Late Quaternary vertical crustal movement of coastal zone along Sanriku Coarst and its tectonic significance

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The upper continental slope of the forearc wedge off Sanriku Coast has been source areas of major earthquakes at every tens of years and is one of the highest seismicity zones around Japan Arc. In contrast, the sediments covering the slope have been scarcely deformed and subsided slowly during the last 10 Ma, indicating that the area is one of the most geologically stable slopes around Japan Arc. The slow subsidence was attributed to tectonic erosion that is basal erosion of the forearc wedge by subducting Pasific Plate (von Huene and Lallemand, 1990). The aim of this paper is to discuss the landward extent of the tectonic erosion and the relation between the tectonic erosion and the seismicity of this area.

There are emerged terraces along the northern part of Sanriku Coast to the north of Miyako, and the continental shelf offshore of the coast consists of an erosional surface of Miocene and older sedimentary rocks without Quaternary covers, that indicate that the coast and shelf have been uplifting during the late Quaternary time. In contrast, the southern part of Sanriku Coast is characterized by submerged valleys and ridges, and the shelf offshore of the southern coast is underlain by Quaternary stacked progradational sequences, which strongly suggest that the southern part of the coast and shelf have been subsiding. The late Quaternary zero-isobase inferred from the topography of the coasts and the geologic structure of the shelves lies roughly along the southern coast in NNE-SSW direction and continues to the east of the shelf edge offshore of the northern coast. This pattern of vertical movement may be related with the distribution of the asperity of major earthquakes. The zero-isobase appears to be located close to the western margin of the asperity of the 1968 Tokachi-oki Earthqake and the 1978 Miyagiken-oki Earthquake (Yamanaka and Kikuchi, 2002). This relationship strongly suggests that the vertical movement has caused by tectonic erosion and underplating along the plate boundary, and also suggest that the asperities develop along the landward margin of the area of tectonic erosion.