

## Seasonal variations of peroxyacyl nitrates and alkyl nitrates concentration at Suzu, the Noto Peninsula

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$\text{NO}_x$  emissions have been increasing in East Asia with recent remarkable economic progress.  $\text{NO}_x$  has relatively short lifetime and  $\text{NO}_x$  concentrations are governed by local  $\text{NO}_x$  emissions. On the other hand, descendant photochemical products of  $\text{NO}_x$  such as  $\text{T.NO}_3$  (the sum of gaseous nitric acid and particulate nitrates), PANs (peroxyacyl nitrates) and ANs (alkyl nitrates) have longer lifetime than  $\text{NO}_x$ , so that they can be transported over a long-distance. In order to understand influences of the cross-border pollution, it is important to clarify the long-range transport of  $\text{T.NO}_3$ , PANs, and ANs.

We have been continuously observing several pollutants at NOTOGRO (Noto Ground-based Research Observatory) super-site in Suzu, the Noto Peninsula. NOTOGRO is located at 37.45N and 137.36E.  $\text{NO}_x$  were determined by an LED photolytic converter /  $\text{NO-O}_3$  chemiluminescence method.  $\text{NO}_y$  and  $\text{T.NO}_3$  were observed by a scrubber difference /  $\text{NO-O}_3$  chemiluminescence method. CO was monitored by a non-dispersive infrared photometer. PANs and ANs were measured by a thermal dissociation / cavity attenuated phase shift spectroscopy method.

In this presentation, observational results and discussion from December, 2012 to July, 2013 are described, focusing on seasonal variations of PANs and ANs. The air mass origins arriving at Suzu were classified into the following four groups, Russia and North China (RC), Korea and Middle China (KC) and Japan (JP) and Sea (S) using backward trajectory analyses. From winter to spring, both PANs and ANs concentrations from KC were higher than those from the other air mass origins. From spring to summer, their concentrations were independent of air mass origins.

From winter to spring, the lifetimes of PANs and ANs are long because of low temperature and weak solar radiation. In addition, their in-situ photochemical generation rates are low, so that PANs and ANs concentrations in this season are governed by long-range transport. From spring to summer, the lifetimes of PANs and ANs become shorter and their photochemical production rates become higher, that is, local photochemical productions of PANs and ANs are relatively important. Diurnal variations of PANs and ANs also support these concentration variation factors. From winter to spring, no diurnal variations were observed. Meanwhile, PANs and ANs concentrations began to be higher and lower in the daytime and nighttime, respectively, from spring to summer.

Keywords: peroxyacyl nitrates and alkyl nitrates, long-range transport, seasonal variation