Geophysical Research Abstracts,
Vol. 11, EGU2009-2460, 2009
EGU General Assembly 2009

Recognition and dynamics of syntectonic sediment routing systems, southern Pyrenees

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The erosional, transportational and depositional aspects of the biogeochemical cycles involving particulate sediment and solutes are integrated in sediment routing systems. The component parts of these tectonic-geomorphic systems communicate with each other, especially in response to changes in external forcing mechanisms such as tectonic perturbations and climate change; that is, sediment routing systems are characterized by important teleconnections. We are only just beginning to understand how these teleconnections work, and what it means for the spatial and temporal scales of system behaviour.

One strategy for investigating the dynamics of sediment routing systems is to link information on the denudation of upstream source regions with downstream patterns of deposition. This is most likely to be fruitful where upstream catchments are tectonically active. Sediment is released into basins whose long-term subsidence is also controlled by tectonic activity. The spatial distribution of subsidence and the magnitude of the sediment discharge from the catchment are critical factors in the dispersal of sediment of different grain size and composition away from a mountain front.

We investigate the coarse clastic sediment routing systems of mid-late Eocene age (40-34 Ma) that were deposited in basins located at the boundary of the Axial Zone and the thrust belt of the South-Central Unit on the southern flank of the Pyrenees, Spain. Most of the fan deposits of interest are found in the Pobla Basin, situated north of Tremp, which benefits from outstanding exposure conditions and rigorous previous work on biostratigraphy, magnetostratigraphy and sedimentology (Mellere 1993; Beamud et al. 2003). Distinct fan depositional systems can be identified and mapped on the basis of their sediment composition, detrital thermochronology, facies and architectures, which can be related to correspondingly distinct catchment properties (size, location, exhumational history, lithologies). Downstream fining of clasts of variable composition in streamflood fanglomerates is interpreted in terms of abrasion, which is minor, and selective deposition, which dominates. The observed downstream trends in different fan systems are used as a test for the selective deposition model of Fedele & Paola (2007).

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