SURFACE RUPTURE FROM DYNAMIC EARTHQUAKE MODELING

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We perform numerical models of dynamic rupture along faults to study the deeper rupture properties effect, specifically the complex fault geometry, on the dynamic rupture process and the surface rupture patterns. We have studied the surface rupture of the 2013 Mw 7.7 Baluchistan earthquake through dynamic earthquake modeling. Our purpose was to reproduce the observed surface rupture characteristics of this earthquake through the numerical modelling of dynamic rupture, allowing us to better understand the links between the deeper properties of the fault and surface rupture patterns. We have used a dynamic rupture Fortran code based on Boundary Integral Equation Method (BIEM) to simulate spontaneous rupture propagation on faults up to the surface in a homogeneous half-space. The first part of our work was the validation the calculation code using the Southern California Earthquake Center/U.S. Geological Survey (SCEC/USGS) Dynamic Earthquake Rupture Code Verification Exercise. As a first case study, we studied the propagation of the rupture along an inclined thrust fault that breaks the free surface in 2D, testing for variable dip angle of the shallower part of the fault, presence or absence of secondary faults. In order to validate our numerical results, we used the surface rupture and deformation data derived from optical correlation of satellite images. This data set covering 200km of fault rupture trace can be used to derive profiles of surface deformation that we can compare to simulations results. Our results will be displayed and discussed. We will also introduce our 3D fault geometry model used for the 3-D Baluchistan rupture simulations to study the impact of the whole earthquake rupture history and the dynamic stress evolution on the surface rupture patterns.