



SFB 754

**Sonderforschungsbereich 754
Climate-Biogeochemistry Interactions in the Tropical Ocean**

SFB 754 colloquium: Friday, 5th Sept, 15:00
Lecture Room (Hörsaal westhore)

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Title:

An Oceanic Teleconnection Mechanism Linking High-Latitude North Atlantic Abrupt Climate Changes to the Tropics

Abstract:

We present an oceanic teleconnection mechanism linking high latitude North Atlantic climate changes to abrupt changes in the tropical Atlantic. We show that the tropical Atlantic ocean-atmosphere system responds nonlinearly to changes in the Atlantic Meridional Overturning Circulation (AMOC) owing to its interaction with the wind-driven subtropical cells (STC). When the AMOC is weakened below a certain threshold, the subsurface North Brazil Current (NBC) reverses its direction, carrying warm subsurface north subtropical gyre waters to the equatorial south Atlantic and causing a drastic decrease in the upper ocean stratification. This oceanic change weakens the boreal summer appearance of cold sea-surface temperature (SST) in the equatorial Atlantic, as well as the occurrence of the Atlantic Niño. The result is a dramatically reduced African Monsoon. The proposed mechanism is supported by the newly reconstructed high-resolution temperature records using oxygen isotope values and Mg/Ca ratios in both surface and sub-thermocline dwelling planktonic foraminifera from a sediment core located in the TNA over the last 22 kyr. The proxy records show significant changes in the vertical thermal gradient of the upper water column, with the warmest subsurface temperatures of the last deglacial transition corresponding to the onset of the Younger Dryas. The finding is also validated by a climate model simulation forced with freshwater discharge into the North Atlantic under Last Glacial Maximum (LGM) forcings and boundary conditions that reveal a maximum subsurface warming in the vicinity of the core site and a vertical thermal gradient change at the onset of AMOC weakening, consistent with the reconstructed record. Finally, we will discuss the impact of climate model biases in the tropical Atlantic on the effectiveness of the oceanic teleconnection mechanism and on tropical Atlantic climate response to AMOC changes.