## Temperature derivatives of elastic wave velocities in plagioclase (An<sub>51±1</sub>) above and below the order-disorder transition temperature

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## ABSTRACT

Compressional  $(v_p)$  and shear  $(v_s)$  wave velocities of plagioclase  $(An_{51\pm1})$  were measured up to 900 °C at 1 GPa. The temperature derivatives of  $v_p (\partial v_p/\partial T)$  and  $v_s (\partial v_p/\partial T)$  show a discontinuous change at ~400 °C. The  $\partial v_p/\partial T$  is  $-0.9 \times 10^{-4}$  km/s/°C below 400 °C and  $-4.4 \times 10^{-4}$  km/s/°C above 400 °C. The  $\partial v_p/\partial T$  also increases from  $-0.7 \times 10^{-4}$  to  $-4.1 \times 10^{-4}$  km/s/°C. These  $v_p$  and  $v_s$  show reversible changes between 25 and 700 °C. In contrast, both  $v_p$  and  $v_s$  increase (0.08 and 0.08 km/s, respectively) at 700–800 °C, and show irreversible changes after heating to 800 and 900 °C. The X-ray powder diffraction analysis shows that the run product heated to 900 °C shows a higher lattice angle  $\gamma$  than the run products obtained on heating up to 700 °C, which is comparable to the lattice angle  $\gamma$  of high and low plagioclase, respectively. We ascribe the discontinuous change in  $v_p$ ,  $v_s$ ,  $\partial v_p/\partial T$ , and  $\partial v_s/\partial T$  to the order-disorder transition of plagioclase at high temperatures.

Keywords: Elastic wave velocity, plagioclase, phase transition, high temperature