

# An AEROCOM/AEROSAT study: evaluation of global models with satellite AAOD and SSA

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AEROCOM & AEROSAT

# Two relevant papers

- Site representativity of AERONET and GAW remotely sensed aerosol optical thickness and absorbing aerosol optical thickness observations
  - Estimate of Spatial Representativity per AERONET site
- An AeroCom/AeroSat study: Intercomparison of Satellite AOD Datasets for Aerosol Model Evaluation
  - Estimate of multi-year bias in satellite AOD globally
- Both in *Atmos. Chem. Phys.* 2020

# AAOD and SSA study

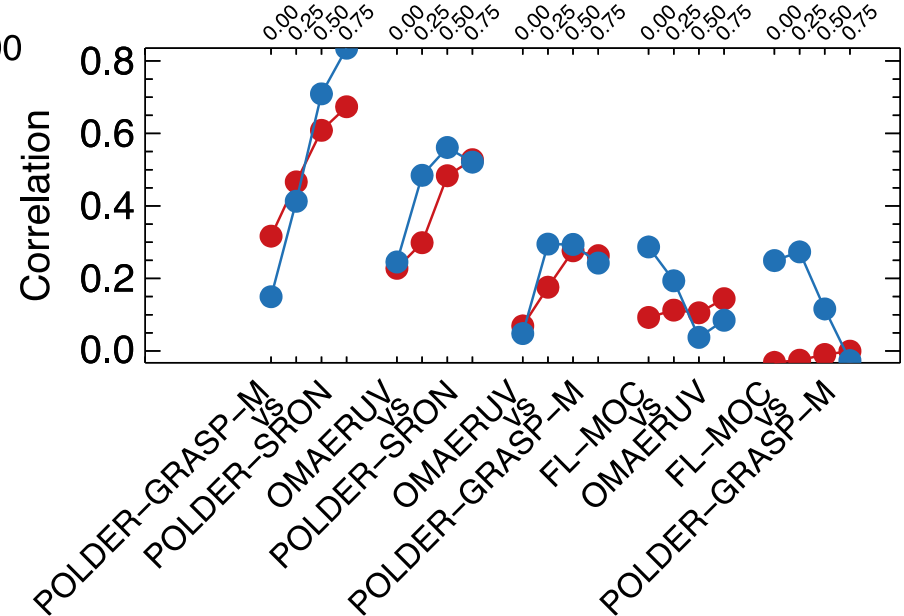
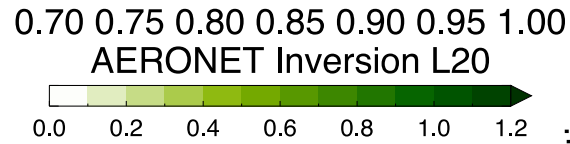
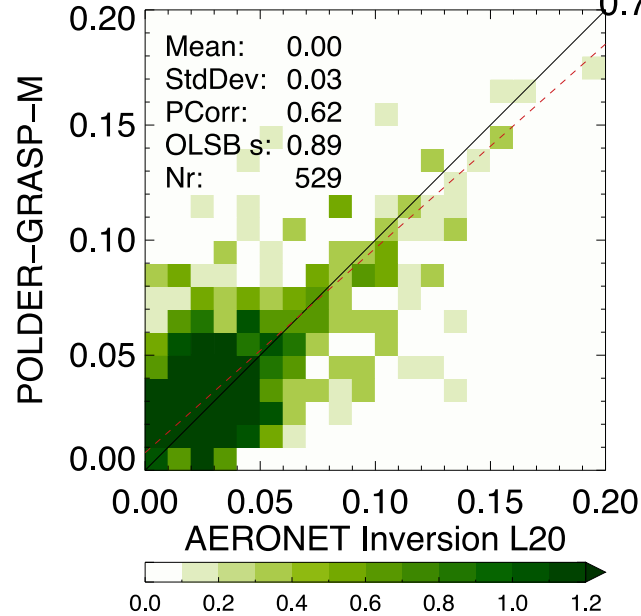
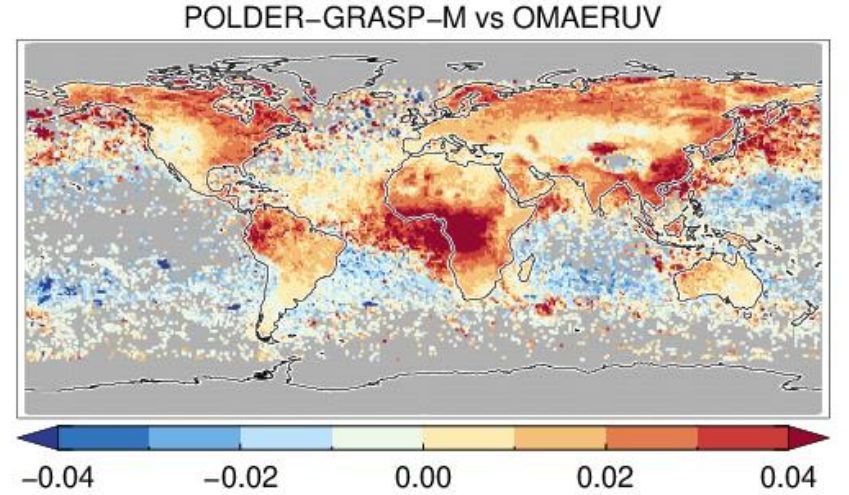
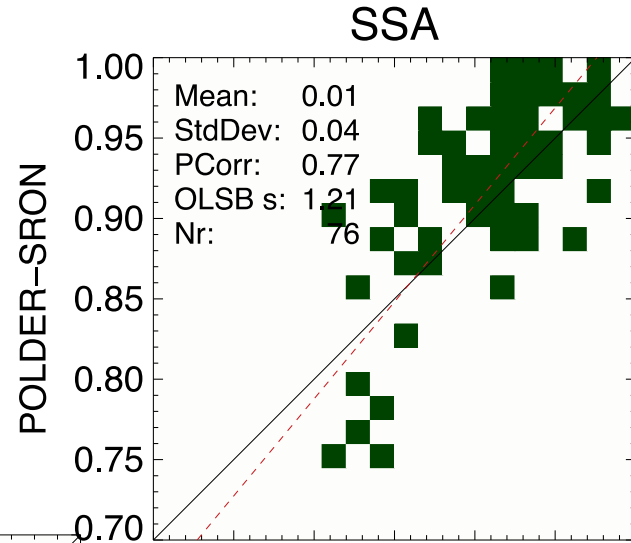
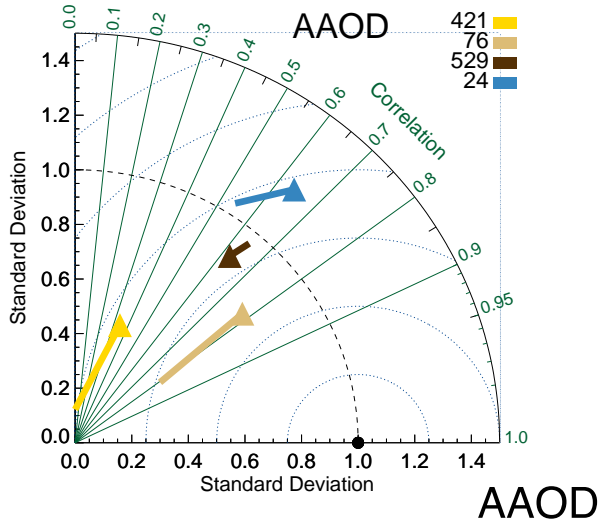
- Evaluate and Intercompare satellite datasets

Platform	Sensor	Algorithm
PARASOL	POLDER	GRASP
		SRON
Aura	OMI	OMAERUV
+ CALIOP, + MODIS		FL-MOC

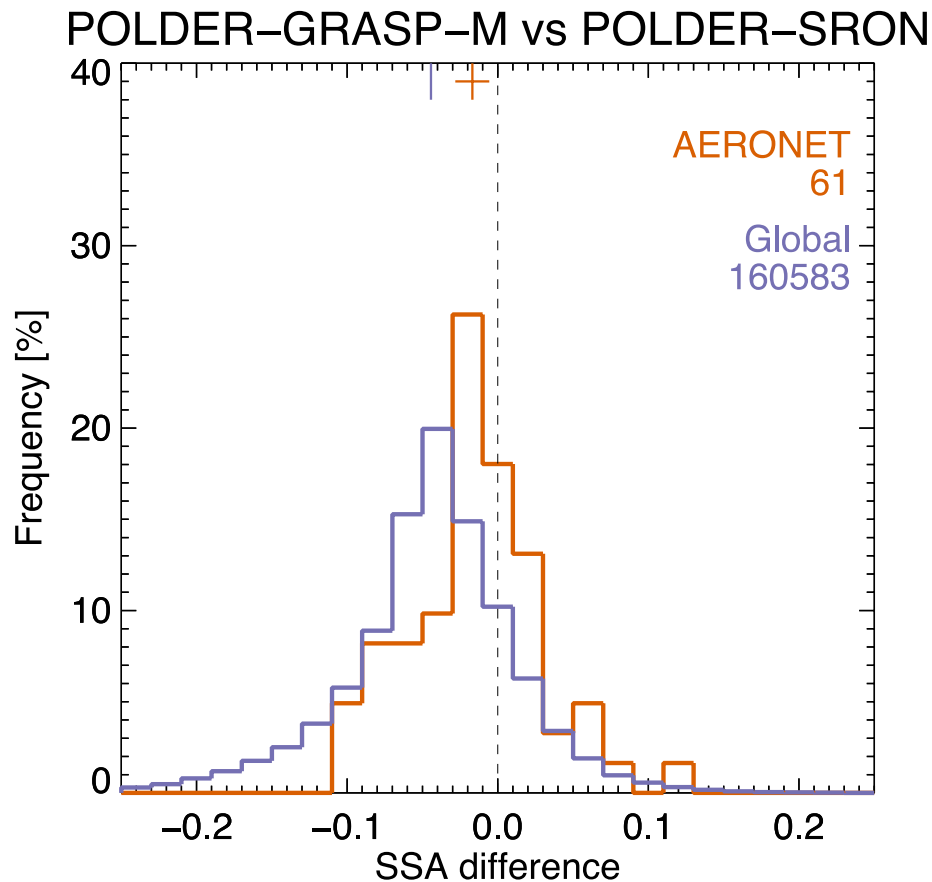
- Evaluate and interpret AEROCOM models

Phase	Experiment	Models
II	CTRL	7
III	CTRL2016	13
	CTRL2019	11

# Satellite evaluation and intercomparison



# Bias between two POLDER retrievals



# 0.04 %

of dataset can be evaluated with reference (AERONET) data

AERONET:  $\Delta SSA = -0.017$

Global:  $\Delta SSA = -0.044$

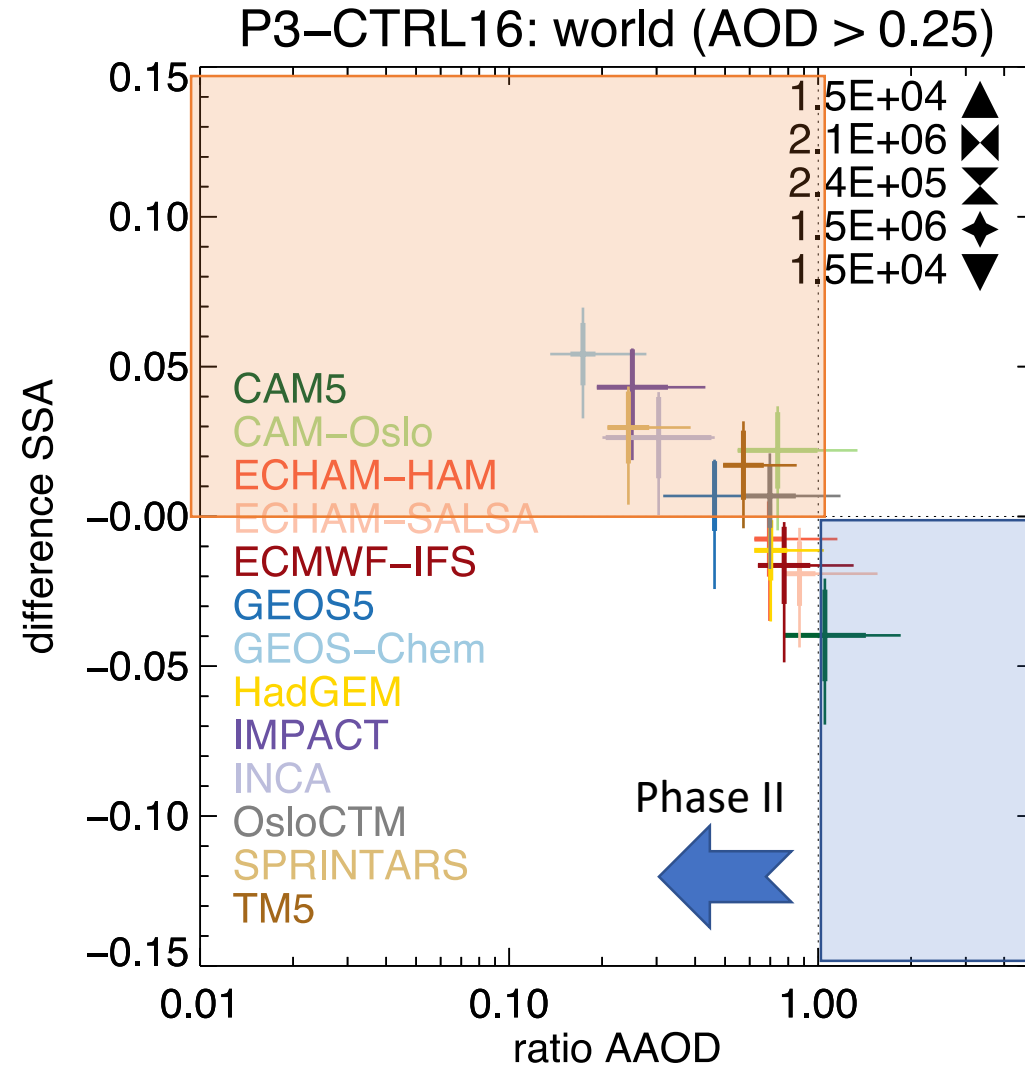
- Evaluation with AERONET is not globally representative
- Identifying cause of bias should greatly improve datasets

# Model evaluation

The uncertainty ranges include

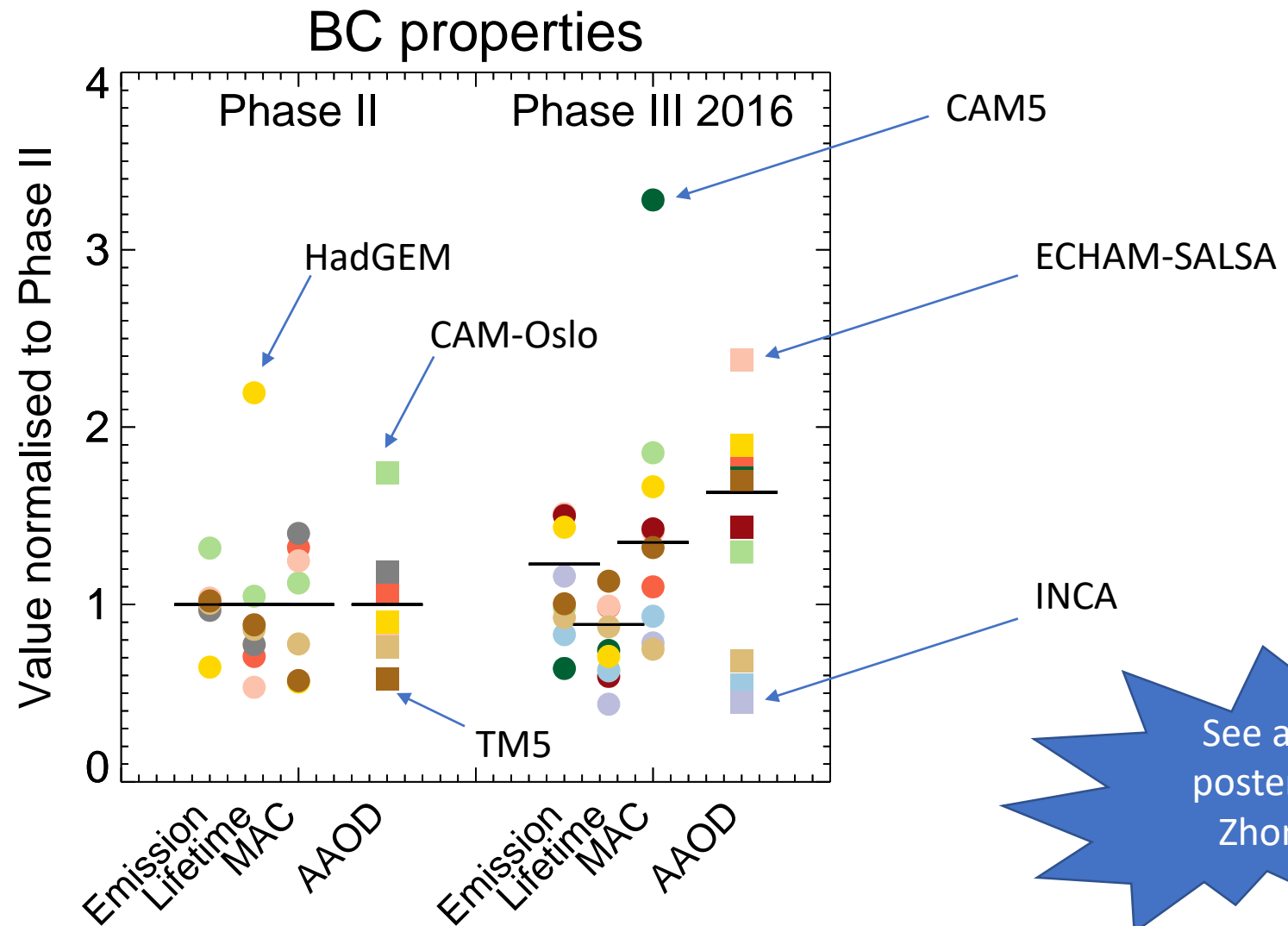
- Retrieval biases
- Sampling differences

Too low AAOD  
Aerosol scatter too much



Too high AAOD  
Aerosol absorb too much


$$\text{BC Emission} * \text{lifetime} * \text{MAC} = \text{AAOD}$$



See also poster by Zhong

# Summary

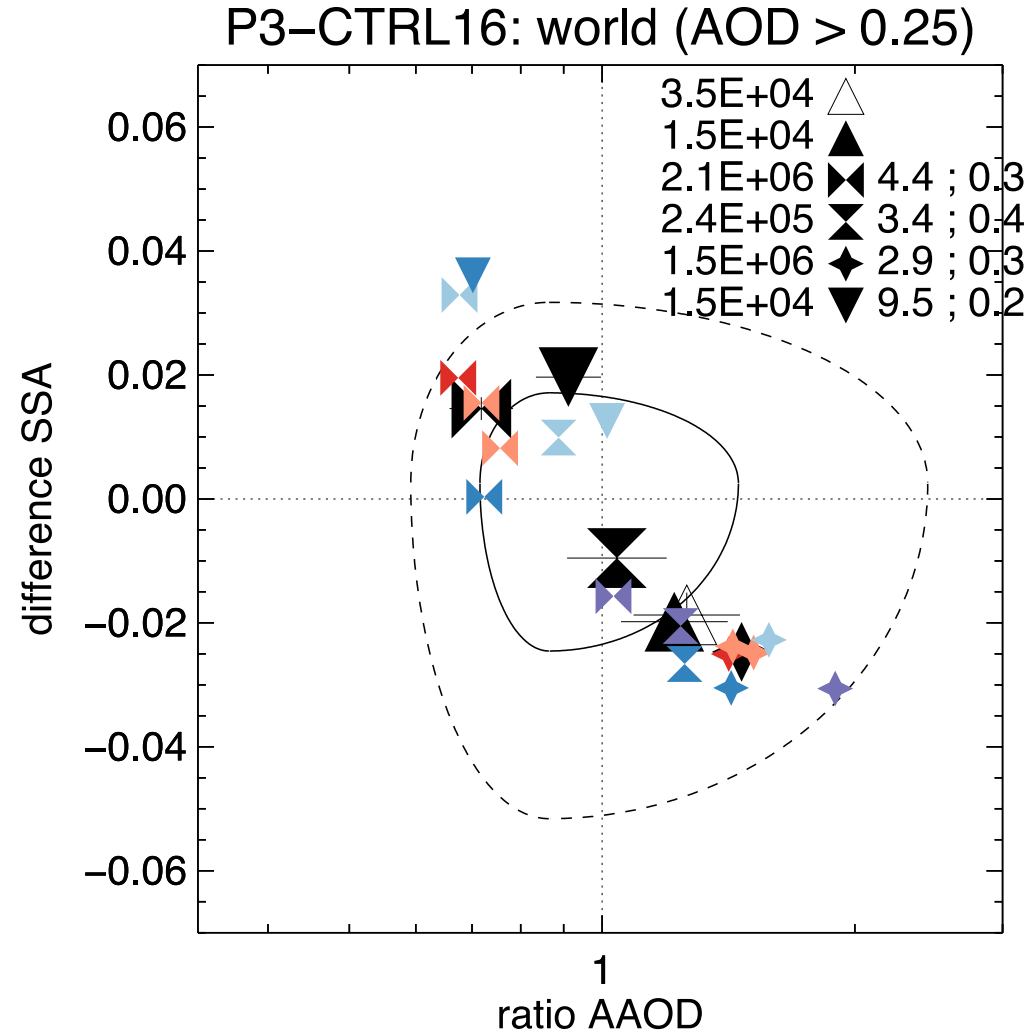
- AERONET may not provide globally representative satellite eval.
- Significant biases in satellite products
- Model biases are often larger so satellite data are still useful 😊
- Phase II low AAOD appears due to emissions (30%) and MACs (50%)
- We have an exciting job in urban-scale data assimilation !



See also  
poster by  
Tsikerdekis



# Construction of uncertainty ranges



# Model evaluation by region

