The International Continental Scientific Drilling Program: Advancing lake-sediment studies through deep drilling

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The sedimentary subsurface of lakes and oceans hold valuable archives for a wealth of paleoenvironmental research questions. While the subsurface of the oceans became explored already in the late 1960s (DSDP and succeeding ODP and IODP programs), drilling projects in lakes took more time to become reality. One of the first deep drilling projects in lakes took place in the birth year of the Institut F.-A. Forel in 1980, and recovered the 150 m long sediment fill and the top of the underlying molasse bedrock in Lake Zurich. After this pioneering lake drilling project, it took over 20 years till the International Continental Scientific Drilling Program (ICDP) provided a state-of-the-art floating platform equipped with a drill rig, which was capable of drilling and recovering long cores in lakes of several 100 m water depths with a drill string of up to 800 m length (RV/Kerry Kelts with GLAD 800).
This new technology enabled the scientific community to target during the last years worldwide numerous lakes in order to recover the lacustrine sedimentary succession as well bedrock sections, such as underlying impact rocks in the case of meteorite-caused lake basins. The involvement of Swiss-based scientists in some of these drilling projects (including members of Institut F.-A. Forel) convinced the Swiss National Science Foundation to support a full membership of Switzerland in ICDP in 2008, so that the Swiss science community now has full access to ICDP funding and can propose and conduct lake drilling projects anywhere in the world.
Many projects with Swiss participation focused on the paleoclimatic reconstructions using lake sediments as continuous and long continental archives (i.e. several glacial-interglacial cycles). The recently completed drilling projects in Lago Peten Itzá (Guatemala), Laguna Potrok Aike (Argentina) and Lake Van (Turkey) all yielded the to date longest paleoclimate/paleoenvironmental records for each region, and thus provided crucial data on the respective natural climate variability. All these ICDP projects in remote areas allow a much more refined analysis of synchronicity of past climate change in different continental regions, thus unraveling teleconnections of the global climate system. Furthermore, such deep drill holes also opened up new windows into the deep biosphere, offering through novel biologic sampling techniques unprecedented views into the microbial community of the lacustrine subsurface.
In the future, Switzerland can use the ICDP membership to enter new domains where continental drilling is expected to trigger novel and high-impact science. Planned projects target Arsenic contaminations in drinking water aquifers in Southeast Asia and deep drilling projects in the Dead Sea and Lake Ohrid as well as into the Quaternary sediment fill of glacially overdeepend Alpine valleys. Furthermore, as a full member of both programs, combining ICDP with IODP will allow to define coupled continental-marine drilling transects, which are now fully exploitable for Swiss universities, research institutes and individual researchers.

Completed, Scheduled, and Proposed ICDP Lake Drilling Sites