

Fog and Rain Water Chemistry at Mt. Tateyama, Near the Coast of the Japan Sea in Central Japan

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To investigate the atmospheric environment at mountainous sites near the coast of the Japan Sea which is highly affected by air pollution from Asian continent, measurements of the chemical compositions of fog and rain water at Mt. Tateyama, central Japan, were performed especially during autumn. Fog water was collected using a passive string sampler and rain water was sampled by a bulk sampler at Murododaira (altitude, 2,450 m) and Midagahara (altitude, 1,930 m), on the western slope of Mt. Tateyama. The samples were usually recovered every 7-10 days. Strong acidic fogs ($\text{pH} < 4$) were frequently observed until 2010 when air masses were transported from the industrial regions in Asian continent. High concentrations of nssSO_4^{2-} were detected in the acidic fogs. The nssSO_4^{2-} concentration was usually higher than the NO_3^- concentration in the fog and rain water. Unfortunately, from 2011 to 2016, the fog water sampling was not made, and the sampling of fog water was restarted in 2017. Highly acid fogs were not detected in 2017 and 2018 and pH was relatively high ($\text{pH} > 4.5$). The concentration of nssSO_4^{2-} in fog and rain water in 2017 and 2018 was much lower than that before 2010, and the ratio of $\text{nssSO}_4^{2-}/\text{NO}_3^-$ dramatically decreased in 2017 and 2018. The H^+ and nssSO_4^{2-} deposition at Murododaira and Midagahara was also much lower in the recent two years. The SO_2 emission has been greatly reduced in China after 2010. There is a possibility that the natural environment of Mt. Tateyama at the high altitude has been improved.