EDM correction by using numerical weather prediction model of meteorology - Application to measurement at Asamayama volcano -

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We tried to apply numerical weather prediction model of meteorology to correction of electro-optical distance measurement (EDM) at a volcano. This method improves signal to noise ratio, and then it proved to be effective for EDM at a volcano extremely.

EDM is the observation technique by which we can measure the geographical deformation near the summit crater optically from the foot of a volcano with safety only by installation of reflectors. However, it is necessary to correct a slope distance by the meteorological elements. Usually, it is common to correct it only with the meteorological weather elements measured at the machine point. But caused by the heterogeneity of weather conditions, the correction may not be done appropriately. So then, we tried to apply numerical weather prediction model of meteorology to correction of EDM.

Japan Meteorological Agency (JMA) carries out numerical calculation of atmosphere routinely to forecast weather. Mesoscale Model (MSM) has a horizontal resolution of 10 km and provides 18-hour forecasts four times a day to assist forecasters in issuing meteorological warnings. Slope distance is corrected by interpolating the grid point values which calculated by the MSM. Consequentially, fluctuation was improved from more than 10mm to less than 5mm. Additionally, annually and several days noise oscillation were removed clearly.

In order to monitor volcanic activities of Asamayama volcano, EDM has been performed from May, 2003. Three reflectors were installed 0.5km south from the summit crater. These are measured from Karuizawa weather station where is 7km south from reflectors. The following is revealed by EDM used this correction method at Asamayama volcano. From September, 2004, summit area of the mountain began to expand in conjunction with beginning of eruption activity. Shortening of slope distance amounted to 15 -30 mm by present. Its velocity became small gradually. Now, variation of distance is not measured or very small.