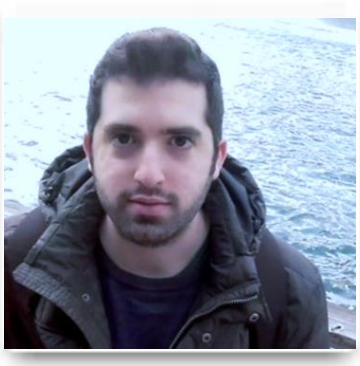
Source apportionment of organic aerosols in the Arctic including the source regions



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WP 1: Ground-based component for SLCFs

Task 1.4 D 1.4.2: A report and a data set on source apportionment of aerosols with a focus on organic aerosols in the arctic including the source regions

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The absence of a high quality, spatially-resolved air quality network impedes the understanding of the climate impact of aerosols in the northern polar region. Here, a comprehensive analysis focusing on the characterization of organic aerosols will be carried out, by the combination of quantitative electron impact mass spectrometry and a novel ultra-high resolution mass spectrometry with molecular information. The task will be focused on statistical analyses to identify the sources or formation processes of organic aerosols. Our dataset will present results of long-term off-line measurements covering the period 2015-2018 from several ground-based stations in the Arctic extending from 68 to 83 °N, including the spatio-temporal distribution of elemental and (water-soluble) organic carbon, major ions and organic markers.

The atmospheric aerosols are sampled using a high volume sampler pumping air through quartz fiber filters. The filters retaining particles finer than 10 μm (PM_{10}) are of 147 mm diameter. The collection time for each sample is one week or longer. The amount of EC/OC and major ions on the filters is determined by a Sunset analyzer and ion chromatography, respectively.

Organic carbon, being an important component of carbonaceous aerosols, may be responsible for a considerable contribution to climate change in the Arctic region. The OC concentrations have been previously characterized by seasonal and annual variability. A significant fraction of OC may be transported from Europe, America or Russia due to anthropogenic activities. It may also originate from the burning of various fuels, wildfires or natural biological and physicochemical processes during summer months.

References:

Daellenbach, K. R., Stefenelli, G., Bozzetti, C., Vlachou, A., Fermo, P., Gonzalez, R., Piazzalunga, A., Colombi, C., Canonaco, F., Hueglin, C., Kasper-Giebl, A., Jaffrezo, J.-L., Bianchi, F., Slowik, J. G., Baltensperger, U., El-Haddad, I., and Prévôt, A. S. H.: Long-term chemical analysis and organic aerosol source apportionment at nine sites in central Europe: source identification and uncertainty assessment, Atmos. Chem. Phys., 17, 13265-13282, https://doi.org/10.5194/acp-17-13265-2017, 2017.