

## ESR20-040 - Heat below the city

### Abstract

The urban subsurface is increasingly used as source of geothermal energy for heating and cooling of buildings. In the course of climate change and global warming, more heat is transferred into the shallow subsurface in summer than is extracted during winter time. The consequence of which is warming of the underground and the development of subsurface urban heat islands. Besides serious restrictions in the further use of geothermal energy, warming of the subsurface comes along with a deterioration of groundwater quality and subterranean ecosystems. There is ample evidence from lab experiments and small scale field studies that the increase in subsurface temperature triggers a cascade of effects including (a) the acceleration of microbial activities, (b) the depletion of dissolved oxygen, (c) the loss of groundwater biodiversity, (d) the onset of anaerobic processes, and (e) the accumulation of unwanted solutes in the water, which lead to a decreased water quality. Studies that consider both, the ecology as well as the use of geothermal energy, have not been conducted in large cities so far. The project combines expertise from ecology, hydrology, geophysics and geothermal energy use, and as such pioneers the development of integrative concepts for the sustainable development of the Viennese urban subsurface. We will provide city-wide maps of heat, biodiversity and water quality, as well as scientifically sound predictions and decision tools urgently needed by local authorities.

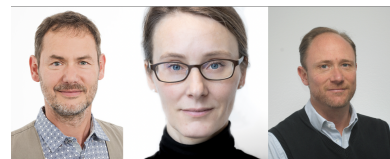
### Scientific disciplines:

Limnology (40%) | Hydrology (40%) | Geothermics (20%)

### Keywords:

groundwater, urban heat islands, geothermy, ecology, water quality, hydrology, sustainable energy use

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Further links to the persons involved and to the project can be found under

<https://www.wwtf.at/funding/programmes/esr/ESR20-040/>