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LETTER

Geobarometry from host-inclusion systems: The role of elastic relaxation

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ABSTRACT

Minerals trapped as inclusions within other host minerals can develop residual stresses on exhumation as a result of the differences between the thermo-elastic properties of the host and inclusion phases. The determination of possible entrapment pressures and temperatures from this residual stress requires the mutual elastic relaxation of the host and inclusion to be determined. Previous estimates of this relaxation have relied on the assumption of linear elasticity theory. We present a new formulation of the problem that avoids this assumption. We show that for soft inclusions such as quartz in relatively stiff host materials such as garnet, the previous analysis yields entrapment pressures in error by the order of 0.1 GPa. The error is larger for hosts that have smaller shear moduli than garnet.

Keywords: Inclusions, residual stress, elasticity, elastic relaxation