

SGD001-07

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The factor causing annual variation of leveling survey result

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Repeated leveling survey carried out by GSI in Omaezaki region shows notable annual variation. The main reason of this annual variation is considered to be thermal extension of leveling staff, which would not be cancelled as only the surface of the northern staff is shone by the sun during observation. Experimental observations to estimate the difference of the temperature between two leveling staffs in various circumstances, such as direction of the staffs, observation procedure and seasons, were carried out. The largest temperature difference between two staffs is 6.7 degrees centigrade, that is observed at a northern and southern staff pair in winter season. This means thermal expansion could be the main factor causing annual variation of leveling survey results. Another experimental observation to confirm the effect of thermal extension is carried out, using a pair of leveling staffs less sensitive to temperature difference. New Super Invar leveling staff, of which thermal extension coefficient is one order smaller than normal invar staff, used in the experimental observation, shows much smaller annual variation. This staff is expected to be a solution to remove the annual variation as the noise to monitor the slight vertical crustal deformation.

Keywords: leveling survey, annual variation, crustal deformation, leveling staff, temprature, thremal extension