BSc(Hons) Projects for 2017: EXPERTIMENTAL PSEUDOTACHYLYTES

These SEM and thin section images show friction melts that were generated during high-velocity rotary shear experiments on SHIVA, Rome. In these experiments, two quartzite rocks - some with secondary phases such as calcite - were sheared very rapidly against one another in fairly violent experiments. The products provide opportunity to examine two fundamental questions about whether or not pseudotachylytes or other fault rocks are unequivocal seismic fossils:


Project 1. Can we tell the temperature these melts obtained from the reactions that occurred in their generation, or the composition of new phases that crystallised?

You will need to gather precise mineral composition data using electron dispersive spectroscopy (EDS), determine temperatures at which key reactions occur, or minerals crystallise, and carry out some thermal modeling of diffusion of heat into the melted materials. This is suited to someone with a bit of chemistry background, who is interested in petrology.

Project 2. Is there a quantitative measure of grain shape that differentiates a melted clast from a fractured one?

This will require image analysis in ImageJ, as well as using a Matlab script. You will calculate shape descriptors and fractal properties of the shapes. Most of the work is computer-based, and it is most suitable for someone with a bit of maths and computing background or interest.

Background reading:

For more information about these projects email
Dr. Virginia Toy
virginia.toy@otago.ac.nz