

4.118 Investigation on the factors controlling new particle formation by long term observation in Noto peninsula.

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Abstract:

The new particle formation (NPF) is an important initial process for the aerosols to nucleate and eventually act as Cloud Condensation Nuclei (CCN). It is therefore important in understanding the contributions of aerosols on the climate and air quality. During the last couple of decades, NPFs have been observed in many different environmental settings in the world. However, previous observations were mostly case studies that involved only several weeks to several months, and there have been few reports so far on seasonal characteristics of NPF based on long term observation in coastal East Asia. We observed particle size distributions, trace gas (SO₂) and meteorological parameters (solar radiation, temperature and relative humidity) at NOTOGRO (37.45°N, 137.36°E, acronym for NOTO Ground-based Research Observatory) located in Suzu City at the tip of Noto Peninsula along the western coast of Japan, from October, 2012 to June, 2017. In addition, hygroscopicity of particles were measured using a CCN counter. Based on 1,262 days' worth of long term observation, we observed in total 126 NPF events. A distinct seasonality was found in terms of the NPF event frequency and spring (May) and autumn (November) were found with the highest frequencies. In spring, cloud cover frequency was particularly low when NPF events occurred. These results suggested that spring events were most strongly affected by solar radiation (hence photochemistry). In order to investigate on the chemical compounds contributing to the particle growth, the chemical components involved in the NPF was inferred from the particle hygroscopicity measured simultaneously by the CCN counter. The hygroscopicity of particles was found to be highest in winter and lowest in spring and summer. This result suggested that chemical compounds involved in the growth of new particles may vary depending on the season.