SEISMICITY OF THE VIENNA BASIN

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The Vienna basin is regarded as one of the most prominent seismic active regions of Austria. Stronger earthquakes tend to occur along a major NE-SW striking fault structure, crossing Wiener Neustadt, Ebreichsdorf and Schwadorf (Fig.1), most probably at a depth of approximately 7 km. In all documented cases the prevailing mechanism could be interpreted as sinistral strike-slip faulting. Following Meissner & Strehlau (1982), we may conclude, that peaks of the focal depth-distribution (Fig.2) also coincide with the maximum of the prevailing shear stress. The more emphasised these peaks are, the more developed should a geological structure be in order to generate more often seismic events at similar depth. This fact could be observed on several occasions, when earthquakes of magnitude 5 and above originated below the Vienna basin. Earthquakes of this magnitude happen on average every 25 years in this seismic region.

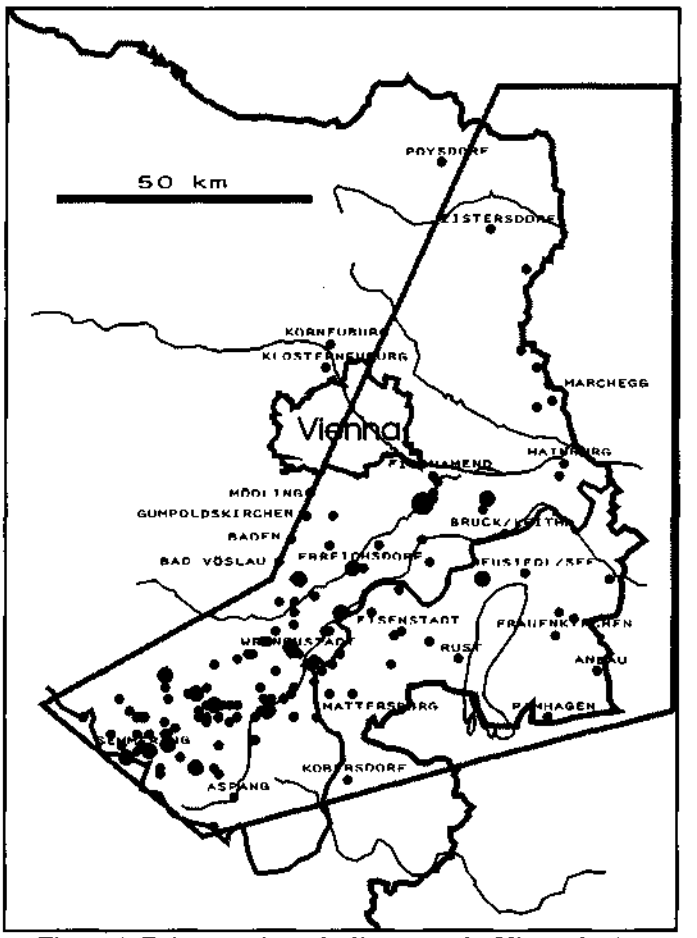

Figure 1. Epicentres in and adjacent to the Vienna basin.

At a depth of around 7 km most favourable conditions seem to exist, which enhance the occurrence of faulting processes due to high shear stresses at the bottom of the brittle crust. This observation applies not only to the Vienna basin but also to those regions in Austria, which experience similar seismic activity, such as the Inn-valley in Tyrol or the Mur-Mürz-valley in Styria.

Considering the spread of the focal depth distribution in the Vienna basin, and postulating a thickness of the seismogenic layer of 5 km - resulting from varying focal depths between 3 and 8 km -, we end up - according to Wells & Coppersmith (1994) - with a magnitude of M=5.6. Such an earthquake needs to be considered already as of extreme nature. Related recurrence intervals cannot be estimated with the accuracy which is needed for sound probabilistic hazard estimates. Therefore, geological investigations are deemed extremely useful in this regard.

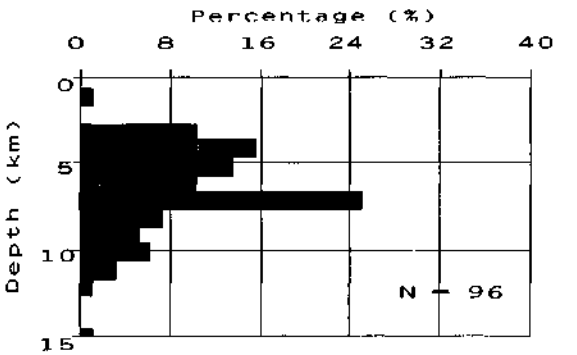

Figure 2. Focal depth distribution in the Vienna basin.

References:

Meissner, R. & Strehlau, J. 1982. Limits of stresses in continental crusts and their relation to the depth-frequency distribution of shallow earthquakes. Tectonics, Vol.1, No.1, 73-89.

Wells, D.L. & Coppersmith, K.J. 1994. New empirical relationships among magnitude, rupture length, rupture width, rupture area and surface displacement. Bull.Seism.Soc.Am., Vol.84, No.4., 974-1002.