DRILLING INTO THE EL’GYGYTGYN IMPACT CRATER, ARCTIC RUSSIA: THE 2009 ICDP PROJECT.
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Introduction: The 3.6 Ma, 18-km-diameter El’gygytgyn impact crater is located in central Chukotka, northeastern Russia. The flat floor of the crater is in part occupied by Lake El’gygytgyn, 12 km in diameter, and surrounding terraces. The average profile of the rim is asymmetric with a steep inner wall and a gentle outer flank. The rim height is about 180 m above the lake level and 140 m above the surrounding area. It was confirmed as an impact crater by Gurov et al. [1].

Geology: The El’gygytgyn crater was formed in the volcanic strata of Late Cretaceous age. The main rock types of the crater basement are ignimbrite, tuff and lava of rhyolites, rarely tuff and lava of andesites and dacite lava. The thickness of the strata that are exposed in the crater walls is more than 650 m. Thus, the El’gygytgyn is the only known terrestrial impact structure where it is possible to investigate shock metamorphism in siliceous volcanic rocks [2].

Drilling Project: A drilling project currently underway at Lake El’gygytgyn hopes to accomplish two scientific goals. First and foremost, we plan to collect - from the largest and oldest, unglaciated lake basin in the Arctic - sediments that represent the longest, most time-continuous record of late Cenozoic Arctic climate evolution. The second goal is to collect meteorite impacted rocks from a metavolcanic bedrock sequence that will allow to study the shock response of volcanic rocks, as well as to provide a comparison with impact process on other planets.

Construction of the ice road and drilling platform began in mid January 2009, after a camp was set up, and a permafrost core was drilled in 2008. Conditions are difficult due to the remote location of the crater and the complex logistics, which require snow train overland and helicopter transport. Drilling takes place from the frozen crater lake. Recover of the first lake sediment cores commenced on March 18, 2009. Lake sediments, representing 3.6 million years of climate record, were recovered until a depth of 315 m below lake floor, when the transition to the impact breccia was drilled on April 14, 2009. Recovery of impact breccia continues into monomictly brecciated bedrock of the central uplift.

Acknowledgements: Drilling supported by ICDP, NSF, the German Ministry of Research and Education, the Austrian Ministry of Science and Research, Russian Foundation for Basic Research, and the Russian Academy of Sciences.