

## The triple isotopic composition of oxygen for sulfate and nitrate in surface snow in a latitudinal transect in East Antarctica

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The isotopic compositions of sulfate ( $\text{SO}_4^{2-}$ ) and nitrate ( $\text{NO}_3^-$ ) reflect their sources and oxidation pathways. In particular, triple oxygen isotope compositions ( $\Delta^{17}\text{O}$ ) are potential tool to reconstruct how the oxidants work in past and present atmosphere. Antarctica is an ideal place to investigate the past proxy, because the ice core preserves in past hundred thousands Earth's history. However, recently we found the annual mean  $\Delta^{17}\text{O}$  values for atmospheric  $\text{SO}_4^{2-}$  at coastal Antarctica is not matched with the  $\Delta^{17}\text{O}$  values preserved in the inland Antarctic ice core records. In addition, the lack of observation, spatial variations of  $\Delta^{17}\text{O}$  values are limitedly reported.

In order to test spatial variation of isotopic compositions, especially for the difference in  $\Delta^{17}\text{O}$  values between coastal site and inland site, here we present latitudinal variation of  $\Delta^{17}\text{O}$  value and conventional isotopic compositions ( $\delta^{34}\text{S}$ ,  $\delta^{15}\text{N}$ , and  $\delta^{18}\text{O}$ ) of  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$  in surface snow in eastern Dronning Maud Land, East Antarctica. Snow samples were collected from the surface at low- and high-elevation sites during the 54th and 57th Japanese Antarctic Research, respectively.  $\Delta^{17}\text{O}$  values of non-sea-salt (nss)- $\text{SO}_4^{2-}$  at the East Antarctica ranges from 2.2 to 3.3‰, and the  $\Delta^{17}\text{O}$  value of nss- $\text{SO}_4^{2-}$  for coastal site was lower than those for inland site. Thus, this result suggest that oxidizing chemistry for biogenic sulfur is different among coastal and inland sites, although small sulfur isotopic variations are observed and source of sulfur is biogenic and homogeneous. For the isotopic compositions of  $\text{NO}_3^-$ , considerably increasing values of  $\delta^{15}\text{N}$  of  $\text{NO}_3^-$  are observed from coastal to inland sites. The  $\delta^{18}\text{O}$  and  $\Delta^{17}\text{O}$  of  $\text{NO}_3^-$  values, on the other hand, decreases with increasing of  $\delta^{15}\text{N}$  values, indicating the secondary formation of  $\text{NO}_3^-$ . Thus, spatial variations of isotopic compositions of  $\text{NO}_3^-$  reflect the post-depositional processes on the East Antarctic snow.

Keywords: stable isotope, triple oxygen isotopes, sulfate, nitrate