A year-round observation of sulfur stable isotopic compositions of atmospheric sulfate at Dumont d'Urville, coastal Antarctica

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Sulfur stable isotopic compositions ($^{34}S/^{32}S$, $^{33}S/^{32}S$ and $^{36}S/^{32}S$) of sulfate in the Antarctic snow and ice cores have been used to investigate the contribution of its sources such as marine biogenic activity and volcanic emissions, as well as its formation pathways (e.g., Patris et al., 2000; Uemura et al., 2016; Baroni et al., 2007). However, temporal variability of those signatures in the present Antarctic atmosphere has never been examined. Here we report a year-round observation of sulfur isotopic compositions of sulfate in aerosol samples collected at Dumont d'Urville (66°40' S, 140°01' E), coastal Antarctica, throughout the year 2011. In summer months, $^{34}S/^{32}S$ ratios were similar to the values observed in dimethyl sulfide (DMS) produced by marine biota (Amrani et al., 2013; Oduro et al., 2012), in contrast to ^{34}S depletion during winter, which suggest the contribution of other sources or unknown processes. Throughout the year, $^{33}S/^{32}S$ and $^{36}S/^{32}S$ ratios suggested no significant contribution of reactions causing mass independent fractionation.

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