

An analysis of the year-round distribution of PM_{2.5} and Oxidant by (Web)GIS and R

*Junji Yamakawa¹

1. Graduate School of Natural Science and Technology, Okayama University

The year-round concentration distribution of PM_{2.5} and Oxidant in Okayama City, Okayama Prefecture, Japan were estimated by using the geostatistics method and expressed by the (Web)GIS.

The observed concentration data of those environmental substances were obtained from the Website of the National Institute for Environmental Studies. The target year of PM_{2.5} was 2015, and the year of the oxidant was 2006. GNU R (R core team, 2018) was used for geostatistics analysis. The JPGIS (Geographical Survey Institute, 2018), which is government-based open data, was used for geostatistics analysis. The On-premise type GIS and the WebGIS were used in the research. The QGIS (QGIS Development Team, FOSS4G, 2018), and the jSTAT MAP (Statistics Bureau, Ministry of Internal Affairs and Communications, 2019) were used for the each type of the GIS.

First, the variogram of the observed concentration data of the environmental substances, were calculated for the estimation of the spatial dependence, then the prediction of the concentration distribution on the target area were carried out by using the Kriging method. The estimated concentration data were examined together with other geographic information data using (Web)GIS. The expression scheme of the accuracy of the estimation were investigated on the QGIS. Furthermore, transformation of the coordinates that was required on the using of the jSTAT MAP was also investigated.

The year-round mean concentration distribution of PM_{2.5} and oxidant in Okayama city were estimated with certain accuracy. It was also possible to qualitative analysis of the coefficient of variation of estimated distributions of PM_{2.5} and oxidant by GIS and WebGIS. The minor error on the conversion from the rectangular coordinate system to the regional mesh code requires further consideration.

GIS is effective for analysis and mapping of the global environmental data and geographic information data. WebGIS is also becoming capable of executing these analysis with only by the Web browser. Further utilization is expected in the study field of the Earth and planetary science.

Keywords: GIS, jSTAT MAP, Kriging, FOSS4G, PM2.5, Oxidant