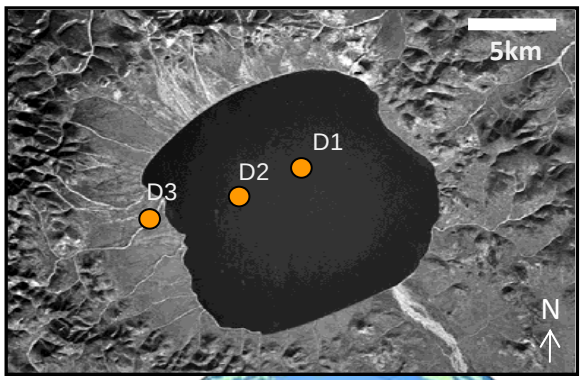
PROJECT TIMELINE

- **1998:** Scouting mission cored 13m of sediments for chronological and geochemical analysis. Results were impetus for future research.
- **2000:** Major effort studied modern limnology, regional seismology and geomorphology for more accurate assessments of future records.
- **2003:** Additional research focused on the structure of the impact crater and the climatic and environmental history of the region.
- **2009:** Project will culminate in May when the entire sediment record and the impact breccia are recovered for extensive analysis

Lake E. is located in Chukotka, Northeast Eurasia, 100 km North of the Arctic circle.



Drill Sites

Institutes

University of Massachusetts Amherst

Institute of Geology and Mineralogy

Arctic and Antarctic Research Institute

СВКНИИ

AWI

universität wien

GFZ Helmholtz Centre Potsdam

Funding Agencies

icdp

NSF

Российская Академия Наук

Federal Ministry of Education and Research

BMWF

Austrian Federal Ministry of Science and Research

Impact painting credit: Michael Carroll http://www.spaceref.com
Design by T. Naughton

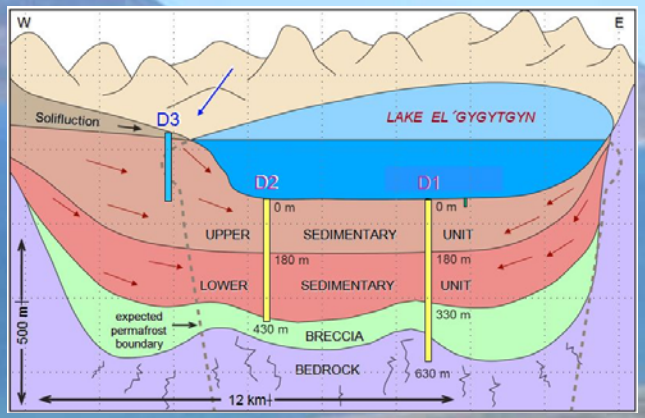
Impact research and climate history in the Eurasian Arctic

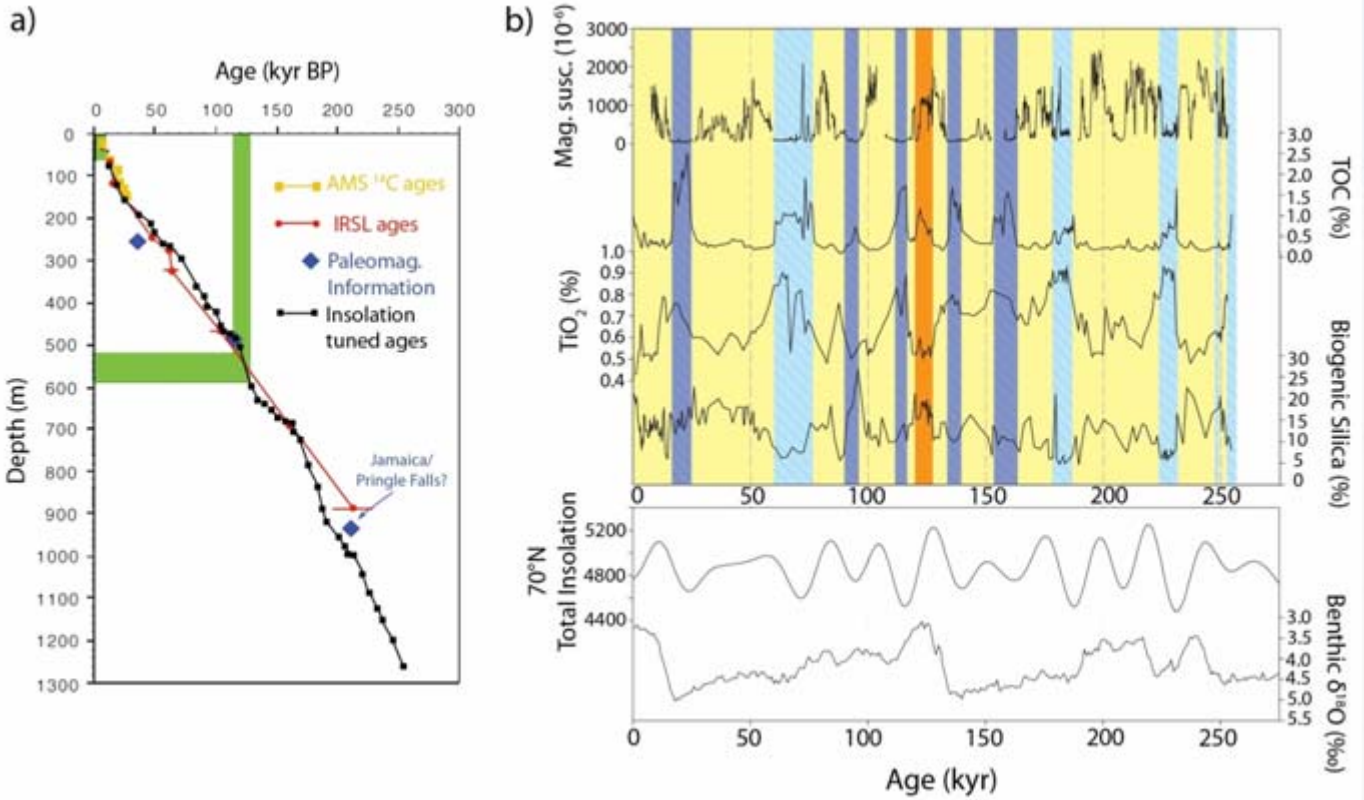
http://elgygytgyn.icdp-oline.org

Lake El'gygytgyn Drilling Project

Meteorite Impact Studies

Deep drilling at the site offers geoscientists a unique opportunity to study impact melt rocks and target material from one of the best preserved large impact craters on earth. It is the only terrestrial impact known to have formed in siliceous volcanics and will provide a chance to study shock metamorphism in volcanic lithologies.





The age model of core PG1351 (taken next to D1) from Lake El'gygytgyn based on radiocarbon ages, infrared stimulated luminescence ages (IRSL), paleomagnetics and interglacial pollen assemblages (Forman et al., 2007; Nowacyzk et al., 2002; 2007; Lozhkin et al., 2007). a) Green bars represent the warmest portion of the last interglacial (MIS 5e) and the Holocene. The black line represents the revised orbitally-tuned chronology based on precession (Nowacyzk et al., 2007). b) high-resolution proxies (magnetic susceptibility, total organic carbon (TOC), Titanium Dioxide (TiO2), and biogenic silica) strongly controlled by temperature, productivity, hydrology, and variability in seasonal lake ice cover. During colder intervals (cold and moist – light blue; cold and dry – dark blue) sediments are laminated when the lake remains ice covered in summer, ventilation ceased, and bottom waters became anoxic; warmer intervals (warm - yellow; peak warm - orange) are marked by non-laminated sediments, suggesting lake ventilation during open water summers (see climate modes of Melles et al., 2007). These proxies are plotted against the age model, insolation (Berger and Loutre, 1991) and the benthic δ18O stack of Lisiecki and Raymo (2005). Figure produced by Kenna Wilkie.

Arctic Climate Evolution

The sediments of Lake E will reveal a history of climate change in the Arctic that began a million years before the last glacial period. Research will focus on millennial-scale changes in the patterns of glacial/interglacial cyclicity and the mechanisms behind those changes. The sediments will also provide insight into the evolution and mode of Arctic climate during glacial/interglacial changes, and whether rapid change events identified during the last glacial cycle are typical of earlier glacial periods. Comparison with data from other regions will be used in climate modeling efforts, including the onset of late Pliocene cooling and the first development of permafrost.

Paleoclimate Scientific Objectives

Our goal is to collect and interpret the longest time-continuous record of climate change in the terrestrial arctic and compare this record with those from lower latitude marine and terrestrial sites to better understand hemispheric and global climate change. The project will yield five cores in total; two replicate overlapping cores from two sites (D1&D2 below) near the deepest part of the lake and one additional land-based core (D3).