Appendix I: Program and time table

Background literature, a multidisciplinary data base on the Kirschgraben study site, tutorials (e.g. on SAGA GIS, regression analysis with R etc.), working materials and documents for the "hands on" approaches will be sent to all participants at the 1st of September.

Day 0 (26.9.2010): Arrival

- Arrival (bus shuttle from Frankfurt International airport and train station)
- 19:00 Ice breaker in the historical "Kernsmühle" mill

Day 1 (27.9.2010): Keynote talks on complexity science and geomorphology

Theory:
- Complexity theory, a paradigm to think about systems and scales (K. Fraedrich)
- The role of complexity in process geomorphology and geoarchive geomorphology (R. Dikau)
- Soil layering – a key to analyzing complex behavior of past environments (C. Lorz)

Data gathering:
- Sediment budgets and process characterization in a nonlinear world (P. Houben)

Data analysis/interpretation:
- Temporarily changing Holocene sediment budgets (G. Verstraeten, enquired)
- Interannual, decadal and multidecadal scale climatic variability and geomorphology (H. Viles)

Day 2 (28.9.2010): Data gathering in a complex system

8.30-12.30: Guided field tour to key locations and sediment exposures in the Kirschgraben catchment (A. Kranz, H.-R. Bork)

14.00-18.00: Field work on present process activity and geomorphologic reconstruction, sediment budget and dating methods (*activities are located at several bases in a walking distance in the catchment; small groups of participants rotate from one activity to the next*):
- Introduction the environmental history of the Kirschgraben Catchment (A. Kranz and H.-R. Bork)
- Event-based interpretation of complex fluvial and hillslope archives (H.-R. Bork)
- Enhanced dating and geochemical approaches for complex, multiphase and multiprocess hillslope sediments (M. Fuchs)
- 3D-quantification of sediment bodies with different geophysical approaches to reveal complex internal structures (M. Krautblatter)
- High-resolution terrestrial laserscanning of recent gully erosion (T. Heckmann)

Day 3 (29.9.2010): Data analysis, processing and interpretation

8.30-12.30 Data analysis of terrestrial laser scanning and near surface geophysics (*both topics perform a two hour "hands on" tutorial for 15 participants each*)
- High-resolution laserscanning (T. Heckmann)
- 3D near surface geophysics (M. Krautblatter)

14.00-18.00: Spatial prediction of soil properties (A. Papritz)
- Key lecture: Nonlinear spatial prediction of soil properties from point samples (A. Papritz)
- Discussion: Spatial predictive modeling and interpolation techniques
- Tutorial: Spatial analyses and prediction using SAGA GIS and R

Day 4 (30.9.2010): From observations to modeling

8.30-12.30 Spatial prediction of soil properties (*"hands on" tutorials continued in small groups, supervision by A. Papritz, W. Schwanghart, T. Heckmann)*

14.00-18.00: Deriving a conceptual model

- Key lecture: On the knife's edge between overwhelming complexity and undue simplicity (T. Coulthard)
- Discussion: Conceptual models - finding simplicity in complex systems
- Tutorial: Formulating the basic equations required for a numerical model based on the conceptual models

Day 5 (1.10.2010): Modeling and validation strategies

8.30-12.30: Assessment of model sensitivity to uncertainties of input data and error propagation

- Key lecture: Introduction to CAESAR*, a geomorphologic, numerical model of landscape evolution. Scopes and limitations (T. Coulthard)
- Tutorial: Simulations of the sensitivity of the CAESAR model to uncertainties in the input parameters

14.00-18.00: CAESAR model runs and assessment

- Tutorial: Event-based and spatially distributed hydrological and geomorphological model of coarse sediment transport
- Discussion: Nonlinear model results vs. findings gained in the field, available data and prior interpretations.

(*The Cellular Automaton Evolutionary Slope and River model is an event-based and spatially distributed hydrological and geomorphological model of coarse sediment transport. The numerical engine of the model uses time steps of different lengths and is thus capable of simulating sequences of extreme events on time scales of tens to thousands of years. Catchments tend to respond in a spatially heterogeneous manner and non-linearly to environmental changes owing to the passage of sediment waves, variable local sediment storage and availability, and large- and small-scale thresholds for sediment transfer within each catchment.)

Day 6 (2.10.2010): Plenary session: Process and archive geomorphology in a complex world
Moderation: R. Dikau

8.30-12.30: Plenary session I

- Discussion: The explanatory power of the complex system theory with respect to theory building, the derivation of hypotheses, data gathering/analysis and modelling strategies (R. Dikau).

13.30-14.30: Plenary session II: Joint output

- Discussion: Joint article (geomorphology or so) on the topic of the summer school based on the theoretical advances achieved and supported by best practice examples collated during the course of the summer school.

Departure from the venue will be after the coffee break.