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An annually-resolved stalagmite tropical cyclone reconstruction from Belize reveals a northward shift in North Atlantic storm track position since 1550 C.E.

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Hurricanes are large-scale atmospheric phenomena that typically produce high volume, high intensity, and isotopically depleted rainfall. Such storms have the ability to alter the isotopic composition of the groundwater reservoir, imparting a uniquely negative isotopic fingerprint to actively growing stalagmites. In regions influenced by the Intertropical Convergence Zone (ITCZ), large volumes of rainfall delivered during the wet season can obscure the tropical cyclone (TC) rainfall proxy signal. Coupled annually resolved carbon and oxygen isotope ratios were used to isolate the low δ^{18}O TC signal from the isotopically more enriched background rainfall associated with seasonal ITCZ migration. The new composite stalagmite proxy record yielded a 99.7% significant correlation with the western Caribbean-filtered HURDAT2 database over the instrumental record based on a non-parametric bootstrap approach. The new annually-resolved TC reconstruction for the western Caribbean spans the last 450 years and reveals a peak in western Caribbean TCs at 1650 C.E. and a gradual decline until a marked decrease is observed at the start of the Industrial Era. Comparison with documentary records of TC occurrence along the US eastern seaboard reveals a clear pattern of north-eastward TC track migration since peak Little Ice Age cooling. This pattern is consistent with natural warming since the Little Ice Age temperature minimum and with anthropogenic influences after industrialisation. Satellite observations reveal Hadley cell expansion has occurred over the last three decades and modelling studies implicate rising atmospheric greenhouse gas concentrations as the driver. Our results suggest that Hadley cell position and width is a major control on hurricane track position and that future emissions scenarios (continued rising greenhouse gases coupled with decreasing Northern Hemisphere aerosol emissions) are likely to increase storm risk to the north-eastern USA.