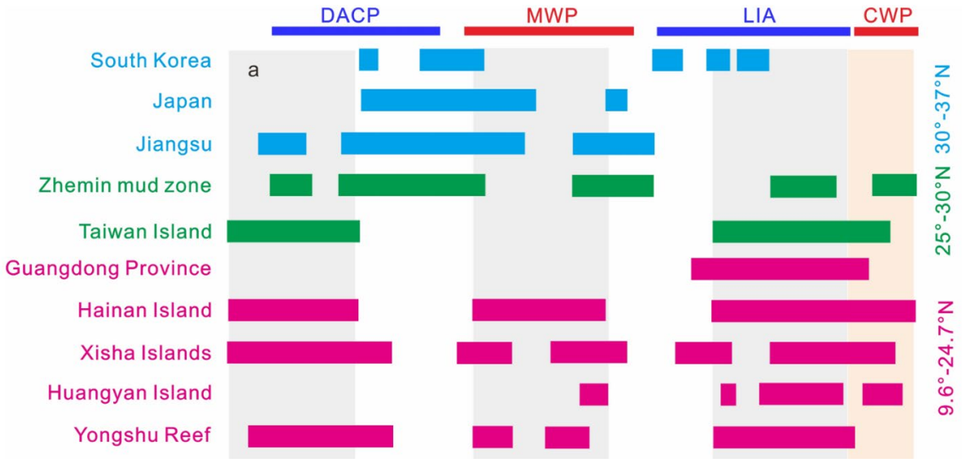
Results from Southeastern Asia



Increased (decreased) ENSO + Strong (weak) EASM

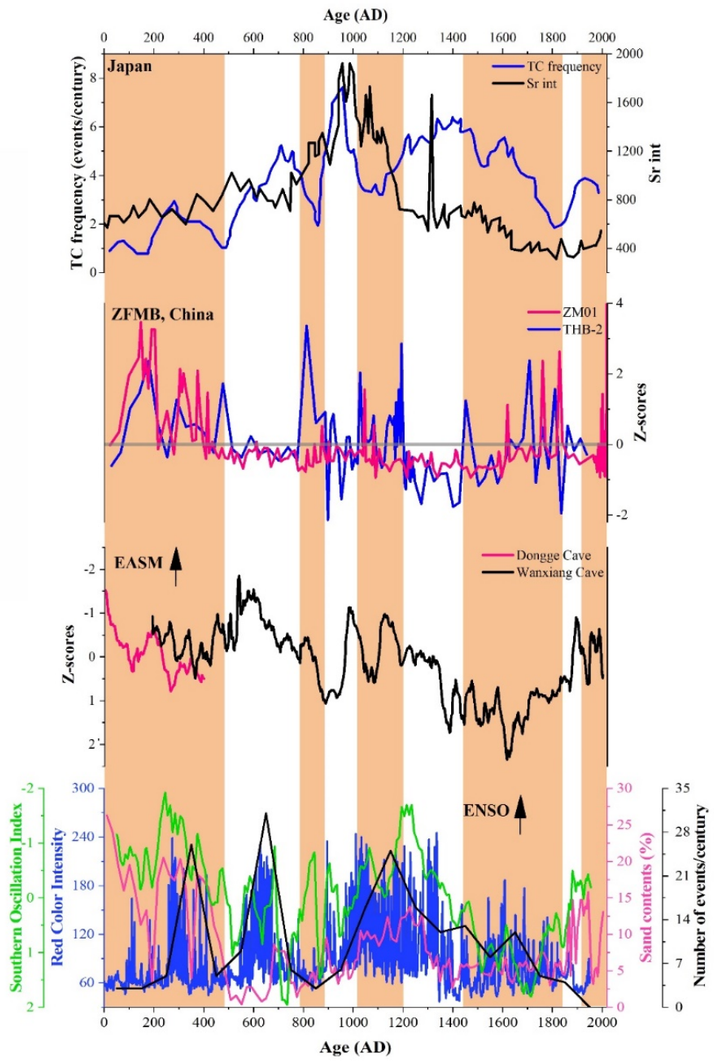
↓

TC formation shifts eastward (westward) with tracks tending northeastward (southwestward)

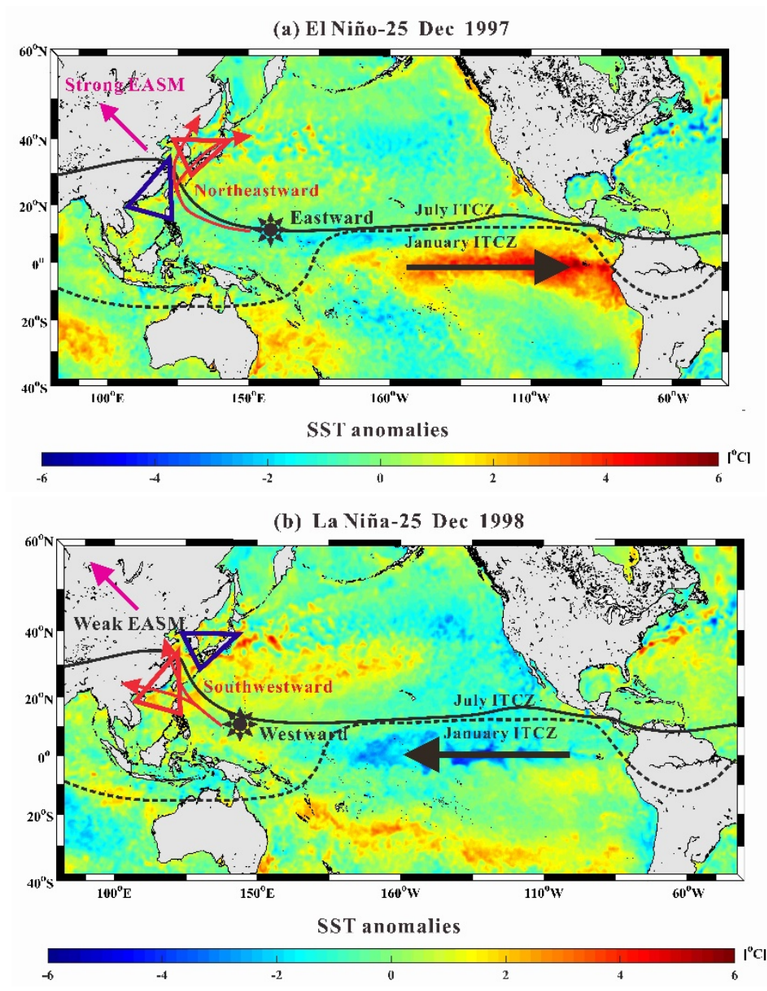
↓

More storms restricted to middle (low) latitudes

The compilation of paleo-TC reconstruction from different latitudes in Southeastern Asia

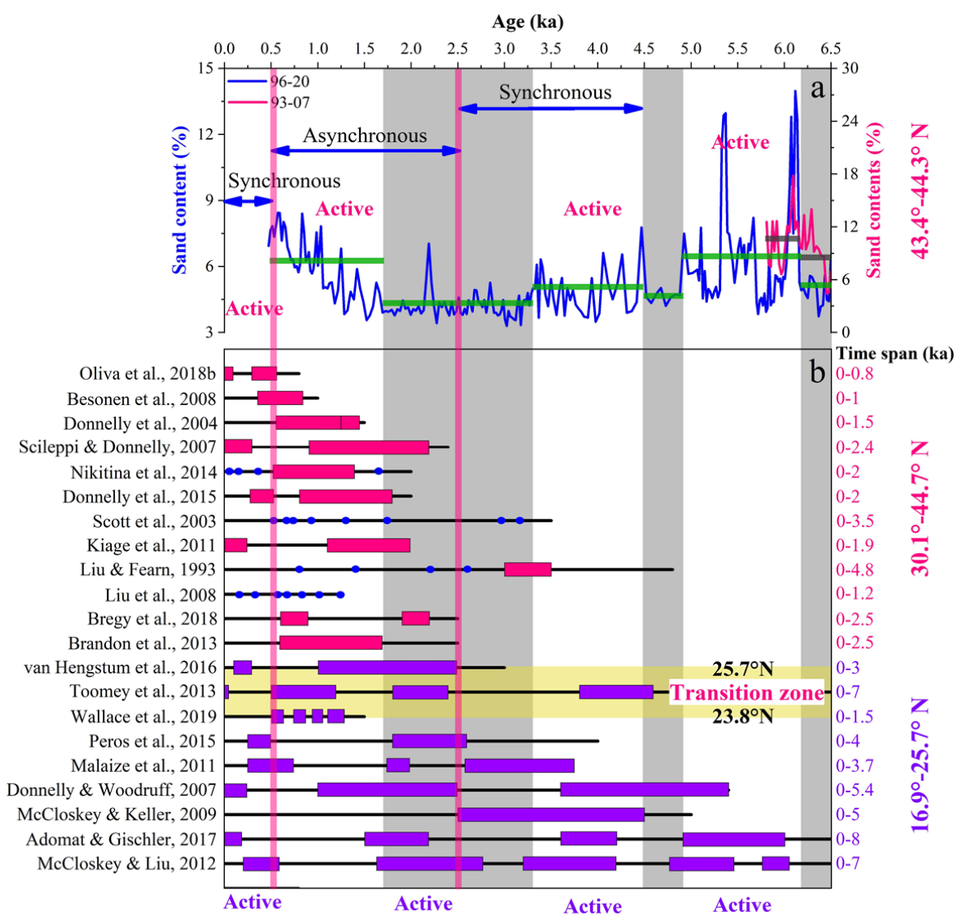


Comparison regional TC reconstructions with climatic proxies

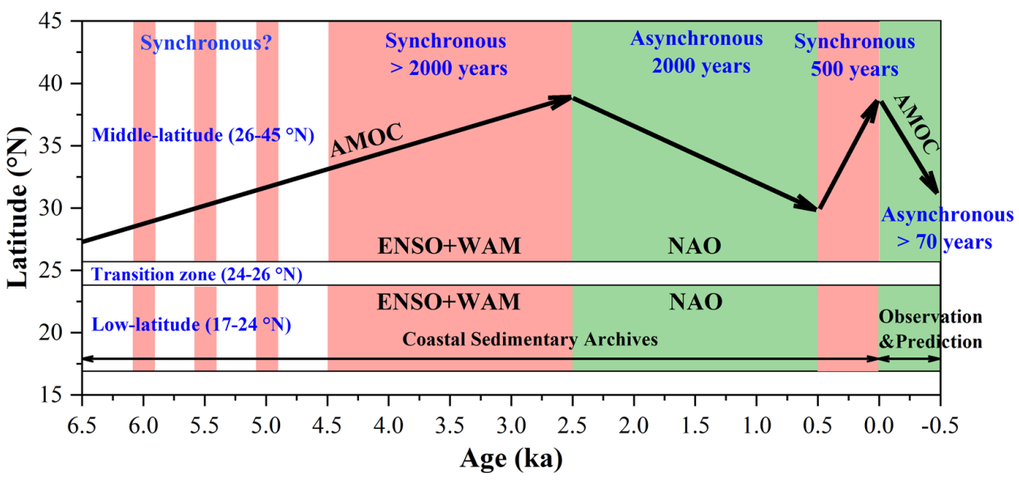


The ENSO–East Asian Summer Monsoon (EASM) hypothesis in the northwestern Pacific region (triangles: Southeastern China and Japan-Korea)

Results from North Atlantic



The compilation of paleo-TC reconstruction from different latitudes in North Atlantic



Schematic demonstration of latitudinal response of TC activity to AMOC-related changes during the mid-to-late Holocene

Conclusions

- Peaks in storminess in the past 2 Kyr are asynchronous at low and middle latitudes in the northwestern Pacific, which can be explained by the ENSO–EASM hypothesis.
- Peaks in storminess are at times synchronous (4.5–2.5 and since 0.5 ka) between low and middle latitudes in the North Atlantic, but in the intervening period (2.5–0.5 ka) were latitudinally asynchronous. Synchronous (asynchronous) behavior correlates with sustained increase (decrease) of AMOC.
- In order to quantify or establish a general model for the storm pattern and climate changes, this study recommends enhancing the accuracy of storm intensity and frequency indicators, as well as improving the techniques to determine the spatial resolution of the sedimentary records of storm events.
- The study may also encourage development of better strategies for management risk in vulnerable coastal areas at different latitudes, as well as provides food for thought about how other climate phenomena might might vary geographically in a warming world.

Recent publications:

Gao S, Jia J J, Yang Y, Zhou L, Wei W, Mei Y J, Li Y N, Wang L, Zhao P P, Liu Z Q, Zhang L F, 2019. Obtaining typhoon information from sedimentary records in coastal-shelf waters. Haiyang Xuebao, 41, 141-160. (In Chinese with English abstract)

Zhou L, Yang Y, Wang Z H, Jia J J, Mao L J, Li Z H, Fang X, Gao S, 2019. Investigating ENSO and WPWP modulated typhoon variability in the South China Sea during the mid–late Holocene using sedimentological evidence from southeastern Hainan Island, China. Marine Geology, 416, 105987.

Zhou L, Gao S, Jia J J, Zhang Yuzhu, Yang Y, Mao L J, Fang X, Shulmeister J, 2019. Extracting historic cyclone data from coastal dune deposits in eastern Hainan Island, China. Sedimentary Geology, v.392, 105524.

Yang Y, Zhou L, Normandeau A, Jia J J, Yin Q J, Wang Y P, Shi B W, Gao L, Gao S, 2020. Exploring records of typhoon variability in eastern China over the past 2000 years. Geological Society of America Bulletin, 132, 2243–2252.

Yang Y, Maselli V, Normandeau A, Piper D J W, Li M Z, Campbell D C, Gregory T, Gao S, 2020. Latitudinal response of storm activity to abrupt climate change during the last 6,500 years. Geophysical Research Letters, 47, GRL61250.

Zhou L, Gao S, Jia J J, Yang Y, Tong C L, Wang A J, 2021. Paleo-typhoon events as indicated by coral reef boulder deposits on the southern coast of Hainan Island, China. Frontiers in Marine Science, 8, 746773.

Yang Y, Piper D W, Normandeau A, Zhou L, Jia J J, Wang Y P, Gao S, 2022. A late Holocene shift of typhoon activity recorded by coastal sedimentary archives in eastern China. Sedimentology, 69, 954-969.

Yang Y, Piper D J W, Xu M, Gao J H, Jia J J, Normandeau A, Chu D D, Zhou L, Wang Y P, Gao S, 2022. Northwestern Pacific tropical cyclone activity enhanced by increased Asian dust emissions during the Little Ice Age. Nature Communications, 13, 1712.