Geophysical Research Abstracts
Vol. 13, EGU2011-9243, 2011
EGU General Assembly 2011

Isotopic composition of atmospheric oxygen

Osamu Abe (1,2) and Jan Kaiser (2)

(1) Graduate School of Environmental Studies, Nagoya University, Nagoya, Japan (osamu.abe@nagoya-u.jp), (2) School of Environmental Sciences, University of East Anglia, Norwich, UK (j.kaiser@uea.ac.uk)

Isotopic composition of atmospheric oxygen, which is spatiotemporally constant for last several hundred years in the troposphere and controlled by global primary productivity, rate of oxygen consumption and photochemical reactions that related to ozone formation/dissociation at the stratosphere, has been widely used as +23.5‰ with respect to VSMOW for δ^{18}O, which was reported by Kroopnick and Craig (1972). After their study, however, reported values of δ^{18}O have had a broad variation, like +23.79 (Horibe et al., 1973), +23.5 (Thiemens et al., 1995), +23.8 (Assonov and Brenninkmeijer, 2003), +23.88 (Barkan and Luz, 2005) and +24.36 (Kaiser, 2008). On the other hand, it can be said that there is no widely accepted value for δ^{17}O until present although several investigations have measured or calculated. Since the first report by Johnston and Thiemens (1997) of +12.2, values have also had a significant range, like +11.92 (Luz et al., 1999), +12.08 (Barkan and Luz, 2005) and +12.32 (Kaiser, 2008), which is about half of that for δ^{18}O. These broad ranges may be attributed to difficulty of measuring atmospheric oxygen as pure O_2 and ambiguity of isotopic scale normalization.

In this study, we measure isotopic composition of atmospheric oxygen by the method of Sarma et al. (2003), which could separate oxygen from nitrogen, argon and other gases, relative to oxygen generated from VSMOW using the CoF_3 fluorination method by Barkan and Luz (2005).