Mid-crustal earthquake swarm generation in West Bohemia/Vogtland: A review of suggested source processes and implications for a planned ICDP proposal

Torsten Dahm (1,2), Tomas Fischer (3), Sebastian Hainzl (1), Josef Horálek (4), Pavla Hrubcová (4), and Michael Korn (5)

(1) Deutsches GeoForschungsZentrum (GFZ), Potsdam, Germany , (2) Institute of Earth and Environmental Sciences, University of Potsdam, Germany, (3) Faculty of Science, Charles University, Prague, Czech Republic, (4) Institute of Geophysics, Academy of Science of the Czech Republic, Prague, Czech Republic, (5) Institute for Geophysics and Geology, University of Leipzig, Leipzig, Germany

The repeated occurrence of earthquake swarms in West Bohemia and Vogtland in the Czech-German border region is an outstanding phenomenon. It represents a manifestation of an intraplate swarm activity at the western part of the Eger Rift, and it has been active for several hundred years. The documented most energetic, historic swarms occurred in 1824, and at the break of 19th and 20th centuries. Since 1985 the activity has been concentrated in the area of Nový Kostel (Czech Republic) where five ML 3+ swarms has already clustered in a depth range of 6-10 km. The inter-swarm-period varied between 11 and 3 years, and the rate of released seismic moment appears to increase during the swarms.

During the past decades several models were suggested to explain the generation and the dynamics of these mid-crustal earthquake swarms. While early studies considered only tectonically driven processes as possible generation mechanism, the more recent data and studies emphasized more and more the role of magmatic fluids and CO_2 degassing beneath the seismogenic depth.

The presentation aims to review different types of models in the light of the newest data. We discuss the consequences of different models and if and how models may be verified by experiments. We discuss how an ICDP deep drilling project may contribute to resolving open questions on the swarm generation process and the possible consequences at the surface.