

40AR/39AR DETRITAL MINERAL THERMOCHRONOLOGY IN ACTIVE FLUVIAL SYSTEMS

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Some of the most powerful tools available for establishing erosional histories in active orogenic systems are the $^{40}\text{Ar}/^{39}\text{Ar}$, (U-Th)/He, and fission-track cooling ages that can be obtained for detrital minerals from stream channels and young river terraces. The $^{40}\text{Ar}/^{39}\text{Ar}$ method is well-suited to such studies; the micas (particularly muscovite) are relatively resistant to grain-size comminution and alteration during erosion and transport, and yield information pertaining to the cooling of source regions through the ~375-325 C temperature range. Modern laser microprobe systems permit the routine determination of sufficiently large numbers of single-grain dates for a statistically significant characterization of the age population in most detrital samples.

Two applications of this technique will be reviewed here. The first is a thought experiment regarding the value of $^{40}\text{Ar}/^{39}\text{Ar}$ thermochronometry for rapid reconnaissance characterization of the thermal history of large regions; such studies may prove critical to efforts such as the U.S. National Science Foundation's Earthscope initiative, where the goal is large-scale studies of the lithosphere. The second focus of the presentation will be the results of detrital $^{40}\text{Ar}/^{39}\text{Ar}$ thermochronometry of modern sediments from rivers draining the southern flank of the central Nepalese Himalaya. We show how such data have been used both to model catchment-wide erosion rates, and to monitor the kinematics of recent deformation.