Evolution and Depositing Response During the Mesozoic and Cenozoic in Dunhua Basin,Northeastern China

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Dunhua Basin is located in the middle of Dunhua Mishan Graben in Northeastern China. And it is a rift-fault depression superposed basin which is controlled by the Dunhua Mishan fracture zone. A series of tectonic system transitions happens during the Mesozoic and Cenozoic period in the Dunhua Mishan fracture zone （ Zhang et al.,1994; Yin ,1993; Li,1994）.The transitions starts in the Late Triassic. In the Late Jurassic, it is compressional; during the Cretaceous–Paleogene, it has a left-lateral displacement and a certain scale of extension; there is a compression in the late Paleogene, which then turns into the extension state again after Neogene. The evolution of Dunhua Mishan fracture zone plays a controlling role in the generation,development and evolution of the Dunhua basin. The evolution of the Dunhua Basin in the Mesozoic–Cenozoic period is: the compressional orogeny, strike slip & pull-apart and the initial rifting stage in Late Jurassic–Early Cretaceous (rift development stage); the inversion, uplifting and exhumation stage in Late Cretaceous-Paleocene;rift basin development stages in the Eocene–Oligocene period and Depression and basalt eruption stage after the Neogene. Different evolution stages have different deposition response characteristics.

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ANAMMOX ACTIVITY IN CONTAMINATED GROUNDWATER HAVING HIGH AMMONIUM AND NITRATE CONCENTRATIONS

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Abstract

Anaerobic ammonium oxidation (anammox) has been recognized as a critical process for removing nitrogen components in marine and surface aquatic systems, and recent studies suggest that anammox appears to be ubiquitous in natural and engineered environments. However, the activity and reaction rates of anammox in contaminated groundwater environments have never been directly quantified and their relative importance is still unknown. In our study, microcosm tracer incubation experiments with $^{15}N\text{-}NH_4^+$, $^{15}N\text{-}NO_3^-$, and $^{15}N\text{-}NO_2^-$ were performed with groundwater and sediment samples from a contaminated aquitard near Elmira, Ontario, Canada, in order to measure the potential reaction rates and assess the respective contribution of anammox and denitrification activities. The tracer experiments showed that the potential anammox reaction rates ranged from 71.5 to 148.1 nmole N_2 L^{-1} d^{-1} which are very comparable to those reported in freshwater lakes. A comprehensive mathematical calculation suggested that 32 to 48% of N_2 production was attributed to anammox at the Elmira site.The measurements of NH_4^+ and NO_3^- before and after incubation and elevated $\delta^{15}N\text{-}NO_3^-$ indicated a complex and interactive ammonium attenuation mechanism including anammox and both microaerobic and anaerobic ammonium oxidation. Together with fluorescence *in situ* hybridization (FISH) results, our study points to anammox as an active process in the highly contaminated Elmira groundwater and to the fact that anammox organisms show a strong adaptability to heavy total nitrogen loads up to 46.5 mmol L^{-1} and relatively high dissolved oxygen concentrations up to 65.3 μmol L^{-1}.