

Iron and other trace elements in atmospheric aerosols in Sapporo measured by PIXE analysis

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Abstract

During August 2016 and August 2017, aerosol samplings onto quartz fiber filter (QFF) were carried out at the site inside of Hokkaido University, Sapporo, Japan. Total 32 samples were obtained, but 29 or less samples were used for the data analyses, for which trace elements were measured by PIXE analysis. The PIXE measurements were carried out at Nishina Memorial Cyclotron Center (NMCC) in Iwate prefecture. Because we used QFF, we firstly assessed the background levels of impurities in QFFs. The contents of Fe in QFFs were stable even if the lot number of the filters was different. Therefore, we concluded that we can analyze Fe data in aerosol samples on QFFs if samples contain Fe amounts of more than those of the background levels on the QFFs. After removing the unusable data based on our definition, we carried out correlation analyses between Elemental Carbon (EC) and trace elements, and between Fe and trace elements, respectively. Furthermore, we calculated enrichment factors (EF) against Fe. Based on the EF analyses, it was indicated that K, Ca, Ti, Cr, Mn, Ni, Sr, Y, and Zr were mainly from soil (crustal) sources, and Cu, Zn, As, Br, Mo, Hg, and Pb were mainly from anthropogenic sources. Because of the high correlation between EC and Zn it is implied that the sources of EC in the filter samples obtained in Sapporo are mostly from anthropogenic origins. On the other hand, Fe had higher correlations with the trace elements from both the natural

and anthropogenic sources (based on the EF analyses). The results of the correlation analyses on Fe might include not only the source information itself but also perhaps the information of transport paths. This means that the interpretation of the origins of Fe in the obtained samples has more complexity.