SCG57-27 会場:国際会議室 時間:5 月 28 日 15:00-15:15

北アナトリア断層帯下における地殻内粘性率の空間変化
The spatial viscosity variation in the crust beneath the western North Anatolian Fault

山崎 雅 [1*] ; Gregory A., Houseman[2]
YAMASAKI, Tadashi[1*] ; HOUSEMAN, Gregory A.[2]

[1] 産業技術総合研究所, [2] リーズ大学
[1]Geological Survey of Japan, AIST, [2]University of Leeds

The GPS velocity profiles across the western North Anatolian Fault (NAF) near the location of the 1999 Izmit rupture are characterised by: (i) before the earthquake, strain rate is localised in a region $<$100 km wide across the near-fault zone, and (ii) after the earthquake, near-fault relative velocities are up to ~150 mm/yr, being significantly higher than the long-term relative displacement rate of Anatolia with respect to Eurasia (~22 mm/yr). We previously showed that these characteristics can be explained if a localised weak zone (LWZ) in the mid-crust directly beneath the NAF northern strand is embedded in a relatively high viscosity background crustal layer [Yamasaki et al., 2014, J. Geophys. Res., 119, 3678-3699]. This study expands upon the previous study of Yamasaki et al. [2014], investigating in more detail a likely spatial viscosity variation beneath the western North Anatolian Fault (NAF), for which a simplified 3D finite element model is employed to solve the linear Maxwell visco-elastic response to periodically repeating right lateral strike-slip earthquakes under the presence of a constant-rate far-field loading. We tested in this study whether the LWZ in the mid-crust is required to be centred on the NAF northern strand. Horizontal offset of the LWZ from directly beneath the rupture zone of the 1999 Izmit earthquake should be less than ~10% of its width in order to preserve the approximate anti-symmetry of the GPS velocity profiles. We find that a LWZ between the NAF northern and southern strands, which may be expected from the spatial variation of low resistivities in the magnetotelluric (MT) images of Tank et al. [2005, Phys. Earth Planet. Inter. 150, 213-225] and Kaya et al. [2013, Geophys. J. Int. 193, 664-677], does not explain the GPS velocities. We therefore find no simple one-to-one relation between viscosities and resistivities beneath the western NAF. In this study we also investigate possible depth-variation of the background viscosity structure on which the LWZ centred on the NAF northern strand is superposed, and find that the background viscosities are required to be greater than ~2×10^{20} Pa s at depths shallower than ~30 - 35 km in the 40 km thickness of the crust in order to explain the high strain-rate zone in the pre-seismic velocity profiles.