Spatiotemporal variation of surface atmospheric 7Be from Australia to Syowa Station, and S17

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The composition of the surface air is formed by the effects of exchange with the nearby ground surface and chemical reaction on the composition of the air which transported over long distances. The traces of influences that have been affected far away provide clues to know the origin of the air and its transport route. From such traces, 1) how much influence is left in a certain place far away, 2) what is the influence of the region, 3) when the influence of the region becomes strong, 4) what kind of transportation process is involved, and so on. We will be able to gain much knowledge from such researches. And the knowledge is important for the climatological study based upon the Antarctic ice cores because the signals of the ice cores indicate the composition of the surface air at the drilling site in the past days.

Remote areas that characterize the surface air in the Antarctic region include the Southern Ocean, Africa, South America, Australia, and the stratosphere. As stratospheric-derived substances, ozone that has undergone a photochemical reaction, and radioactive elements 7Be and 10Be produced by cosmic ray are well known. In this study, the concentration of 7Be was measured on the Southern Ocean from Australia to Syowa Station on the island near Antarctica, and at S17 Station on the coastal Antarctic ice sheet during three summer seasons of Decembet to January in 2014/15, 2016/17, and 2017/18.

Figure 1 shows time series of the concentration of 7Be in the 2014/15 summer. While the 7Be concentration fluctuates between about 1 mmBq/m3 or less (the detection limit) and about 10 mmBq/m3, the concentration increases as the latitude increases, that is, there is a tendency for stratospheric air to become conspicuous. As the process of mixing the stratospheric atmosphere, tropopause foldings associated with synoptic-scale disturbances and a conbination of the downdraft in the polar vortex and the kataba wind can be considered. The discussion and other cases will be presented at the poster.

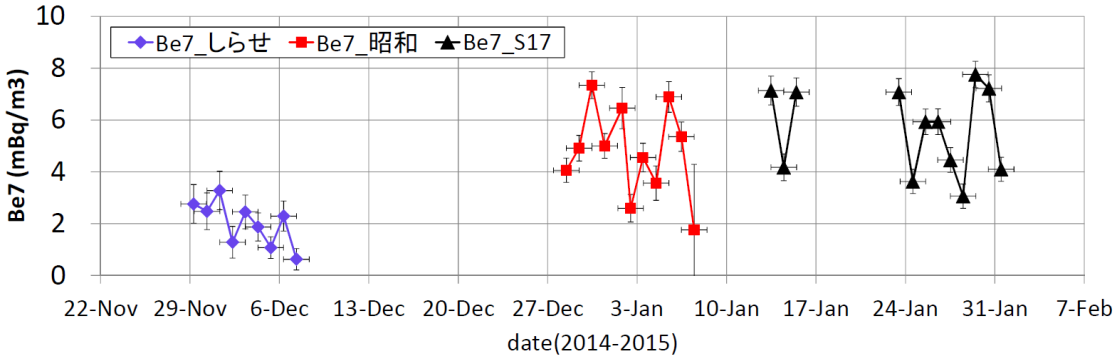

Figure 1. Time series of the concentration of 7Be in the 2014/15 summer. Blue, red and Black indicate on Southern Ocean, at Syowa Station, and at S17.