U-series stratigraphy of late Quaternary sediments from Mendeleev Ridge and glacial vs. interglacial ^{231}Pa-^{230}Th budgets in the Central Arctic

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Due to the lack of 'conventional' oxygen isotope stratigraphies, inconsistent sedimentation rates have been proposed for the Mendeleev ridge area. Here we investigate U-series isotopes behaviors in two multicores (MC) and a Trigger Core (TC) cores from HOTRAX 2005 as a means to better constrain these rates. The two coring sites are located at depths of 2570 m (MC & TC 11) and 1586 m (MC 12). The similarity of their geochemical and sedimentological features despite the bathymetric difference is striking. ^{210}Pb, ^{226}Ra, ^{230}Th, ^{231}Pa, ^{234}U, ^{238}U and ^{232}Th also show similar profiles in both MC cores, with some ^{210}Pb-excess restricted to the top cm. Below, ^{210}Pb shows a trend controlled by ^{226}Ra-diffusion gradients down to 8 cm from core-top. Deeper in the sediment, ^{230}Th governs the distribution of both ^{226}Ra and ^{210}Pb. In both MC, significant ^{230}Th-excesses matching abundance peaks of fine detrital carbonates (dolomite/calcite ratio ~ 1), are observed from core top to ~8 cm, between ~15 and ~20 and between 26 and 38 cm. Below, based on correlation with TC data, ^{230}Th-contents fall within error bars of the supported fraction, thus indicating a total decay of any initial excess and suggesting an age ≥300 ka for the underlying sediment. Similarly, the total decay of any measurable ^{231}Pa-excess below 29 cm suggests an age ≥ 180 ka for the underlying part of the cored sediments. By combining all available information, a rough stratigraphic frame can be set in these cores. The three peaks in ^{230}Th are assigned to MIS (Marine Isotopic Stage) 1-3, 5 (5e?) and 7, respectively, thus suggesting a very low mean sedimentation rate (~ 1.5 mm/ka). Glacial stages 4-5d (?) and 6 seem to be restricted to discrete coarse-grained IRD layers, respectively ~7- and ~5 cm-thick. Their very low ^{231}Pa and ^{230}Th initial excesses indicate a nearly total export of the ^{231}Pa and ^{230}Th production from the overlying water column during such intervals.

Vertical changes in organic carbon quality in a 11-thousand years old, 8.2-meters deep peat profile in Central Europe

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There are fears that global warming may lead to progressive relase of carbon currently stored in wetlands back to the atmospere. This carbon release in the form of greenhouse gases CO_2 and CH_4 could accelerate further climatic warming. Knowledge of age-related trends in the chemical speciation of organic carbon in peat deposits may provide insights into the processes of terminal carbon mineralization over time. We collected an 8.2 meter deep vertical peat core from the Velke Darko (VD) wetland in the Czech Republic. Pollen analysis and ^{14}C dating demonstrated that peat accretion at VD has been under way continuously since 11 thousand years B.P. With an increasing peat depth, the concentration of lignin, the most abundant C form, increased from 400 to 800 mg g^{-1}. In contrast, with an increasing depth, the concentration of holocellulose, alpha-cellulose, hemicellulose and acid-soluble carbohydrates decreased. The concentration of the second most abundant C form, holocellulose, decreased downcore from 300 to 150 mg g^{-1}. The concentration of acid-soluble carbohydrates decreased downcore from 250 mg g^{-1} to zero. The concentration of lipids (150 mg g^{-1}) and phenolics (2 mg g^{-1}) remained constant with depth. Most vertical trends in the abundance of individual C forms were smooth and did not reflect warmer climate ca. 7 thousand years ago. Peat diagenesis probably dominated the relative representation of C forms along the peat profile. We also determined C isotope composition of bulk peat along the vertical peat profile. The δ^{13}C value of bulk peat increased from –27 to –25 per mil between the depths of 0 to 50 cm, and then decreased downcore. At a depth of 6 meters, the δ^{13}C reached a minimum value of –28 per mil. The δ^{13}C value steadily increased with an increasing depth in the lowermost 2 meters of the profile. The δ^{13}C values were a result of changing plant composition, changing isotope fractionation during C assimilation, changing moisture, changing minerization rates, and changing δ^{13}C of air-borne CO_2.