Estimation and presentation of the spatial statistics analysis of the Earth scientific informations by R-Language

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The estimation of the spatial distribution of the structural shift of the quartz from a granite rock body in the Northwest area of the Okayama city was attempted to perform using the spatial statistics. The structural shift of the quartz were detected by the X-ray structural analysis. In this study, the spatial statistical analyses were performed by the combination of some applications.

The auto-correlation of the data was estimated using the kriging method (Matheron, 1973). Moreover, to minimize the estimation error, the Universal kriging, the kriging procedures using the auxiliary maps was employed. Each auxiliary data was generated from the public open data using with the data integration algorithm developed in this study. The ?rst auxiliary data was a digital elevation model (DEM). The original DEM data was given by the Geospatial Information Authority of Japan. The second auxiliary data was a buffer model. In this study, the boundary of a geologic feature was selected as the buffer reference line. The boundary data of the granite body was extracted from the Seamless Digital Geological Map (1:200,000) that was published by the Geological Survey of Japan. A multi buffer map was generated as the buffer model using the GIS application. The all coordinates of the data at the geospatial calculations are converted to the Japanese Geodetic Datum 2000 (JGD2000) System V. Because of this unifying process, the all geospatial statistics calculations can avoid the error caused by the displacement of the position.

The prediction of the estimated distribution of the structural shift that take into account the altitude was shown. The projection method of the predicted map was converted to latitude and longitude coordination with WGS84 ellipsoid. The appropriate script ?le coded by the Keyhole Markup Language (KML) was generated to plot the map with the Google earth. In the application, the map was automatically overlaid on the geographical data and the surface image of the Google earth. The qualitative analysis of the map compare with those geographical features by the arbitrary three dimensional directions and the magnification factor was enabled.

The all procedures could be performed using the non-proprietary applications in satisfactory precision. The Google earth representation may be useful for the qualitative analysis of the estimation map. In the high altitude and the marginal part of the rock body, the estimated structural shift was relatively high. The mineralogical and the petrological descriptions for the estimated distribution will require the further investigations.

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