Integrated approach for identification of active fault in slow tectonic settings: a case study

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Abstract:

Recent seismicity in SE Korean Peninsula raised concerns to the public about the stability of Korean peninsula in terms of earthquake hazard. Especially, the 2016 Gyeongju (M_L=5.8) and 2017 Pohang (M_L=5.4) earthquakes were enough to recognize the necessity of detailed mapping of active faults, their exact locations and rupture histories of major faults during the Quaternary period. Considering the rapid urbanization in Korea, it is urgently necessary to be studied in greater details in terms of its surface trace, Quaternary slip rate and rupture history.

For this purpose, the integration of high resolution satellite photos, geophysical investigation and detailed field survey can be useful. Under the ongoing Korean Active Fault Mapping Project, an attempt has been made for detailed study of Dongnae Fault, which is one of the less studied faults in SE Korean peninsula, based on high resolution satellite photos, LiDAR, geophysical survey and detailed field data. We have traced almost ~90 km long lineament of the Dongnae fault on the basis of Quaternary landforms. Furthermore, to collect the subsurface data and exact location for detailed paleoseismic investigations, apparent resistivity data were collected along 500m profile across the suspected fault line at two locations.

The fault is displayed by the presence of an expressive resistivity gradient until a depth of 20m with a strike of NW. The results from the resistivity survey were compared with the exposed section along a river just 200m from the location of ERT survey. The geological evidences of the fault suggest that the fault lies between granite and andesite. The presence of several colored fault gouges penetrated to the overlying sandy and boulder alluvial units, indicating the fault has moved several times in recent past and active in Quaternary time. More detailed paleoseismic investigation with age dating is required to assess the seismic hazard along this fault.