Forward Modeling - A tool to figure out effects of fault zone thickness on seismic images

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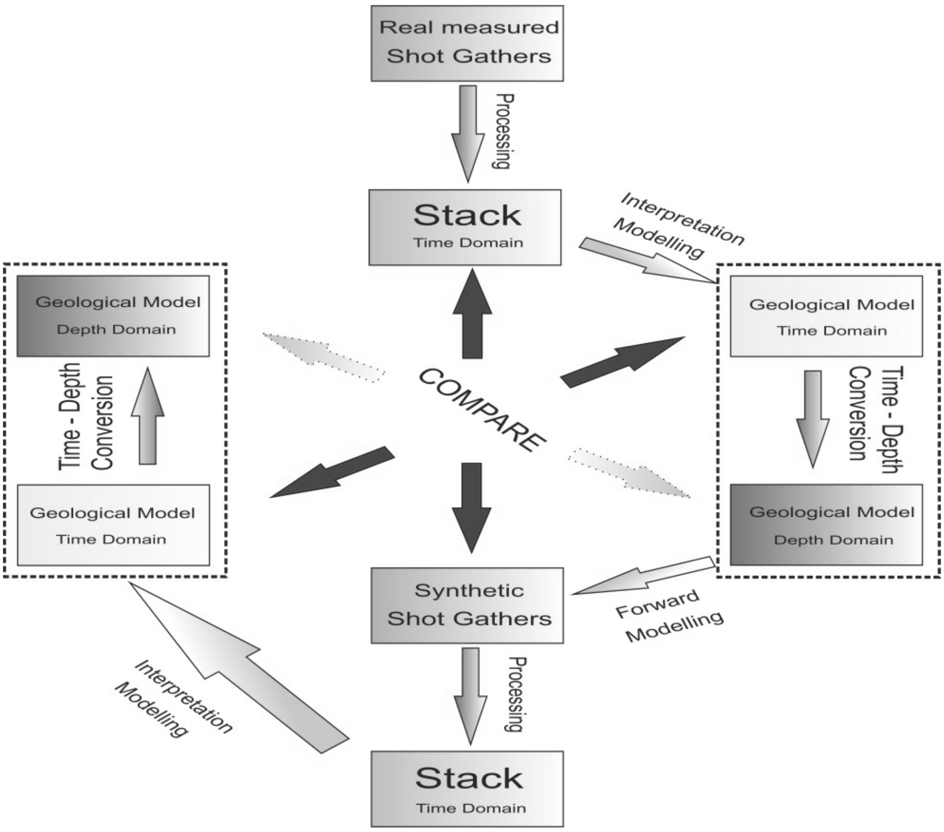
In the course of geothermal projects we came up with the problem of fault zone modeling. In seismic data we are only able to see discontinuities which we interpret as two-dimensional faults. Due to the seismic resolution it is generally impossible to depict the fault thickness. With this research project we try to investigate the effect of fault zone thickness on the seismic images. For this purpose we apply seismic forward modeling onto existing geological models. This abstract represents the initial phase of this research project. In a first step we started with a simple geological model to become familiar with the workflow of seismic forward modeling. As an example an existing geological model from the Upper Rhine Graben is used to verify the interpretation and geological model. With the result of the forward modeling process synthetic shot gathers were generated.
With the help of the presented workflow it is possible to verify geological models. In the mentioned case study the comparison of horizons derived from the real seismic data and the synthetic seismic data in the time domain show a maximum error of approximately ±20ms.



Provenance and depositional processes in conglomerate and sandstone on Mitterberg (near Gröbming, Austria)

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The Upper Enns Valley does not show a homogenous structure in the area between Gröbming, Öblarn and St. Martin. The Mitterberg (elevation 870 m) divides the landscape. The Enns River runs along its southern side, the northern side is a suggested water gap. Provenance analysis of the conglomerate shows primarily the Niederen Tauern as source. 60% of the clasts are of crystalline origin, 26% are unmetamorphic carbonates, 13 % are sandstone. Significant for the conglomerate on Mitterberg ist he occurrence of carbonates derived from the NCA, like Gutenstein and Hallstadt Limestones as well as Fellerbach-Schichten. The dearth of fine fractions identifies the Mitterberg as an older deposition and not as a "Niederterrasse" as suggested before. This leads to the conclusion that the sedimentary pattern has undergone a change between Pleistocene and Holocene times. Cross- bedding surfaces indicate bipolar transport directions, towards the NNE and S.

Coupled Human-Landscape Systems in Mountain Regions - A Conceptual Model

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Human effects on natural processes have shifted from short-lived changes in microenvironments to larger scale of human impacts or even global scale human impact on the natural environment. In Austria, for example, nearly any river or catchment is affected by engineering structures and changing land-use. Conversions of riverine retention areas into arable land or built-up areas turned common events such as high water flows into natural hazards (i.e. soil erosion, floods) and increased hazard-induced risk. Thus, the impact of landscape processes on the human system is in the focus of natural hazard and risk research. The increasing strength of these interactions gives rise to the possibility that human agency and landscape processes can no longer meaningfully be treated separately, but rather only as an inter-weaved, coupled system. Many examples can be given for instance from natural hazards highlighting these interactions such as the use of areas prone to floods for settlement purposes, leading to the regulation of rivers by levees, which in turn encourages further development and increased values in areas behind these structures. Such coupled developments are of particular societal and political relevance in highly active areas such as coastal environments, floodplains and densely-populated mountain regions of the world. However, research questions on the interlinkages between landscape systems and human systems have not sufficiently been studied so far.
This poster gives an overview of a newly developed qualitative conceptual model for coupled human-landscape systems in alpine regions to achieve more insights in the two-way interaction between landscape and human systems. The conceptual models involve statements of the basic interactions between the system components and possible feedbacks, self-organization and emergent structures, as well as system behavior and phase transition. Furthermore, the conceptual model will be the basis for the development of a numerical model. The examples from different studies in high and low mountain regions also highlight the observed changes in the landscape system and the historical development of the social system, as well as the results of these two-way interactions.

Multidisciplinary studies on three active rock glaciers in the Hohe Tauern Range, Austria

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Active rock glaciers are large-scale creep features in high mountain environments consisting of perennially frozen debris material (talus and/or till) supersaturated with interstitial ice and ice lenses of variable volumetric ice extent and origin. Therefore, rock glaciers are indicators for present permafrost conditions. High mountain areas such as the European Alps are recognized as being particularly sensitive to the effects of the ongoing climate change. Permafrost areas and hence active rock glaciers are prone to warming and consequently thawing also creating potential threat to human activity and infrastructure in alpine and subalpine environments. In order to increase knowledge about permafrost occurrence and dynamics in Austria and the Eastern European Alps, the nationally funded project "permafrost - Austrian Permafrost Research Initiative" was launched in 2010. permAfrost is a first step to establish a nation-wide permafrost monitoring program. One work package of permAfrost focuses on climate-induced spatio-temporal changes of rock glacier kinematics and temperature regime of permafrost at three active rock glaciers (Weissenkar, Hinteres Langtalkar and Dösen) in the Hohe Tauern Range, Central Austria. This work package aims to continue and improve previous research and knowledge in the field of kinematics, internal structure, volumetric and thermal conditions of rock glaciers. A multidisciplinary approach was chosen to reach this aim by applying geodesy, aerial photogrammetry, terrestrial laser scanning, different