Sea level rise produces abundant organobromines in affected coastal environments

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Halogenated organic compounds frequently destroy stratospheric ozone when released into the atmosphere. While many such organohalogens are anthropogenic, recent studies have revealed that natural biogeochemical processes in soils and sediments can produce similar compounds at rapid rates. Here we show that recent rises in sea level may have increased the natural production of brominated organic compounds in submerged wetland sediments.

We investigated the concentrations and speciation of Cl and Br in a fresh water wetland, salt-impacted wetland, and salt marsh along a salinity gradient in Winyah Bay, South Carolina. Our studies indicate that Cl in the fresh water wetland is mostly retained as organochlorine. However, Cl in the salt-impacted wetland and salt marsh is primarily retained as Cl^-. No significant production of organochlorines is seen in the salt-impacted wetland. In contrast, Br is primarily retained as organobromine in all three systems, and organobromines are most abundant in the salt-impacted wetland. Using the partitioning behaviour of Cl and Br, we predict that the salt-impacted wetland retains excess Br because of the bromination of natural organic matter.

As sea levels continue to rise, bromination of natural organic matter will become a major source of volatile organohalogens that deplete stratospheric ozone.