

Late Quaternary litho- and seismic stratigraphy of the Chukchi abyssal plain of the western Arctic Ocean

Young Jin Joe^{a, b}, Seung-il Nam^{a*}, Leonid Polyak^c, Frank Niessen^d, Michael Schreck^{b, f} and Gee Soo Kong^e, and Seok Hoon Yoon^b

^aKorea Polar Research Institute, Incheon 21990, Republic of Korea,

^bDepartment of Earth and Marine Sciences, Jeju National University, Jeju Special Self-Governing Province 63243, Republic of Korea,

^cByrd Polar and Climate Research Center, The Ohio State University, USA,

^dAlfred Wegener Institute (AWI) Helmholtz Centre for Polar and Marine Research, Am Alten Hafen 26, Bremerhaven 27568, Germany;

^eKIGAM, the Korea Institute Geoscience and Mineral Resources, Republic of Korea,

^fUiT, the Arctic University of Norway, Tromsø, Norway.

Abstract

To define late Quaternary litho- and seismic stratigraphy, we used a ~14 m long piston core ARA06C-04JPC and CHIRP sub-bottom profiles (SBP) taken from Chukchi abyssal plain during the RV Araon expedition (ARA06C) in 2015. This area is surrounded by slopes extending to Chukchi and East Siberian continental margins, and stacked several debris lobes are identified at the lower slopes. Based on sediment colour, structure and texture, physical properties (wet bulk density, p-wave velocity, and magnetic susceptibility), and elemental geochemical composition (XRF-core scanning), 17 major brown layers were classified in core 04JPC. To constrain a reliable age model for the core 04JPC, we correlate the core 04JPC to neighboring sediment cores with relatively well established stratigraphy. According to our well constrained age model, the age of ARA06C-04JPC is likely to extend to Marine Isotope Stage 13 (>0.5 Ma).

Using wet bulk density and p-wave velocity, we conducted core-seismic integration. 4 major seismostratigraphic units (SSU 1-4) were classified based on prominent strong reflectors on SBP data related to drastic lithological changes. According to this integration, several debris lobes identified at the surrounding slopes is consistent with SSU 2 (MIS 5d to 3) and 4 (MIS 12). In particular, relatively thick and entirely laminated glacial unit, and the thickest glacial unit formed through repeated turbidites corresponds to MIS 4 and 12, respectively. Based on these seismic and lithological records, these mass movements at the lower slopes are related to repeated ice grounding events on the Chukchi and East Siberian margins during the middle to late Quaternary including MIS 4 and 12.