

AeroCom INSITU PNSD: Comparing Climate Model Particle Size Distributions with Surface InSitu Observations

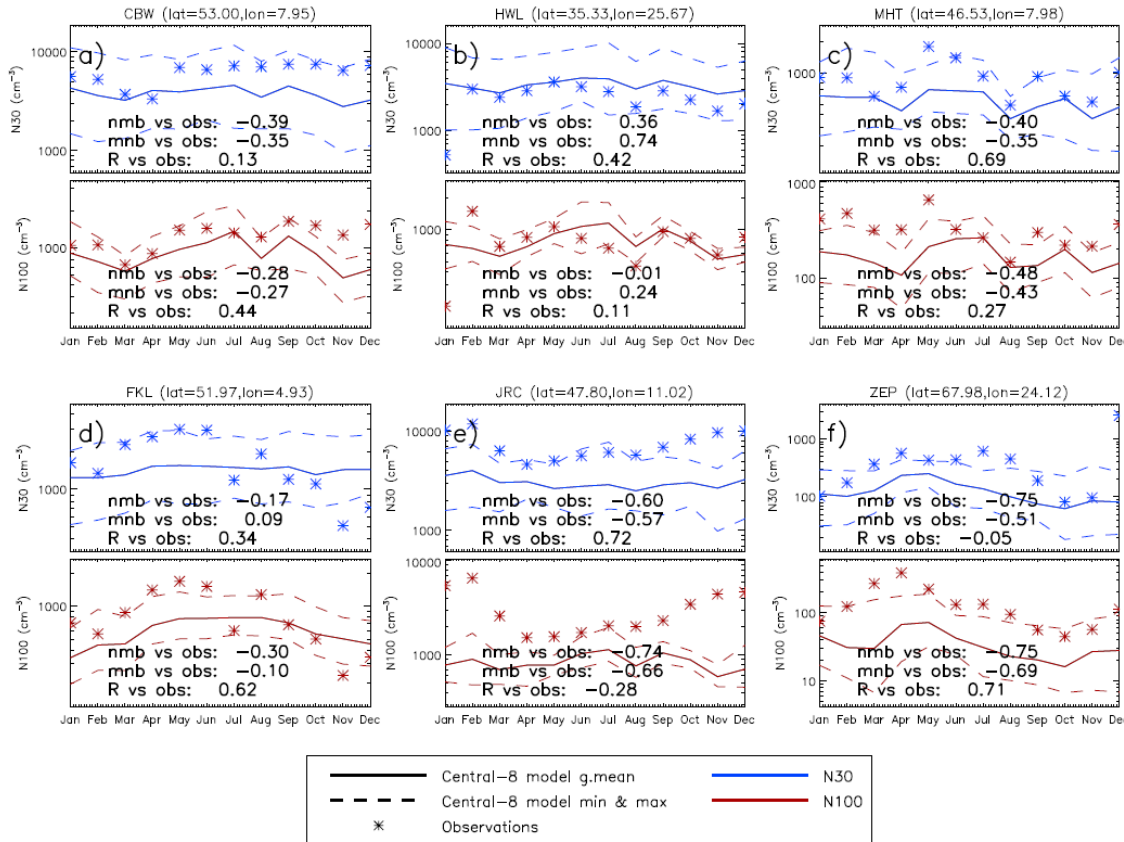
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Previous Work: Mann et al., 2014

Western Europe, Mediterranean, and Arctic sites

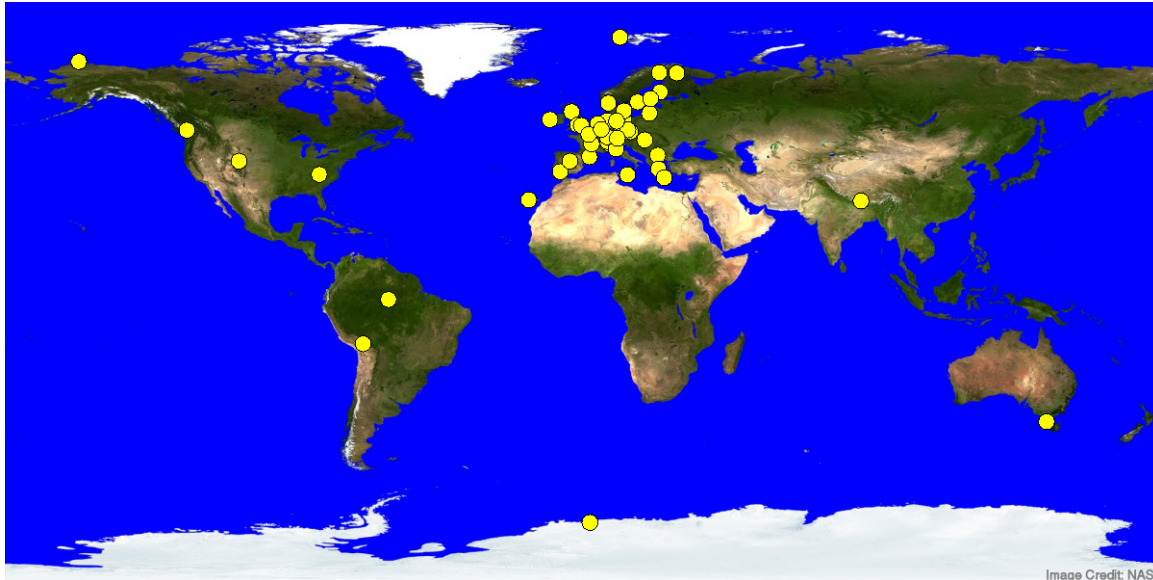


- Previous comparison based on AeroCom phase II models.
- Compares to model ensemble median, not individual models.
- Finds: $N_{30\text{nm}}$ biased high in winter, low in summer, $N_{100\text{nm}}$ biased low in winter.
- Limited to fine range of particle size distribution ($D_p < 1 \mu\text{m}$)

The Plan for AeroCom PNSD INSITU

- Extend comparison of particle size distribution between AeroCom models and surface in situ measurements to Phase III models.
- Fit log-normal modes to measured and modelled particle size distributions
- *Compare* not only concentration, also *size information* in particle size distribution *quantitatively* by evaluating modal fit parameters (modal concentration N , modal median diameter D_{med} , modal width σ_g).
- Extend comparison to coarse size range ($D_p < 1 \mu\text{m}$) by comparing particle scattering spectral dependence / scattering Ångström coefficient \mathring{A}_{sp} and mass concentrations of PM2.5 and PM10.
- In evaluation, discriminate by model to find reasons for agreement / disagreement between model and observations.
- Provide benchmark datasets and suggestions for targeted model experiments.

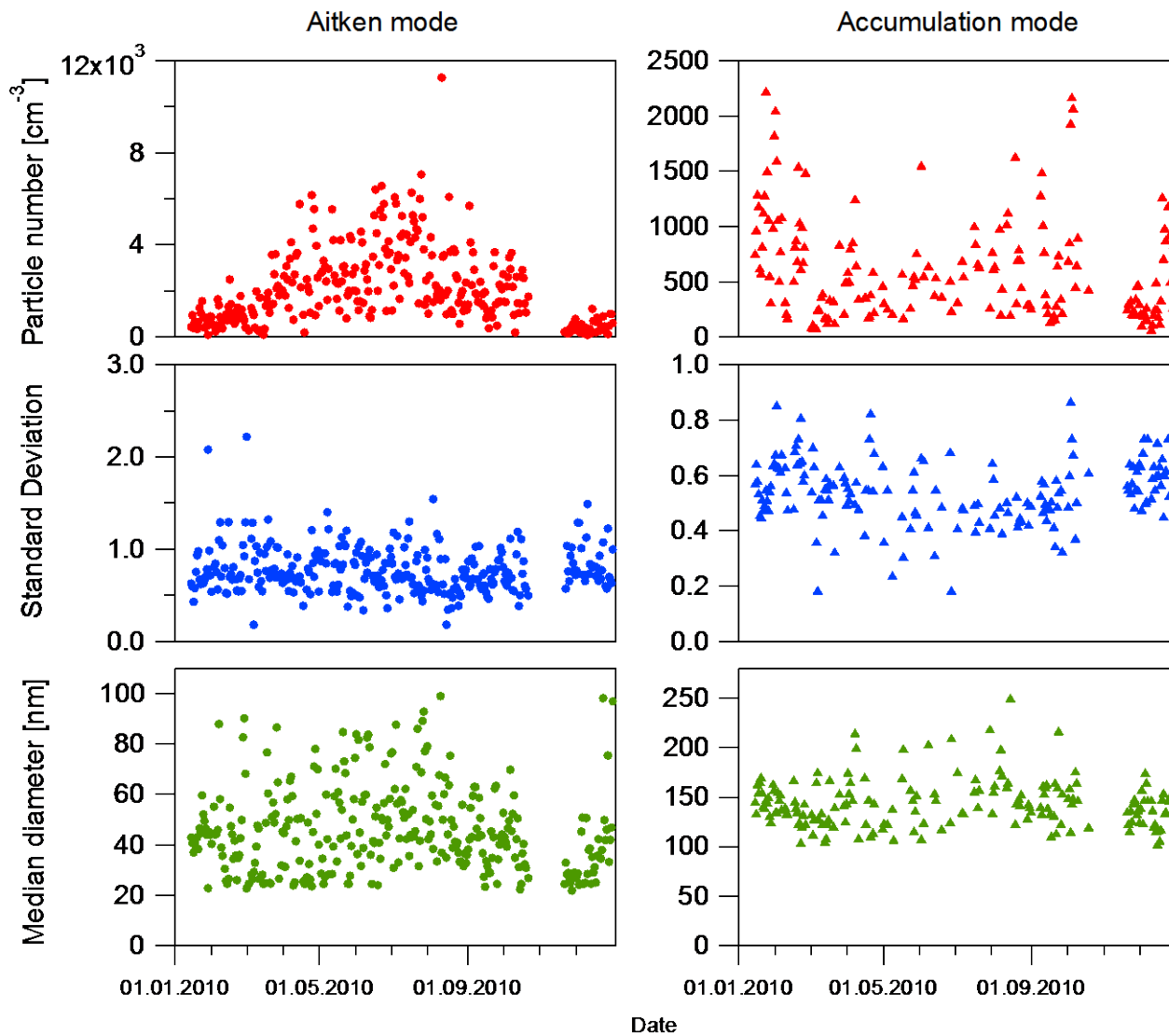
Map of Prospective Stations



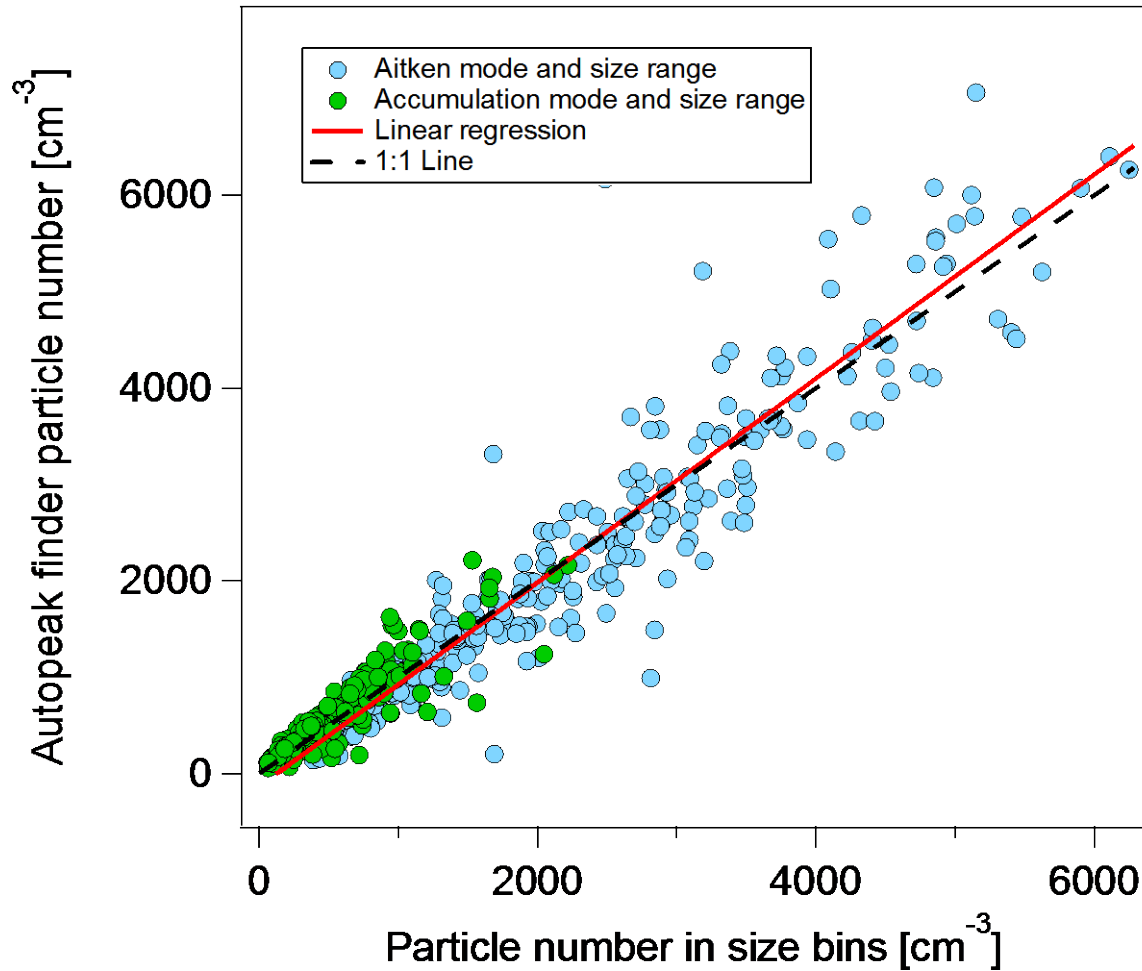
- 49 stations registered as measuring fine-range ($D_p < 1 \mu\text{m}$) particle number size distribution (PNSD) using electrical mobility size spectrometers.
- 23 stations registered as measuring scattering spectral dependence in addition to fine range PNSD.
- 15 stations registered as PM_{2.5} and PM₁₀ mass concentration in addition to fine range PNSD.

Auro-Peak-Finder to Fit Size Distribution Modal Parameters

Example from
Birkenes,
Southern Norway



Quality Assurance of Approach



Modal concentration N of fitted modes over particle concentration integrated over fixed PNSD range (N_{ait} : $20 \text{ nm} < D_p < 100 \text{ nm}$; N_{acc} : $100 \text{ nm} < D_p < 300 \text{ nm}$).

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EGU.eu



AS3.2

Constraining global aerosol model forcing estimates with in-situ observations

Convener: Cathrine Lund Myhre 

Co-Conveners: Bjørn Samset , P. Laj , Lucia Mona , elisabeth andrews , Michael Schulz 

▪ [Abstract submission](#) ▪ [Convener Login](#)

More and more high quality data of aerosol optical properties, aerosol humidification, size distributions, black carbon and aerosol extinction vertical profiles have become available through international cooperation such as ACTRIS, GAW and NOAA networks. At the same time exhaustive global aerosol model results from renowned groups have been assembled in the AeroCom database. This session shall focus on model evaluation using the aerosol observations. Emphasis will be put to presentations which explore how the data may constrain aerosol concentrations, aerosol loads and radiative forcing.

<http://meetingorganizer.copernicus.org/EGU2016/session/21187>

Constraining global aerosol model forcing estimates with in-situ observations

- New session on model evaluation using the aerosol observations.
 - Emphasis will be put to presentations which explore how the data may constrain aerosol concentrations, aerosol loads and radiative forcing.
- This type of work will serve as input for the next IPCC work on aerosol modelling
 - AerChemMIP results will be analyzed for the CMIP6 runs
- Check also the AEROCOM web:
<http://aerocom.met.no>
- We hope for your contributions! Don't hesitate to ask if you have questions
 - Paolo, Cathrine or Michael Michael Schulz (PI of AEROCOM, and co-lead ACTRIS JRA3.)

The screenshot shows the AEROCOM website interface. The main navigation bar includes 'Home', 'Meetings', 'Data', 'Protocol', 'References', and 'Tools'. The page title is 'Aerosol Comparisons between Observations and Models'. The content area features an 'Introduction' section with text about the AEROCOM project and an 'Aerocom wiki' section. A sidebar on the left lists supported EU Framework programmes: ACTRIS, MACC-II, IS-ENES, EUCAARI, and PHOENIX. At the bottom, there is a logo for 'Heterologisk Institut'.