Multidisciplinary Research on the Central Yangsan Fault for Seismic Hazard Assessment

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The Yangsan Fault (YF) is one of the tectonically active faults in Korea. In September 2016, the Mw 5.5 Gyeongju earthquake, which is the largest earthquake ever recorded instrumentally in Korea, occurred around the YF. After the earthquake a new research project has immediately started to assess the seismic hazard of the central YF. The project aims to acquire multidisciplinary information on basement geology, tectonic geomorphology, and subsurface structures to trace active faults in the survey area. Detailed geological mapping scaled on 1:5,000 indicates that 1) the YF was formed approximately in the Late Cretaceous and 2) horizontal displacement of about 20 km was cumulated after the intrusion (ca. 50 Ma) of the A-type granites. As the YF is not exposed at the surface in more than a half of the survey area, borehole drilling as well as geophysical survey are conducting to detect a buried fault. The results show a complex architecture of the YF, consisting of sub-parallel faults and fracture zones, covered by unconsolidated young sediments. Trace of the buried fault was inferred by an asymmetric profile of fault valley, which is unconformity between basement and unconsolidated sediments, detected by borehole survey. Inclined borehole drilling for the expected fault detected a sub-vertical fault zone. The estimated vertical separation is about 30 m on the basis of the unconformity, and ESR dating for the fault gouges suggests that the central YF caused at least one large earthquake event after 348 ± 25 ka. Several suspected areas of active faults along the YF were identified based on airborne LiDAR survey, and paleoseismological studies are planned to acquire reliable fault parameters for seismic hazard assessment. All of the multidisciplinary survey data are to be embodied as a strip map at the end of the project.