The latest event and its fault model of active faults off the northern coast of the Noto Peninsula, central Japan

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The active faults zone on the seafloor off the northern coast of Noto Peninsula are divided into four segments, Monzen-oki, Saruyama-oki, Wajima-oki, and Suzu-oki, from west to east. The eastern half of the Monzen-oki segment corresponds to the active fault that caused the 2007 Noto Hanto earthquake (M_{JMA} 6.9). The average recurrence interval of the Monzen-oki segment was inferred from the relationship between the amount of coseismic vertical displacement and the height of the former shoreline of middle marine terraces. However, there is no data on the latest event for the other segments.

To reveal the coseismic crustal movement of the Saruyama-oki segment to the Suzu-oki segment, we investigated the vertical displacement along northern coast of the Noto peninsula. We chose *Pomatoleios kraussii*, which is one of intertidal sessile organisms for a marker of movement. We obtained 13 fossilized *P. kraussii* in rocky coast, measured the height of them by GPS surveying and dated them using the AMS ^{14}C method.

Since the altitude of the sampled fossilized assemblages includes the effect of a sea level change, it is necessary to remove it. Therefore, we apply an altitude correction based on the millennium sea level change for the northern hemisphere from data on climate changes reported by Grinsted *et al.* (2009). The vertical displacements and the dates at the sites implied that the coastal uplift occurred most likely between 1600 and 1800 AD. The uplift is recognized in a distance range of 20 km along the coast south of the Wajima-oki segment. Historical documents record seismic damages in this area in 1729 AD, although the hypocenter of this event has not been specified.

To confirm that the uplift is caused by the fault movement of the Wajima-oki segment, we constructed a fault model of the segment. In the calculation of displacements, we set rectangular faults in a homogenous elastic half-space. Based on the facts of the 2007 earthquake, the dip is set to be 60 degrees, the depth of the upper fault end is set to be 2 km and the depth of the lower fault end is set to be 15 km. We set the location of the fault based on the fault trace of the Wajima-oki segment. In the western part of the Wajima-oki segment, two faults extend parallel to each other and we selected the southern trace as the location of the rectangular faults. We used rakes of 90 degrees, 105 degrees, 120 degrees and 135 degrees. The rectangular faults consist of three sections. We used the non-linear inversion method to estimate the optimum net slip.

Our inversion result shows that a rake of 90 degrees, a net slip of the western fault plane of 1.8 m and a net slip of the center and the eastern fault planes of 0.6 m provide the best fit to the estimated vertical displacements. The zones damaged by the 1729 earthquake are included in the area above the fault model. The moment magnitude (Mw) calculated from these parameters with a rigidity of 30 GPa is 6.6 (M_{JMA} 6.7). This is coincident with the magnitude of 6.6 — 7.0 estimated empirically from the area of the damaged zones of the 1729 earthquake.

We, thus, conclude that the latest event of the Wajima-oki segment is the 1729 earthquake.

Keywords: coseismic crustal movement, active fault, intertidal sessile organisms, carbon dating, fault model, the Noto Peninsula