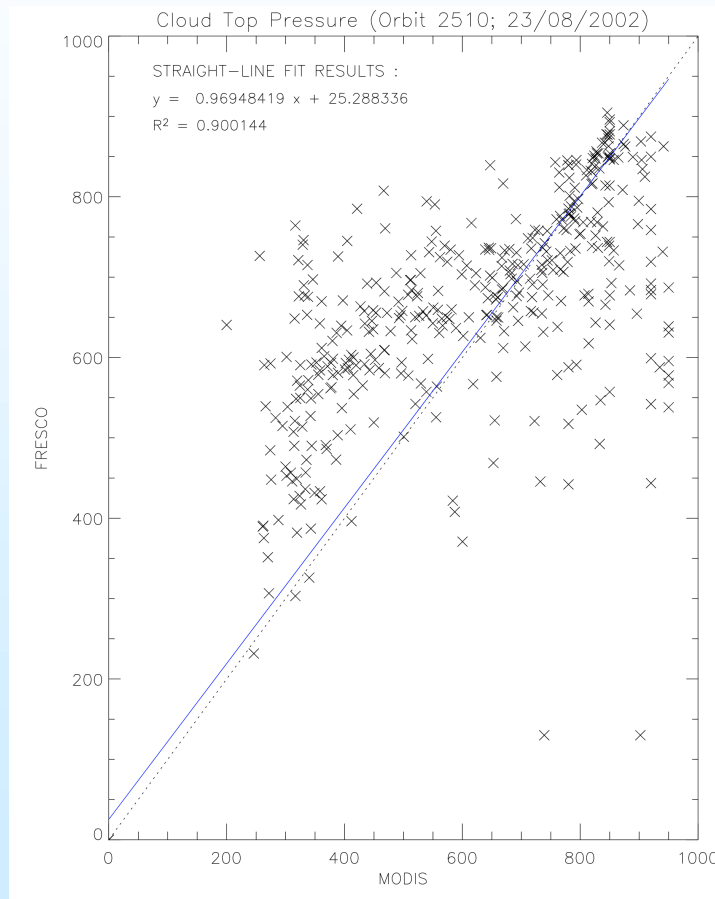
OCRA



FRESCO

FRESCO cloud top pressure validation with MODIS

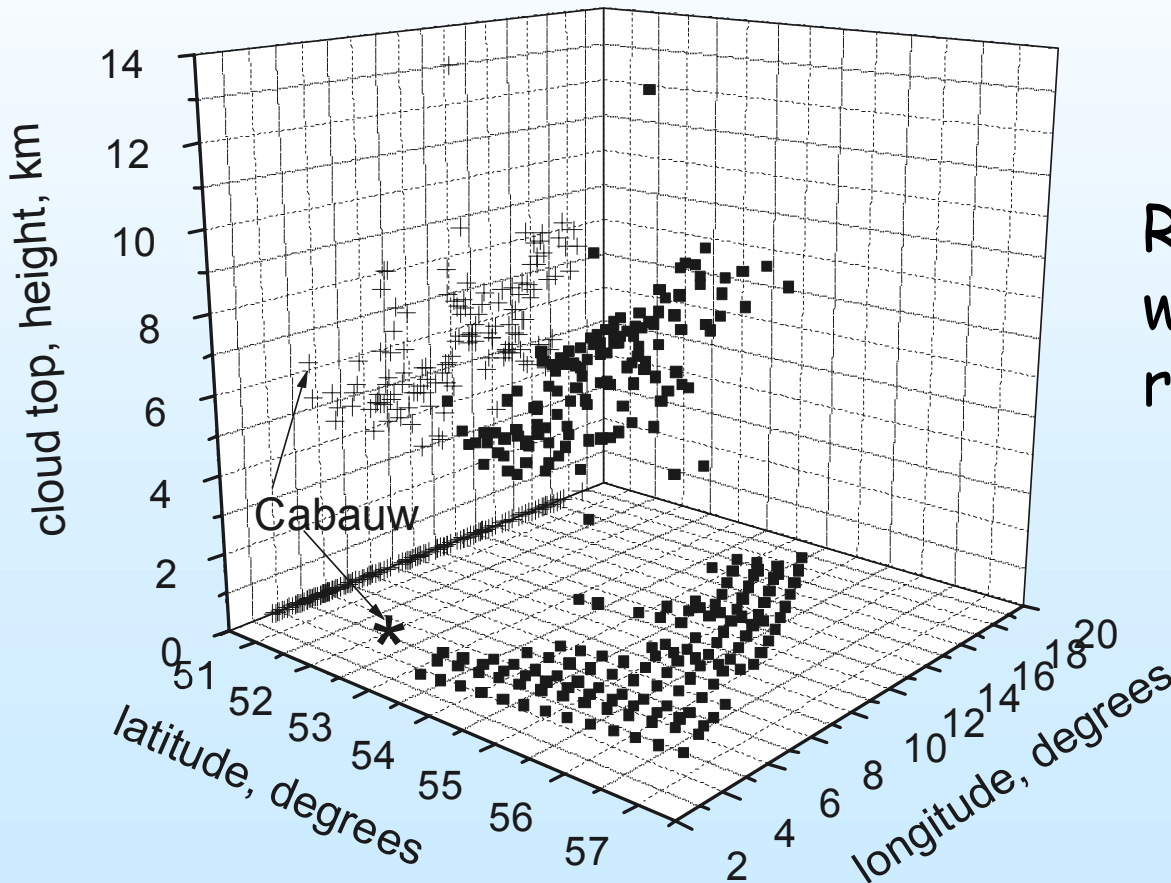
FRESCO



MODIS

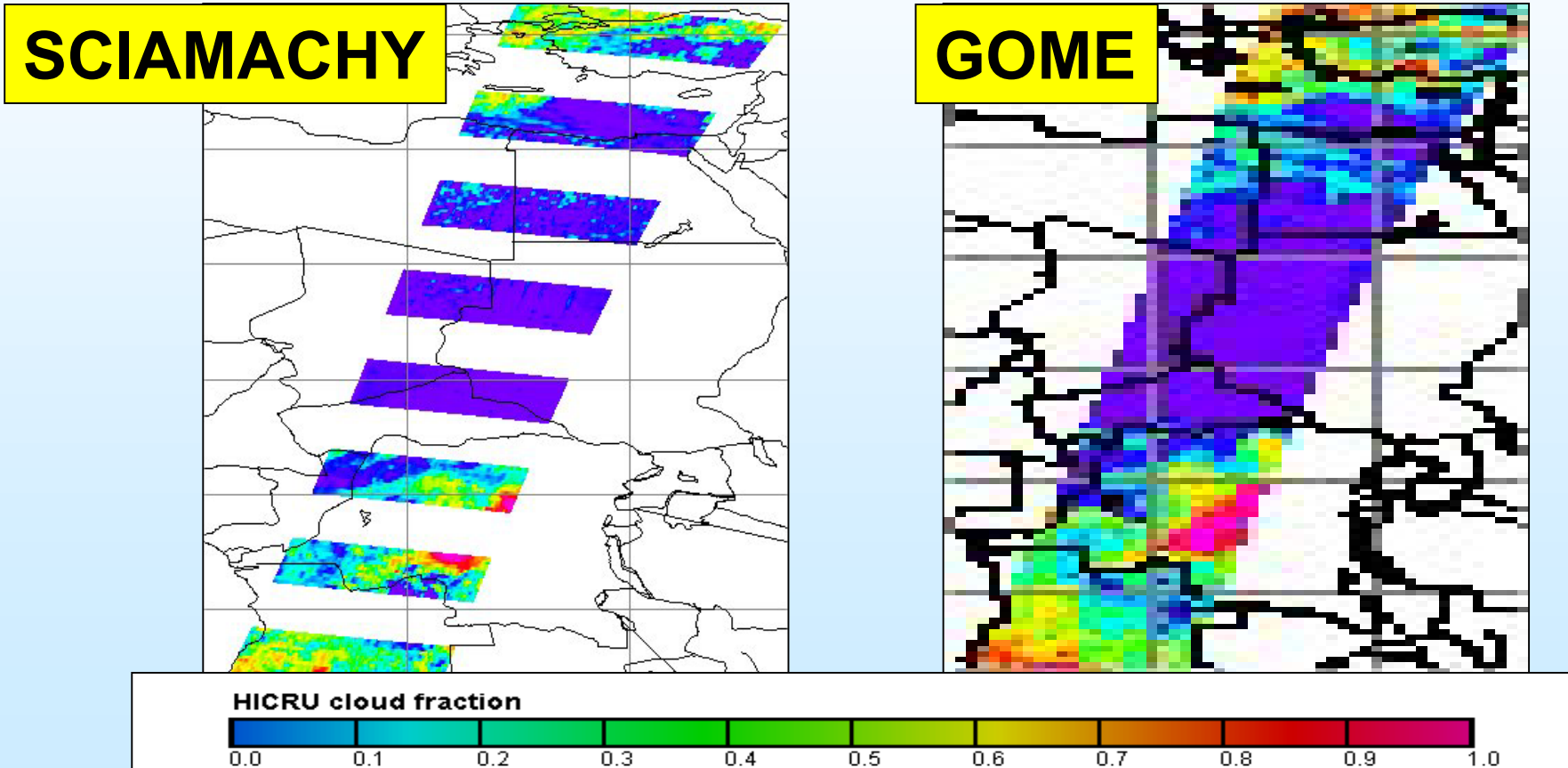
Reasonable agreement.
Difference is about 100 hPa.

SACURA cloud top pressure retrieval on 9 May 2003 of a state over north-Netherlands



Retrieved value agrees with Cabauw cloud radar measurement.

HICRU cloud fraction on 24 Jan. 2003: very good agreement with GOME



Conclusions

- *If NRT processor is the same as used for verification and validation dataset processing, the accuracy of OCRA cloud fraction is about 0.1, as compared to FRESCO. Can even be improved if $(1/\cos VZA)$ error is corrected.*
- *Absolute accuracy of FRESCO cloud fraction is not yet fully validated, but is about 0.1.*
- *Radiometric calibration correction is needed for FRESCO.*
- *Accuracy of FRESCO cloud pressure is about 100 hPa.*
- *Other scientific algorithms (HICRU, SACURA, Cloud phase index) look promising.*

FRESCO data on TEMIS website

SCIAMACHY FRESCO-FD EFFECTIVE CLOUD FRACTION FOR 22-04-2004

