Geophysical Research Abstracts, Vol. 8, 00691, 2006
SRef-ID: 1607-7962/gra/EGU06-A-00691


# Fault rocks from the seismogenic zone: pseudotachylytes from the Sierra Nevada, California.

J. D. Kirkpatrick and Z. K. Shipton

University of Glasgow, Glasgow, UK (j.kirkpatrick@ges.gla.ac.uk / Fax: +44 (0)141-330-4817 / Phone: +44 (0)141 330 5469)

Fieldwork in the Granite Pass region of Sequoia and Kings Canyon National park, in the Sierra Nevada, California, has identified a new suite of pseudotachylyte-bearing strike-slip faults cutting granodiorite host rock. By analogy with faults reported from other parts of the Sierra Nevada, the depth at which the Granite Pass faults were active is expected to be approximately 12-15km, i.e. close to the base of the seismogenic zone. The newly defined faults are km's long, shallowly-dipping (40˚-70˚ south), left-lateral strike-slip faults, with 10's m displacement, and often display strong mylonitic fabrics. Pseudotachylytes are locally developed along strike, and demonstrate that the faults were seismically active. These faults are overprinted and consistently offset by the Glacier Lakes fault and associated structures, which are characterized by a distinctly different fault architecture; they are steeply-dipping (70˚-90˚ south), strike slip faults, often displaying parallel boundary faults bordering highly fractured protolith, and containing rare examples of ductile fabrics. Fault geometry is well constrained by field observations for the two systems, allowing comparison of the two suites of faults. In particular, exceptional exposure allows us to study fault development not just by comparing faults of different sizes, but also by examining variations in the style of deformation along strike of individual faults. Differences in the deformation mechanisms active within the fault core and damage zone, and the relationship between subsidiary structures generated in the damage zone and the geometry of the main fault have important implications for models of fault growth and processes within the seismogenic zone. Our observations suggest that the depth at which faulting occurred has a significant influence upon fault growth and the corresponding fault architecture.