

The International Continental Scientific Drilling Program (ICDP) – status and prospects for Nordic drilling projects

Øystein Nordgulen

Geological Survey of Norway, Postboks 6315 Torgarden, 7491 Trondheim, Norway, oystein.nordgulen@ngu.no

The International Continental Scientific Drilling Program (ICDP – <https://www.icdp-online.org/home/>), founded in 1996, currently includes 22 member nations, including Iceland, Finland, Norway, and Sweden. UNESCO serves as a Corporate Affiliate. GeoForschungsZentrum (GFZ) in Potsdam is acting as ICDP's Executive Agency and is also hosting an Operational Support Group for project planning and technical assistance. ICDP supports drilling projects addressing significant scientific and societal concerns, such as environmental changes, geohazards, Earth resources, and the origin and evolution of life through Earth's history. Collaboration with organizations like IODP is a priority. ICDP has supported over 80 planning workshops and 55 drilling projects. Several projects have been completed or are planned in the Nordic countries. Some examples of are briefly summarized here.

COSC-2 (Collisional Orogeny in the Scandinavian Caledonides), following COSC-1, was successfully completed in 2020 at the Caledonian front near Åre in central Scandinavia. Cores are now available through key sections of the Caledonian Nappe stack and the underlying Fennoscandian Shield.

Krafla Magma Testbed project, approved by ICDP in 2021, builds on the experience from previous drilling in Iceland. The project aims to drill into the magma front and sample the rock-magma interface at the Krafla volcano and has important implications for the use of geothermal heat as well as volcano monitoring.

DAFNE (Drilling Active Faults in Northern Europe) has ICDP support for a drilling project aiming to intersect a postglacial fault near Kiruna. Prominent post-glacial faults are widely distributed in northern Fennoscandia, and given their relatively recent movement history, a better understanding of these fault systems has great scientific and societal relevance.

PVOLC (Volcanic Forcing and Paleogene Climate Change) was approved by ICDP in 2020. Two planned boreholes in northwest Denmark will obtain a complete section through Paleocene-Eocene marine strata, including abundant ash layers. The drill cores will provide data that will give new insights into the relationships between the North Atlantic Igneous Province and the global Paleocene-Eocene Thermal Maximum (PETM).

GOE-DEEP (Gabon and Oxygenation of Earth - Drilling Early Earth Project) aims at creating a drill core archive of the best-preserved Paleoproterozoic sedimentary rock successions for the 2.2-2.0 Ga time interval. Its goal is to enable researchers to confidently reconstruct original environmental conditions that led to the emergence of the modern aerobic Earth system during and following on from the Great Oxidation Event, previously studied in the highly successful FAR-DEEP project.

ICDP, after more than 25 years, has proven highly successful, fostering international collaboration, involving students and early-career scientists, and yielding groundbreaking discoveries. All cores and samples are preserved for future research. Financial support from ICDP varies, often securing only initial funding. Obtaining the remaining part of the budget has in many cases turned out to be challenging, also in the Nordic community. Therefore, it is crucial to identify ways to highlight the great benefits of both onshore and offshore drilling projects and develop strategies and collaborative platforms to attract and secure funding from research councils, universities, and other relevant organisations.

Using the ICDP platform, the Nordic earth science community has an excellent opportunity to develop drilling projects of potentially great scientific and applied importance.