

Audio frequency magnetotelluric imaging and tectonic activity evaluation of the Cimandiri Fault, West Java, Indonesia

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The tectonic activity around the Cimandiri fault zone, Pelabuhan Ratu, West Java, Indonesia, has been analyzed for 30 years (1973-2013). The subsurface electrical resistivity structure close to the Cimandiri fault has been also investigated by twenty five audio-magnetotelluric (AMT) sites. The AMT exploration was carried out during two weeks, from July 27, 2009 to August 8, 2009. The sites were distributed on two lines along about 13 km x 6.5 km profile. There are two profiles of the AMT: (1) the A-A' line of the AMT which is perpendicular to the fault (2) the B-B' line of the AMT which is parallel to the fault. Two-dimensional modelling using the code developed by Ogawa and Uchida 2-D inversion has been applied in the AMT data. The result of tectonic activity analysis shows that the Cimandiri fault is the active fault. The subsurface electrical resistivity structure of the Cimandiri fault zone is characterized by (1) the A-A' and B-B' lines present a conductive zone (1-100 Ωm) from the surface up to the depth of 1 km, which is possibly associated with quaternary volcanics. At the surface, there are also some very conductive spots (1-5 Ωm) which are indicating the existence of the marine sediments in the study area. (2) The gradual conductive-resistive (500-1,000 Ωm) zone at the depth of 1-3.5 km overlays above a low resistivity zone (10-100 Ωm). This low resistivity zone may reflect the combined influences of a fluid network and the presence of the young and less compact sediments with the 500-1,000 Ωm zone as a cap rock that defines the upper boundary of the low resistivity zone (10-100 Ωm). Finally, the result of both methods presents that the Cimandiri fault is the strike-slip fault.

Keywords: audio frequency magnetotelluric, subsurface electrical resistivity structure, 2-D inversion, Cimandiri Fault, Indonesia