Historical seismicity - A review of the 1590 earthquake

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The project „Historical Earthquakes in Lower Austria“ serves to complete the Austrian Earthquake Catalogue to gain a better image in terms of seismic hazard (see also HAMMERL 2007, LENHARDT et al. 2007).
The project aimes at the investigation of
- so far unknown earthquakes,
- fake quakes, and
- the correction of false catalogue entries.

To improve the seismic hazard assessment in Lower Austria the project focuses mainly on the research of gaps and the restudy of the most important historical earthquakes in the area like the damaging Neulengbach earthquake of 1590 09 16 with the epicentral intensity I_0=9° EMS.
The results of the project among others – the translation, the interpretation and the documentation of the original sources, the intensity estimation for each place (IDP´s - intensity data points) is shown for the example of Neulengbach.
The question where the actual earthquake occurred can only be tentatively answered. However, when comparing historical reports of local damage with the gravity field in Lower Austria in the vicinity of Neulengbach points towards a flat dipping and N-S-striking thrust fault. Such a mechanism would explain the reconstructed historical pattern damage.

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The Neogene-Quaternary magmatism of the Carpathian-Pannonian Region and its geodynamic relationships

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Neogene to Quaternary volcanism of the Carpathian-Pannonian Region is part of the extensive volcanic activity in the Mediterranean and surrounding regions. The volcanic rocks can be divided into four main groups based on their geochemistry: (1) Miocene (21-13 Ma) silicic pyroclastic (mostly ignimbrite) suites; (2) Middle Miocene to Quaternary (16.5-2 Ma) calc-alkaline volcanic rocks; (3) Miocene to Quaternary (15-0.02 Ma) potassic and ultrapotassic rocks; and (4) Late Miocene to Quaternary (11-0.2 Ma) alkaline sodic volcanic rocks.
Using the spatial and temporal distribution of the magmatic rocks and their major and trace element and Sr-Nd-Pb isotope characteristics, lithospheric extension in the Pannonian Basin could have a major role in the generation of the magmas. Dehydration of the subducting slab resulted in thorough metasomatism in the mantle wedge during Cretaceous to Early Miocene, lowering the melting temperature, and therefore playing an indirect role in the generation of magmas later on. Mixing between mantle-derived magmas and lower crustal melts was an important process at the first stage of the silicic and calc-alkaline magmatism in the Northern Pannonian Basin. However, the crustal component gradually decreased with time consistent with a magmatic activity in a continuously thinning continental plate. Calc-alkaline volcanism along the Eastern Carpathians was mostly post-collisional and could be related to slab break-off process. However, the fairly young (<1.5 Ma) potassic magmatism at the southeasternmost segment of the Carpathian volcanic arc could have been related to lithospheric delamination under the Vrancea zone. Alkaline basaltic volcanism began at the end of rifting of the Pannonian Basin (11 Ma) and continued until recently. A mantle plume beneath the Pannonian Basin is highly unlikely as indicated by the distribution of the basaltic volcanic fields and the calculated mantle potential temperatures. Mafic magmas were formed by small degree partial melting in a heterogeneous asthenospheric mantle, which has been close to the solidus temperature due to the lithospheric extension in the Miocene. Significantly, the basaltic volcanic fields are located mostly on the western and northwestern margins of the CPR, where the lithosphere/asthenosphere boundary shows a steep gradient. Thus, the cause of CPR basaltic volcanism could be an eastward flow of sublithospheric mantle from beneath the thick Alpine lithosphere. The mantle flow could have been triggered either by the thin-spot suction beneath the Pannonian Basin or by slab roll-back beneath the East Carpathians. At the western margin of the CPR, this mantle flow could have had a significant vertical component due to the steep lithosphere/asthenosphere boundary, leading to decompression melting. In contrast, eruption of alkaline mafic magmas at the southeastern margin of the CPR can be explained by upwelling of hot asthenospheric mantle due to slab detachment.

Karstentwässerung im Kaisergebirge: Modellkonzept - hydrologisches Modell - Konzeptmodell

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Die Erkundung von Wasserressourcen aus verkarsteten Festgesteinsaquiferen zur Trinkwasserversorgung erfordert gerade bei der Quantifizierung des nutzbaren Dargebots den Einsatz adäquater Erkundungs- und Auswertemethoden. Die Komplexität von Karstaquiferen drückt sich vor allem darin aus, dass in derartigen Gebieten kaum jemals orographische Einzugsgebiete mit hydrographisch wirksamen übereinstimmen. Im Rahmen des Kompetenznetzwerkes „Wasserressourcen“ war die Hauptzielrichtung eines Arbeitspakets die Erarbeitung von neuen methodischen Grundlagen zur Erkundung von Karstaquiferen in Gebirgsräumen und damit verbunden die Abgrenzung hydrographisch wirksamer Einzugsgebiete unter Einsatz physikalisch basierter hydrologischer Modelle (BENISCHKE et al. 2008). Die Erarbeitung der Grundlagen und konkrete Tests zur Quantifizierung hydrologisch relevanter Kenndaten erfolgten im intensiv verkarsteten Massiv des Kaisergebirges.
Für die Simulation aller Teilkomponenten des Wasserhaushalts wurde das flächendetaillierte integrierte hydrologische Modell MIKE SHE herangezogen. Der Schwerpunkt bei diesem Modell ist die Koppelung aller hydrologischen Prozesse, es werden Schneefall, Schneeschmelze, Evapotranspiration, Infiltration und die Wasserbewegung in der ungesättigten Zone sowie der Grundwasserabfluss für jede Zelle nachgebildet. Die Abflüsse aus den Pixeln werden sodann den orographischen Einzugsgebieten entsprechend zusammengefasst, an denen teils kontinuierliche, teils