Sam Bain

Work Address: Building 120, Department of Applied Geology, Western Australian School of Mines, Curtin University, Perth, WA 6845, Australia

Email: samuel.bain@postgrad.curtin.edu.au

Brief Summary

The deformation behaviour of olivine exerts a fundamental control over mantle rheology. The mechanism by which olivine deforms is determined by environmental conditions, composition and grain size. Dislocation creep is thought to be the dominant deformation mechanism in upper mantle olivine, with varying conditions resulting in changes in active crystallographic slip system. Trace elements may concentrate in deformation microstructures within olivine. Such segregation is known from materials science to alter the physical and chemical properties of materials. Similar behaviour in olivine could affect its deformation behaviour and therefore influence mantle rheology. My research utilises state-of-the-art and novel nanoscale analytical techniques – primarily atom probe microscopy – to better understand the distribution of trace elements within dislocations and grain boundaries in mantle olivine.

Education: University of Otago

Research interests: Mantle olivine, deformation mechanisms, atom probe microscopy

Thesis title: Mantle olivine at the nanoscale: trace elements and deformation

Supervisors: Prof. Steven Reddy, Dr. David Saxey, Dr. Will Rickard, & Dr. Denis Fougerouse

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