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Setting chronostratigraphies in low sedimentation rate sequences from the Arctic Ocean: isotopic approaches with focus on U-series

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The setting of unquestionable time frames for Late Quaternary, low sedimentation rate sequences from Arctic Ocean ridges, encounters difficulties. 14C ages from biogenic carbonates can only document late MIS 3 and more recent episodes. Biases due to large amplitude changes in fluxes of such biogenic 14C-carriers and uncertainties in reservoir age corrections also add problems for the transcription of such ages into calibrated ages and sedimentation rate estimates. Attempts at using aminoacids yielded similarly questionable results. Correlations based on sedimentological, micropaleontological and magnetic properties are often inconclusive or at least open to discussion. In a similar fashion, 'conventional' oxygen isotope stratigraphies from isotopic measurements in foraminifer shells are poorly informative due to a large array of reasons: large amplitude changes in 18O-carrier fluxes, isotopic offsets linked to the influence of isotopically light brines added to the foraminiferal water habitats and resulting from sea-ice growth, discontinuous records and dissolution events (foraminifers are mostly restricted to detrital carbonate-rich layers in such settings). In this context, information from cosmogenic (10Be) and U-series isotopes may reveal useful. Interpretation of 10Be data is not unequivocal either, due to changes in production rates (cf. the issue of magnetic paleointensity measurements above). In a similar fashion, 230Th and 231Pa data vary in accordance with critical paleoceanographic conditions (particulate fluxes, particle compositions and relative adsorption rates, boundary scavenging...) and cannot be used straightforwardly for the setting of precise time scales. However, both isotopes can provide unquestionable time marks ($\sim$ 300 and $\sim$150 ka, respectively) based on the radioactive decay of their initial excess over fractions inherited with detrital particulate fluxes. This is already more than information from most other relative or absolute dating tools with respect to the interval > 35 ka to $\geq$ 300 ka, as we intend to illustrate here from representative sequences from Mendeleiv Ridge in particular. Grain size, mineralogical, geochemical (Corg, Cinorg) and isotopic (210Pb, 238U, 234U, 232Th, 230Th, 231Pa) measurements on ground bulk sediment, and isotopic (13C, 14C, 18O) measurements on planktonic foraminifers when present will help illustrating the above problems and provide a suitable methodological approach.