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(Article begins on next page)

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CHARACTERIZATION AND TEMPORAL EVOLUTION OF THE ELEMENTAL COMPOSITION OF PM_{10} COLLECTED AT NY-ÅLESUND (THE ARCTIC)

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In this study, the elemental composition of PM_{10} samples collected in Ny-Ålesund (Norwegian Arctic) in the sampling campaigns 2010-2013 was investigated, with the purpose to identify the PM sources and to understand short- and long-range transport processes [1]. Enrichment factors were calculated for all elements with respect to the mean values for the Earth's crust reported by Wedepohl [2] and to the mean abundances in sea water reported by Goldberg [3], in order to distinguish elements having natural, anthropic or mixed origin. The results obtained so far evidence a remarkable seasonal trend for most of the investigated elements. For both geogenic and anthropogenic elements, concentrations are generally higher in March and April, when the ground is almost entirely covered by snow and ice, suggesting that long-range transport processes might be taking place. On the other hand, the elements typically deriving from marine aerosol (i.e. Mg and Na) present higher concentrations in late spring and summer, together with Co, Ni and V, typical anthropogenic metals related to ship emissions. From the Kruskal-Wallis and Conover-Iman tests it emerged that, for most of the analytes, the four campaigns are not significantly different; therefore, in the studied period, the composition of PM_{10} in Ny-Ålesund did not vary remarkably. Principal Component Analysis allowed us to better understand the sources of different elements and to lay the basis for an interpretation of the chemical and physical processes concerning the Arctic atmosphere. Airborne pollution deriving from ship fuels, local vehicle and continental emissions resulted to be the main sources of anthropogenic elements.

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[3] E.D. Goldberg, Chapter 5. In: J.P. Riley, G. Skirrow, Chemical Oceanography. Academic Press, 1965.