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MEASUREMENTS OF CHEMICAL COMPOSITIONS IN THE SNOW COVER AT MT. TATEYAMA, JAPAN

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Snow cover at high elevations records atmospheric environmental signals during the winter and spring. Mt. Tateyama is located near the coast of the Japan Sea in central Japan, where air pollution and Asian dust particles are actively transported from the Asian continent and the winter monsoon is highly affected by the Arctic climate condition. Snow-pit observation and sampling of snow in the pits at Murododaira (2450 m a.s.l) near the summit of Mt. Tateyama were performed in each April from 2004 to 2014. Measurements of formaldehyde (HCHO) and hydrogen peroxide (H₂O₂) as well as major ions of the snow samples were conducted.

The mean concentrations of nssSO₄²⁻ and NO₃⁻ are higher than those in snowpack in 1990s. The highest mean nssSO₄²⁻ concentration was observed in 2007. The pH and nssCa²⁺ were usually high in the upper parts of 2- 3 m of snow deposited in the spring, when Asian dust (Kosa) particles are frequently transported. High concentrations of nssSO₄²⁻ were detected in both the spring and winter layers. The high nssCa²⁺ layers usually contained high concentrations of nssSO₄²⁻. The results show that not only Kosa particles but also air pollutants might have been transported long-range from the continent of Asian.

The concentrations of H₂O₂ were high in the new snow (precipitation particles) and granular snow (coarse grain, melt forms) layers. High H₂O₂ concentrations may be preserved in granular snow layers having low concentrations of nssCa²⁺. The concentrations of HCHO were well correlated with the anthropogenic ion components, such as nssSO₄²⁻. Not only acidic species but also HCHO may be transported to high elevations in Japan from the Asian continent during the cold months. These results indicate that post depositional modification of H₂O₂ is more significant than that of HCHO in the snow cover at Murododaira, Mt. Tateyama. Snow pit observations may also be useful for the interpretation of ice core analysis, especially for unstable species, such as HCHO and H₂O₂.