

## Continuous measurement of organic nitrates at Suzu, the Noto peninsula

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Peroxyacyl nitrates (PANs) and alkyl nitrates (ANs) act as one of the reservoirs of nitrogen oxides ( $\text{NO}_x$ ) in the atmosphere. Since their lifetime is longer than that of  $\text{NO}_x$ , they can be transported over a long-distance and would be important as trans-boundary pollutants. In this research, continuous measurement system of total PANs and ANs in the troposphere has been developed by using a thermal dissociation / cavity attenuated phase shift spectroscopy (TD/CAPS) method. Both PANs and ANs are thermally decomposed to produce  $\text{NO}_2$  and then  $\text{NO}_2$  is measured by CAPS method. This system can observe PANs and ANs with high time resolution while this system cannot separate constituents of PANs and ANs. Total PANs and ANs can be measured separately by setting up decomposition lines at different temperatures.

Continuous field observations of PANs and ANs concentrations have been being carried out at NOTOGRO (NOTO Ground-based Research Observatory) supersite in Suzu, Noto Peninsula, since November 2012.  $\text{NO}_x$ ,  $\text{NO}_y$ , total inorganic nitrate ( $\text{T.NO}_3$ ),  $\text{O}_3$  and CO concentrations have also been being observed at NOTOGRO.

$\text{NO}_y$  concentrations were in agreement with the sum of observed  $\text{NO}_y$  components ( $= \text{NO}_x + \text{T.NO}_3 + \text{PANs} + \text{ANs}$ ) regardless of seasons.  $\text{NO}_x$  fractions were the highest in  $\text{NO}_y$  constituents.  $\text{T.NO}_3$  fractions were small in winter and increased in spring. Opposite tendencies were observed for PANs fractions. These reflect that wet deposition of  $\text{T.NO}_3$  is promoted in winter and temperature increasing accelerates decomposition of PANs.

Seasonal variations of both PANs and ANs concentrations showed spring maximum and summer minimum. From winter to spring, both PANs and ANs concentrations from Korea-China air mass origin were higher than those from the other air mass origins. On the other hand, both PANs and ANs concentrations were independent of air mass origins from spring to summer. These indicate that PANs and ANs concentrations in winter and spring are governed by long-range transport and local photochemical productions of PANs and ANs are relatively important from spring to summer. In addition, PANs and ANs diurnal variations being high and low in the daytime and nighttime, respectively, in spring and summer also imply the local photochemical productions of PANs and ANs.

Keywords: Organic nitrates, Total odd nitrogen species, Long-range transport