# Diamond-eclogitic garnet pair: A test case to elastic geobarometry

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Although inclusion-bearing diamonds are rare, they are geologically important, because they are the only direct and unaltered samples that we have from the Earth's mantle. Therefore, the determination of their pressure of formation is fundamental to better constrain the chemico-physical environment in which they formed.

The pressure of formation is typically estimated by classical geobarometry methods, based on cation partitioning between mantle minerals. However, these methods can only be applied to rare cases. Recently, an alternative method has been developed, the 'elastic geobarometer' (e.g. [1]). This method is based on the residual pressure ($P_{inc}$) of the inclusion still trapped in the diamond while at room conditions. This $P_{inc}$ arises from the contrast in elastic properties between the diamond host and the trapped inclusion. In principle this method can be applied to any diamond-mineral inclusion pair, but requires accurate knowledge of the thermoelastic parameters of the diamond host and inclusion.

In order to test if the compositional dependence of garnet elasticity can be reliably modeled assuming ideal mixing the measured elastic coefficients for a complex solid solution ($Py_{51}Al_{22}Gr_{27}$) have been compared to the results of ideal mixing calculations. Two sets of entrapment pressures at temperatures typical for subcratonic-lithospheric regions for the eclogitic-like garnet were therefore calculated by means of 'elastic geobarometry', using both the observed and the extrapolated elastic parameters.

The results show that the differences between the calculated and measured values produced discrepancies in the entrapment pressures of about 0.03 GPa. For the purpose of elastic geobarometry, these results suggest that ideal mixing can be safely assumed for the calculation of elastic parameters of garnets still trapped in diamonds.

[1] Angel *et al*. (2015*) J Met Geol* (submitted)