

AGU Fall Meeting, session B-10, poster

THE IMPACT project: Seismic investigation of Lake Elgygytyn NE Russia – implications for sediment thickness and depositional environment

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As part of a multidisciplinary expedition to Lake Elgygytyn during this summer (THE IMPACT project, Terrestrial History of Elgygytyn – International Multidisciplinary Paleoclimate Project) airgun seismic and 3.5 kHz echosounding investigations were carried out. The aim was to study the geometry and thickness of the sediment fill and to provide a pre-site survey for future drilling proposals. Lake Elgygytyn, located in central Chukotka, NE Russia, is an impact crater lake with a diameter of 12 km and a water depth of 170 m. A 13.0 m long sediment core retrieved from the deepest part of the lake in 1998 revealed a basal age of approx. 400 ka, and is now the longest lacustrine paleoclimate record in the Arctic. A full-length sediment core would yield a record back 3.6 million years, a million years prior to the first major glacialiation of the Northern Hemisphere. Refraction seismics using sonobuoys indicate velocities in the range of 1500 to 1700 ms⁻¹ for the sediment fill. This is underlain by a refractor characterized by velocities of c. 3400 to 3900 ms⁻¹ and interpreted as bedrock or brecciated bedrock. Based on preliminary field estimations the depth of the refractor is in the range of 350 to 400 m subbottom. Single channel reflection profiles exhibit well stratified sediments to a depth of at least 160 m subbottom, locally intercalated with debris flow deposits. The latter are clearly documented in 3.5 kHz profiles and are more common in the western part of the lake and along the slopes. The lower part of the sediment fill appears to be more massive. However, most of the lower sediments including the sediment/bedrock contact are not well documented in field-recorded analog reflection profiles where masked by multiples. Nonetheless, the top of a cone-shaped sediment drape is identified in the centre of the lake at about 150 m sediment depth. This drape may reflect the presence of a bedrock centre cone typically observed in large impact craters. The drape is completely levelled by overlying sediments and not visible in the modern bathymetry of the lake. At both the 1998 and newly proposed drillsites the sediments appear to be well stratified and largely unaffected by debris flows. This suggests undisturbed, continuous hemipelagic sedimentation to at least a sediment depth of 160 m.