



Seismotectonic characteristics of the Krško Basin with relation to seismic safety of existing and planned nuclear infrastructure

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The Krško Basin hosts complex infrastructure and is being investigated as a potential site for several future projects including a new NPP and a low and intermediate level radioactive waste repository. A large database of geological, geophysical and geotechnical data has been accumulated, producing increasingly detailed tectonic and seismotectonic models of the Krško Basin. The first tectonic and seismotectonic investigation campaign was undertaken in the 1970s for the first Krško NPP (Arsovski et al., 1973). The next study (Fajfar et al., 1994) was followed by an extensive geophysical survey in which basin axis-trending syncline was reevaluated (Persoglia, ed., 2000). In 2004 the geological, tectonic and seismotectonic characteristics of the Krško Basin were readdressed by performing a periodic seismic hazard assessment for the NPP (Swan et al., 2004). After which, a series of field investigations were conducted for the potential radwaste repository site evaluation (Brenčič, ed., 2006; Petkovšek, ed., 2009). In 2008-2013 a set of geological, geotechnical and seismological investigations were performed for the proposed new NPP unit (Bazargan-Sabet et al., 2010). As part of this project the seismotectonic model and the seismic source model were updated (Bavec et al., 2010a,b). Particular attention was given to the Libna fault (Bavec et al., 2013), which was also the subject of a follow up study to further evaluate the age of deformed sediments in the basin (Cline et al., 2013). A new phase of geological, geophysical and geomorphic investigations is being undertaken in the Krško basin by the team of Rizzo Associates and Geological Survey of Slovenia to refine on the geological and seismological inputs to the planned PSHA.

The Basin has experienced moderate and dispersed seismic activity. The catalogue of known earthquakes in the region (ARSO, 2011) extends back to the early 17th century. The strongest earthquake in the Krško basin was the January 29th 1917 Mw=5.7 Brežice (IMSK=VIII) (Živčič et al., 2010). In 2002 a seismic network was built that now consists of five stations within 15 km of the NPP (Vidrih, ed., 2006).

The Krško Basin generally coincides with the Krško syncline stretching from the Novo Mesto district to the Hrvatsko Zagorje in Croatia. The stratigraphic succession consists of Mesozoic basement sedimentary rocks, overlain by mostly clastic Neogene sediments and covered by Plio-Quaternary and Quaternary terrestrial sediments, and very young fluvial deposits. There are indications for faulting in the Plio-Quaternary deposits while the Mid-Pleistocene terrace remnants are tilted towards the pre-Quaternary Krško syncline axis in both limbs of the syncline, indicating post-Mid-Pleistocene folding (Swan et al., 2004). Late Pleistocene and Holocene surfaces are not tilted.

The Krško syncline is placed in the extension of the Mid-Hungarian zone. This zone borders with the Sava compressive wedge to the N (Placer, 1998) and the Dinaric tectonic zone to the W. The position of the syncline near the intersection of the three structural domains is resembled in its seismotectonic characteristics.