***The Department of Earth and Environmental Sciences and GeoPRISMS presents:***

**“Extension beyond the rift boundaries: magmatism, heat, and depth-dependent deformation in Ethiopia”**

**Dr. Katie Keranen**



**Friday, March 1, 2013, 1:00 – 2:00PM**

**Peters Business Building, room 192**

   
Studies of continental rift systems commonly assume that lithospheric deformation has a similar scale to and is spatially coincident with the surface expression of rifting. In Ethiopia, studies of extension typically concentrate on structures and processes active within and beneath the spectacular, narrow rift valley of the Main Ethiopian Rift (MER). However, recent studies have revealed that the wide margin of the Ethiopian Plateau, on the western edge of the MER, is also actively deforming, making it one of few seismically and volcanically active continental rift margins at a stage close to breakup. At the surface, normal faulting occurs across the Ethiopian Plateau, concentrated near Lake Tana, and Quaternary volcanism is distributed across the plateau’s breadth. Geophysical observations indicate thermally perturbed, deforming lithosphere beneath both the rift valley and the Ethiopian Plateau hundreds of kilometers from the rift valley. Across this region, seismic velocity structure indicates thin lithosphere, with a hot lower crust and upper mantle (over 1300ºC), and ~5% partial melt. Similarly, geodetic studies indicate that extension between the Nubian and Somali plates is accommodated over a region broader than the structural rift valley, and seismicity is recorded beneath the width of the Ethiopian Plateau. The breadth of active deformation implied by these results suggests that ongoing continental extension between Nubia and Somalia is localized to a narrow rift zone only in the thin elastic uppermost crustal lid. At greater depths in both the lower crust and mantle lithosphere, weak materials appear to accommodate extension by viscous stretching over long length scales at lower strain rates, resulting in highly depth-dependent stretching. The possibility of active, depth-dependent extension in Ethiopia is important because it challenges our existing understanding of continental rifting and provides an opportunity to investigate the implications of heterogeneous rheology, including melt distribution, for continental mechanics.