# The elastic-wave velocities of fault-related rocks under in situ conditions of seismogenic zone

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Laboratory measurements of elastic-wave velocities under the in situ conditions are useful to estimate the physical properties around the fault zone and to interpret the geophysical survey results conducted on the ground. We measure the seismic-wave velocities under the pore-free conditions to evaluate the effect of pore on elastic-wave velocities. Experimental apparatus we used is the gas-medium, high-pressure and high-temperature deformation apparatus at AIST Japan (Masuda et al., 2002). We measured elastic-wave velocities of Berea sandstone samples with the cylindrical shape (20mm diameter and 20mm length). The experiments were carried out under various temperature conditions (25 and 200 C) at high-effective confining pressure (Peff =130MPa), which is defined as Peff=Pc- kPp where Pc (130 or 200 MPa) is confining pressure, Pp (0 or 70 MPa) is the pore-fluid pressure, and k is a coefficient (in this study k=1). Previous studies indicated that elastic-wave velocities are controlled by the effective-.confining pressure law (e.g. Todd and Simmons, 1972). Thus, in this study, Vp and Vs are measured under fixed effective-confining pressure (Peff =130 MPa) and two temperature conditions (25 and 200 C) in order to evaluate the effect of water on Vp and Vs. In the room-temperature condition (25 C), Vp and Vs did not show significant differences between in the dry condition and in the wet condition (Dry; Vp=4.46 km/s, Vs=2.67 and Wet; Vp=4.42 km/s, Vs=2.62km/s). However, Vp and Vs measured in the dry and in the wet condition at the same temperature of 200 C showed the significant difference (dry; Vp=4.02 km/s, Vs=2.33 and wet; Vp=3.90 km/s, Vs=2.24km/s). These results show the importance of interaction between temperature and water.