

A new fault dating project on the Nojima and Arima-Takatsuki active fault zones—opportunities for integrated geo- and thermochronology studies

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Kyoto University is coordinating an integrated multidisciplinary study on the assessment of activity of active faults involving active tectonics, structural geology, geochemistry and geochronology of active fault zones in Japan, particularly the Nojima fault which triggered the 2015 Mw 7.2 Kobe earthquake and Arima-Takatsuki active fault zone which is one of the most active faults in Japan. The neotectonic Nojima and Arima-Takatsuki fault zones are currently investigated within trench and drilling sites providing unique fresh and unaltered sample materials of fault damage zones. Samples from the trench and drilling sites are investigated by a whole array of geophysical, geological and geochemical tools. The geochronological history and isotopic signatures of the fault zones will be investigated in detail from a relative high temperature frame work (U-Pb) of the host rocks, via fault zone activation and reactivation documented in authigenic illite (K-Ar) to very low temperature last fault motion and slip events (ESR, OSL and TL). The thermochronological framework will be investigated by ZFTA, AFTA and U-Th/He dating providing temperature information from ~ 300 to 70 °C. The compositions of major and trace elements as well as isotopic ratios of fault gouge samples will also be analyzed to understand the fault shearing and frictional heating processes. The combination of these methods will provide a unique integrated toolbox to constrain the timing of fault zone formation and the most recent event in geological timescale. In addition active fault drilling will start in spring of 2016 complementing the fault zone sample suite. Unique drill core samples from different depths at ~300 m, ~700 m and ~1500 m will be investigated using the new analytical protocols to test, compare and refine results obtained from near surface trench sites.