402

HISTORICAL CHANGES IN ANTARCTIC PENGUIN AND SEAL POPULATIONS RECORDED IN SEDIMENTS INFLUENCED BY ANIMAL EXCREMENTS

Sun Liguang, Liu Xiaodong, Xie Zhouqing, Yin Xuebin, Zhu Renbin, Wang Yuhong

Institute of Polar Environment,University of Science and Technology of China, Hefei, Anhui Province, China

The Antarctic region has been selected as one of the core research areas in numerous international global change research programs, such as International Geo-Biosphere Program (IGBP) and World Climate Research Program (WCRP), and the responses of eco-environment in Antarctica to the global change are one of important research contents in these projects. There might have close relationships between historical marine animals (e.g. penguin, seal etc.) population, human civilizations and natural conditions in Antarctica, which will be helpful to well understand the ecosystem's responses to global change.

A novel biogeochemical method to reconstructing historical changes in penguin and seal population was established. According to elemental geochemical study on the lake sediments influenced by penguin droppings on Ardley Island in the maritime Antarctic, the assemblage of elements including Sr, F, S, P, Se, Ba, Ca, Cu and Zn was identified to be an important geochemical characteristic of the lake sediments impacted by penguin droppings or guano soil. Q-mode factor analysis was used to determine the change of penguin droppings in the sediments, which suggests the dynamics of historical penguin populations. The reconstructed change curves during the past 3000 years showed that the penguin population began to decline around at 3,000 yr before present (yr B.P.) and was lowest at 1,800-2,300 yr B.P., namely, Neoglacial period. After that, the population increased, peaking somewhere between 1,400-1,800 yr B.P., corresponding to a period of high temperature.

The historical seal populations at King George Island, Antarctica, for the past 1500 years were estimated from the seal hair abundance, bio-element concentrations, total organic carbon (TOC) and total nitrogen (TN) in one terrestrial sediment sequence influenced by seal excrement. Prior to human interference the seal populations exhibit dramatic fluctuations with two peaks during 750 -500 and 1400 –1100 years before present (yr B.P.) and two troughs during 1100-750 and 500-200 yr B.P.