Geophysical Research Abstracts, Vol. 9, 05863, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-05863

Study of interaction between wedge deformation and friction change in decollement zone by Distinct Element simulations.

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Friction coefficient in the decollement zone should increase due to the growth of the accretionary wedge, and this friction increase affects the shape of the wedge. In this study, we simulated the wedge deformation and the friction change by using a numerical simulation method, and examined the influence of the friction change on the structural geometry. We used Distinct Element Method (DEM) to simulate the deformation. DEM approximates that the analytical subject is composed of distinct spheres, and these particles move independently to simulate the brittle deformation of sediments. There are two layers in our initial model; the upper thick layer has a high friction coefficient (0.35) and the lower thin layer has a low friction coefficient (0.25). These correspond to turbidite and the decollement zone respectively. The shortening displacement is given to the initial model with the moving side wall, to produce the off-scraping and accreting process. In this study, we also increased the friction coefficient of the lower layer up to the same friction of the upper layer. Two modeling configurations were tested; the stable friction model and the increased friction model. The stable friction model has sequential thrust faults and low angle surface slope. The increased friction model shows more complex deformation than the stable friction model, and the model also produced an out-of-sequence thrust which displaces older thrust faults systems. The surface slope angle of the model changes at the margin of the high friction zone in the decollement. Comparing with the analog model, these features of the increased friction model correspond to the deformation where the main horizontal share zone is stepping down to a high friction zone. These complex features are similar to the frontal out-of-sequence thrust zone in the Nankai Trough, suggesting that the friction of the decollement zone are increasing under the frontal

out-of-sequence thrust zone. We are now working on the coupling of deformation-fluid flow in an integrated numerical model to examine the interaction of deformation and the physical property change induced by dehydration at the decollement.