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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Organic Functional Groups in the Submicron Aerosol at 82.5° N from 2012 to 2014" *by* W. Richard Leaitch et al.

Anonymous Referee #3

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General comments This comprehensive study reports 2.5 years of weekly averaged data from the Arctic research observatory Alert. Measured species include elemental (EC) and organic carbon (OC), organic functional groups as measured by FTIR, inorganic species including oxalate and methanesulfonic acid (MSA), non-refractory species measured by an Aerosol Chemical Speciation Monitor (ACSM). Furthermore, particle size distributions were analysed by a Scanning Mobility Particle System (SMPS) and an Optical Particle Counter (OPC). The authors used chemical speciation in the Arctic aerosol, PMF and linear regression based on this data, and the transport model FLEXPART to associate organic aerosol components with source types and source regions. The manuscript is well written with sound discussions.

The large number of figures in the manuscript could be reduced, e.g. moved to the

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Discussion paper

supplementary section.

The authors state that filter-OC data will be published elsewhere, but it will add great value to the manuscript and be meaningful to compare this data with ACSM-OM concentrations and OFG-OM that has a central position in the source attribution.

The authors build the factor analysis on organic functional groups, which may undergo atmospheric degradation during transport to Alert, which they correctly state could be much longer than 10 days. The authors should consider if chemical transformation of the functional groups into more oxidized oxidized in the (often acidic) arctic aerosols, could lead to erroneous conclusions in the PMF analysis. . Specific comments Line 181: How does the OFG-OM and ACSM-OM based mass concentrations compare with the offline OC measurements (estimating O/C equals that obtained from the FTIR measurements), and does the uncertainty in OFG-OM agree with that of Russel, 2003?

Line 205: How is the collection efficiency (CE) justified? Based on the variation in chemical composition over the year, in particular with respect to sulphate, the acidity could vary substantially. Thus, a variable CE would probably be appropriate, e.g. based on the parameterization method. More in Middlebrook et al., 2012. Line 520: Does the possible marine influence of Factor 1 agree with MSA, or is this stronger in Factor 3? Line 561: Does the OFG-OM agree with filter OC derived concentrations?

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