



The Kola Superdeep Borehole, welded shut since project abandonment.

CAN YA DIG IT?

By Austin Harvey, Computer Science '21

Throughout human history, from our cave dwelling ancestors to modern people in mines, humanity has dug holes. Typically, we cut them for practical purposes such as finding useful metals or rocks to power cities, but digging also allows us to discover the planet's deep past. One such dream is to bore through Earth's thin crust to touch the mantle and learn how the depths of the planet behave. This quest has led humans to create unimaginably deep holes.

The Kola Superdeep Borehole holds the record for the deepest hole on planet Earth. With a 23-centimeter diameter, this hole might sound small, but its depth is a whopping 12,262 meters or roughly 132 football fields. When drilling began in May 1970, the goal was simple: dig until you reach the mantle. The mantle was never reached, and, in 1992, the hole was abandoned

due to a combination of higher than predicted temperatures and the stress of maintaining the hole at that level damaging the equipment being used. Though the objective of busting through the crust was never achieved, the team running the drill made some unexpected discoveries. A vast amount of information on the composition of the deep crust, such as unexpected metamorphic changes in the rock and even billion-year-old microscopic plankton fossils, was found six kilometers below the surface. Although the Kola Superdeep never reached the mantle, the discoveries it made were invaluable in understanding how the planet works. Since the days of the Kola Superdeep Borehole, several oil companies have dug holes exceeding its length, but it remains the deepest hole humanity has dug.

With significant advancements in drilling technology exponentially speeding up drilling and decreasing resistance, the desire to dig as deep as possible becomes more feasible. What once took 20 years can now be done in a matter of weeks or months. While the mantle has yet to be reached, many scientists still yearn to dig further. The International Ocean Discovery Program (IODP) is a coalition of oceanic drillers who desire one such effect. One of the program's most important projects, the MoHole to Mantle (M2M), is a plan inspired to pick up where a long-abandoned U.S. drilling plan from the 60s known as Project Mohole left off: find a point on the sea floor where the crust is thin, drill through, and bust the crust. The crew of the Japanese drilling ship Chikyū (Earth) aims to chase this endeavor. The 210-meter-long by 38-meter-wide ship currently contains a riser drill capable of reaching depths of 10,000 meters and a laboratory for studying rocks obtained from coring. This riser drilling method uses special casing pipes overlaid on one another in order to prevent the borehole's sides from caving in, at the cost of the hole narrowing the deeper the drill goes. Improvements in such drilling methods could extend this depth, but the project would be costly. It is estimated M2M would cost one billion dollars.

Due to high costs and potential needs for technological improvement, it is unknown if or when humanity will achieve the dream of drills penetrating the mantle, but as past digs have uncovered, there is much yet to learn in the depths.



The Japanese drilling ship Chikyū.