Constraining timing and conditions of brittle deformation in the shallow crust
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Neotectonic brittle faults are associated with near-surface deformation. Displacement on the fault planes can result to fault gouge composed of rock fragments and authigenic illite. Recent studies [1 to 7] have demonstrated the potential to determine the absolute timing of brittle fault history using isotopic dating techniques of clay minerals. The understanding of the timing of clay-rich fault gouge formation is important for: (1) hydrocarbon exploration as faults may act as either a conduit or a seal for fluids and/or hydrocarbons; (2) civil engineering in the evaluation of earthquake hazards and (3) ascertaining the suitability for waste storage.

K-Ar and 40Ar/39Ar data using micro-encapsulation of authigenic illite from gouge developed in different geological settings comprising magmatic, metamorphic and sedimentary rocks in Europe (Alps), Japan (Nojima fault) and Korea (Deokpori thrust) and Australia (Sydney basin) will be presented. Ar dating results are consistent with well-defined field constraints and bracketed by AFTA and ZFTA ages from adjacent localities. The data provide absolute time constraints on the youngest, retrograde, neotectonic movements.

References