From active faults to seismogenic sources: progress, issues and challenges

*J Bruce H Shyu[1]

1. Department of Geosciences, National Taiwan University

As one of the most tectonically active areas in the world, the island of Taiwan is characterized by frequent seismic activities and numerous active faults. As a result, one of the most crucial tasks for Earth scientists in Taiwan is to understand, assess, and mitigate future seismic hazards of the island. To achieve this, models of earthquake hazard, risk, and related social and economic impact of Taiwan need to be established through multidisciplinary collaborations, and the very first step toward this would be to construct a complete and updated seismogenic structure database for Taiwan.
One such database has been constructed in the past several years based on reviews of existing active structure databases and new information for structures that have not been thoroughly analyzed before. For example, the Central Geological Survey of Taiwan has published a comprehensive database of active faults in Taiwan, including all of the historically ruptured faults. Many other active structures, such as blind faults or folds that can be identified from geomorphic or structural analysis, have also been mapped and reported in several previous investigations. On the basis of such information, a preliminary version of this database has already been released and published earlier in 2016. This preliminary database includes primarily on-land structures, but has not included offshore structures that may also pose significant seismic hazards.
Therefore, we have been working on updating the seismogenic structure database in the effort to obtain sufficient data for offshore structures. In addition, based on historical earthquake events, we have also been working on proposing earthquake scenarios that involve ruptures of multiple structures, or only partial segments of a given seismogenic structure. These new additions and considerations, however, also created new challenges for the construction of the database. For example, many parameters, especially the long-term slip rates, of the offshore structures are extremely difficult to determine. The proposed frequency of multi-structure or segmented rupture events would also significantly influence the recurrence interval calculations. Although this seismogenic structure database would undoubtedly provide significant constraints for the calculations of seismic hazards in Taiwan, we suggest that the issues and challenges we identified will constitute the next most important questions to be solved for future seismic hazard assessment studies.

Keywords: seismic hazard assessment, active faults, seismogenic sources, Taiwan

