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Analyses of the diurnal variation of nitrogen oxides in the remote area.

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Nitrogen oxides consist of NO, NO_2, NO_3, HONO, N_2O_5, gaseous nitric acid (HNO_3), particulate nitrate (NO_3^-(p)) and so on. NO reacts with oxidants and gives NO_2. The other N-containing species are generated by the reaction of NO_2 and oxidants. Nitrogen oxides have various characteristics; NO_2 is a precursor of O_3. HNO_3 and NO_3^-(p) are stable against photochemical degradation, making them transportable over long distances so that HNO_3 and NO_3^-(p) being adverse effects to the environment over larger regions. We have been observing total odd nitrogen species (NO_y), HNO_3 and NO_3^-(p) at the Cape Hedo, Okinawa, Japan.
The diurnal variations of NO_y, $HNO_3$and NO_3^-(p) from March to December were analyzed to reveal the effect of local emission and photochemistry. We discuss the data from March to December in 2 008. NO_y and HNO_3 concentrations had peak values at 10:00 and 14:00, respectively, while NO_3^-(p) concentration minimized at 14:00. We analyzed the relationship between the meteorological conditions and the diurnal variations of NO_y, HNO_3 and NO_3^-(p). The diurnal variation of HNO_3 was independent of the seasonal variations and the origins of air mass. The diurnal variation of HNO_3 in each month had the same pattern. The variations of HNO_3 concentrations were more sensitive to the local effect than the long range transport. This suggests HNO_3 photochemical production in the local regions. We also analyzed the relationship between wind velocity and the diurnal variations of HNO_3 and NO_3^-(p). The concentration of the sea salt particles increases with the increase of wind velocity. The heterogeneous reaction of HNO_3 with sea salt particle can be promoted when the wind velocity is large.

Keywords: Diurnal variation, Nitrogen oxides, Gaseous nitric acid, Particulte nitrate, Remote area