Can we identify all possible source faults?

*Manabu Hashimoto[1]

1. Disaster Prevention Research Institute, Kyoto University

I have been devoted to study of crustal deformation with space-borne synthetic aperture radar during recent years. The lessons I learned in this study is that earthquake source fault is complex.For example, source faults in the sequence of earthquakes in New Zealand since 2010 are its representative. Parallel faults rutptured during the April 2010 Iwaki, Fukushima earthquake. Furhtermore, the lower bound of M6.4 above that surface rupture appears may be questionable for practical use. We detected clear discontinuities in phase in interferogram that covers source region of the northern Ibaraki earthquake (M6.1) on March 19, 2011. Considering pattern of observed crustal deformation, it is reasonable that rupture reached the Earth's surface. Furthermore, we observed similar crustal deformation during an earthquake of M6.3 on December 28 in the same area. Discontinuity in phase were also identified at the almost same location. It is obvious that earthquakes of similar size recurred at a shorter interval than 6 year in such a narrow area. Based on these experience, I am skeptical about the rationality on the calculation of ground motion with limited number of sources.

It is easy to reject these observational facts as exceptions. Earthquake science has developed probably by seeking universality that are common in many examples and sophisticating it; i.e. finding law by focusing average in probability distribution. However, is it OK for discussion on construction of nuclear power plants in which people must consider long tail distribution? On the other hand, to what extent we should consider "exceptional" events mentioned above or events that have not occurred? It is regrettable that I do not have answer to these questions. I expect discussion among community of earthquake science today.

Keywords: source fault, crustal deformation, nuclear power plant

