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Effect of thresholding on calculated mass concentrations

AMS users meeting

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Outline

- The Helsinki nano-AMS
 - Single/multiple ion detection
 - Running with different thresholds
 - Example data
- } The problem
- } Searching for the solution



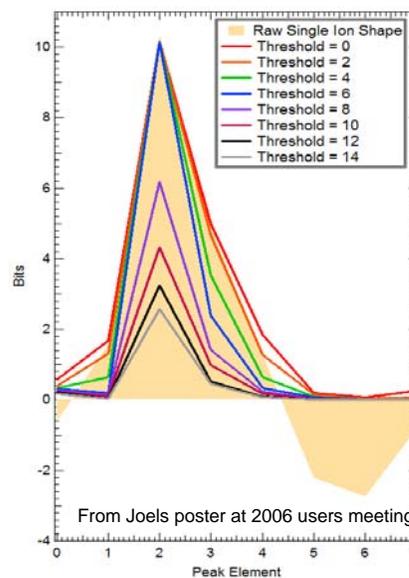
The Helsinki C-ToF AMS

- Joint acquisition by University of Helsinki and Finnish Meteorological Institute
 - Although related, Doug was acquired through a separate deal
- The "Nano-AMS" was designed to be able to measure as small particles as possible
 - P-ToF flight path only ~11 cm long
 - Addition of He to remove the huge airbeam
- Arrived in Hyttiälä in March 2007, measured until May, returned to Aerodyne for "final" modifications



Single/multiple ion detection

- Issues:
 - Response of the ToF is not linear for small signals
 - The influence of thresholding becomes relevant for small signals
- With the Helsinki AMS we want to look at nucleation mode particles in a clean environment
 - ⇒ Small signals expected
 - ⇒ Need to be able to correct for the non-linearity



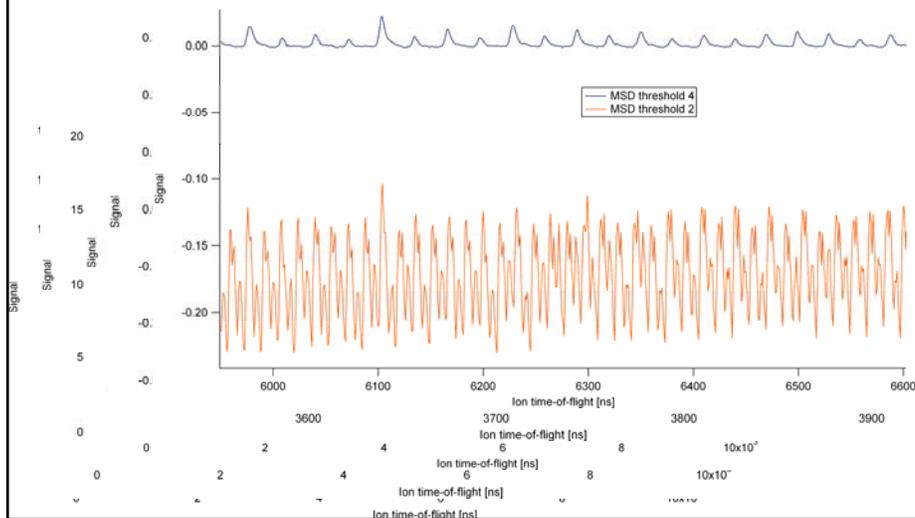


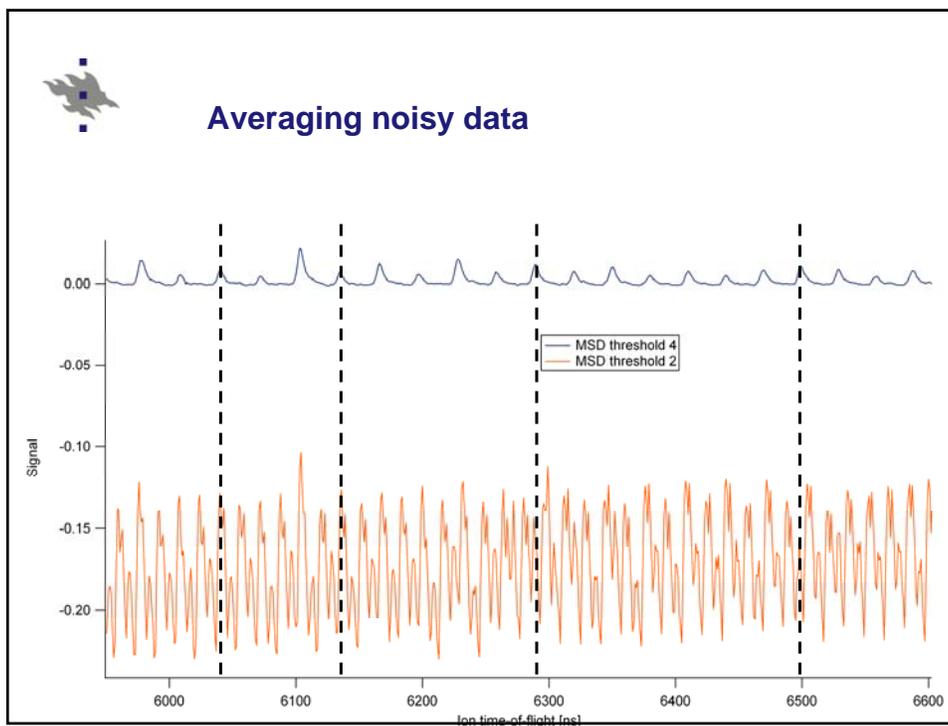
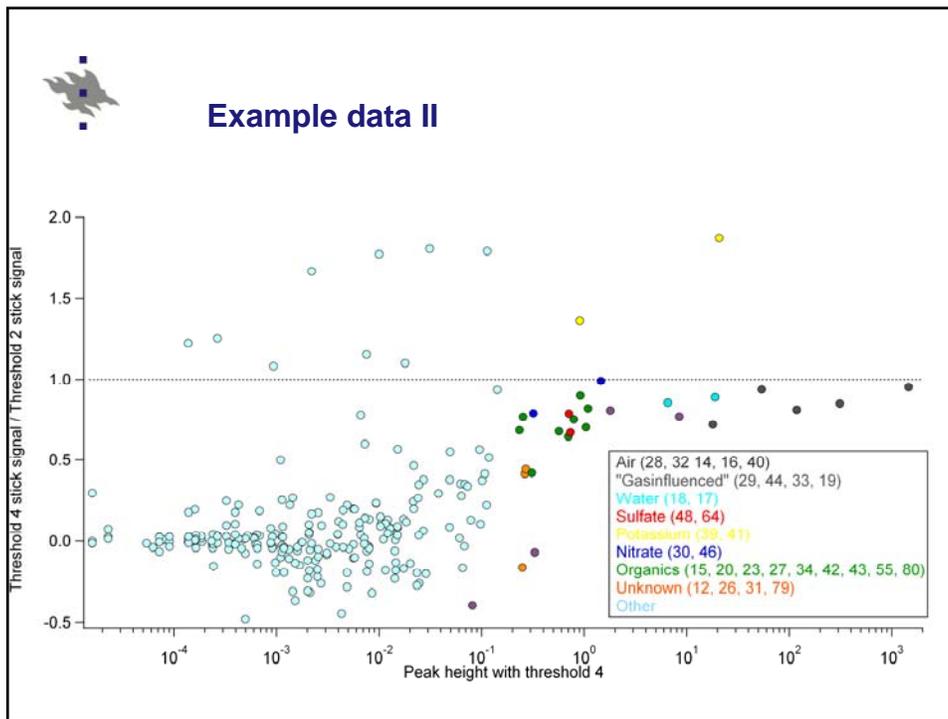
Running with different thresholds

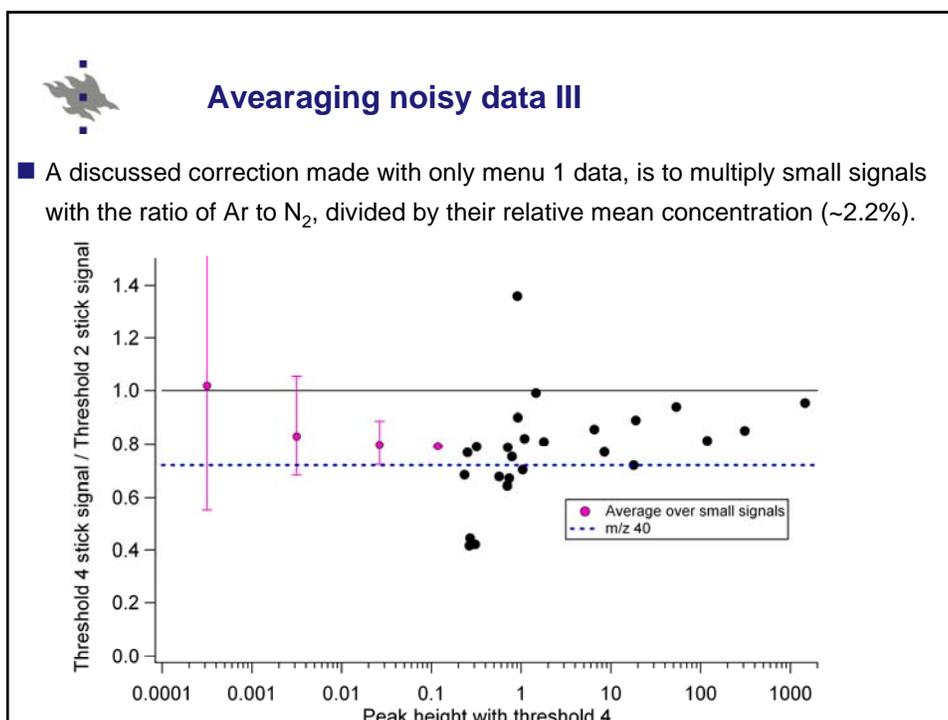
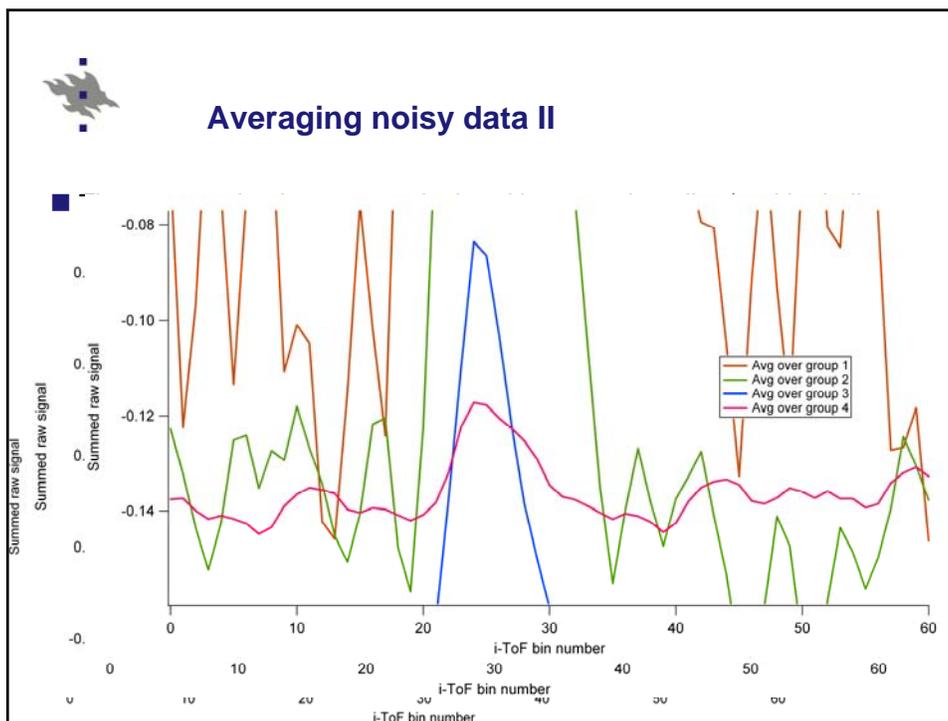
- A second menu was added for the second half of the measurements, with a lower threshold
 - **Menu 1: Threshold = 4**, duty cycle ~80% (MS + PToF)
 - **Menu 2: Threshold = 2**, duty cycle ~20% (only MS)
- Threshold off would give the “most correct” results for a comparison, but we couldn’t go lower than threshold = 2 since the electronic noise was too high to be able to distinguish any true signal

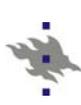


Example data









Time-dependent corrections with menu 2 and with "40/28"

