Decadal changes in circulation and particle flux in the Amerasian basins of the Arctic Ocean inferred from the water column distribution of dissolved ^{230}Th and ^{231}Pa

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Combining data published since the 1980s and more recent measurements obtained during the Arctic GEOTRACES program reveals decadal changes in the distribution of dissolved ^{230}Th and ^{231}Pa in the water column of the Amerasian basins of the Arctic Ocean. These changes can be explained by i) higher particle flux resulting from the loss of Arctic sea ice and ii) increased lateral exchange between the Atlantic water transported by the topographically-steered cyclonic boundary currents that dominate the intermediate water circulation and the less ventilated water from the Arctic basins' interior. Before rapid melting of sea ice, the relative isolation under permanent sea ice cover of intermediate water in the basins' interior allowed the buildup of dissolved ^{230}Th and ^{231}Pa. Subsequent sea ice retreat increased biological productivity, and the resuspension and off-shore transport of shelf sediments, both resulting in increased scavenging of ^{230}Th and ^{231}Pa near the continental margins. Concurrently, lateral exchange between the basins' interior and the margins increased, a process which is uniquely documented by prominent but transient subsurface extrema in dissolved ^{230}Th profiles reflecting the invasion of high ^{230}Th water towards the margins and low ^{230}Th water toward the interior.