

## Relations among stable and radioactive elements contained in aerosol and trajectories of the Nagasaki atmosphere from 2013 to 2017

T. Takatsuji<sup>1</sup>, T. Nakashima<sup>1</sup>, K. Furui<sup>1</sup> and K. Sera<sup>2</sup>

<sup>1</sup>Graduate School of Fisheries and Environmental Sciences, Nagasaki University  
1-14 Bunkyo-machi, Nagasaki 852-8521, Japan

<sup>2</sup>Cyclotron Research Center, Iwate Medical University  
348-58 Tomegamori, Takizawa, Iwate 020-0603, Japan

### Abstract

Concentrations of stable and radioactive elements in aerosol collected in Nagasaki City were measured from 2013 to 2017. The stable elements were measured with particle induced X-ray emission (PIXE) at NMCC (Nishina Memorial Cyclotron Center, Japan). The radioactive elements were measured with a gamma-X type germanium radiation detector at Nagasaki University.

Fluctuations of Fe, Ca, Ti, Mn, Co and Sr concentrations almost synchronized with each other. It is said that these six elements are basic soil component and the contents should be synchronized. If so, the synchronization demonstrated the accuracy of PIXE measurements.

<sup>210</sup>Pb showed different fluctuation pattern from the six elements and more positively correlated with Br, Pb and Zn than the six elements. <sup>210</sup>Pb is a disintegration product of radon and the origin is land area. When the concentrations of Br, Pb and Zn were high, the air trajectories calculated at the NOAA Hysplit web site showed that the air came from north-west Eurasia, namely, Mongolia, Northeast China and Korea. Newly generated radon disintegration products are said easily adhere to fine aerosol particles. Therefore, fine aerosol particles floating for a long time and transported long distances from the depth of Eurasia should contain large amount of <sup>210</sup>Pb, and it account for the correlation of <sup>210</sup>Pb, Br, Pb and Zn.

Concentrations of Pb and Zn were strongly correlated with each other and Pb and Zn were strongly possible to be originated from some fixed compound or mixture material.

Fluctuations of Ni, V, Cu and S tend to be independent from other elements. Even when the air did not come from distant land area, the concentrations of Ni, V, Cu and S became high. Therefore, origins of the elements were possible to be somethings on the sea area or neighborhood of the sampling point.