

Contrasted East-West sedimentary fluxes along the Lomonosov Ridge (Arctic Ocean) during the late Quaternary

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The Lomonosov Ridge ranges East to West, from the Laptev-East Siberian seas occupied presently by annually renewed sea ice cover to the Northern Greenland characterized by multi-year perennial sea ice. Another major feature of the Lomonosov Ridge is the presence of the very active TransPolar Drift (TPD) mostly over its eastern section. As a consequence, highly contrasted sedimentary regimes are observed from East to West. High resolution analysis of 6 box cores raised during the Polarstern expedition PS87 in 2014 were undertaken with the objective to characterize and quantify sediment composition and fluxes over the ridge during the late Quaternary. Centimetre-thick samples were collected at 1 cm intervals. Measurements included AMS-14C on biogenic carbonates wherever available, systematic ^{210}Pb by alpha counting, grain size analyses, organic and inorganic carbon content and bulk X-ray mineralogy. Results highlight areas with very low sedimentary fluxes westward to relatively high sedimentation rate eastward. High detrital dolomite-rich carbonate contents from the Canadian Arctic and Beaufort characterize the westernmost section of the ridge. Whereas the excess lead 210 distribution downcore is controlled by bioturbation and diffusion down to layers dated of several tens of ka by ^{14}C , ^{226}Ra distribution is strongly influenced by its diffusion in the upper ~ 8 cm of cores. The decay sequence ^{226}Ra - ^{210}Pb cannot therefore be used for the calculation of recent sedimentation rates. AMS ^{14}C provide here the most reliable radiometric ages, allowing us to get first-order estimate of sedimentary rates ranging from ~ 0.1 mm.a $^{-1}$ in the easternmost sector to ~ 4 mm.ka $^{-1}$ year westward, hence illustrating a 3 orders of magnitude difference in ice-rafting deposition rates along the ridge. The westernmost sector also depicts a sedimentary gap during the last glacial maximum, as generally observed in low sedimentation rate sites from the Central Arctic Ocean. Combining sedimentological and geochemical features, one may infer a major role of sea ice dynamics over the Ridge, with the eastern sector under TPD influence experiencing average sedimentation rates orders of magnitude higher than those of the western sector more frequently overlain by perennial sea-ice characterized by low detrital content.