Study of Deformation Architecture of Accretionary Prisms by the Discrete Element Method

Satoshi Ueda[1]; Yasuhiro Yamada[2]; Toshifumi Matsuoka[3]

[1] Department of Civil and Earth Resources Engineering,Kyoto Univ; [2] Civ. Earth Res. Eng., Kyoto Univ.; [3] Kyoto Univ

Deformations at plate subduction zones, in particular accretionary prisms, have been the key subject for a number of geoscientists not only because of the methane hydrate distribution but also possible major earthquakes.

Sandbox experiments have successfully reproduced typical deformation architecture of accretionary prisms, such as a sequence of faulting that a new thrust generates in the footwall of the previous one.

In order to examine the deformation in detail, we have applied the Discrete Element Method and extracted velocity and stress data from each particle.

These results suggest thea the development process of faults is intermittent that strongly related to the stick-slip motion along fault surfaces.

In addition, we also found how the input parameters affect the final deformation geometry.

Such information is extremely useful to evaluate the timing of faulting and to assume possible fluid flow within the accretionary prism, both of that are vital information for methane hydrate exploration and earthquake prediction.