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AIC model selection in microboudin palaeo-piezometer

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Microboudin structure is a deformation structure of rocks at microscopic scale. It is formed as the fracture of mineral grains and their subsequent separation within the matrix minerals, which accompanies with infiltration of matrix minerals into the inter-boudin gaps by flowing. In particular case in which microboudin structure consists of columnar minerals such as tourmaline, amphibole, and piemontite embedded within quartz or calcite matrix minerals, it can be utilized as a palaeo-piezometer if a set of data (proportion of boudinaged columnar mineral grains with respect to the their aspect ratio) is supplied. Estimation of the magnitude of palaeo-stress in the rock is generally a difficult subject, although many geologists have been recognized its importance. The microboudin palaeo-piezometer can estimate the magnitude of stress with increasing strain of rocks under metamorphic conditions. However, flow of rocks is generally treated by the viscous model with a Newtonian material. In this presentation, we measure the relative quality of both elastic and viscous models by using the Akaike Information Criterion (AIC) for selecting model. The set of data for the palaeo-piezometer is given by measurements of total 6171 tourmaline grains within 9 quartoze metamorphic rocks, which are collected from the greenstone belt around a granite complex in East Pilbara, Western Australia. It was clarified that AIC shows that the elastic model is preferable to the viscous one.

Keywords: Microboudin structure, palaeo-piezometer, AIC, Model selection