Reconstructed the source rupture and strong ground motions of the 1935 Hsinchu-Taichung Earthquake (M_L7.1) in Taiwan

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On 21 April 1935, a large earthquake with a local magnitude of 7.1 struck central Taiwan, named the Hsinchu-Taichung earthquake. It was the most destructive earthquakes in Taiwan history since 1600. This event was associated with two major faults: the northern one as the Shihtan reverse fault, and the southern one as the Tuntzuchiao right-lateral strike-slip fault. To understand its possible rupture history of the associated faults, and its potential impact to Taiwan of a destructive earthquake of this kind, we reconstructed the possible source characteristics and the strong ground motions of the 1935 Hsinchu-Taichung earthquake. We constructed the three main types of fault model for this event in view of historical triangulation data in the time period of 1917-1937, as two previously proposed fault models and a combined model. We investigated the spatial slip distribution based on these fault models from source inversion by using the triangulation data. In comparison to the triangulation data, we chose a best fault model for a scenario for ground motion simulation by Spectral-Element Method (SEM). The model suggested that this 1935 earthquake was composed of four fault-segments, as two observed surface rupture faults to the north by reverse faulting and to the south by strike-slip motion, and with two blind faults without surface rupture in between. We compared the spatial slip distribution, the ShakeMap, and the intensity distribution for various scenarios to examine the possible hazard from the reconstructed source model. This study suggests the possible multiple fault-segments rupture from adjacent fault segments with different styles of faulting. Special attention is needed for future seismic hazard evaluation from multiple faults rupture of this kind in addition to the single fault segment rupture made in current seismic hazard evaluation.