

## Big data era and compact atmospheric environmental sensors for PM2.5 and pollution gases such as NOx: Developments and their applications

\*Yutaka Matsumi<sup>1</sup>, Shungo Kato<sup>2</sup>, Tomoki Nakayama<sup>1</sup>, Takayuki Yamasaki<sup>1</sup>, Wataru Okamoto<sup>1</sup>

1. Institute for Space-Earth Environmental Research, Nagoya University, 2. Tokyo Metropolitan University

A new palm-sized optical PM2.5 sensor has been developed and its performance evaluated. We also developed instruments for multiple gas components with small sensors for pollution gases such as CO, O<sub>x</sub>, NO, NO<sub>2</sub> and SO<sub>2</sub>. We are measuring those components in polluted areas and a volcano crater. The PM2.5 sensor was originally developed by Nagoya University and Panasonic Corporation. The pollution gas sensors are electrochemical detectors which are commercially available. We have integrated these sensors in a small compact box. These kind of instruments can be distributed everywhere. We can collect big data from the instruments which are utilized in every school, every home, every car and train. The data of the instruments will be useful in everyone's environmentally healthful life. We have checked the specifications of the sensors. The PM2.5 mass concentration is calculated from the distribution of light scattering intensity by considering the relationship between scattering intensity and particle size. The results of laboratory tests suggests that the sensor can detect particles with diameters as small as »0.3 mm and can measure PM2.5 mass concentrations as high as 1000 ug/m<sup>3</sup>. Year-round ambient observations are conducted at many urban and suburban sites in Japan and in Asian foreign countries. We also checked the performances of the electrochemical sensors.

Keywords: PM2.5 measurement, compact atmospheric environmental sensors , Big data era