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The "Crystal Eye of Nunavik" (Pingualuit): New insights from one of the deepest crater lakes and one of the oldest sediment records of the Northern Hemisphere

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Most lakes in the northern circumpolar region are of glacial origin and allow hindcasts that date back only until the last deglaciation several thousand years ago, because of glacial erosion of their sediment infill. With the exception of the El'gygytgyn Crater Lake in Siberia, all other climate archives of the Arctic covering several interglacials originate from marine sediments or ice cores. The sediments of the 1.4. Ma old Pingualuit Crater Lake (Nunavik, Canada; 61°17'N, 73°41'W) - known as the "Crystal Eye of Nunavik"- offer the unique opportunity to study terrestrial climate dynamics not only during the postglacial period, but potentially over several hundreds of thousands of years as its deep sediment infill promises to yield an uninterrupted arctic paleoclimate record covering several interglacial-glacial cycles. Previous attempts to core the lake have resulted in the collection of only 14 cm of sediments that spanned the last $\tilde{5}$000 years. Almost 20 years later (May 2007), we managed to extract about 10 m of sediments from the crater lake at a water depth of 270 m using a UWITEC piston percussion corer system under harsh climatic conditions and severe water environmental protection measures. Here we will present preliminary results of the sedimentological, micropaleontological and stratigraphic analyses of one of the deepest and most dilute closed freshwater basins on this planet. The initial results revealed the presence of at least two decimetre-thick intervals composed of laminated, dark grey clayey silts characterized by a relatively low density and magnetic susceptibility that contrast sharply with the thicker over- and underlying sections with light grey, denser, sandy sediments. The sediment characteristics in the darker laminated intervals are also similar to the ones observed in the small surface gravity core sampled at the site. Moreover, these two intervals revealed the presence of fossil diatoms and chrysophytes, suggesting that these two intervals represent ice-free conditions and thus possible interglacials, whereas the more extensive light grey and sandy sediments likely reflect glacial intervals. This interpretation will be tested by ongoing paleomagnetic (i.e., magnetostratigraphy) and multi-proxy biostratigraphic analyses (diatoms, chironomids, cladocerans, pollens), as well as radiocarbon and optical dating. In fact, a first IRSL-based estimation in the uppermost laminated (interglacial) interval suggests an age of 110 $\pm$ 15 ka BP.