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Late Quaternary sediment deposition of core MA01 in the Mendeleev Ridge, the western Arctic Ocean: Preliminary results

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Late Quaternary deep marine sediments in the Arctic Ocean are characterized by brown layers intercalated with yellowish to olive gray layers (Poore et al., 1999; Polyak et al., 2004). Previous studies reported that the brown and gray layers were deposited during interglacial (or interstadial) and glacial (or stadial) periods, respectively. A 5.5-m long gravity core MA01 was obtained from the Mendeleev Ridge in the western Arctic Ocean by R/V Xue Long during scientific cruise CHINARE-V. Age ($\sim$450 ka) of core MA01 was tentatively estimated by correlation of brown layers with an adjacent core HLY0503-8JPC (Adler et al., 2009). A total of 22 brown layers characterized by low L* and b*, high Mn concentration, and abundant foraminifera were identified. Corresponding gray layers are characterized by high L* and b*, low Mn concentration, and few foraminiferal tests. Foraminifera abundance peaks are not well correlated to $CaCO_3$ peaks which occurred with the coarse-grained ($>$0.063 mm) fractions (i.e., IRD) both in brown and gray layers. IRDs are transported presumably by sea ice for the deposition of brown layers and by iceberg for the deposition of gray layers (Polyak et al., 2004). A strong correlation coefficient (r^2=0.89) between TOC content and C/N ratio indicates that the major source of organic matter is terrestrial. The good correlations of $CaCO_3$ content to TOC (r^2=0.56) and C/N ratio (r^2=0.69) imply that IRDs contain detrital $CaCO_3$ which mainly originated from the Canadian Arctic Archipelago. In addition, high kaolinite/chlorite (K/C) ratios mostly correspond to $CaCO_3$ peaks, which suggests that the fine-grained particles in the Mendeleev Ridge are transported from the north coast Alaska and Canada where Mesozoic and Cenozoic strata are widely distributed. Thus, the Beaufort Gyre, the predominant surface current in the western Arctic Ocean, played an important role in the sediment delivery to the Mendeleev Ridge. It is worthy of note that the TOC and $CaCO_3$ peaks are obviously distinct in the upper part of core MA01, whereas these peaks are reduced in the lower part of the core. More study on these contrasting features is in progress.

References

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