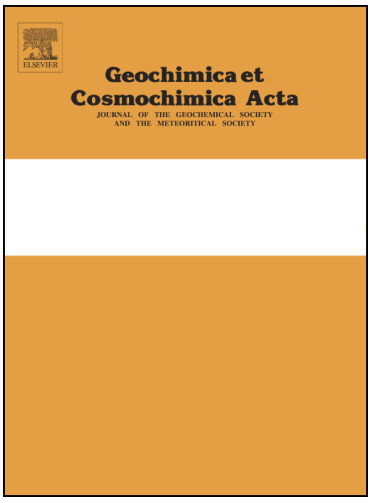

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Reliability of Shell Carbon Isotope Composition of Different Land Snail Species as a Climate Proxy: a Case Study in the Monsoon Region of China

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Abstract

Carbon isotope compositions of land snail shells ($\delta^{13}C_{shell}$) are shown to be indicative of local climate conditions. However, it is largely unknown how the responses of $\delta^{13}C_{shell}$ to climatic factors changes amongst different species. In this study, we collected 3 species of land snail shells across the East Asian monsoon region of China to explore the overall relationship between $\delta^{13}C_{shell}$ as well as the response of individual species to the regional climate. Results show that, whereas all species collectively can provide a consensus relation between $\delta^{13}C_{shell}$ and local climatic factors such as temperature and precipitation; the response of individual species to the fluctuations of these factors is not uniform. Specifically, while the southerly species *Bradybaena similaris* exhibits robust $\delta^{13}C_{shell}$ – mean precipitation correlation in both linearity and sensitivity, a common northerly species, *Cathaica fasciola*, only finds limited utility as a climate indicator, particularly for precipitation. Meanwhile, the south -central species *Acusta ravida* appears to be able to faithfully record past climate conditions despite showing a wider distribution and a broader habitat. Such species-dependent nature in the relations between $\delta^{13}C_{shell}$ and local climatic factors can be attributed to the effect of ingested carbonate and variations in eco-physiological factors of different species, and is expected to be widespread, suggesting the need to be taken into consideration for future studies.

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