RUHR-UNIVERSITÄT BOCHUM

RUB

INVITATION TO THE PHD-COLLOQUIUM OF THE FACULTY OF GEOSCIENCE

Date: 18th January 2024 at **16:00**
Room: IA 02/445
Zoom: 618 2030 8759, passcode: 884319
Moderator: Roman Fritz

16:10 to 16:30 Anne Mohr
– Imaging the Alpine subsurface – Toward resolving 3D small-scale crustal structure

16:35 to 16:55 Manuel Ditz
– Generating Teleseismic Surface Waves with a Hybrid Forward Solver

17:00 to 17:20 Dilshan Bandara
– Origin and controls of (hot) springs in an amagmatic geologic setting: an example from Sri Lanka

17:25 to 17:45 Annika Korte
– Influence of neuroscientific processes on the effectiveness and efficiency of cognitive maps

All interested parties are kindly invited to attend in the colloquium.

Join on Zoom via the QR-Code:

LIST OF ABSTRACTS

Anne Mohr

Understanding the orogeny of the Alps has long been a subject of debate. With the advent of geophysical imaging, a look beneath the surface was possible for the first time, which helped immensely in the tectonic interpretation of the Alpine structure. However, both the scale and the resolution of the subsurface models was not good enough to answer pressing questions. The Alp Array initiative has therefore deployed a dense network of seismological stations across the greater Alpine region. Using this data, we want to perform an inversion that resolves small-scale crustal structure. For this purpose, a method for the computation of P-phase high-frequency teleseismic seismograms is currently being developed, in particular involving the calculation of seismic travel times and amplitudes. Due to computational cost considerations, the calculations are performed using a 1D velocity model in the bulk of the Earth, switching to a full 3D treatment only in the study area.

Manuel Ditz

In order to understand how earth is internally structured, seismologists have been making use of a wide range of tomographic methods. Many of these rely on synthetically generated seismograms generated through computer simulations. This talk will give an introduction of earthquake simulation with a special focus on teleseismic Surface Waves.

Dilshan Bandara

Hot water springs are generally found in active tectonic settings, especially volcanic tectonic settings, due to the elevated geothermal gradients in such terrains. Sri Lanka is an old and amagmatic tectonic setting, not the typical location for thermal springs. Still, nine hot springs are known in the lowlands of the island. Based on previous geochemical studies, the hot springs in Sri Lanka are of meteoric origin and recharged at higher altitudes. Therefore, the geothermal system in Sri Lanka can be categorized as an orogenic (mountainous) geothermal system (OGS). However, the recharge zones and hot springs locations in Sri Lanka (~ 100 km) have large distances than other known hot springs in similar settings worldwide (~ 10-15 km). This poses a question, how the recharged water circulates such a long distance, what are the controls of the spring localization, what is the heat source and or can background heat flow itself be enough to heat the water to the calculated peak temperature of ~ 100-130 °C. With the aim to understand these questions, we applied multiple methods including, Remote sensing, geophysical surveying and modelling, 1-D geothermal gradient modelling, geological and structural geological field works. Analysis of published stable isotope ratio data reveals that recharge occurs between 600 and 1200 m altitude. The maximum depth of water circulation is 3.5 – 5 km according to the 1D geothermal gradient modelling. Using satellite remote sensing and structural geological field mapping, we identify a fault network that connects central highland recharge and foreland discharge zones. Both cold and hot water springs are located at fault intersections, presumably due to the elevated hydraulic permeability. In Sri Lanka, springs are remarkably often located at the edge of paddy fields. These findings can be compiled into a conceptual model from water recharge areas in the mountains to the hot springs in the foreland providing a coherent explanation for the location of hot and cold springs across the island. Further, based on this conceptual model, we introduced a straightforward, low-cost, and rapid-to-apply exploration methodology to improve utilization of thermal hot springs by increasing temperature and discharge rates through targeted drilling operations.

Annika Korte

Many everyday activities require orientation and navigation in familiar as well as unfamiliar environments. Maps and 3D visualizations of these environments play an important role as external aids. The cognitive map of an environment is created by dealing with these aids. Accurate cognitive maps help to minimize errors when navigating and finding a destination in the real environment. Therefore, the impact of cognitive effects on the perception of these maps is investigated. One focus are the "grid cells" in the human entorhinal cortex as an element of a metric system for spatial navigation in the brain. The dissertation deals with the connections between the properties of "grid cells" and orientation and navigation in space and how the direct addressing of these properties through cartographic design tools can improve spatial navigation and orientation.