

Effect of atmospheric pressure changes on 100-meter extensometers of Matsushiro

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The effect of atmospheric pressure changes on the 100-meter quartz-tube extensometers of the Matsushiro Seismological Observatory is investigated. One of the main sources of noise for the extensometers is temperature changes. At Matsushiro, it has been observed that changes in the temperature inside the tunnel are approximately proportional to the temporal derivative of the atmospheric pressure. To explain this phenomenon, adiabatic changes of the air inside the tunnel caused by pressure changes are proposed as the main cause of temperature changes. Taking into consideration the heat conduction between the air and the surrounding rocks, this effect is theoretically investigated. As a result, it is verified that the observed frequency dependence of the pressure effect on temperature is a consequence of the contrast of the material properties between the air and the rocks.