



## REVIEW OF DOCTORAL THESIS

**Title:** **Isotope hydrogeology and geothermal applications to clarify the origin, the sustainability and the character of groundwater flow”**

**Author:** **Mgr. Hana Jiráková**

On the basis of application from the Faculty of Natural Sciences of Charles University I prepared the review of doctoral thesis “Isotope hydrogeology and geothermal applications to clarify the origin, the sustainability and the character of groundwater flow” by Mgr. Hana Jiráková.

From the formal standpoint the submitted thesis consists of six chapters (143 pages), references and annexes.

According to my opinion the doctoral candidate selected very topical problem to be solved with important practical contribution to hydrogeological investigations of Bohemian Cretaceous Basins and Aquitaine Basin. Author clearly presented the aims and objectives of work. The thesis summarizes the results of several research projects with the aim to improve knowledge about the groundwater recharge history, sensitivity of aquifers to climatic changes, different groundwater recharge processes and timing within Europe and geothermal development in the Bohemian cretaceous Basin. Four case studies were carried out in the scope of the work:

- 1/ Palaeorecharge conditions of the deep aquifers of the Northern Aquitaine region (France)
- 2/ Carbon isotopes to constrain the origin and residence time of groundwater in the Cretaceous Basin of Bohemia (Czech Republic)
- 3/ Insight into palaeorecharge conditions of European deep aquifers
- 4/ Geothermal assessment of the deep aquifers of the north western part of the Bohemian Basin, Czech Republic.

The thesis consists of manuscript introducing briefly the objectives of the thesis and methodology and in chapter 5 objective compliance and perspectives for further research studies. The results of studies undertaken are presented in the form of published papers or papers in press in chapter 4. Since the papers were published in high quality peer reviewed journals they obviously present the research study with very thorough description of data sources and methods. The results of studies are in-detail discussed including uncertainties and challenges for further investigations.

It can be stated that doctoral thesis is very well structured. The layout of thesis is logical and balanced. The author proved high scientific level much above average of PhD. thesis. She proved deep knowledge of scientific methods, put together extensive database of information. She was able to apply the isotope, geochemical and geothermal investigation in a complex study. The synthesis of all available information, new investigations improved the knowledge about groundwater dynamic and geothermal regime in the part of Bohemian Cretaceous Basin as well as of paleorecharge conditions of the deep aquifers of the Northern Aquitaine Basin.

I have only one formal comment with very low importance. In manuscript some of the references are missing in the list e.g. Němeček et al. (1991,1992), Šilar (1976), Pačes et al. (2008), Mazor (2004).

Question for discussion: Could you specify the methods of determination of thermal conductivities used for geothermal applications? Are all values based on laboratory measurements done on core material or in-situ thermal response tests were applied as well?

## **CONCLUSION**

Doctoral candidate proved her ability to scientific work and brought new knowledge in development of scientific field of isotope hydrology investigations. Therefore I recommend accepting her thesis for defense and after successful defense awarding PhD degree.

doc. Ing. Nada Rapantova, CSc.

Ostrava, 18.3.2011

