

# Latitude effect on carbon, nitrogen and oxygen stable isotope ratios in nitrogen oxide ions of aerosol and in foliage

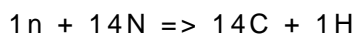
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## ABSTRACT

It is known that at altitude 30000 feet to 15000 feet (9000 meter to 15000meter) following nuclear chemical reaction was occurred by cosmic-ray.



Futhermore it is also known that latitude effect for newtron from cosmo and the sun to the earth. Although to date there have never been considered relationship between characterization of stable isotope ratios in aerosol and latitude effect for neutron or characterization of stable isotope ratios in foliage and latitude effect for neutron. In this study, aerosol samples (PM 4.5) and foliage samples were collected in Singapore in February 2010 and July 2010.and in Fairbanks, Alaska, U.S.A. in January 2010 April 2010 and September 2010. Anion concentrations and nitrogen and oxygen stable isotope ratios in nitrogen oxide ions of the aerosol samples and carbon and nitrogen stable isotope ratios in foliage were measured by ion chromatography, gas chromatography-mass spectrometry. and element mass spectrometry. Average value of delta 15/14N in foliage in Fairbanks was -1.84 [per mil] versus in Singapore was -1.3 [per mil]. It had the latitude effect regarding delta 15/14N in foliage between Fairbanks and Singapore clearly. In addition average value of delta 15/14N in the nitric-oxide substances within the aerosol samples in Fairbanks was -2.70 [per mil] versus in Singapore was +7.61 [per mil]. It had also the latitude effect cleanly regarding delta 15/14N in nitric-oxide substances within the aerosol samples. However It was unclear tendency for delta 13/12C in foliage and 18/16O in the nitric-oxide substances within the aerosol between Fairbanks and Singapore. In Singapore it was also clearly observed that values of delta 15/14N in nitric-oxide substances within the aerosol samples had correlativity with declination surely. The value of delta 15/14N in nitric-oxide substances within the aerosol samples in Fairbanks was increasing depending on increasing value of declination due to more active conversions from <sup>14</sup>N to <sup>14</sup>C by neutron bombardment.

## KEYWORDS

latitude effect, PM 4.5 aerosol, foliage, neutron, <sup>14</sup>C radioisotope,  $\delta^{13}\text{C}/^{12}\text{C}$  isotope ratios,  $\delta^{15}\text{N}/^{14}\text{N}$  isotope ratios,  $\delta^{18}\text{O}/^{16}\text{O}$  isotope ratios, anion concentrations, ion chromatography, gas chromatography-mass spectrometry, element mass spectrometry, nuclear chemical reaction,