Aerosol optical properties are strongly dependent on ambient relative humidity. Depending on their size, composition and the ambient humidity, atmospheric particles will take up varying amounts of water, thereby altering their optical properties and impacting their contribution to aerosol radiative forcing. In this project, the ultimate goal is to assess how well global models simulate the aerosol/water interaction using in-situ measurements of aerosol hygroscopicity. In the initial phase of the research, it is vital to compile and assess the data quality of the available tandem nephelometer humidiograph measurements and to harmonize the data sets in terms of data treatment (instrument corrections, hygroscopic fitting assumptions, etc.). Here, we present preliminary analysis of the SGP humidiograph record.

**Motivation**

- Ambient aerosol particles experience hygroscopic growth at relative humidity
- Aerosol light scattering is strongly dependent on RH
- Different types of growth may be observed
- RH<40%
- RH>40%

**Knowledge of RH dependency of scattering**

- Calculating aerosol radiative forcing
- Relating dry in-situ data to ambient conditions (e.g., remote sensing measurements)
- Climate model improvements

**Size distribution and chemical composition matter for the scattering enhancement (f(RH)) can be measured with tandem nephelometers and humidifier**

**Creating a consistent data set**

A review of f(RH) values from the literature reveals a large variability of f(RH) across measurement sites and aerosol types. Comparison of f(RH) values among studies is not straightforward. Due to differences in the instrumentation, methodology, size cut and the uncertainties.

**What is dry??**

- WMO/GAW guidance suggests RH in dry neph should be  <30-40%
- There can be significant light scattering due to water at these RH levels
- over-estimate of dry reference scattering underestimate of f(RH)
- Very problematic for sites with marine influence

**Conclusions**

Water uptake by aerosol particles has a strong influence on aerosol scattering. Evaluating this effect with measurements requires a careful consideration of system RH. Closure studies may be a useful tool to constrain f(RH) measurements. SGP data set – is amazing, but long way to go in analysis (tools developed for this should make evaluation of other sites go much quicker)

**Future Work:**

- f(RH) as function of trajectory footprints
- Creation of harmonized measurement data sets
- Bringing in the global models simulations for comparison with harmonized data sets

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