

Please type the necessary scripts in each column by clicking on the line in brackets.

Echo facies distribution of the Quaternary glacial bedforms in the Chukchi Sea, west Arctic.

Young-Jin Joe¹, Seok-Hoon Yoon¹ and Seung-II Nam²

¹Department of Marine Sciences, Jeju National University, Jeju 690-756, Korea
yjjo011@jejunu.ac.kr and shyoon@jejunu.ac.kr

²Korea Polar Research Institute, Incheon 406-840, Korea
sinam@kopri.re.kr

In the recent seafloor mapping surveys in the western Arctic, the Quaternary glacial bedforms have been ubiquitously recognized including iceberg scours, till deposits, mega-scale glacial lineations and moraines. This study focuses on the Chukchi Sea, a part of the glacier-influenced western Arctic margins, where the high-resolution stratigraphic and echo facies analyses were carried out using the sub-bottom profiles (SBP). The SBP data were obtained during the Arctic expeditions of R/V Araon (operated by KOPRI) in 2011 and 2012. Echo facies is classified on the basis of seafloor geometry and characters of sub-bottom reflection within the high-resolution stratigraphic framework. On the SBP data, two stratigraphic units (units I and II in descending order) are recognized by two distinctive sub-bottom reflectors of which lateral continuity is more or less variable. Stratigraphic unit I consists of parallel to sub-parallel stratified (A) and transparent reflections (C) with flat or undulating topography (I). Echo facies IA is frequently observed in the Chukchi continental shelf while it is absent or very thin toward deeper water. Echo facies IC is found below ~360 m water depth. Instead, sediment infills on top of iceberg-ploughed seafloor are locally recognized in the Chukchi continental shelf. Echo facies IA and IC as well as this sediment infill are interpreted as Holocene sediments by marine transgression and hemipelagic settling. Unit II is quite variable in thickness and generally consists of echo facies IIIB and IIB that show overlapping hyperbolae and hummocks (III) and highly dissected topography (II) with random or fuzzy sub-bottom reflection (B). Echo facies IIIB and IIB dominantly occur between 150 m to 360 m in water depth. Acoustically fuzzy and unstratified reflection can be generated from subglacial tills beneath the grounded glacier. Echo facies IIIB or IIB shows distinct or erosive lower boundaries in some places, which indicates that stratigraphic unit II formed during the glacial retreat. Highly dissected topography of echo facies IIB suggests that glacial tills were reworked by iceberg scouring. Distribution of these echo facies and stratigraphic units in the Chukchi continental margin suggests that Chukchi shelf and rise areas were effected by the retreating grounded ice during last deglaciation.

Keywords: echo facies, glacial bedforms, Chukchi continental margin, iceberg scours, glacial tills