Japan Geoscience Union Meeting 2013
(May 19-24 2013 at Makuhari, Chiba, Japan)

SSS32-P11 Room:Convention Hall Time:May 22 18:15-19:30

Location and activity of the Isurugi fault in the western part of the Tonami-heiya fault zone

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In the Tonami-heiya fault zone of Toyama Prefecture, there are several active faults such as Takasyozu fault in the east, Horinji fault and Isurugi fault in the west. All of them are NE-SW striking reverse fault whose degrees of activity are classified as the B-class. They have been thrusted their hanging wall in the mountain side toward the Tonami-heiya Plain. The probability of big earthquake within 30 years from the present are estimated as 0.04-6% in the east and 0-2% or more in the west(Earthquake Research Committee,2008). The Isurugi fault has been estimated as a reverse fault thrusting against hill-side in the north-west, however,Maruyama et al.(2012)estimate an activity of back thrust after the middle of the Jomon age on the basis of trench survey on the Pleistocene terraces in Fukuoka, Takaoka City.

The objective of this sutudy is to elucidate the location of the master fault of the Isurugi fault and its activity, because the range of master fault of the Isurugi fault in the plain has not hitherto been studied precisely. The author traced the fault line by comparing the stratigraphic situation of underground sediments described in the boring columnar sections of snow-melting wells dug by Toyama Prefecture and Takaoka City.

Land Condition Map of Coastal Area(1:25,000)issued from Geospatial Information Authority of Japan(GSI), precise data of altitude by air survey issued from Hokuriku Regional Development Bureau, Ministry of Land, Infrastructure and Transport, hypocenter list(1977-2001)from Kamitakara observatory, Disaster Prevention Research Institute, Kyoto University, were used in order to correlate river terraces and widespread tephra.

(1) According to the analytical result of the boring columnar sections, the depth from land surface to basement rock and the situation of sediment differ between the left bank and the right bank of the Oyabe river. This fact suggests that Isurugi fault leaves from mountain foot at Fukuoka town and runs to the north-east along the Oyabe river, extending to the northern part of Takaoka urban area.

(2) The land condition map of coastal area shows which is located in Toyama Bay off the coast of the western part of Shinminato district, Imizu City, there exists a hillock under submarine alluvium which is about 20m higher than the surrounding. This hillock is located on the north-east extension line of Isurugi fault which is estimated to run through the northern part of Takaoka urban area. Therefore, it is estimated that Isurugi fault reaches Toyama Bay at the western part of Shinminato district and runs the south side of the hillock.

(3) Isurugi fault length attains to about 30km from the southern part of Oyabe City to Toyama Bay.

(4) The seismicity map of Kamitakara observatory(2012)shows that micro-earthquake hypocenters are distributed in a range of some 15km towards the ENE direction offshore from Shinminato district, which may be related with the activity of Isurugi fault. But there remain some problems since the depths of hypocenters are not homogeneous and the distribution of hypocenter is scarce on land.

(5) The middle terrace surface of 50˜30m a.s.l. at the south-eastern foot of Mt. Futagami-yama lowers to about 15m a.s.l. at Takaoka-kojyo park to the south of Isurugi fault. DKP pumice(ca.55,oooyBP)is detected from brown-colored soils above the terrace gravel bed on both terraces. A simple calculation based on the difference of relative height showed that the degree of activity of Isurugi fault is 63˜27cm per 1,000 years.

Keywords: active fault, Tonami-heiya fault zone, Isurugi fault, boring columnar section