CM SAF data for model evaluation

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Contributions from Salomon Eliasson and Jan Fokke Meirink and the participants

CM SAF data for model evaluation

**What we were trying to cover**

- Evaluation of atmospheric models (focus on climate models, e.g. through Obs4Mips)
- Evaluation of reanalysis data
- Evaluation of parameterizations
- Process studies
- Satellite simulators

Aim of this Splinter group

- Reviewing the usage of satellite (CM SAF) data for the purposes listed above
- How future CM SAF products can serve these purposes even better
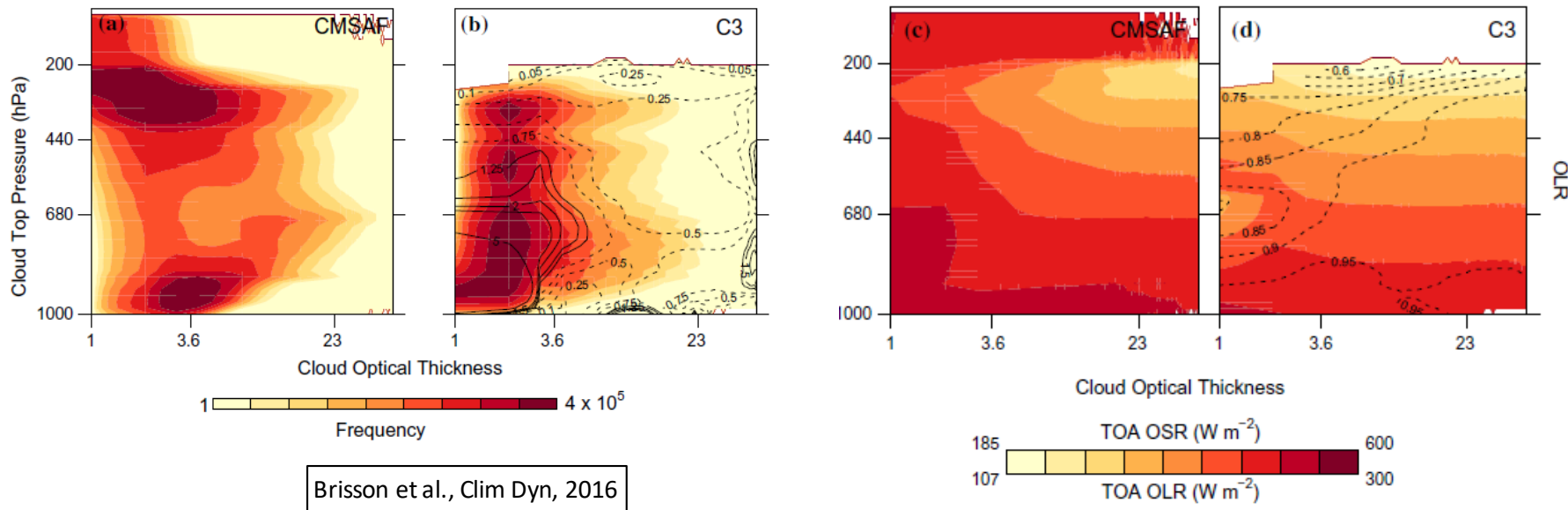 (which products, processing levels, temporal/spatial resolution, formats)

Classical model evaluation
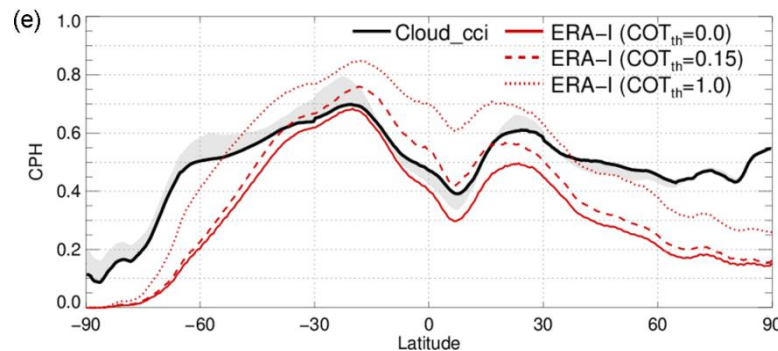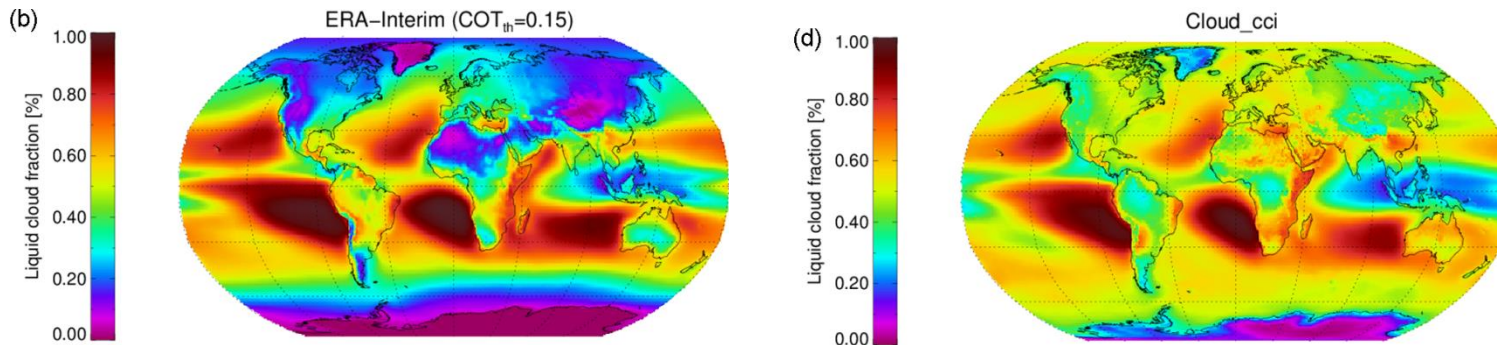
Eliasson et al., ACP, 2011
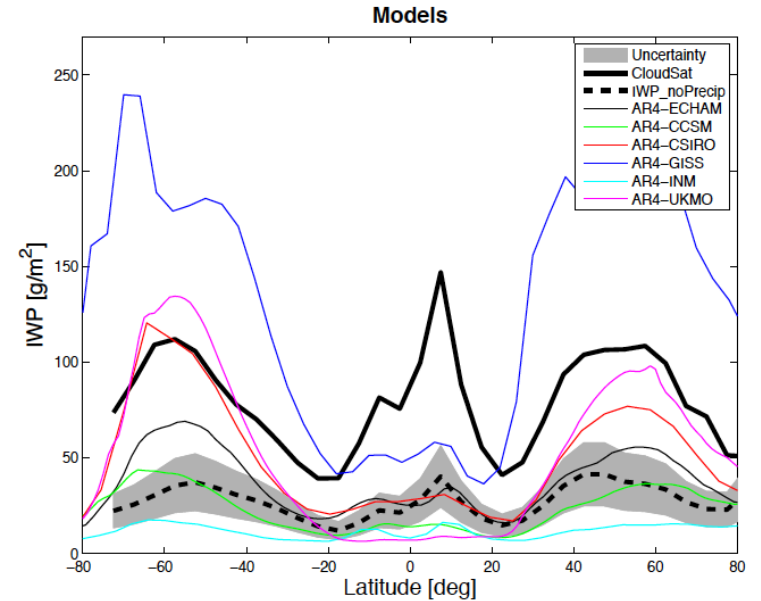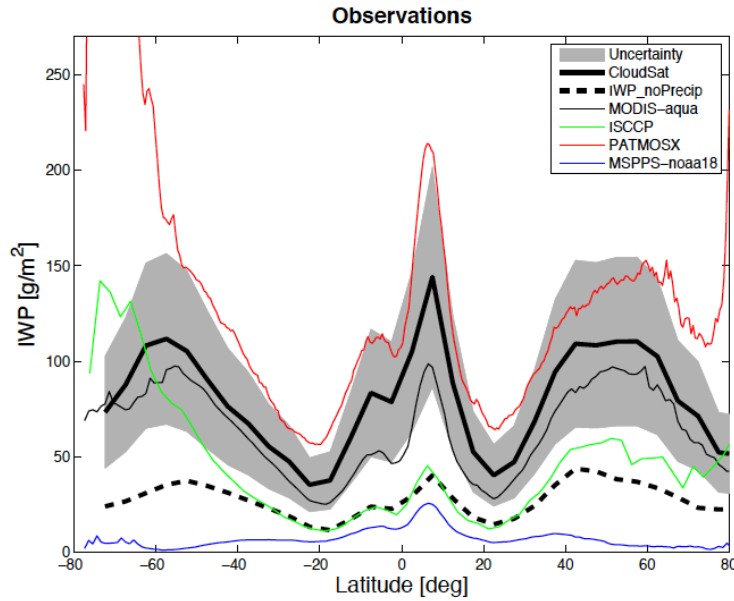
Advanced model evaluation

Using/combining Level 2 data aggregating for special needs

Brisson et al., Clim Dyn, 2016

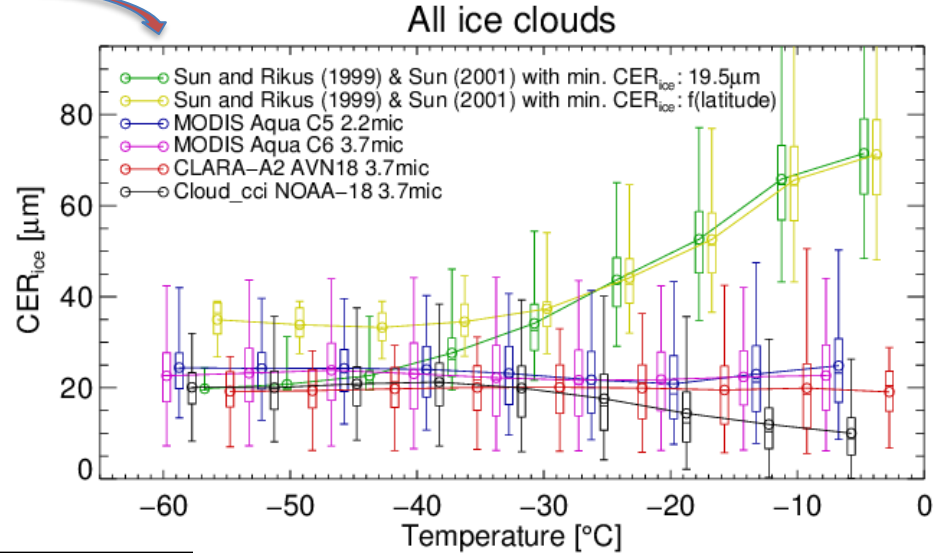## Evaluation of reanalyses

Satellite simulator applied

Stengel et al., ACP, 2018

Model parameterizations (e.g. of ice effective radius)

Satellite simulator required!

Ice effective radius at 500hPa

All ice clouds
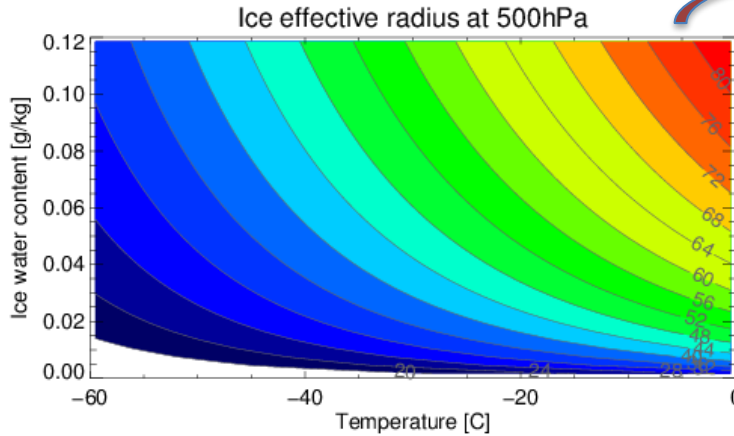
Own unpublished results

Process studies (e.g. cloud glaciation)

Coopman et al., JGR, 2019

Splinter group on
CM SAF data for model evaluation
EUMETSAT CM SAF CLIMATE MONITORING

Deutscher Wetterdienst
Wetter und Klima aus einer Hand
DWD
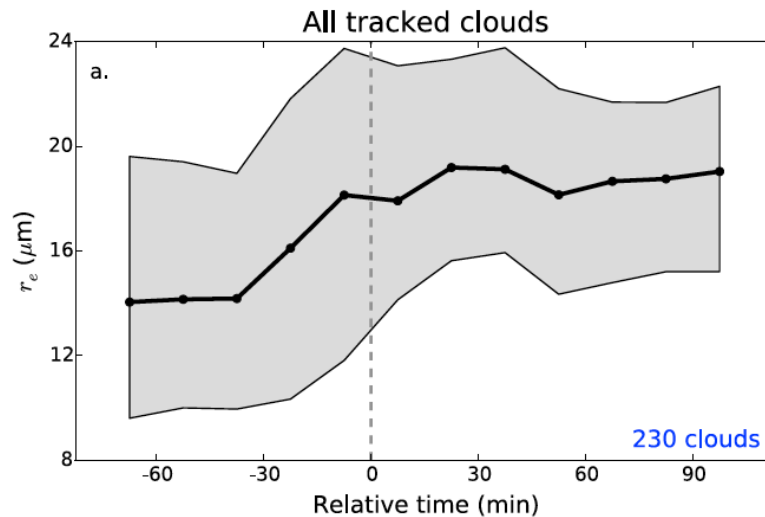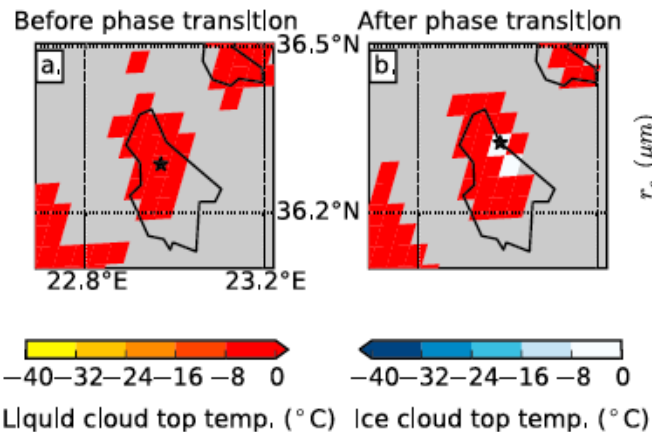
Model evaluation - Satellite simulators

Stengel et al., ACP, 2018

EUMETSAT CM SAF CLIMATE MONITORING

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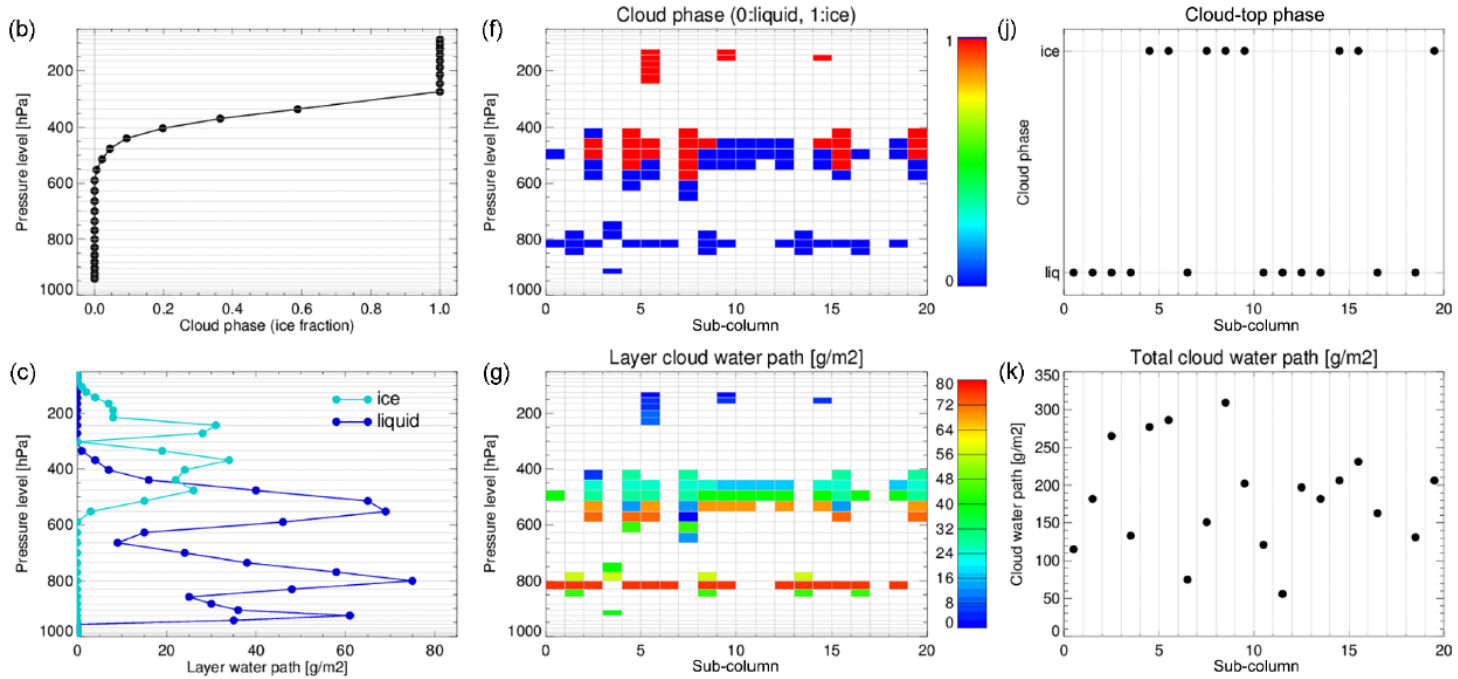
Model evaluation - Satellite simulators

Eliasson et al., GMD, in prep.

EC Earth CLARA−A2 (c)   EC Earth ISCCP (d)   CLARA−A2 (a)   ISCCP (b)
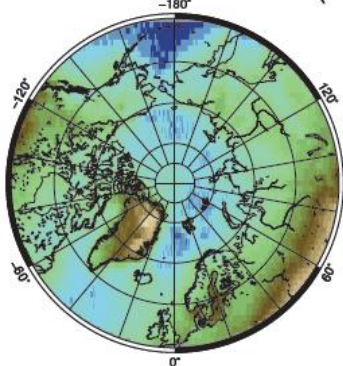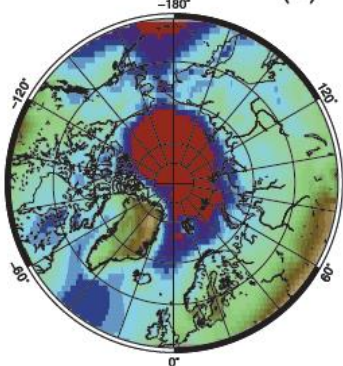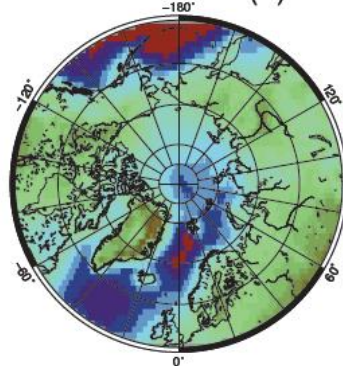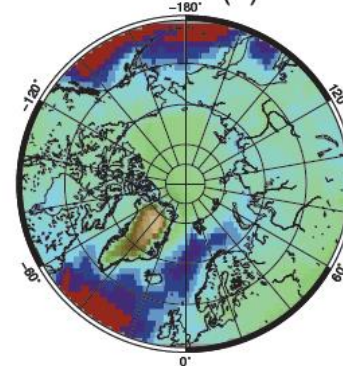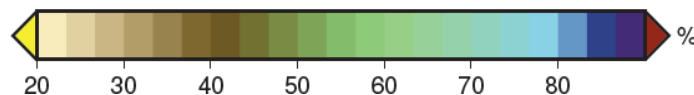
Cloud Fraction JJA

20   30   40   50   60   70   80   %

Summary I (without claiming to be complete and 100% correct)

- (CMSAF) satellite datasets significantly contribute to validating atmospheric models and/or can lead to further model developments, and can thus lead to increased confidence in the atmospheric models and their climate projections

- It is acknowledged that there is a need for satellite simulators for some applications. Thus we need to continue our activities in that respect and ensure that our simulators are available to modelling centres (i.e. as part of COSP) (CMSAF satellite simulators available for cloud properties and MW FCDR)

- There are model evaluation applications than go beyond classical evaluations (for which monthly mean data might be sufficient) that need Level-2/Level-2b data, e.g. for evaluation of parameterizations and process studies. So we should make sure this data is available and properties are as independent as possible.

Summary II (without claiming to be complete and 100% correct)

- Process studies (e.g. monitored through cloud tracking) would certainly benefit from data with higher spatial and temporal resolution, which would lead to the recommendation of generating a MTG FCI (demonstrator) dataset (of cloud properties) once FCI data is available.

- Temporal memory in retrievals might be beneficial (general comment to improve the data)

- Recommendation to prolong the existing data record (e.g. using GAC-like VIIRS Level-1 data)

- New products will be available, e.g. TOA fluxes in CLARA-A3 which will be of interest to modellers

- *NWP validation* (TBD)

Summary III (without claiming to be complete and 100% correct)

- Uncertainties: will be used when available and certainly help interpreting model evaluation results

- Uncertainties are ideally provided for Level-3 products as well. Can be achieved either through uncertainty propagation (e.g. as developed in Cloud_cci) or maybe by generating an ensemble record (e.g. based on lower spatial and temporal resolution)

- There are already Level-3 uncertainties in HOAPS, which are also available through Obs4Mips. Currently working on CLARA-A3 Level-3 cloud uncertainties

- Validating the uncertainties is an important aspect (maybe learn from Cloud_cci and HOAPS here)

- *This was the start of the discussion (will reach out to more modellers)*

Thank you