Do warped paleoshorelines in tectonically active zones indicate coseismic crustal deformation derived from blind faulting or not ?

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Paleoshorelines on marine terraces are generally deformed like warping and tilting styles in tectonically active zones on the earth. The presence of marine terraces shows the crustal uplift. The geographical change in height of the contemporary paleoshoreline directly indicates the accumulation of peculiar crustal deformation in a tectonic region, as the sea level stand is fundamentally same during the formation of the terrace. Thus, the height distribution analysis helps us comprehend modes and components of crustal movements. With reference to records of vertical coastal movements at interplate and intraplate large earthquakes, cosesimic crustal movements is demonstrated as the cause of warped paleoshorelines in Japan, New Zealand, West Coast of USA, Chile, Italy, Greek etc. Well, how can we consider the uplift and deformation process without excellent tectonic references? There are superior samples in the back-arc of Northeast Japan to solve this problem. I examined the possibility of cosesimic deformation producing apparent warping on paleoshorelines, adopting recent geophysical and earthquake-geological information.

Pleistocene shorelines distinctly depict warping mode with wavelength of 20 to 30 km and amplitude of 20 -150 m on MIS 5e terrace. This deformation pattern is similar to those of fault-related folds in hanging wall of reverse faults, which are imaged by seismic reflection profiling across inland active faults. Soeda and Miyauchi (2007) presented a solution that asymmetric warping of late Pleistocene fluvial terrace is originated from the development of Kita-Yuri thrust with fault-related folds which was source of 1931 Akita-senpoku earthquake in Dewa Mountains. Applying this comprehensive interpretation to coastal areas with same tectonic situation, warping on paleoshorelines importantly suggests the accumulation of similar cosesimic crustal deformation in hanging wall of blind reverse faults. According to this insight, we need to understand the essential meaning of cosesimic and aseismic crustal movements recorded on paleoshorelines, with special reference to tectonic geomorphology, structural geology and seismology.