Metamorphic Microstructures
Donna Whitney (PI), Nicholas Seaton
Department of Geology & Geophysics, University of Minnesota
NNIN Facility Utilized: CharFac (JEOL6500)

- Lattice orientation of minerals in metamorphic rocks applied to:
  - Origin of garnet polycrystals
  - Deformation mechanisms of silicates & carbonates (P=0.5-2.5 GPa, T=300-700C)
  - Lawsonite vorticity as indicator of subduction kinematics
  - Recrystallization of high-pressure textures
  - Record of deformation in partially molten rocks
  - Trace element distribution in deformed quartz

- MAJOR OBSERVATIONS
  - Garnet polycrystals are much more common in metamorphic rocks than previously thought
  - Carbonate minerals preserve high-P microstructures during overprinting; quartz microstructures are easily overprinted, but high-P mineral compositions preserved
  - Magnetic lineation in paramagnetic migmatite is from zone axis orientation of biotite oriented in direction of flow

- Publications

Top: Cathodoluminescence image of deformed quartzite, showing CL variation in relict grains vs. recrystallized grains. Bottom: EBSD (Euler) map showing lattice orientation of quartz grains. These maps were used to guide ion microprobe analyses (Stanford; Woods Hole) of titanium content in quartz.