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A new perspective on hinterland tectonics – An example from the Siwalik basin, Pakistan

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Geochronological analysis of detrital grains in sedimentary basins has provided useful information, e.g. Cerveny et al. (1988). However until now this has been treated on single time planes by most workers. More interesting, is thus to understand the longer term tectonic evolution of the hinterland through time. This can be done by carrying out geochronological studies on grains from sedimentary horizons which have good time control. But, first it is important to check that the closure temperature of the phase and method in use has not been exceeded during burial in the sedimentary column. Basically, the importance of lagtime is stressed as the key indicator of tectonic activity in the hinterland. Using the concept of lagtime (Zeitler et al., 1986) specific patterns are recorded which can be interpreted in terms of events in the source region. In order to decrypt the significance of detrital grain ages in sedimentary basins, a new approach has been developed. Five characteristic paths identified by the change in age of detrital grain populations combined with the change in lagtime over time were identified. These paths are correlated to different geodynamic processes in the source regions. The addition of heavy mineral analysis can be a complementary tool in supporting the interpretations.

An example is presented from sediments of northern Pakistan. Zircon fission-track ages of detrital grains from sediments of the Siwalik basin of Pakistan presented by Cerveny and others in 1988 have been reinvestigated using a revised methodological approach. Single-age populations have been correlated through time and combined with published ages in the hinterland in order to interpret the tectonic history of the source area. Results show that steady-state evolution has not always existed; exhuma-

tion in the source regions has varied since $\sim$ 20 Ma with a major pulse between 12 Ma and 10 Ma. Earlier studies suggested that at this time the source of the sediments was the presently outcropping Kohistan Arc. We are able to demonstrate that this cannot be so but more likely the products of the erosion of the cover of the growing Nanga-Parbat Haramosh Massif.