Diking-faulting interaction and interpretation of moment tensor solutions

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Full moment tensor inversions are a useful tool for the understanding of the dynamics of faulting during volcanic crises. However, it is generally difficult to interpret the sometimes puzzling results of such inversions in volcanic contexts. Here we present a series of forward models of the interaction of faulting with diking, and of the resulting change in the moment tensor. The sudden elastic change in dike geometry associated with faulting will interact with the seismic waves radiated from the fault and will result in a cumulative effect. We find that the fault orientation extracted from the seismic moment appears rotated with respect to the true orientation of an angle that depends on the geometry of the interaction and may be up to 25 degrees. We also find that the presence of pure double couple solutions or of CLVD and isotropic components depends on the compressibility of the magma. Gas-rich, very compressible magma will be associated to isotropic components, while DC and CLVD will result from the interaction of faulting with gas-poor magma. CLVD components may have a physical meaning of geometrical change in the dike associated to interaction with the faulting.