The origin of the anticline founded on fluvial terraces at the eastern part of the Tokamachi Basin, Niigata Prefecture

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Many fluvial terraces formed by Shinano River can be seen in the Tokamachi Basin, which is located between the Uonuma and Higashikubiki Hills. Previous researchers reported that some thrusts along the eastern and western margin of the basin cut and deformed those fluvial terraces, and have surveyed their distribution, activities and structures. The Headquarters for Earthquake Research Promotion (HERP) named these faults western and eastern segment of Tokamachi Fault Zone (TFZ) and revealed each last event based on the results of previous and contract researches. However, relationships with other faults around of the TFZ and their recurrence interval have still been highly debatable.
We found a plunging anticline on the terrace surface by detail geomorphological analyses around the eastern TFZ. The anticline, which is likely to be symmetric fold, has about 1.5 km-wavelength and uplifted the top terrace classified as Mibara group (formed in 140-300 ka) about 20 m high. Near Nakazaike village, one and two steps lower of the top terrace classified as Hoonokizaka (140-170 ka) and Kaisaka (50 ka) groups, respectively, have been uplifted progressively. In addition, geological survey about the Uonuma Formation, basement rock of the terraces revealed that the upper layer has deformed in keeping with the deformation pattern of the surface anticline. These results suggest that the anticline had deformed in the period at least from the time when the upper Uonuma Formation deposited until about 50 ka. The surface deformation which we judged as the anticline is looked as the deformation related to Hosoo-Nyoraiji Fault, striking NNE-SSW, reported by Active Fault Map in Urban Area (Tokamachi) and Active Faults in Japan (Active fault research group, 1991). Our geological and geomorphological study, however, revealed that there is no surface rupture along the fault and the anticline have NE-SW strike. Wavelength of the anticline yields thickness of deformed layer is about 1-1.5 km, suggesting that the anticline formed by the slip on the detachment fault inside of the Uonuma Formation. The depth of the detachment fault is consisted with that reported by Yokokura et al. (Chishitsu News, 2008). It implies that the detachment fault is connected to the eastern TFZ.
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