Structural variation along the Main Himalayan Thrust in the source region of 2015 Gorkha earthquake, Nepal

*Chintan Timsina[1], James Mori[2], Masumi Yamada[2]

1. Department of Geophysics, Graduate School of Science, Kyoto University, 2. Disaster Prevention Research Institute, Kyoto University

The 2015 Gorkha earthquake (M_w 7.8) in the central part of Nepal is the most studied earthquake in the Himalaya due to the availability of precise and multifaceted geodetic and seismic data. This earthquake is widely considered as the repetition of similar sized 1833 earthquake. Partial rupture, only at the down-dip portion of Main Himalayan thrust (MHT), during both 2015 and 1833 events contrasting the complete unlocked of whole seismogenic zone during great (M_w>8) earthquakes in the Himalaya strongly suggest the bimodal seismic behavior of the fault. Although, Gorkha earthquake occurred on relatively well-known section of MHT, both along and across-strike rupture segmentation models for MHT in this area are still a subject of hot debate.

Multiple studies on the Gorkha earthquake aftershock sequence have produce catalogs either from local and/or teleseismic arrival time data. All catalogs have similar features like two separate seismic belts located north and south of main coseismic slip area and narrow to broad along strike variation of northern belt, however, depths of the events among these catalogs vary significantly. Yamada et. al., (2019) produced the aftershock catalog by using an automatic onset and hypocenter determination procedure from continuous waveform recorded by 42 broadband and short period seismic stations deployed under the *Nepal Array Measuring Aftershock Seismicity Trailing Earthquake* (NAMASTE) network spanning the whole aftershock region from 25 June 2015 to 14 May 2016. In this study, we choose nearly 1500 aftershocks from around 15000 events of that catalog which are detected by more than 20 recording stations. The epicenters of these events cover the entire aftershocks zone and represent sufficient characteristics of aftershock sequence. We visually and manually inspect all the waveform and repick seismic phases arrivals. Using regional-scale double difference tomography, we simultaneously relocate the hypocenter and invert for both P and S-wave velocity models from these manually picked arrivals in the source regions of Gorkha earthquake. We compare our results with previously published catalogs and competing models for lithospheric structure in this area.

