Inter-comparison of cloud retrieval algorithms: preliminary results

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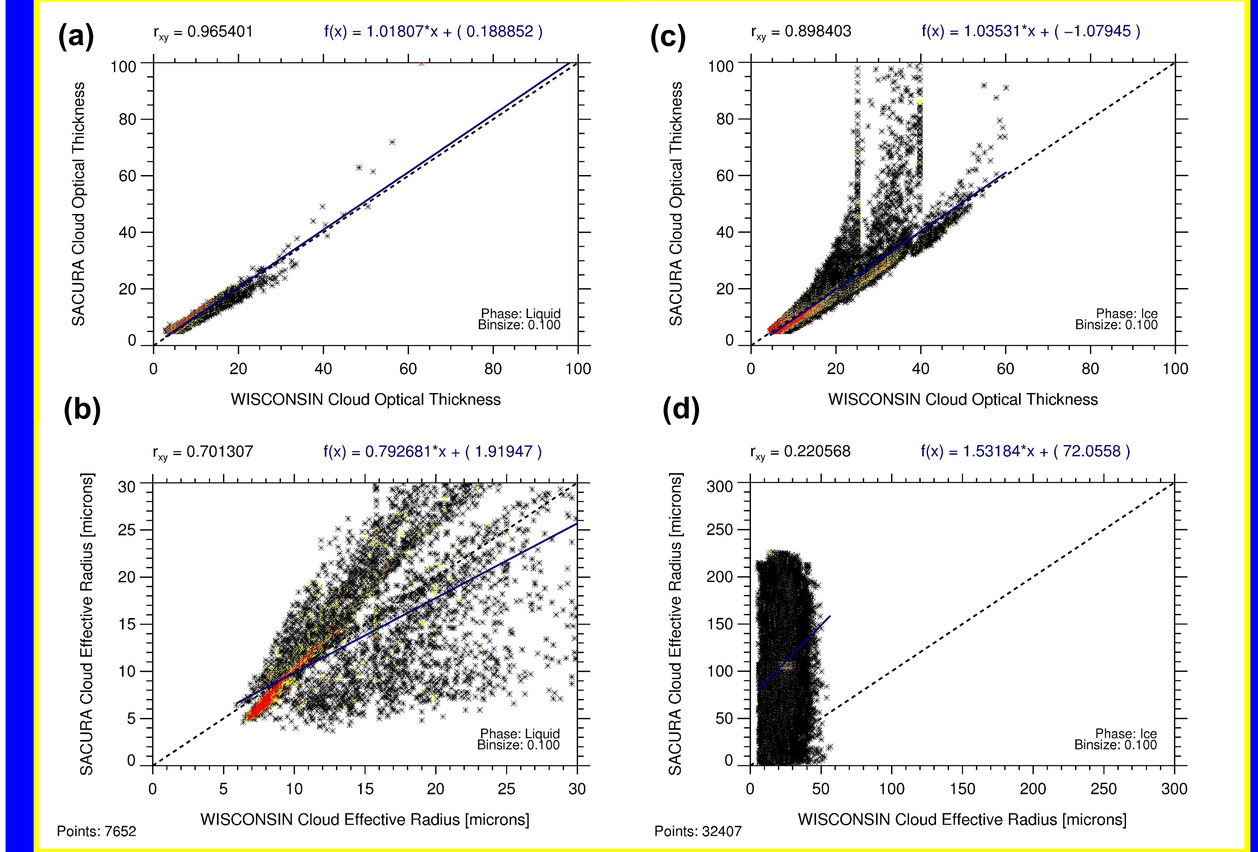
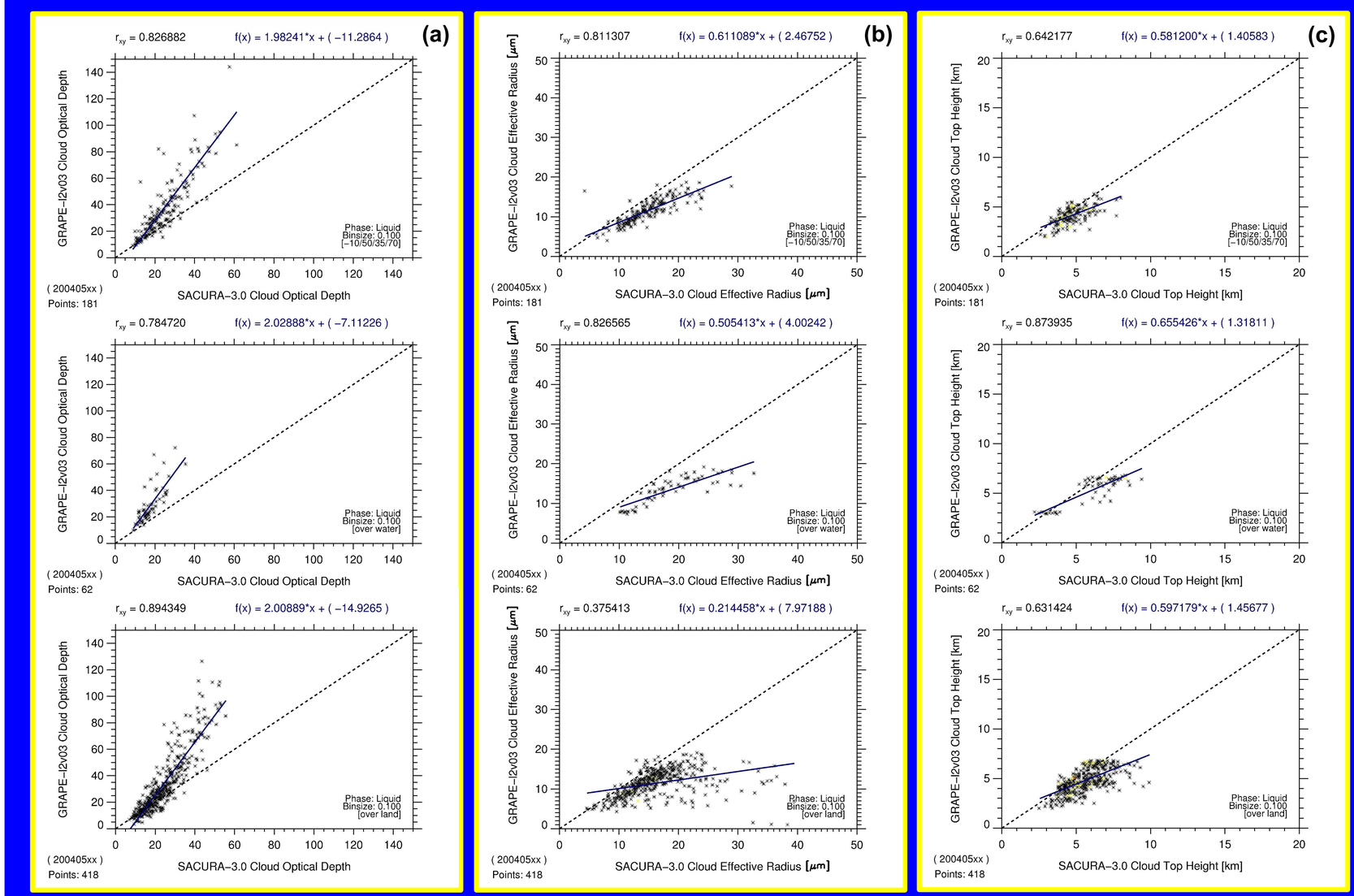
WISCONSIN VS. SACURA CLOUD PRODUCTS: SEVIRI

Fig.1. Inter-comparison of SEVIRI **cloud optical thickness** (COT) and **cloud effective radius** (CER) derived from WISCONSIN and SACURA (Kokhanvosky et al., 2003, Rozanov and Kokhanvosky, 2004) algorithms. Figures **(a)** and **(b)** show the cross-validation of COT and CER for **water clouds**, while Figures **(c)** and **(d)** show the cross-validation of COT and CER for **ice clouds**.



SACURA VS. GRAPE CLOUD PRODUCTS: SCIAMACHY

Fig.2. Inter-comparison of SCIAMACHY **COT (a)**, **CER (b)** and **CTH (c)** (for water clouds) derived from **SACURA-SCIAMACHY** and **GRAPE-AATSR** algorithms. Only cloud products offering highest retrieval quality have been considered in the collocation of SCIAMACHY and AATSR in the time period of 2004/05/01 and 2004/05/31.



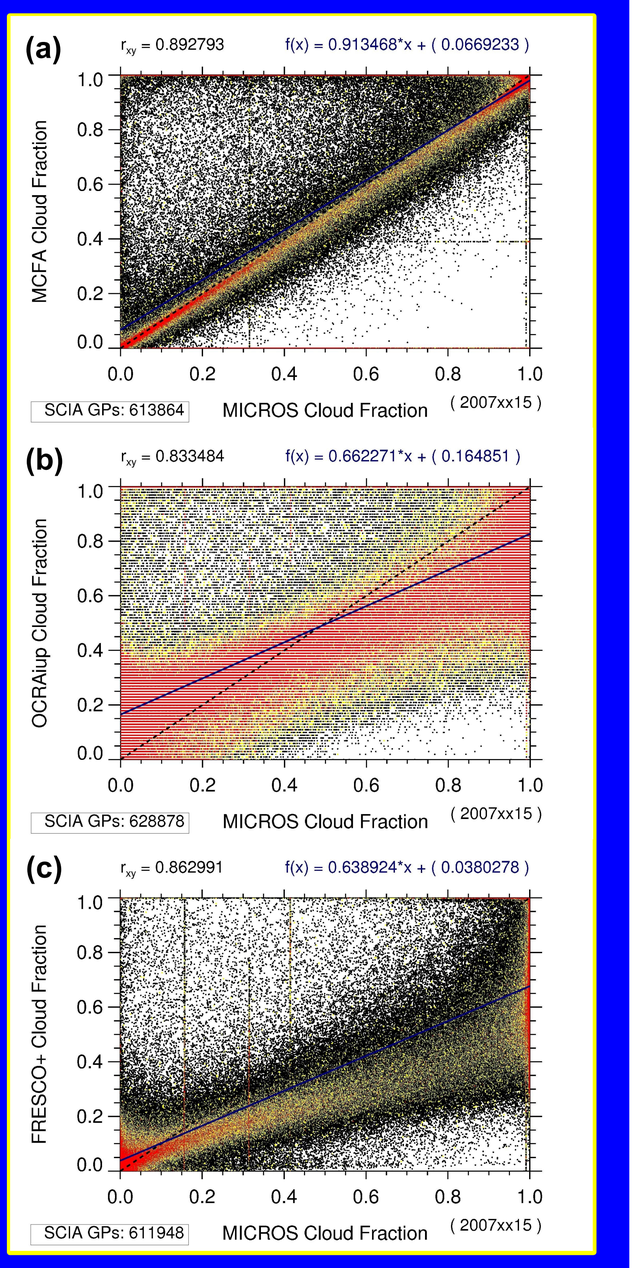
SCIAMACHY CLOUD FRACTION INTER-COMPARISON

Fig.3. The SCIAMACHY cloud fractions (with respect to optically thick clouds) at mid- and low latitudes [65S-65N;180W-180E] derived from MICROS (MERIS Cloud fRaction fOr SCIAMACHY) are inter-compared with other current SCIAMACHY cloud fractions based on different approaches (Martinecz et al., 2010).

(a) MICROS vs. MCFA (MERIS Cloud Fraction Algorithm, Kokhanovsky et al., 2009) cloud fraction. MCFA is the previous version of MICROS and thus, provides the same MERIS based cloud fraction as MICROS.

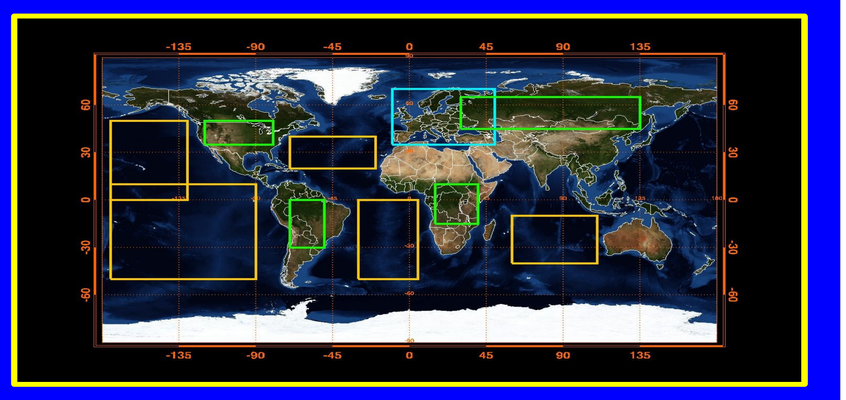
(b) MICROS vs. OCRAiup (Optical Cloud Recognition Algorithm, Loyola, 1998). OCRAiup calculates the cloud fraction based on the PMD measurements from SCIAMACHY.

(c) MICROS vs. FRESCO+ (Fast Retrieval Scheme for Clouds from the Oxygen A band, Koelemeijer et al., 2001). FRESCO+ determines a so-called effective cloud fraction making use of reflectivities as measured by SCIAMACHY inside and outside the oxygen A band assuming an a priori chosen cloud albedo.



Cross-validation results:

- Above 80% agreement for cloud fractions at mid- and low-latitudes.
- Above 90% agreement for cloud fractions found over land and water.
- Large discrepancies for cloud fractions found at polar regions, where MCFA and OCRAiup overestimate clouds. FRESCO+ does not provide cloud fractions over snow/ice regions.



CONCLUSIONS AND OUTLOOK

- **MERIS Cloud fRaction fOr SCIAMACHY (MICROS)** algorithm developed for determining an **accurate geometric cloud fraction for SCIAMACHY** ground pixels at nadir using MERIS reduced resolution data as sub-pixel information.
- **MICROS = improved version of MCFA**, which is the previous algorithm based on the same approach with several shortcomings, especially regarding the cloud detection over bright surfaces (solved in MICROS).
- **Limits of MICROS**: optically thin clouds over very bright surfaces and thin cirrus clouds are not detected by MICROS.
- **Inter-comparison of SEVIRI cloud products using WISCONSIN and SACURA** algorithms shows very good agreement regarding COT, while CER needs to be investigated in detail.
- **Preliminary cross-validation of SACURA and GRAPE cloud products** for SCIAMACHY looks very promising.

FUTURE WORK:

- **Further improvements of MICROS** using the synergy with AATSR thermal observations and MERIS oxygen A band measurements.
- **MICROS cloud fraction used as input parameter in SACURA-4.0** in order to retrieve more accurate cloud products for SCIAMACHY.
- **Validation of SCIAMACHY cloud products** derived from SACURA by comparison with independent satellite products as well as products derived from ground-based measurements.

References

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