A simple approach to modelling sedimentation along synsedimentary faults: WINGEOL / SEDTEC

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WinGeol/SedTec is a software package developed at the Institute of Geology (University of Vienna), which simulates erosion and deposition in dependency of topography, fault movements, lithological properties and sea level.

Sedimentation modelling is based on a cellular automata approach. Sediment transport is induced by elevation or concentration differences between neighboring cells. In the first case a topographic driven mass transport is generated, in the second case sediment transport due to suspension is modeled. Grain size reduction during sediment transport is included. The spatial distribution of different rock types are extracted from a lithological raster map at the beginning of the simulation process. Rock types are characterized by their resistance to erosion and grain size reduction during sediment transport. The progress of the simulation can be checked with control point data, which define maximum sedimentation rates at certain locations.

Input data for simulation include elevation, lithology, fault data and tabular data from various data sets:

- digital elevation model (simple plane or real world model)
- fault data (optional)
- lithological raster map (optional)
- lithological parameters (resistance to erosion, ...)
- sea level (single value or curve)
- control points (optional)

Faults are defined by the following parameters:

- geographic position
- start and end time of activity
- displacement vector (direction and length)
- translation and/or rotation

Examples simulated with WinGeol/SedTec include landscape deformations due to translation and rotations of several fault blocks, erosion and deposition along a steep scarp and grain size distributions in small grabens and pull apart basins.

Geology of the Galila region in the southern Afar depression, Ethiopia: preliminary report

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The geological and petrological investigations (FWF Project P15196) in the southern Afar depression of Ethiopia support an international palaeoanthropological research-team (PAR) under the leadership of Horst Seidler from the Institute for Anthropology, University of Vienna. The research area is situated within the district of the village Gadamaitu [N 9° 44.101', E 40° 27.368'], towards the east of National Road No. 18 to Aseb. Mount Galila forms the centre of the research area, situated about 20 km towards the east of the recently active rift axis (Hertale Graben). The NNE-SSW striking Hertale Graben represents a northern segment of the Main Ethiopian Rift (MER) thus being northern part of the East African Rift system.

Stratigraphically, the fossiliferous lacustrine and fluvial deposits, as well as the intercalated volcanic layers of the Galila area, belong to the "Upper Stratoid Series" (5-1.4 Ma) and will be named the Galila Formation. They are similar to some sedimentary successions of the Awash Group to the northwest, from which very famous early hominid fossils have been described (e.g. "Lucy" *Australopithecus afarensis*, 3.4 Ma; "Bodo"-skull *Homo heidelbergensis*, 0.6 Ma). The sedimentary and volcanic succession represents an older rift sedimentation, due to Miocene–Pliocene opening in the Afar depression. Presently, they are exposed on the eastern shoulder of the rift structure, which has been active since c. 2 Ma.

In the Galila Formation, 7 main volcanic, pyroclastic and tuffitic horizons have been observed as marker beds, which can be used for subdivision into members. The volcanic rocks comprise basaltic lavas, ignimbrites, tuffs and tuffites and represent short volcanic events. Radiometrically dated pyroclastic horizons and their geochemical fingerprints will be helpful in establishing a tephra stratigraphy for long-distance correlations with other hominid sites of the northern East African Rift.