

Small volcanic lakes tapping giant underground reservoirs

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In its large caldera, Newberry volcano (Oregon, U.S.) has two small volcanic lakes, one fed by volcanic geothermal fluids (Paulina Lake) and one by gases (East Lake). These popular fishing grounds are small windows into a large underlying reservoir of hydrothermal fluids, releasing carbon dioxide (CO₂) and hydrogen sulfide (H₂S) with minor mercury (Hg) and methane into East Lake.

What happens to all that CO₂ after it enters the bottom waters of the [lake](#), and how do these volcanic gases influence the lake ecosystem? Some lakes fed by volcanic CO₂ have seen catastrophic CO₂ degassing during lake overturn ("limnic eruptions"; e.g., Lake Nyos, Cameroon). Could East Lake be a simmering "American lake Nyos"? East Lake went through a short "gas alert" in summer 2020, with strong H₂S smells spreading over the caldera region.

Six Wesleyan University undergraduate/graduate students and their advisor set out to measure CO₂ fluxes at East Lake each summer between 2015 and 2019.

East Lake accumulates CO₂ below its winter ice cover, which is released again in abundance during ice melting and subsequently during the summer months. They also proposed that the East Lake ecosystem is largely driven by its volcanic inputs: CO₂, nutrients like phosphorus and trace metals, with the fixed nitrogen nutrient largely provided by local cyanobacteria.

The outside world only adds sunshine to make this organic matter factory go! Their study illustrates how the lake CO₂ reservoir renews itself over the seasons, and East Lake is unlikely to have catastrophic gas releases. Variations in CO₂ flux can be used for volcano monitoring once the seasonal flux trends related to lake processes are understood.

More information: H.D. Brumberg et al. Volcanic carbon cycling in East Lake, Newberry Volcano, Oregon, USA, *Geology* (2021). [DOI: 10.1130/G48388.1](https://doi.org/10.1130/G48388.1)

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