

ENSO-linked climate change on rodent population dynamics in wild natural plague foci of southern China from 1878-2019

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May 30, 2022

Abstract

El Niño Southern Oscillation (ENSO)-linked climate patterns have been known to be associated with several rodent species, but the effects of ENSO on rodent populations at both the spatial and temporal scales in wild natural plague foci of southern China, have not been thoroughly studied. In this study, we investigated the possible natural environmental factors relating ENSO, precipitation, relative humidity and surface temperatures to the populations of 2 allopatric rodent species (*Apodemus chevrieri* and *Rattus tanezumi*) in Jianchuan county the most important core area of the natural foci of wild plague in southern China from 1978 to 2019. Our results indicated that ENSO-driven climate factors, such as the Southern Oscillation Index (SOI), rainfall, surface temperature, and other biological factors, all affected the rodent population densities. We found that sympatric rodent species with different life histories respond differently to precipitation and surface temperature, while SOI had a similar effect on the population densities of these two species, and the effect of SOI on rodent population densities was time-dependent. Additionally, nonlinear negative relationships were established between the population density of rodents and SOI, and El Niño events were found to be beneficial for increasing the rodent density, whereas La Niña events were favorable for decreasing the rodent density. The cross-wavelet analysis results revealed that the rodent population density oscillated in an anti-phase pattern with SOI over a period of approximately 2-3 years before 1995 but has oscillated in-phase with SOI over the same periods since 1995. These results indicate that ENSO-driven climate variations may significantly impact rodent population dynamics in Jianchuan county, and SOI, a large-scale climate factor, has the same effect on sympatric rodent species with different life histories.

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