

Change of nitrogen isotope in ancient guano profiles in Xisha Islands of South China Sea and possible cause

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Stable nitrogen isotope composition in ornithogenic sediments is affected by many biogeochemical processes. In this study, we analyzed total nitrogen (TN) and different forms of nitrogen as well as N isotopic composition and total organic carbon (TOC) in the guano pellets collected from three ornithogenic sediment profiles in Yongle Islands, Xisha Archipelago of South China Sea. An increasing trend of $\delta^{15}\text{N}$ in the ancient guano samples was observed in three profiles from the bottom to top and a significant increase of $\delta^{15}\text{N}$ from fresh guano to ancient guano pellets. We suggest that the nitrogen in the ancient guano pellets had experienced two major fractionation processes. The first one happened immediately after excretion by seabirds, which caused a significant enrichment in ^{15}N and obvious loss of total nitrogen. The second process took place during post-buried diagenesis, which caused the $\delta^{15}\text{N}$ value to increase toward the top of sediment profiles. The diagenesis process can produce some inorganic nitrogen such as NH_4^+ , NO_3^- , and the abundance of these inorganic nitrogen may be leached due to the rainwater, and this caused the increase of NH_4^+/TN ratio from the bottom to top of sediment profiles, thus the increasing trend of $\delta^{15}\text{N}$ in the ancient guano samples might occur towards the top profiles. This study provided some valuable insight into the biogeochemical cycle of nitrogen in the tropical region.