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Searching for Subduction Zone Seismogenesis in the Rock Record

It is well known that the planet's subduction zones are responsible for the world's largest earthquakes. However, relative to other tectonic environments which can be observed on continents, subduction thrust fault systems are difficult to directly observe. Seismologists, geodesists, hydrologic and thermal modelers have made great contributions to understanding macroscopic properties of the subduction thrust system. In many cases these results and models are limited by a lack of geologic data to constrain such parameters as temperature, mineralogy, and structural geometry within fault zones.

Exhumed subduction thrusts are preserved in accretionary complexes such as the Kodiak Accretionary Complex of south central Alaska as well as the Franciscan Complex of California. Geologic research in these environments has declined, possibly due to the structural complexity of accretionary systems as well as the paucity of economic motivation to solve the structural problems. The Kodiak Accretionary Complex contains fault-bounded terranes which are internally undeformed since subduction thrust activity, making this an excellent place to study thrust activity at various stages of development. The descriptions of mineralogy and structure and the inferred processes recorded in preserved faults in this environment provides a simple model which aids in the interpretation of more complexly deformed terranes, such as within the Franciscan Complex.

I will report a survey of subduction thrust faults I have studied in the Kodiak Islands, with an emphasis on questions about the role of fluid flow in thrust faults, both in changing the material properties of rocks in fault zones, as well as possible role in seismogenesis. I will describe pseudotachylytes discovered in an ancient décollement zone, the third reported from the subduction thrust environment, and the largest reported occurrence to date. Finally, I will explain how the insights gained from the work in the Kodiak Complex is contributing to an understanding of the shear zone underlying the ultramafic rocks on Ring Mountain, Marin County, and give NCGS an update on my collaborative work there with David Bero, and other possible correlations between the Kodiak and Franciscan complexes.

Biography: Christen Rowe grew up in the Franciscan Complex and has maintained a life-long interest in collisional margins. She studied blueschist and eclogite mineralogy in Marin and Sonoma Counties for her bachelor's thesis at Smith College. Christie worked for 18 months as an environmental consultant in the Bay Area and Tahoe. As a graduate student at UC Santa Cruz, she is studying the geochemistry of subduction thrust faults in the Kodiak Accretionary Complex. Her thesis research examines the feedbacks between metamorphic, and structural evolution of faults and fluid flow and seismogenesis in subduction zones. In 2004, Christie's team discovered the largest pseudotachylytes ever described from a subduction thrust fault. Supported by the NCGS, (**NCGS $1,000 Graduate Collage Scholarship** for the 2004 – 2005 year; *Fluid-Assisted Metamorphism Along a Dismembered Fragment of the Coast Range Thrust, Ring Mountain, Marin County, California*) Christie has returned to Ring Mountain to document fault relationships between Franciscan and ultramafic rocks in collaboration with David Bero. In her rare free time, Christie enjoys sailing, riding bikes, and working on her sail boat. More information about Christie's research can be found at http://www.es.ucsc.edu/~crowe