Meghalaya cave stalagmite

Prelims: *Current events of national and international importance | Geography*

Why in News?

A study led by researchers from IIT Kharagpur and IISER Kolkata analyzed a stalagmite recovered from Mawsmai Cave in Meghalaya to reconstruct approximately 6,000 years of monsoon dynamics in Northeast India.

Key Highlights

- **Sample Analysis-** Researchers analyzed an 11 cm-long stalagmite collected from a chamber roughly 300 metres inside **Mawsmai Cave** (East Khasi Hills district), where relative humidity stays above 95%.
- **Early Holocene Wet Phase -** Stable oxygen isotope ($\delta 18O$) analysis indicated significantly stronger monsoon rainfall during the Early Holocene.
- **Gradual Monsoonal Decline -** The study revealed a progressive decline in Indian Summer Monsoon (ISM) strength starting around 7,700 years before present, indicating a long-term drying trend.
- **Cyclical Climate Drivers -** The stalagmite records uncovered recurring wet-and-dry climate cycles occurring at intervals of approximately **110 and 118 years**.
- It links regional Indian rainfall changes to global solar variability and broader ocean-atmosphere atmospheric oscillations.

Speleothems (Stalagmites & Stalactites)

- Secondary mineral deposits formed in limestone caves.
- **Stalagmites** grow upward from the cave floor from mineral-rich water drippings, acting as natural climate archives or "paleoclimate proxies".
- As rainwater seeps through overlying soil and limestone, its oxygen isotope composition reflects past surface temperature and total precipitation levels.
- **Stalactites** are icicle-shaped mineral formations that hang downward from the ceilings of caves, hot springs, or man-made structures like concrete bridges.

Relevance of Meghalaya Caves in Paleoclimatology

- **The Meghalayan Age -** The current geological age (the late stage of the Holocene, starting ~4,200 years ago) was formally named after a mega-drought event preserved in a stalagmite from **Mawmluh Cave** in Meghalaya.
- **Karst Topography -** The Khasi, Jaintia, and Garo hills feature extensive soluble limestone bedrock, creating one of Asia's densest karst networks and rich natural palaeoclimate libraries.



Reference

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