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# Light scattering coefficients and enhancement factors in dry conditions

Evaluation between different models and measurements

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# Introduction

- Light scattering coefficient is a measure of light scattering abilities of aerosol particles
  - a strong function of RH

$$\sigma_{sp} = \sigma_{ex} - \sigma_{ab}$$

- Larger for small particles
- Can be used to calculate enhancement factor in different RH cases

# Motivation

- Is there inconsistencies in different models by the means of aerosol optical properties in "dry" cases?
- Is there inconsistencies between models and measurement dry scattering?

# Measurement data

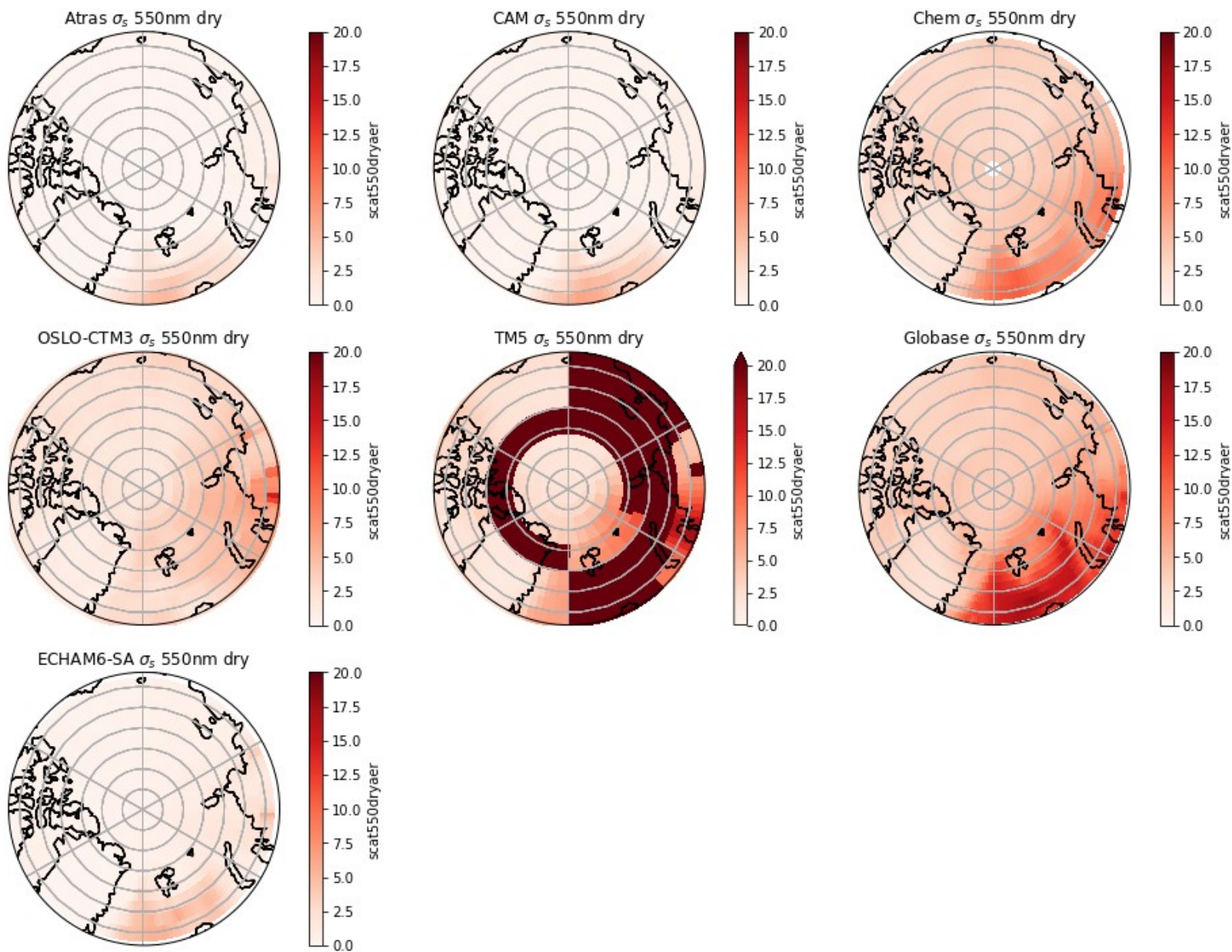
- Measurement data measured with humidified nephelometer system
- Data (EBAS) from different measurement sites
  - Tiksi, Zeppelin, Barrow and Alert
- Used the dry case studies ( $RH=0$ ) to see differences between models and measurement

# Model data

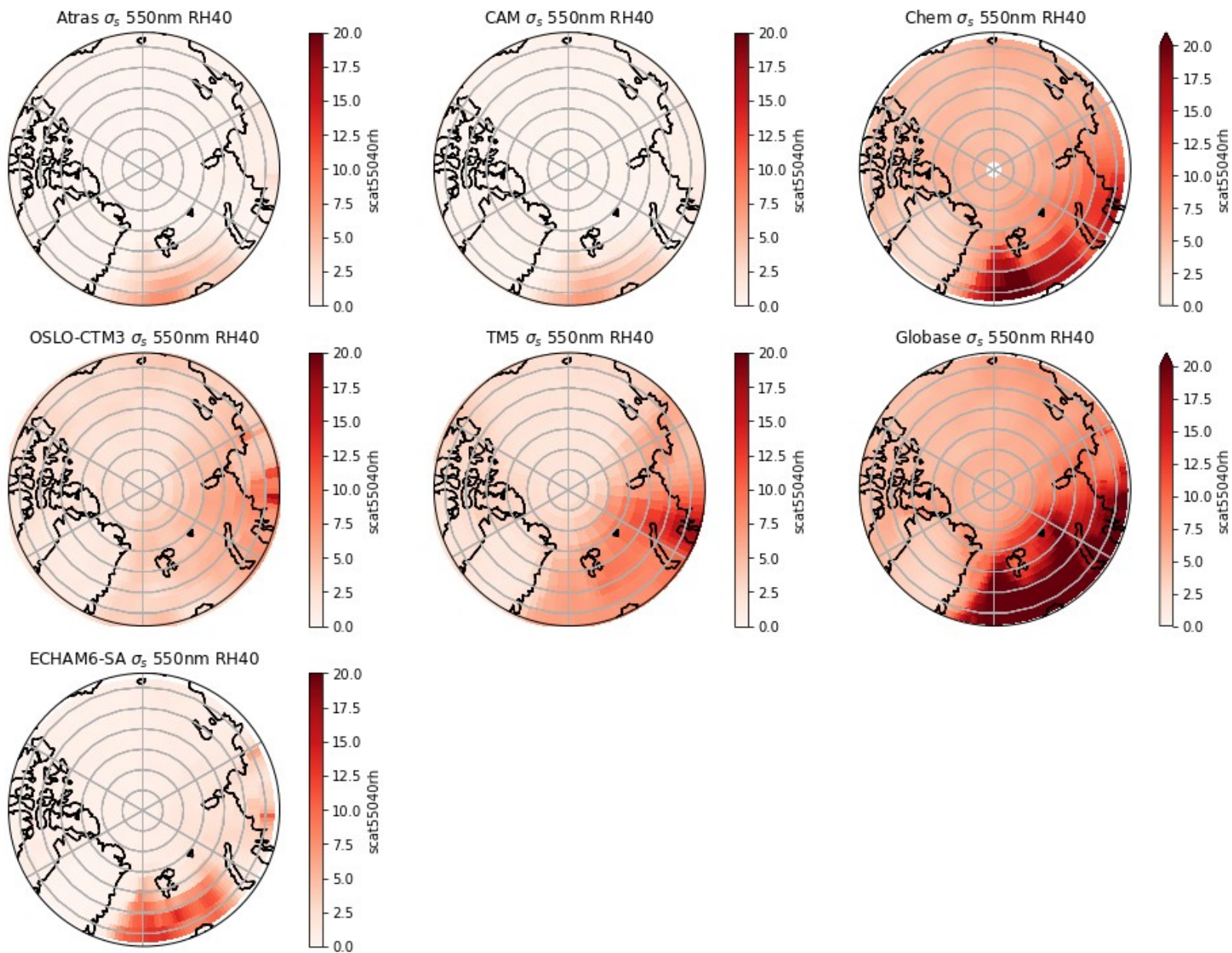
- Models: CAM5-Atras, CAM5, GEOS-Chem, OSLO-CTM3, TM5-AP3, GEOS5-Globase, ECHAM6.3-SALSA
- Data for different RH cases
  - absorption and extinction in 0, 40 and 85 RH
- Different time format and resolution for different models



March,  
2010

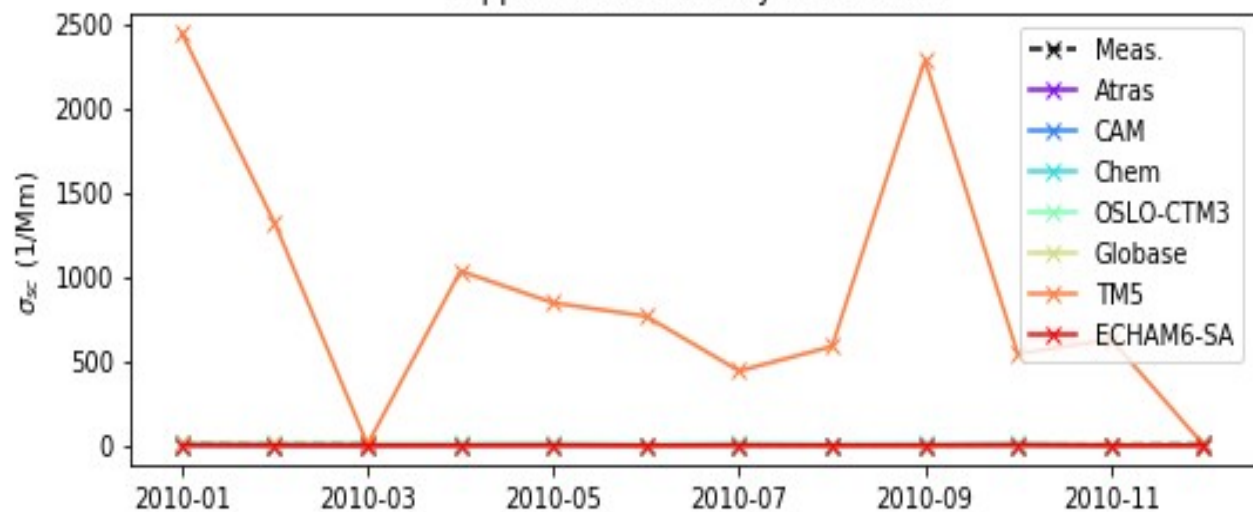


March,  
2010

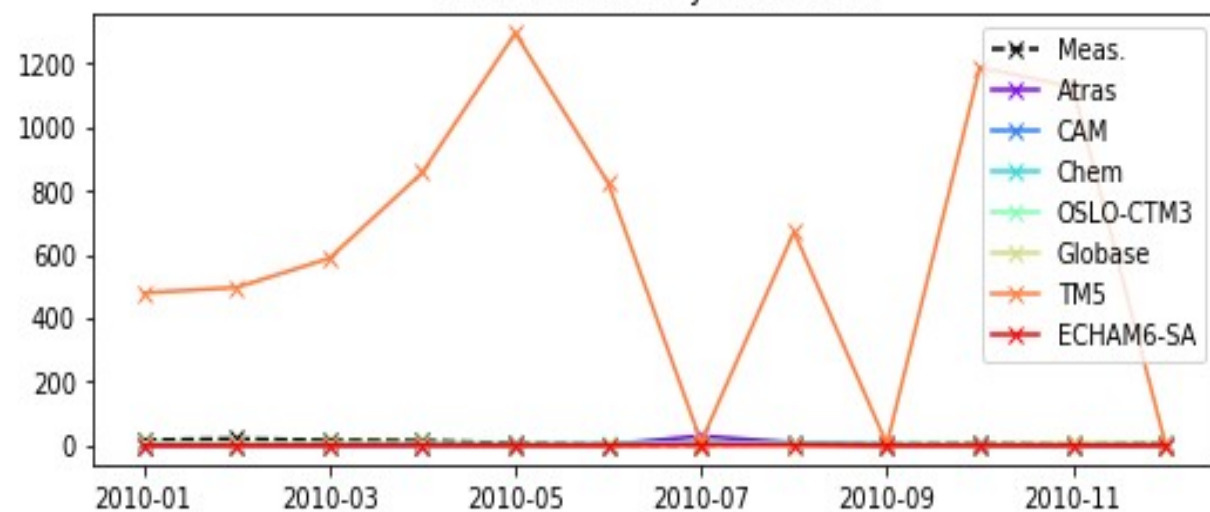




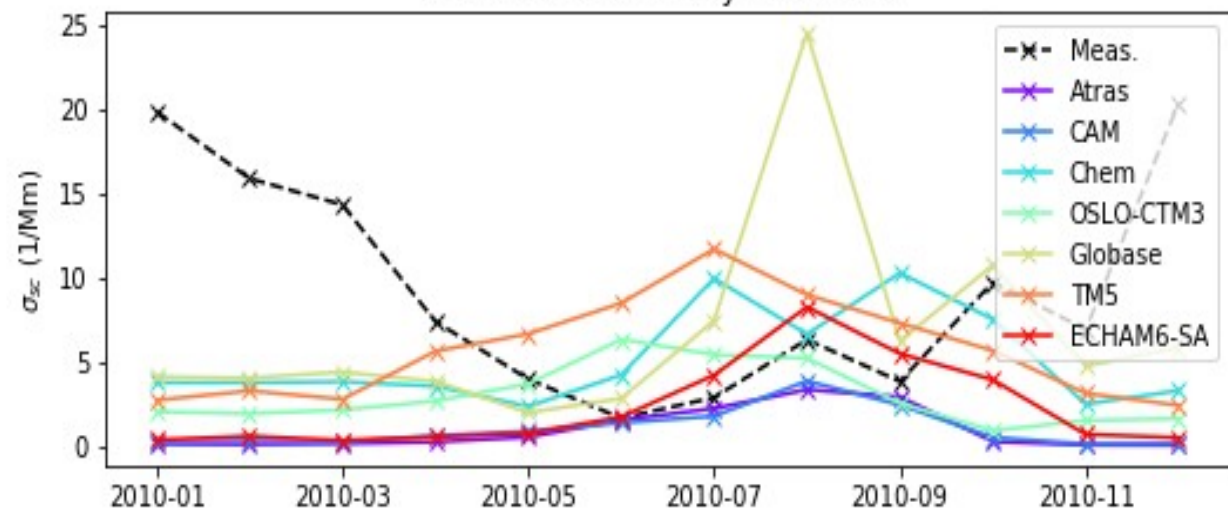
Zeppelin 2010 monthly mean 0 RH



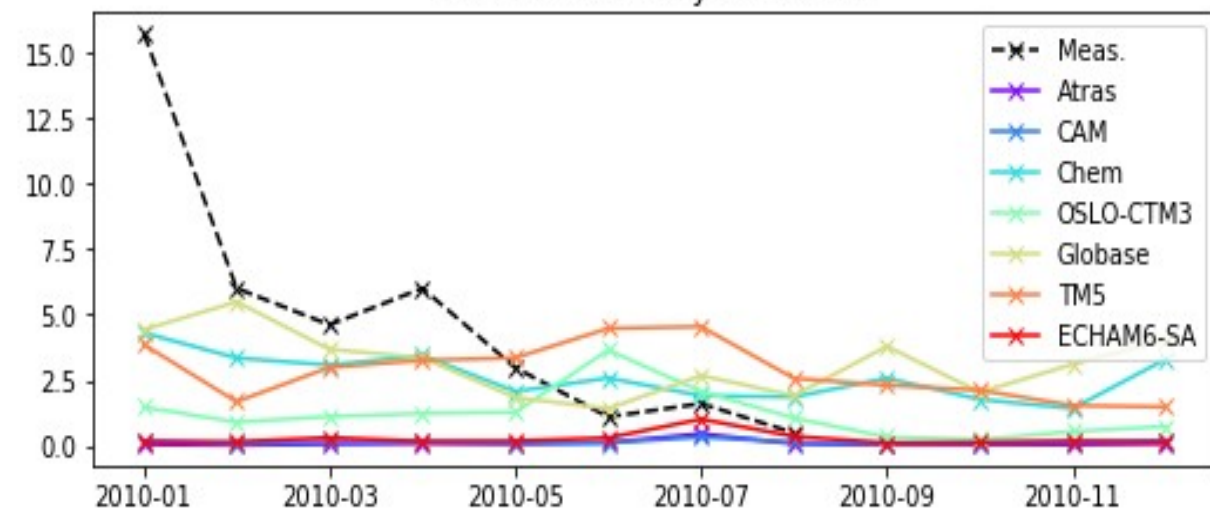
Tiksi 2010 monthly mean 0 RH



Barrow 2010 monthly mean 0 RH

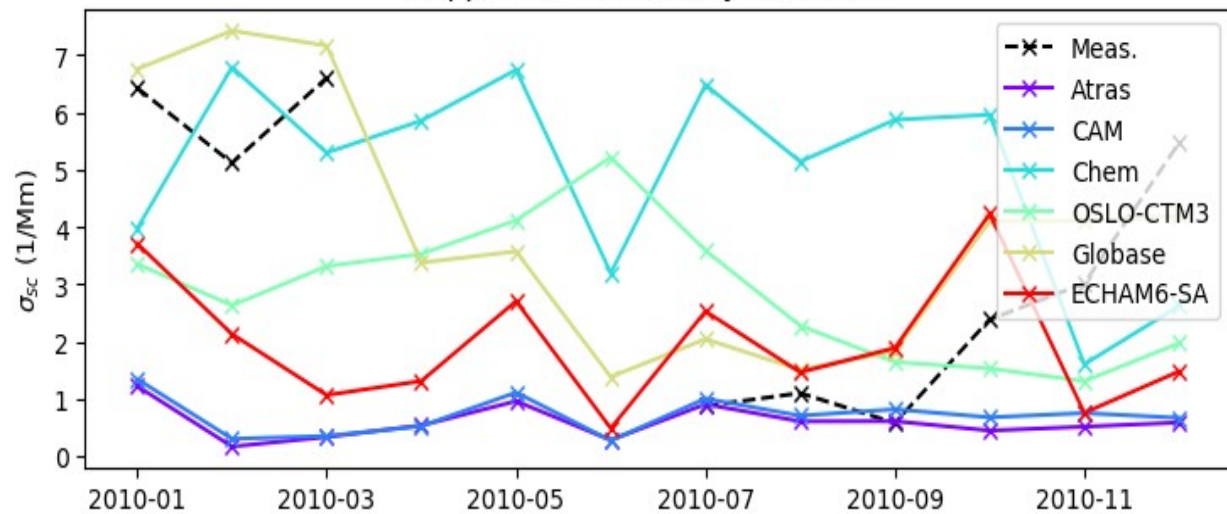


Alert 2010 monthly mean 0 RH

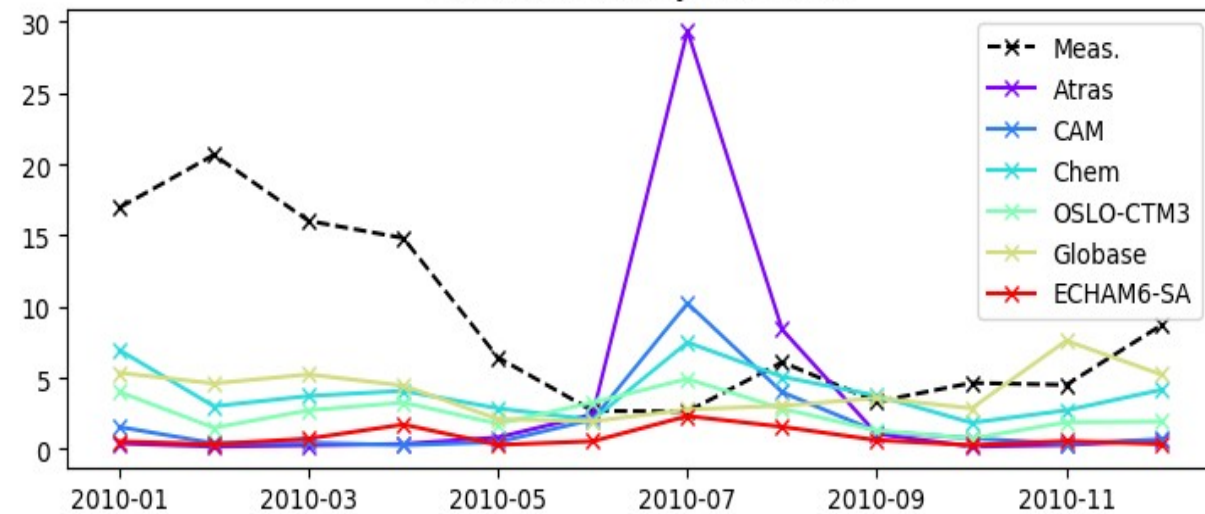




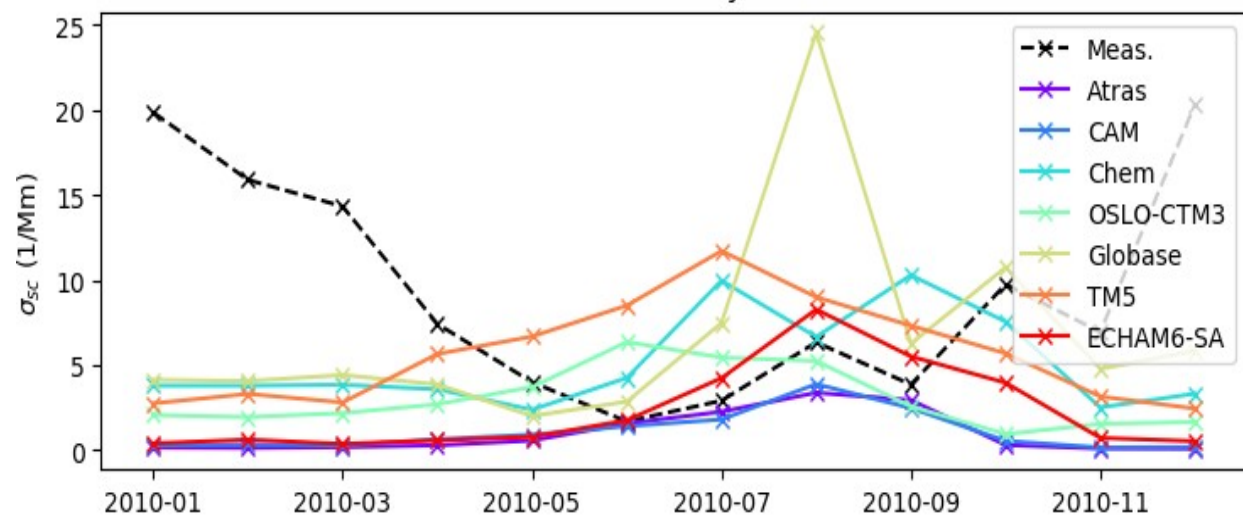
Zeppelin 2010 monthly mean 0 RH



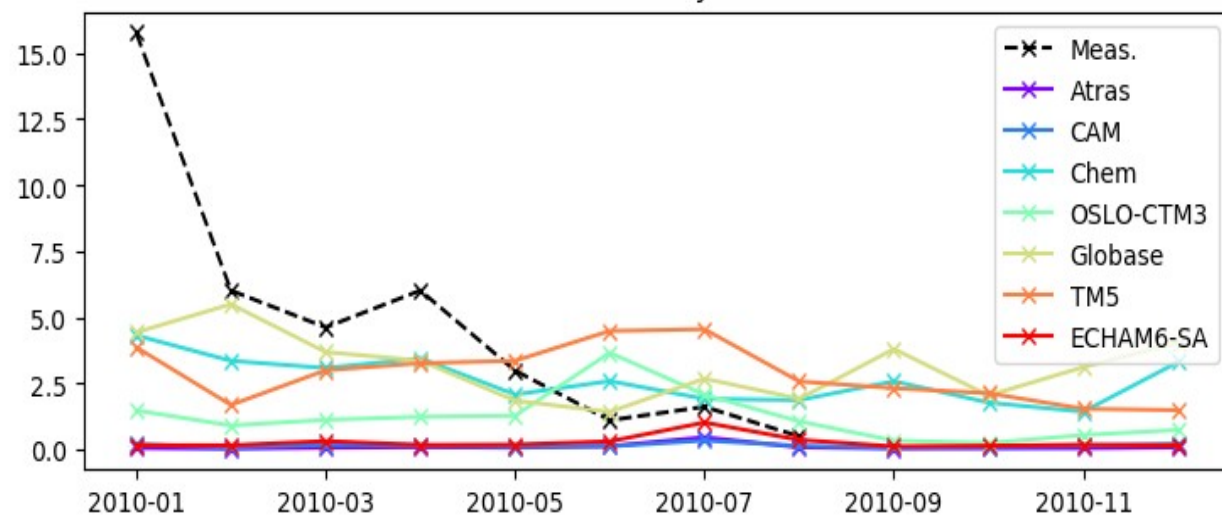
Tiksi 2010 monthly mean 0 RH



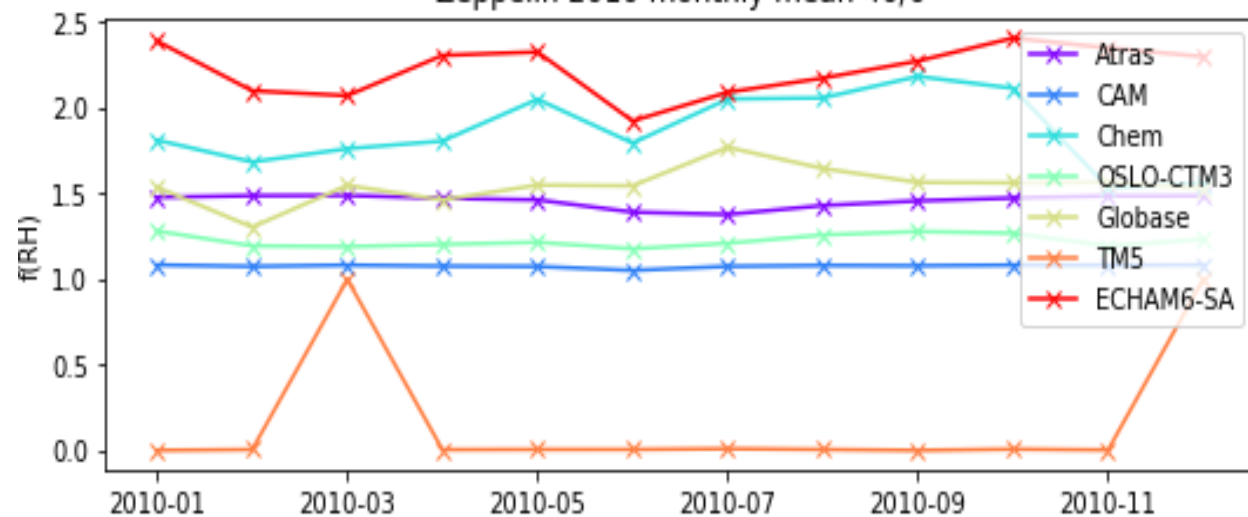
Barrow 2010 monthly mean 0 RH



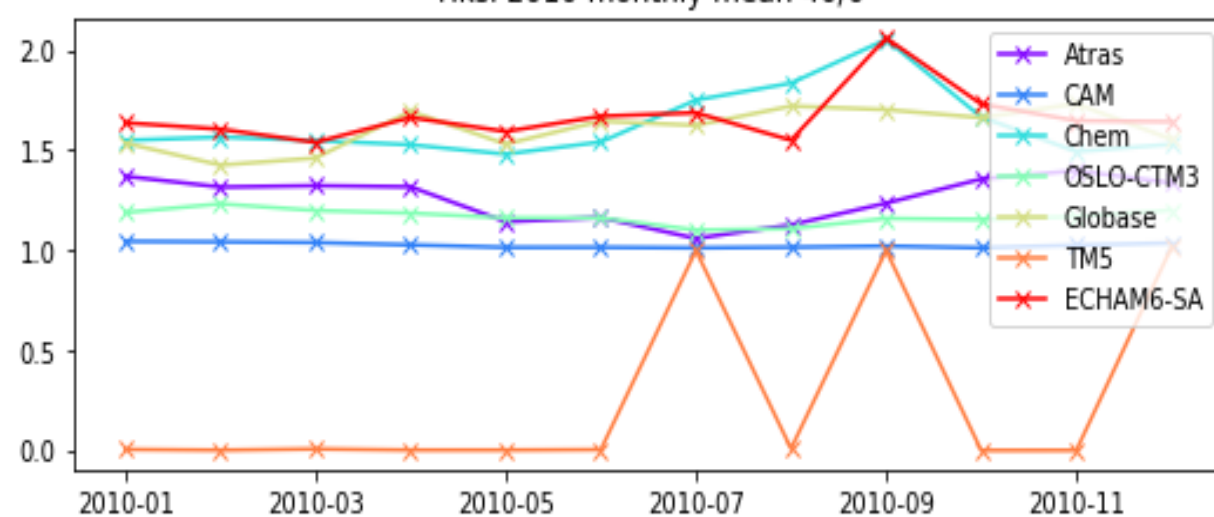
Alert 2010 monthly mean 0 RH



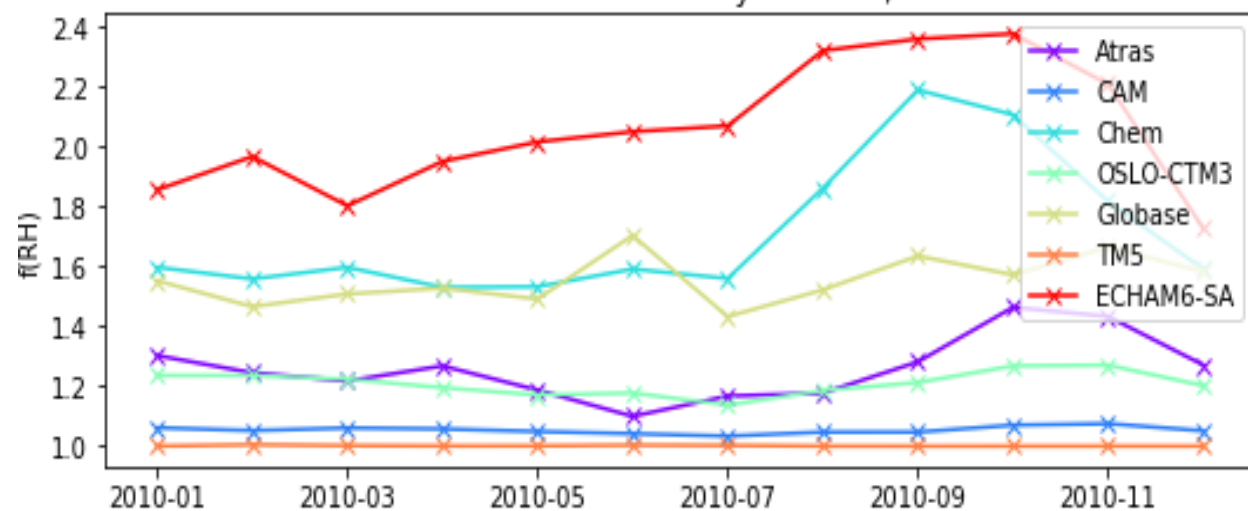
Zeppelin 2010 monthly mean 40/0



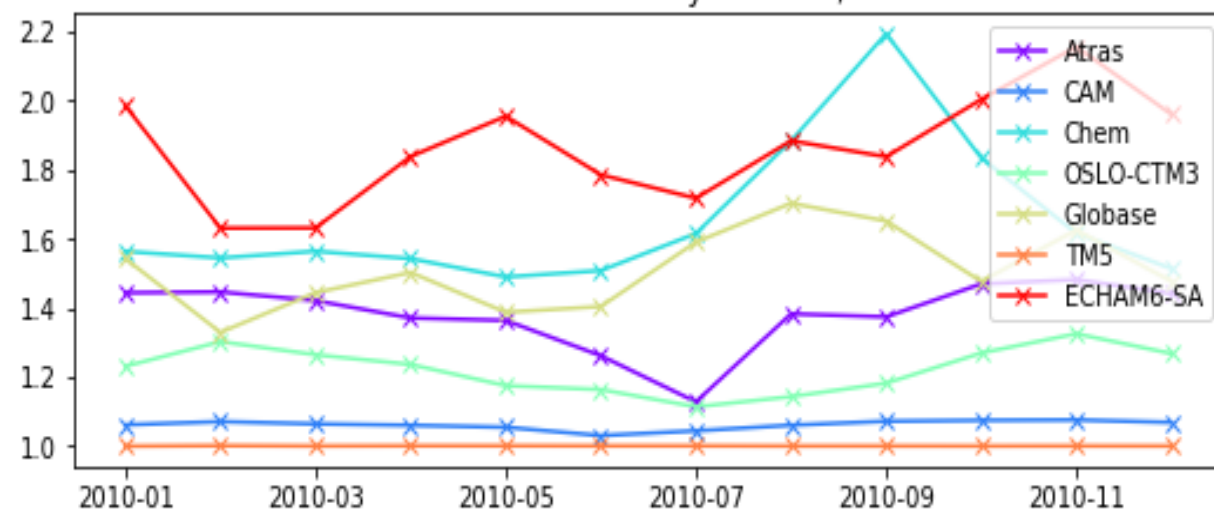
Tiksi 2010 monthly mean 40/0



Barrow 2010 monthly mean 40/0



Alert 2010 monthly mean 40/0





# Conclusions

- Models represent the dry scattering and enhancement factor differently
- Models can somewhat represent the aerosol optical properties in dry case when compared to measurements but more thorough investigation is needed



# Outlook

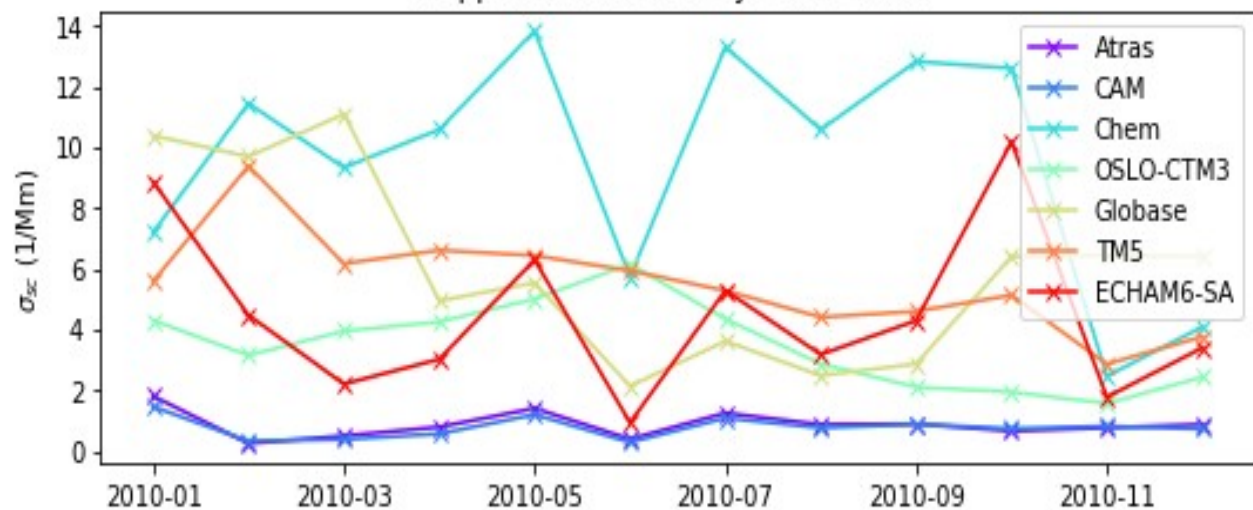
- Data temporal collocation and correlation plots between models and the measurements
- Include more models in the evaluation (ECMWF, MERRAero, etc..)



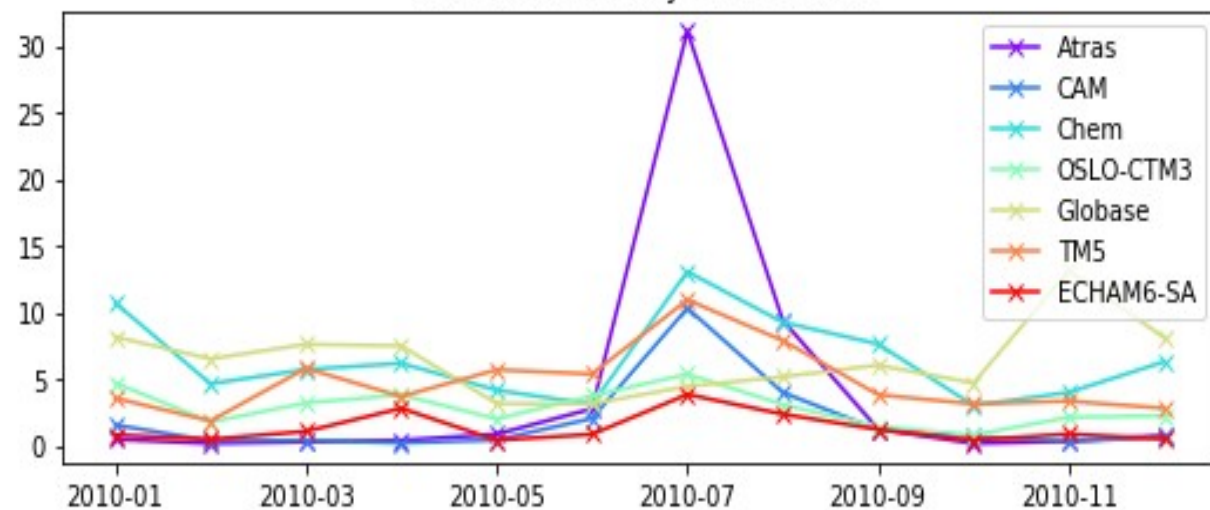
# References

Ziegler et al. (2015). Low hygroscopic scattering enhancement of boreal aerosol and the implications for a columnar optical closure study. ACP. 15, 7247–7267, doi:10.5194/acp-15-7247-2015

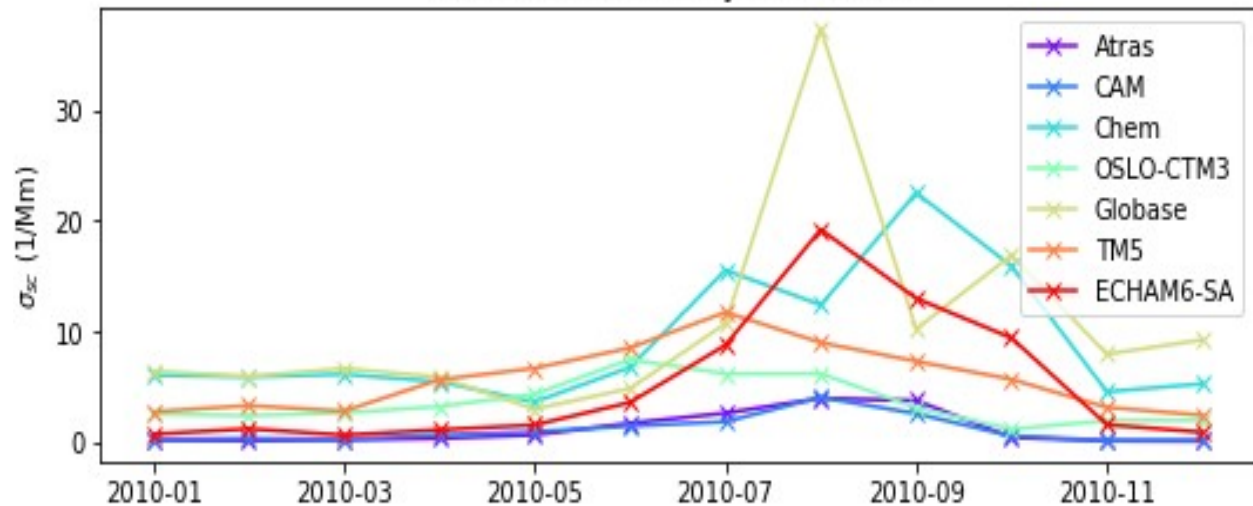
Zeppelin 2010 monthly mean 40 RH



Tiksi 2010 monthly mean 40 RH



Barrow 2010 monthly mean 40 RH



Alert 2010 monthly mean 40 RH

