Reconstruction of eco-environmental change on Qilian Yu Islands, South China Sea over the past 800 years

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Ornithogenic sediments are ideal materials to reconstruct paleoecological and palaeoenvironmental changes. Field investigation showed that a large number of ornithogenic coral sand sediments were present beneath vegetation in the Xisha Islands, South China Sea, and they were proven well preserved. Ornithogenic sediments were collected beneath seabird-inhabited shrubs from Qilian Yu Islands of Xisha Archipelago, and a large number of seabird/fish sub-fossils were recovered from them. Based on the method of reflectance spectroscopy, historical records of seabird population at Nandao, Beidao, Zhongdao and Zhaoshu Islands have been reconstructed, and the results showed that the number of seabirds on these Islands reached an overall peak during the Little Ice Age (LIA, 1400–1850 AD), indicating that the cool climate may favor the breeding of seabird occupied on Qilian Yu islands. However, the result of relatively high-resolution reconstruction showed that the seabird population sizes fluctuated during specific periods within the LIA. It appears that seabirds migrated among adjacent islands, leading to their decline or absence while increased on the other, with a further change in their foraging behaviors inferred from stable carbon and nitrogen isotope analyses on sub-fossils including seabird and flying fish bones, fish scales. At the same time, the historical change of Cu, Zn, Cd and Hg concentrations in the ornithogenic sediments have been determined, and the results showed that the variation of Cu, Zn, Cd and Hg concentrations in the ornithogenic sediments had close relationship with the fluctuation of historical seabird population size, suggesting that they can be used to indicate historical seabird population occupied on islands.