Geophysical Research Abstracts, Vol. 8, 03660, 2006
SRef-ID: 1607-7962/gra/EGU06-A-03660


# Postseimic slip on fault in a poroelastic medium

T. Yamashita

Institut de Physique du Globe de Paris, 75252 Paris, FRANCE (teruo@ipgp.jussieu,fr / Phone 33-1-44-27-48-80), (on leave from Earthquake Research Institute, the University of Tokyo, Japan)

It has been reported that large shallow events are commonly followed by postseismic slips especially at plate boundaries. Such postseismic slip is generally attributed to stable sliding. I will report here that fluid flow also make some contribution to postseismic slip. In fact, nonvolcanic deep tremor recently found at southwest Japan suggests some role of fluid at subduction zone. It is well known that fault slips do not affect fluid pressure change mechanically as far as a planar fault is assumed in an isotropic, homogeneous and infinite medium. However, plate boundaries, where postseismic slips are widely observed, are generally characterized as interfaces that separate different materials. If fault slip occurs on such an interface, fluid pressure change is generally excited by fault slip. It should be noted that fluids are abundant especially in subducting plates. I here analyze the quasistatic stress change due to fault slip in an infinite poroelastic medium; the fault is assumed to separate mechanically different materials. Stresses and fluid pressure are shown to be expressed as spatio-temporal integrals of fault slip in special cases. The fluid pressure rise is shown to be largest near one of the fault tips. The rates of changes in the normal stress and fluid pressure are much larger than that in the shear stress soon after the sudden introduction of fault, so that the first two will play a dominant role in the earlier phase of postseismic deformation. This causes quasistatic fault slip near one of the fault tips if the Coulomb friction law is assumed. In general, the postseismic slip due to the change in the Coulomb stress occurs more easily where the gradient of fault slip is larger, so that it will tend to occur at the periphery of seismic fault. This is in harmony with observations that postseismic slips occur outside areas where large dynamic slips take place. Since the zone of fluid pressure change will be larger for a large magnitude event or the fluid pressure change is larger for larger fault tip singularity, postseismic slip due to fluid flow will be more commonly observed for larger events.