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| Ber. Inst. Erdwiss. K.-F.-Univ. Graz | ISSN 1608-8166 | Band 20/1 | Graz 2014 |
| PANGEO AUSTRIA 2014 | | Graz, 14. September 2014 – 19. September 2014 | |

New insights to the seismic potential of the central Vienna Basin Transfer Fault (Lasee segment)

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The NNE-SSW striking left-lateral Vienna Basin Transfer Fault (VBTF) is characterized by moderate seismicity ($I_{max}/M_{max}=8-9/5.7$). Seismic slip rates calculated from cumulative scalar seismic moments vary along the VBTF between 0.5-1.1 mm/a at its tips and the apparently seismically locked central Lasee segment. Geological and morphological data, however, suggest long term horizontal Quaternary slip rates of 1-2 mm/a for the VBTF.

In order to address this deviation between long-term and short-term slip rates at of the VBTF, we investigated the tectonically controlled western margin of the Pleistocene Schlosshof terrace at the Lasee segment (dated to approximately 200-300 ka using IRSL from feldspar). Research presented here include LIDAR-based DEM interpretation, geophysical surveying, and paleoseismological trenching. Results from 3D trenching gives evidence of at least 3 major earthquakes since ~90 ka, with the most recent one occurring after ~40 ka. Observed horizontal offset of channels crossing the fault suggests that slip along the VBTF seems to be accomodated by earthquakes with estimated magnitudes of ~7 and return periods of several thousand years. Geophysical surveying helps to pinpoint the normal component of the predominant strike-slip character of the VBTF.

All data are included in a 3D model and provide thus an insight into the Quaternary displacement of the Lasee segment that represents a seismic gap along the VBTF. This result, together with the fact that additional fault branches as part of the flower structure are still not investigated, indicate that the seismic potential of the Lasee segment might be higher than historical seismicity suggests.