

Volumetric strain change caused by pumping of groundwater at Mikkabi

Akio Kobayashi[1]; Takeyasu Yamamoto[1]; Shin Chikasawa[2]; Kazuhiro Kimura[2]; Akio Yoshida[1]

[1] MRI; [2] JMA

The Japan Meteorological Agency has new and old strainmeters in the Mikkabi observation point. In the hole of new strainmeter, a groundwater level is also observed. In Mikkabi, the characteristic changes of strain and groundwater level are observed during the summer months every year. As a result of the research, it became clear that the changes of strain and groundwater level were caused by pumping up the groundwater in the vicinity. In this research, features of strain and groundwater level changes caused by pumping up the groundwater in Mikkabi are examined.

Several strain changes were observed in the new and old strainmeters from July to August every year. Strain rapidly compressed at first, and then returns to original level gradually. The strain change of old strainmeter is almost similar to the new one, but there is a small expansion prior to the first rapid compression change. It is proved that these changes are not limited in the observation hole, because there are the synchronized changes at both strainmeters in which the distance has separated. The cause of these strain changes are supposed relating to the groundwater, because there is the lowering of groundwater level with the strain changes.

The extension strain at Mikkabi appears with the groundwater level rise. Maruyama (1994) calculated responses of pore pressure to the pumping of water for given underground structures. His result showed that the pressure rose at some specific depth by the pumping in the case of the existence of a less rigid layer under the aquifer and the high ratio of hydraulic conductivity. This indicates that there is a multi-layered structure of elastic modulus and hydraulic coefficient in Mikkabi.