Late Pleistocene abrupt climate change
ICTZ, teleconnections and the impact of seasonality

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abstract

Palaeoecological records have demonstrated a close link between the annual average position of the intertropical convergence zone (ITCZ) and interannual scale climate change recorded in Greenland ice cores. The Indian summer monsoon (ISM) is an integral part of the ITCZ and the manifestation of the seasonal migration of the ITCZ. This abstract presents results of Indian monsoon records from the Arabian Sea for the late Pleistocene. We show that summer monsoon intensity is highly correlated for northern hemisphere summer insolation, however it became synchronized during North Atlantic oxygen-isotope events, which resulted in a southwest displacement of the ITCZ. Furthermore, we present a reconstruction of sea surface temperature (SST) from northern and southern Gulf of Mexico for the late glacial, which can partly explain the Indian summer monsoon. Finally, we compare changes in the late Pleistocene ITCZ position to other climate events of the late Pleistocene, such as the Younger Dryas (12.9 ka B.P.), the Bolling-Allerød interglacial (14.7 ka B.P.), and the warm winter (15.6 ka B.P.).

Sensitivity of the Intertropical Convergence Zone to Last Glacial Maximum boundary conditions - Land and Sea ice as forcing factors

Palaeoecological evidence from the last glacial period and deglaciation show significant changes in the position of the Atlantic ITCZ that occurred synchronously with climate changes in the North Atlantic. In this study, we focus on the forcing of ITCZ changes through changes in land ice and sea ice. We use boreal summer temperatures in the Gulf of Mexico and in the Arabian Sea to infer changes in the ITCZ position and to study the impact of changes in land and sea ice on ITCZ position.

Boreal summer ITCZ position indicators - Gulf of Mexico

Indian summer monsoon "fast" component is based on 4135 measurements, that indicate changes in monsoon intensity. Changes in teleconnections related to 4135 measurements, that indicate changes in the Asian monsoon.

The Indian Monsoon intensity changes are related to monsoon seasonality, which determine the land and sea ice that differ in the ITCZ. In this study, we focus on the forcing of ITCZ changes through changes in land ice and sea ice. We use boreal summer temperatures in the Gulf of Mexico and in the Arabian Sea to infer changes in the ITCZ position and to study the impact of changes in land and sea ice on ITCZ position.

1. Regional Indian winter monsoon
2. North Atlantic cold events (now closer feedbacks related to cold boreal winter temperatures
3. Gulf of Mexico
4. JAS mean temperatures - India

Decoupled from NA cold events (influence on boreal winter/ITCZ position)

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