ALLUVIAL VALLEYS: IDEAL AREAS TO IDENTIFY, QUANTIFY, AND DATE COSEISMIC DEFORMATION

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Seismic events that cause surface deformation or rupture in stream valleys provide a Holocene to Pleistocene record of the event(s). Because streams respond to subtle gradient modifications by changing their path, pattern, channel cross section, sediment-load volume and size, and aggradation/degradation, they can record deformation at a wide range of scales. Earthquakes event(s) may also be recorded by deformation or rupture of bedded sediment common in alluvial and lacustrine systems, by altered depositional and erosional patterns in response to various scales of deformation, liquefaction of saturated sand beneath the floodplain, and ground failure along banks and bluffs. In addition to the physical record for earthquakes, floodplain vegetation may also provide a biologic record of seismic events. Trees may experience trauma due to lost canopy, tilting, and severing of roots resulting in narrow annual rings. Subsidence or uplift may result in a growth response to a new water level such as an increase or decrease in ring width, modification of the tree morphology, or widespread mortality of selected species and new growth of other species more suited to the new hydrologic setting. Methods used to date various geomorphic, sedimentologic, and biologic responses to coseismic deformation include radiocarbon dating of organic matter in fluvial, lacustrine, and anthropogenic features, dendrochronology, optical thermoluminescence (OSL), amino acid geochronology, and diagnostic cultural artifacts from archeological sites that are common in alluvial valleys. In some cases deformation can be dated directly and in other cases it may only be bracketed by minimum and maximum dates.