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Climate evolution of the high Arctic during the past 3.6 Million years recorded in the sediments of Lake El'gygytgyn, NE Siberia

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High arctic Lake Elgygytgyn (67°30' N, 172°05' E) is a 3.6 Ma old meteorite crater lake situated in Chukotka/NE Siberia. With its continuous and undisturbed sequence since the Pliocene, the lake comprises the most long-lasting climate archive of the terrestrial Arctic. In spring 2009, the ICDP Elgygytgyn Drilling Project recovered the 315-m long lacustrine sediment record of Lake Elgygytgyn.

Within the framework of a presite survey, pilot cores from Lake Elgygytgyn, covering the last 340 ka, were investigated by a multi-proxy approach. The results of geochemical, biological and geophysical analyses of the sediment well reflect variations in sedimentation, weathering, lake hydrology and bioproductivity mostly triggered by multiple glacial-interglacial cycles. Furthermore, minor fluctuations of those proxies display the sensistivity of the Lake Elgygytgyn sediments to regional and global climate changes on a decadal to centennial scale. The comparison of individual interglacial periods within the sediment record shows a highly variable character of the duration and intensity of those warm periods in the Siberian Arctic, which are only partly explained by insolation forcing.

Based on initial results of the Elgygytgyn deep drilling cores, first conclusions about the climatic evolution of the Arctic back to the Pliocene can be drawn. Preliminary geochemical, physical property and pollen data indicate even more pronounced climatic variations during the early and middle Quaternary. The early Quaternary climate record seams to be partly masked by an enhanced rate of mass movement deposits. In contrast to the Quaternary, more stable conditions during the Pliocene are suggested.