

The Thrill to Drill in the Chill

FOR RELEASE: Immediate Feb. 13, 2009

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UNDER A FROZEN LAKE IN SIBERIA, SECRETS OF EARTH'S ANCIENT CLIMATE CAPTURES THE HEART OF AN INTERNATIONAL TEAM OF GEOSCIENTISTS

AMHERST – On this Valentine's Day, the thoughts of some global climate change scientists are in Russia (with love of their research), and the big passion warming their hearts today are the secrets to be learned from under the ice at a frozen lake in Arctic Chukotka.

That's because the first convoy of five huge equipment containers with the drill rig are arriving this week at Lake El'gygytyn (pronounced el'geegitgin), in Siberia, 62 miles north of the Arctic Circle to begin a study of sediment and meteorite-impact rocks that should provide the longest time-continuous climate record ever collected in the Arctic. The project involves scientists from the USA, Germany, Russia and Austria. Brigham-Grette (US chief, UMass Amherst), Martin Melles (German chief, Univ of Cologne), Pavel Minyuk (Russian chief, NEISRI Magadan) and Christian Koeberl (Austrian chief, Univ Vienna) are the leaders of an international team of geoscientists who will soon begin to burrow back in time, retrieving core samples more than 3 million years old and answering questions about Earth's ancient past.

Almost impossibly remote, "Lake E," was formed 3.6 million years ago when a monster meteor, more than a half-mile across, slammed into the Earth between the Arctic Ocean and the Bering Sea. Because this part of the Arctic was never covered by ice sheets or glaciers, it has received a steady drift of sediment – as much as a quarter mile (1,312 feet or 400 meters) deep – since impact. Thus, it offers a continuous depositional record unlike any other in the world, say Brigham-Grette and colleagues, beneath the crater lake that's just over 560 feet deep (170 m), equal to the height of the Washington Monument.

El'gygytyn thus offers a truly unprecedented and ideal opportunity, Minyuk notes, for piecing together a clearer picture of the hemisphere's prehistoric climate and the dynamic processes of global climate change since the meteor's impact. Notably, the researchers hope they can learn more about the unexplained shift from a warm forest ecology to permafrost, some 2 million to 3 million years ago.

Scientists from institutes in Germany, Russia and Austria and the USA have been flying in by helicopter for pre-site survey research over the past 10 years, drilling pilot cores and taking other samples and measurements. The site has passed every test, showing, for example, the lake bed has been undisturbed by glaciation, erosion, or drying for thousands of years.

Comparing cores from under Lake El'gygytyn to those from lower latitudes will help the climate scientists with a high-resolution tool to study climatic change across northeast Asia "at millennial

timescales,” Brigham-Grette says. In addition to climate data, “cores into deposits below the lake sediments may offer the researchers an opportunity to study the 3.6-million-year-old “impact breccia,” that is, how Earth’s volcanic bedrock responded to the meteor’s impact, says Koeberl.

Waiting until now to transport and install the equipment means the team can use the frozen lake surface to support an enclosed drilling system specially designed by DOSECC, Inc (Salt Lake City) to withstand the extreme weather conditions. Drilling overlapping cores at these frigid locations starts this month, using the windswept lake ice as a drilling platform. Sampling will continue until May 2009, as part of the International Continental Scientific Drilling Program (ICDP).

To ensure the safety of both scientists and drill-team members on the isolated lake in potentially life-threatening conditions, the research team and ice engineers have scrutinized how the ice shifts, cracks, and responds to heavy wind and circulation forces before settling on rig placement. Workers and scientists will travel in a protected personnel carrier that will also transport cores from the rig on the lake ice to the science camp on the shore.

Sediment cores will be processed for shipment and stored at the lake in a temperature-controlled container until they can be flown to St. Petersburg and later trucked to the University of Cologne, Germany, for study by the international team, says Melles. An “archive half” of each core will also be stored at LacCore, an international lake core repository at the University of Minnesota.

The international collaboration is funded by the International Continental Drilling Program, U.S. National Science Foundation, the German Federal Ministry for Education and Research, and the Far East Branch of the Russian Academy of Sciences. Investigators from the Russian Academy of Sciences’ Far East Geological Institute, Vladivostok, the Northeast Interdisciplinary Scientific Research Institute, Magadan, and Roshydromet’s Arctic and Antarctic Research Institute, St. Petersburg, are taking part.

High-resolution diagrams and photographs (shown below) are available at the IPY site, or from the project leads listed below.

Supplementary Information

Scientific Deep Drilling for Past Climate Change at Lake E’lgygytgyn, NE Russia (“from Russia with Love”)



Lake El'gygytgyn was created 3.6 million years ago when a meteor hit the earth creating a 18 km wide basin in the remote mountains of Chukotka. The lake is now the focus of a challenging interdisciplinary multi-national scientific drilling campaign as part of the International Continental Drilling Program (ICDP). With drilling initiated in Nov. 2008, the goal is to collect the longest time-continuous record of past climate change in the terrestrial Arctic and to compare this record with oceanic and land based records from the lower latitudes to better understand hemispheric global climate change and polar amplification. Lake E is truly unique because the meteorite landed in the center of what was to become Beringia -- the largest contiguous landscape in the Arctic to have escaped Northern Hemisphere glaciation.



Several web sites contain information about the projects and participants

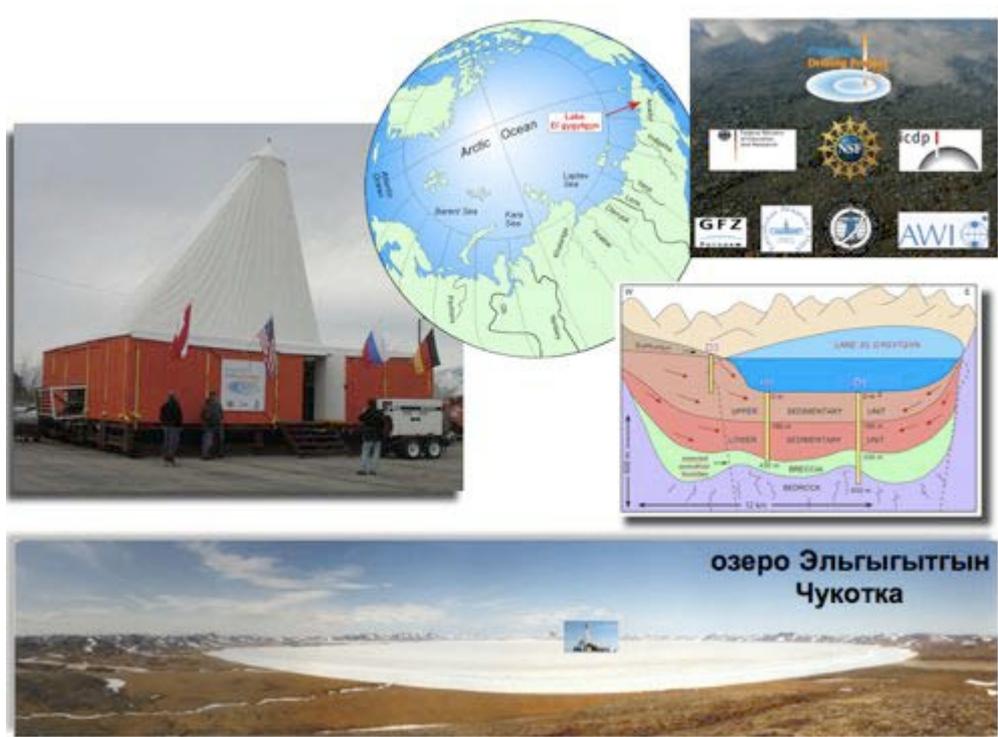
1. ICDP Main website -- with blogs and pictures at elgygytgyn.icdp-online.de/ ; click on “news”, and then click in “Daily news” at the right side of the center column.
2. Weekly news updates for download in English and German at elgygytgyn.icdp-online.de/, then click on “public data”.
3. US Science Team -- http://www.geo.umass.edu/lake_e/index.html
4. German Science Team -- <http://www.elgygytgyn.uni-koeln.de>
5. Recent NASA image of the Day -- <http://earthobservatory.nasa.gov/IOTD/view.php?id=36151>
6. Educational Outreach -- Follow 8th grade earth science teacher Tim Martin, on his “Polar Trec” with support from the US National Science Foundation. Tim will post a public blog for his school

system but be linked to teachers and classrooms from anywhere. He will hold webinars, send pictures and talk about the science from the field. <http://www.polartrec.com/geologic-climate-research-in-siberia>.

7. A shameless interview about the project:

http://www.dkv.columbia.edu/video/nsf/nsf_brigham_grete.html

Period of field work: November 2008 to mid-May 2009



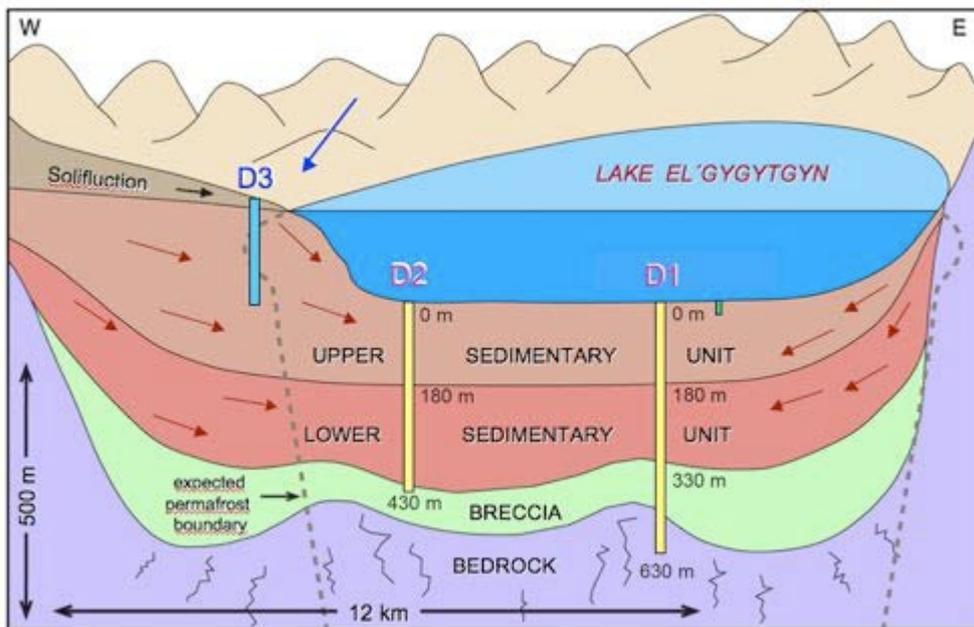
Location of fieldwork: El'gygytyn Lake, Lat. 67.50N; 1720E, NE Russia

Countries involved: United States, Germany, Russia and Austria



Additional Material:

- o [Press release of Dec. 2008](#)
- o [PAGES News Jan 2009 pdf](#)
- o [CPS Newsletter, Dec. 2008 pdf](#)
- o Photos at the above web sites and here as jpegs
- o 3D Visualizations can be downloaded at :
<http://www.uaf.edu/water/faculty/nolan/lakee/index.htm>
- o [Lake E Poster in English pdf](#)
- o [Lake E Poster in Russian](#)



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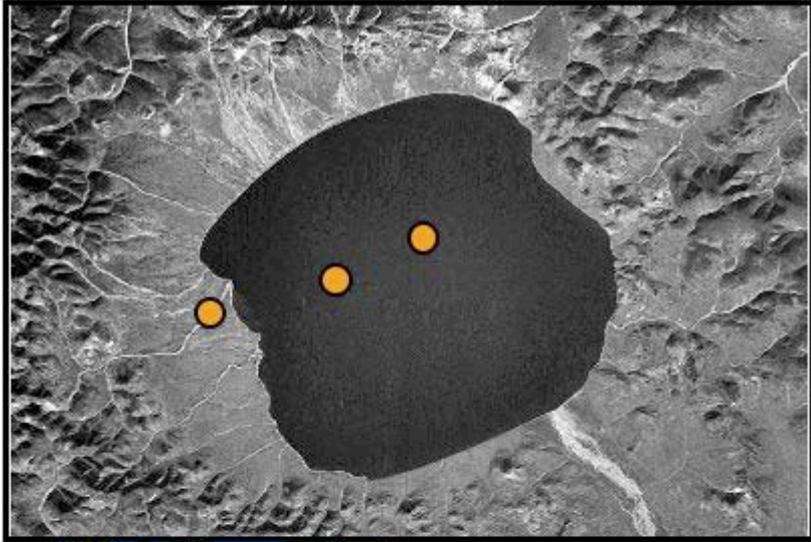
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● Drill sites



Location of Lake El'gygytgyn, NE Russia



On February 25th 2009, the IPY Joint Committee will release a report on 'The State of Polar Research'. In the lead-up to this event, major IPY research projects are releasing information for the press, and making themselves available for media enquiries. A wide range of projects will be profiled reflecting the diversity of IPY. For more information, please visit http://www.ipy.org/index.php?ipy/detail/feb09_projects/