

# Measurement and field observation of atmospheric nanoparticles

メタデータ	言語: eng 出版者: 公開日: 2017-09-26 キーワード (Ja): キーワード (En): 作成者: メールアドレス: 所属:
URL	<a href="http://hdl.handle.net/2297/00049561">http://hdl.handle.net/2297/00049561</a>

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# 学 位 論 文 概 要

## Dissertation Summary

学位請求論文

題名 Measurement and field observation of atmospheric nanoparticles

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(大気中ナノ粒子の測定とフィールド観測)

専攻 (Division) : Natural System

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### 学位論文概要

The long-range transport of air pollutants in the East Asia changed the particle size distributions of ultrafine particles in the downstream region. This phenomenon also called as new particle formation (NPF). However, the mechanism of newly formed nanoparticles was incompletely understood. This is because those air pollutants consist of not only the gaseous pollutants but also primary aerosols such as  $PM_{2.5}$ ,  $PM_{10}$ , BC, and OC. In order to investigate the NPF events under long-range transport of polluted air, we conducted the field observation in Fukue Island, Japan, a rural area located in the western coast of Kyushu, over certain period in 2013-2017. Therefore, we classified and analyzed the factors affecting the NPF at Fukue site.

Type-A is strong event when remarkable increase of new particles were identified under low concentration of pre-existing particles with the initial size of nucleation is as small as 3-4 nm. In the case of type-B and -C, most of the days were identified under sulfur rich in the particle phase. It suggested that the nucleation might appeared in the upstream region and high altitude. Therefore, we conducted aerial observation to investigate the particle number concentration related to NPF events. We also tried to develop of nanoparticles detector that the minimum size of detection of particle is as small as 1 nm.

In 2013, we observed the large-scale of air mass came to the site. It was identified under high concentration of  $SO_2$  and  $PM_{2.5}$ . These conditions significantly affected the number of strong event during our field observation period. However, since then, the number of events were gradually decreased due to the emission sources in the upstream region were also decreased. In 2015, we only identified the weak event due to insufficient amount of  $SO_2$  concentration. It seems that the pre-existing particles surpassed the NPF events. In the last 2-year (2016-2017), the strong events were reappeared due to clean environmental (low concentration of  $PM_{2.5}$ ). For that reason, we analyzed the 5-year data of field observation at Fukue site, particularly in the winter-to-spring season.