InterRidge Fellowship Report for Jessica Till

During my InterRidge fellowship I visited Imperial College London in 2013 to work with Dr. Adrian Muxworthy. During the visit we conducted nanoscale characterization of magnetic minerals in gabbros from both slow- and fast-spreading ridges in order to help determine how exsolution microtextures reflect temperature-dependent diffusive processes. Our results will be used to help constrain variations in cooling rates of the lower oceanic crust. One particularly interesting discovery was the unexpected complexity of silicate-hosted Fe-oxide particles in gabbros from oceanic core complexes. These nanoscale particles appear to be the product of multiple generations of exsolution and mineral "unmixing". This tells us that cooling rates in these rocks must have been very slow and that the growth process of the Fe-oxide minerals is much more intricate than previously thought.

During the fellowship I also had the opportunity to travel to Bochum, Germany to attend a workshop where I learned a variety of techniques for creating numerical models of diffusion data in mineralogical processes at the Ruhr Universität . The workshop provided a wealth of skills that are currently being applied to better understand how diffusion processes produce the mineral textures we observe. Modeling work will help explain the variation in exsolution textures between gabbros formed at slow-spreading and fast-spreading ridges and how these textures record the thermal history of the rocks. Many thanks to the InterRidge program for an excellent research experience that has provided a foundation for continuing work and for the opportunity to interact with a range of international colleagues and experts that has enriched my professional network.

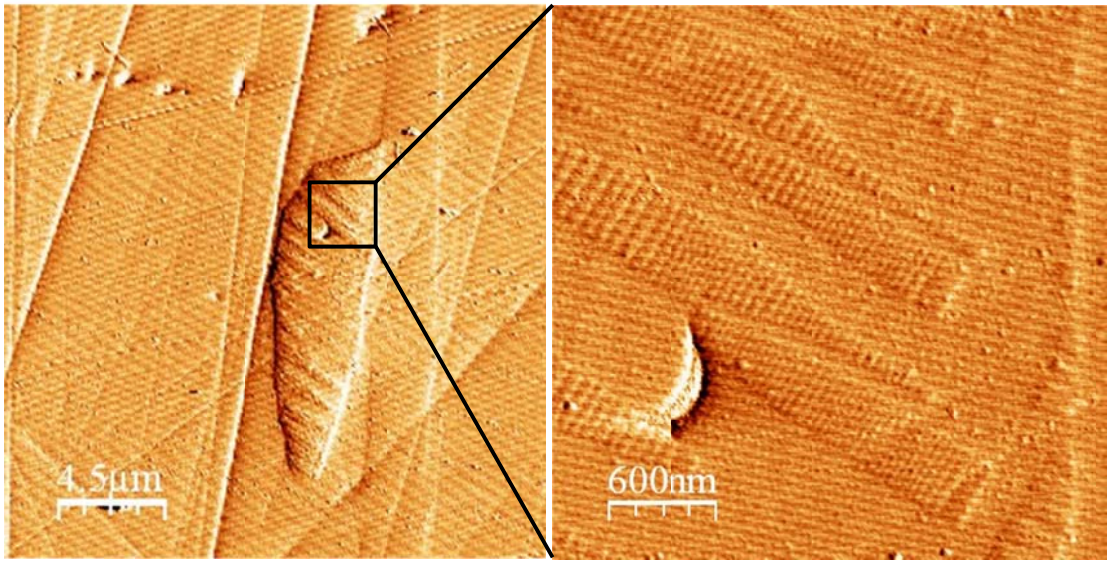

Figure caption: Scanning probe microscope images of nanoscale lamellar magnetic Fe-oxide particles in a pyroxene grain representing multiple generations of oxide mineral exsolution.