Origin of chaotic deposits as seismites in a trench slope basin setting, Boso Peninsula, Japan

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Variety of soft sediment deformation structuers In the chaotic deposits of the late Miocene to early Pliocene Miura Group in the forearc side Honshu arc, Tomiura and Namuya areas, southern Boso Peninsula, Japan, was studied to know the origin and mechanism including their tectonic implications. These materials have undergone considerable deformation above the early to middle Miocene accretionary prism as part of a forearc complex as a result of arc-arc collision. Seismically induced liquefaction was concluded to play the main role in the formation of these chaotic deposits, which have mudstone clasts within liquefied sands. Vein structures have been recognized in many localities above the chaotic structures, and the both are thought to be produced by the same trigger mechanism. The vein structures are generally restricted to layer parallel faults. Sigmoidal and en echelon vein array are absent, suggesting that simple shear and downslope movement may not have been an important role in the development of vein structure and other soft sediment deformation structures. Presence of layer parallel faults above and below the vein arrays supports the idea of more or less horizontally cyclic shear stress along these layer parallel faults. The absence of any vein structure within the coherent blocks in the matrix supports the idea of contemporaneous deformation with other chaotic structures.

Reciprocally shaking experiments using a dry mud-powder box were done to establish the most potential trigger mechanism that mimic the earthquake shaking by horizontal ground motion, body S-wave or surface, particularly Rayleigh waves. In the experimental study, one of the most important soft-sediment deformation structures-vein structure-was simulated. In the experiment we used the crushed powder of natural sedimentary rocks from the field. From the observations during the experiments it is very clear that veins were formed due to two main factors; shearing and dilation. First shearing resulted in equally spacing vertical fractures and then dilation resulted in increasing the width of these veins. The vein structures are most likely to be seismites, but the relation between liquefaction and veining should be further studied.