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A Seismic Gap Study in the western offshore of Sumatra, Indonesia

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The extremely destructive earthquake in December 26 2004 and by the resulting tsunami was the worst natural disaster in recorded human history. However, the tsunami earthquakes continue to strike the west coast of Sumatra in the last 8 years. There were at least 12 events, the earthquake Magnitude between M = 7 to 8.9. In 2010, after 6 years of the 2004 event, an earthquake of a magnitude 7.8 resulted a destructive tsunami was also happened near Mentawai Island at West coast of West Sumatra Province. Here we present local earthquake data from local seismic network along the Sumatra region that provided by the Meteorology Climatology Geophysical Agencies of Indonesia (MCGAI). The data processing itself was started with building a minimum 1D P-wave velocity model, by using joint inversion of picked P-wave travel time; then we determined the correct relocation of the initial hypocenter provided by MCGAI. To see the spatial overview of the historical seismicity along the Sumatra subduction zone, we use IRIS-NEIC catalogue between 2004 and 2010. The result shows that there is a possible of seismic gap in the border of central – southern domain of Sumatra region. This region included in the Northern Sumatra Province near Batu Island. The historical earthquake along the Sumatra trench since 17th century showed that the last big rapture in this border of central – southern domain was occurred in 1797 by the magnitude of 8.8. In the other hand, the free-air gravity anomaly shows high values correspond to the N-S oceanic fracture zone. All the high values were found near the trench of Sumatra subduction zone and gradually lower values through the south. Regarding to the locked patches, the area below Batu Island was less coupled proposed as the result of the subducted Investigator Fracture Zone (IFZ). Through this evidence, in near future we try to investigate the P-wave velocity structure by using seismic tomographic technique. In particular, most of the events were happened in the Northern Domain and Southern Domain, meanwhile in Central Domain there were less. In this case we propose this seismic gap as a threat possible for the next big rupture and tsunami.