Geophysical Research Abstracts
Vol. 18, EGU2016-11582, 2016
EGU General Assembly 2016

Groundwater temperature transients on the Armutlu peninsula, eastern Marmara region

Heiko Woith (1), Deniz Caka (2), Cemil Seyis (3), Francesco Italiano (4), Cengiz Celik (5), Rongjiang Wang (1), and Serif Baris (2)

(1) Deutsches GeoForschungsZentrum GFZ, Potsdam, Germany (heiko.woith@gfz-potsdam.de), (2) Department of Geophysics, Kocaeli University, Kocaeli, Turkey (sbaris@kocaeli.edu.tr), (3) TÜBITAK Marmara Research Centre, Earth and Marine Science Institute, Gebze, Turkey (cemil.seyis@tubitak.gov.tr), (4) INGV Palermo, Italy (francesco.italiano@ingv.it), (5) Kandilli Observatory and Earthquake Research Institute, Boğaziçi University, Istanbul, Turkey (celikc@boun.edu.tr)

Since many years MAM and GFZ in co-operation with Kocaeli University (KU) operate fluid monitoring stations around the Sea of Marmara. In the frame of MARsite (MARsite has received funding from the European Union's Seventh Programme for research, technological development and demonstration under grant agreement No 308417) these networks were jointly evaluated for the first time. The on-land fluid monitoring networks continuously monitor the following parameters: soil radon (21 sites), temperature and conductivity of thermal springs (9 sites) operated by MAM covering the whole Marmara region; fluid pressure and water level/temperature (8 sites) within ARNET operated by GFZ/KU. ARNET is a combined seismological/hydrogeological monitoring network covering the Armutlu peninsula located SE of Istanbul.

Additional to the geothermal wells and springs – our main target to detect transients of potentially seismo-tectonic origin - three shallow groundwater wells (tenth of meters deep) are being operated to identify and quantify seasonal variations, and meteorological influences like rainfall and snowmelt. But it turned out that these shallow aquifer systems showed very stable conditions with very small annual temperature amplitudes (0.2 – 0.3°C). One of these shallow monitoring wells is located just south of Lake Iznik (in the village of Sölöz) very close to the southern branch of the North Anatolian Fault Zone. Water level showed a steady decreasing trend since June 2012. This trend resulted in a data gap starting in January 2014, when the water level dropped below the sensor position. After adjusting the sensor position, positive spikes in the borehole temperature were recorded in June and August 2014, and again in 2015. The spikes are characterised by a sharp temperature increase followed by a decay lasting several days until the pre-event temperature was reached again. Since the spikes occurred on two independent logger systems, and since they lasted several days, a technical origin is not likely. During the station visit in 2015 a physical explanation for these positive temperature spikes emerged. We noticed the release of pressured gas while opening the wellhead. Thus, tentatively we propose that the rise of a giant gas bubble was responsible for the temperature spikes. We present a preliminary model to explain the observations.