Three types of clastic dyke, related to Miocene Seismite and Tsunamiite, Chita Peninsula,, Japan

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There are three types of clastic dyke in the Miocene Morozaki Formation, intimately relating to the deposition of Tsunamiites and Seismites. The first type is due to filling of conjugate cracks by sand in the substratum. Clastic dykes of this type in the study area are 20cm wide in muximum, and several meter long in plane. The origin of the filling sand is not clear, but conjugate cracks suggest the orientation of the stress field generating the earthquakes and tsunami. After the correction of dip to horizon, the maximum stress is N42W for producing the conjugate cracks.

The second type is relating to sea floor cracks due to severe earthquake. The earthquake cleaved sea floor, and caused subsequent large tsunami. Violent rip current of tsunami transported sand, gravel and other near shore deposits to deep sea floor, and deposited Tsunamiite. The cracks were filled by this Tsunamiite. Clastic dyke of this type branches off and tapers downward. The maximum width of dyke is about 20cm, and the length is 2m downward in maximum. The distribution of this type clastic dyke is rather systematic. The pole of dyke are plotted on two large circles on stereographic projection, and center of the crossed large circles suggests the orientation of the earthquake propergation. Pilar structures due to water-escaping from dyke disturb overlying Tsunamiite. This water-escaping structure is not disturb thin mud deposit covering Tsunamiite, which indicates aftershock succeeded just after the deposition of Tsunamiite.

The third type of clastic dyke is due to liquefaction of sand layer and penetration to the overlying layer. Width of this type clastic dyke in this area is about 20cm in maximum, and taper upward. Distribution of this type dyke is at random, and penetrate network into overlying beds. Causal relation between Tsunamiite and this type dyke is not clear in this area.

Intimate relation in the second type clastic dyke, Tsunamiite, pilar structure, and disturbed structures due to earthquake shows following scenario in geologic record; disturbance and homogenization of sea floor sediments due to fore-shock, cleavage of sea floor due to severe earthquake and subsequent deposition of Tsunamiite filling cracks, water escaping due to shake by aftershock.