

Quality check for A11 nCNC scanning mode raw data

With the A11 nCNC, if there are small particles present in the sample, the cumulative sum of particles measured increases with increasing saturator flow rate. Whenever there are no small particles below 4 nm, or the air mass that the A11 nCNC samples changes too quickly, the concentration response as a function of the saturator flow rate can be very different. During one scan, the cumulative sum of particles can even decrease as a function of saturator flow rate. In these cases, one can argue if the data should be inverted at all. The latest version (1.0) of the scanning data inversion gives the user the option to discard such scans.

The bases for discarding a scan is simple. The number concentration readings within a scan are scaled with the maximum concentration within that scan, and the linear correlation against the saturator flow rate is calculated. Whenever the linear fit has a non-zero positive slope, the scan will be inverted. Whenever the slope is zero or negative, the scan will be discarded—if the user chooses to do so. In this case, the size bins are set to NaN, but total concentration of particles above the largest size bin will still be calculated. The user also has an option to average over n number of scans (moving average), in which case the linear fit is done after the averaging.

The main motivation for this new method is to prevent the inversion method to come up with results that are not true, which can happen in some rare cases with certain scan shapes. This method ensures that there were small particles present already before the data gets inverted.

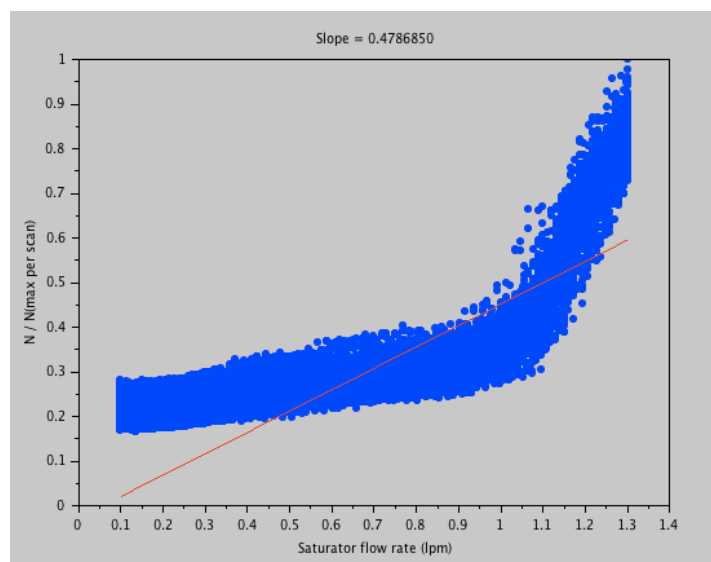


Figure 1. An example of data, where small particles are present. Scaled concentration is plotted against the saturator flow rate and a linear fit is made to the whole data set.