New exploration method for geothermal energy
12 November 2019

Since geothermal fields are often located in volcanic areas, they usually occur near or below crater lakes. "However, these lakes hide structures that are important for geothermal energy," explains Maren Brehme. "In the study, we showed that volcanic lakes such as the Lake Linau in Indonesia, which we investigated, have so-called 'sweet spots,' deep holes with fluid inflow from the surrounding rock." The method is not limited to volcanic lakes though. It can also be applied to other underwater areas.

Novel combination of two technologies brings success

The new approach combines bathymetry measurements with geochemical profiles. In this study, bathymetry (from Greek bathýs 'deep' and métron 'measure') is used to map fault zones and geyser-like holes in the lake floor. Its most important feature is the echo sounder. The geochemical profiles from data on temperature, salinity, density and pH at different depths show areas in the lake with inflows from the surrounding geothermal reservoir. The combination allows the distinction between permeable and non-permeable structures, which was previously not possible. With this method, promising locations for drilling can be located more precisely.
The related field work took place in 2018 during an expedition to Lake Linau led by Maren Brehme. It was part of the long-standing GFZ cooperation with Indonesian partners funded by the German Federal Ministry of Education and Research. Lake Linau is only a few kilometres from the Lahendong site, where the first geothermal low-temperature demonstration power plant in Indonesia, jointly developed by GFZ and Indonesian partners, was successfully commissioned in 2017.

3D representation of the lake depth with fault zones running through the lake. Points G01 and C11 show geyser-like holes through which hot water is carried into the lake. Credit: CC BY 4.0: Maren Brehme; DOI:10.1038/s41598-019-52638-z

