Very low $\delta^{15}N$ of atmospheric nitrate found in the earstern equatorial Pacific and its implication to dynamic nitrogen recycle between ocean and lower atmosphere

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Atmospheric nitrogen sources in the marine boundary layer of the remote ocean have been known to include long-range transport (LRT) of anthropogenic pollutants, and the LRT of anthropogenic atmospheric particulate nitrate ($p\text{-}NO_3^-$) within the free troposphere has been observed in regions influenced by westerlies from the Asian continent over Pacific Ocean. This traditional paradigm that the ocean is considered a passive recipient of anthropogenic N deposition can be applied western north Pacific regions. However, for the equatorial Pacific under the influence of pristine air, the sources of such $p\text{-}NO_3^-$ remain unresolved. To address this, we present $\delta^{15}N$ of $p\text{-}NO_3^-$ collected over the Pacific Ocean between 40˚S and 68˚N on two cruises, carried out by the Research Vessel *Hakuho Maru*, and estimated $\delta^{15}N$ of source NO_x of each sample. We categorized six marine regions within the Pacific Ocean, based on backward trajectory analysis to determine their source regions and various ion concentrations to assess whether anthropogenic or non-anthropogenic sources were dominant.

We found remarkably low $\delta^{15}N(NO_x)$ values for the equatorial Pacific regions compared to those in other regions over Pacific Ocean. These low source $\delta^{15}N(NO_x)$ values cannot be explained using conventional NO_x apportionment. Given that the eastern equatorial Pacific is one of the biologically active ocean regions resulted from upwelling water, here we postulate the alternative biogenic nitrogen source (NH_3 or alkyl nitrate) in this region. In the presentation, we will discuss important feature of self-recycle process of nitrogen between ocean and lower atmosphere in the eastern equatorial Pacific. We will also discuss its implication to nitrogen deposition for this region, which may contribute to new marine biological production and/or nitrous oxide emissions.

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