Stress estimates in peridotites from Orapa kimberlites Botswana

Yosuke Uehara[1]; Tsuyoshi Komiya[2]; Kei Hirose[3]

[1] Titech; [2] Earth & Planet. Sci., Tokyo Inst. Tech.; [3] Dept. Earth & Planet. Sci., Tokyo Tech.

Geopiozometers using dynamically recrystallized grain-sizes are useful to infer the stress magnitude in naturally deformed rocks. Some experimental relationships between grain-size and stress have been provided since late 1970s, especially for olivine as one of most abundant minerals ine the upper mantle. Xenoliths in kimberlites provide a wide window into the underlying crust and upper mantle. Among these xenoliths, deformed (sheared) peridotites are well known for their texture indicating deformation before the eruptions of kimberlites. P-T conditions of such deformed peridotites are clearly higher than those of coarse peridotites. These facts brought Boyd (1973) and others to the idea that intensely deformed peridotites were deformed directly by some athenospheric flows or other plumes around lithosphere/athenosphere boundary. Ave Lallement et al. (1980) firstly provided grain-size distribution data of peridotites from southern-Africa kimberlites and proposed a dragged-plate model. After that work, not so many systematic studies have been provided. On the other hand, the diamondiferous Orapa kimberlites (this study) intruded into Limpopo mobile belt between Kaapvaal and Zimbabwe Cratons about 93Ma in the period of upper Cretaceous. We collected new peridotitic samples from the Orapa kimberlites. At this time new stress and viscosities estimated by Olivine grain-sizes vs. P-T conditions are shown. More over we are going to explain about a new attempt to the estimate of stress distribution. The final goal is to propose a best model of the history about tectospheric mantle.