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A 1300-year record of seabird population on Dongdao Island of South China Sea in response to climate change

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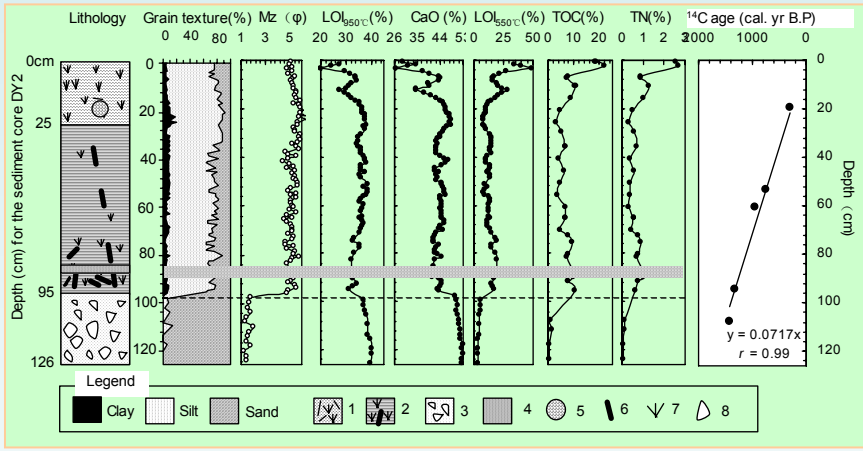
Red-footed Booby (*Sula sula*)

ABSTACT: We collect and analysis a well preserved and seabird feces contained lacustrine sediment core(DY2)(Fig 1) on Dongdao Island(16° 39'~16° 41'N, 112° 43'~112° 45'E), South China Sea (SCS).As, Cd, Cu, Se, Zn, P and S were identified as the indicator element group for seabird since they displayed the similar trends versus depth through the 26~96cm sediment sequence (Fig 2), evidently been amended by seabird dropping. By Q-mode factor analysis on the bio-element/Al ratios (Fig 3), we reconstructed the historical seabird populations on the so called "Birds Island" over the past ~1300 years (Fig 4), which showed significant fluctuations. A comparison of the seabird populations and sea surface temperature (SST) of SCS indicated that SST might have been the main controlling factor on the seabird population on SCS and, a SST range of 27~31℃ seems to be suitable for seabirds reproduction.

KEYWORDS: Dongdao Island, lacustrine sediment, sediment sequence, seabird population, SST, biological response

Fig 1 Down-core variation profiles of grain-size composition, mean grain size, percentage of loss on ignition at 550℃ and 950℃, the contents of calcium oxide, total organic carbon (TOC), total nitrogen (TN), and total sulfide (TS) in the DY2

Legend:1. Brown-black humic mud enriched with plant remains; 2. Brown-red middle to fine grained coral sandy mud containing sea bird droppings; 3. Grey-white coral, shell, and sandy gravel; 4. Well-sorted coral sand; 5.Humpy cattle excrements 6. Bones of seabird and fish; 7. Remains of plant root and leaf; 8.Large coral clast. ^{14}C are AMS^{14}C age.



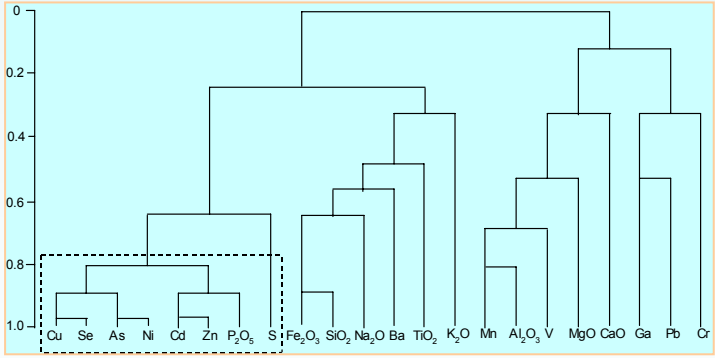


Fig 2 R-mode clustering results for the chemical elements in the sediment layer of DY2 between 26 and 96cm.

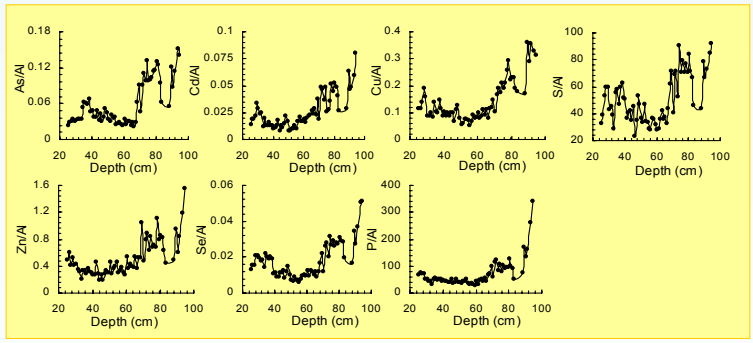
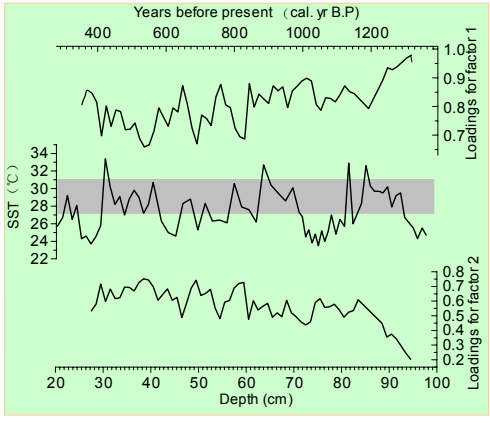


Fig 3 Down core variations of bio-element/Al values in the ornithogenic sediments of the core DY2



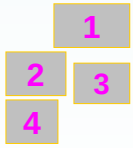


Fig 4 Historical change of seabird population during the past ~1350-350 year obtained by the Q-factor analysis . The factor 2 is opposite to the factor1; variation in loadings of factor 1 represents the historical variation in seabird population. At the middle of the graph, the change curve of sea surface temperature (SST) is based on the $\delta^{18}O$ value of bottom-perch foraminifer in an undisturbed sediment core from the lagoon of SCS (Wen Xiaosheng, Ph. D. Dissertation, USTC, 2001);

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