

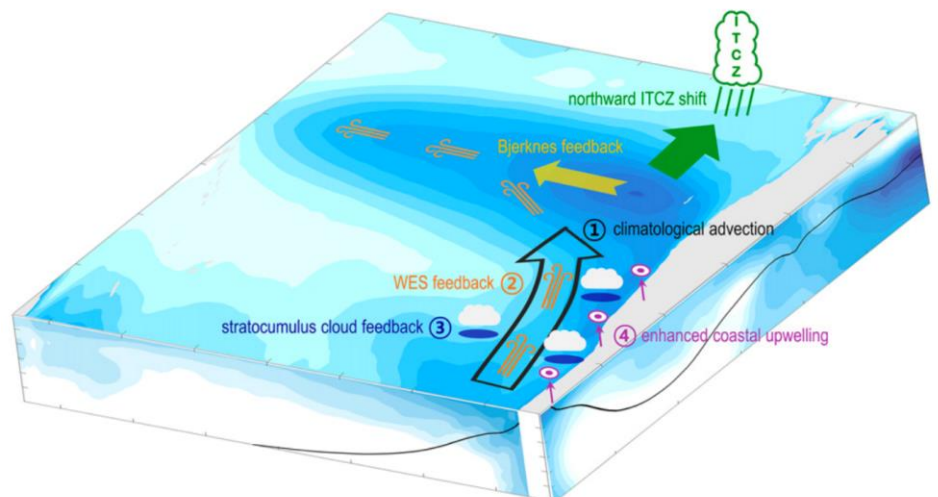
## Einladung zum Physikalischen Kolloquium

08.11.2024 **Sarah M. Kang, Max-Planck-Institut für Meteorologie, Hamburg**  
**»Puzzles in Historical Climate Trends:  
 Insights into Walker Circulation and Tropical SST Pattern Changes«**  
*Einführung: J. Pinto*

Global warming is known to weaken both the convective mass flux and the Walker circulation. Yet, in the past decades, the convective mass flux has been weakening while the Pacific Walker circulation has actually been strengthening. To investigate this discrepancy, we conducted a series of prescribed sea surface temperature (SST) experiments to separate the effects of global warming from changes in SST patterns. The tropical-mean convective mass flux weakens in proportion to global warming, largely unaffected by SST pattern changes. Conversely, the Walker circulation response is sensitive to SST pattern changes, weakening with global warming if zonal SST contrast decreases or increases below a certain threshold and strengthening if the increase in SST contrast exceeds that threshold. Thus, the Walker circulation might continue to strengthen if the SST pattern effects dominate. Our results indicate that the weakening of convective mass flux alone is insufficient for projecting the Walker circulation response.

Recognizing the impact of historical SST pattern changes, we further investigate potential mechanisms behind the changing the tropical Pacific SST pattern during the historical period. Recently, the tropical Pacific has been cooling, particularly in the eastern basin – a trend that coupled global climate models under historical forcing notoriously fail to capture. Our coupled model intercomparison study suggests that Southern Ocean surface cooling, another feature absent in historical simulations, has driven the eastern tropical Pacific cooling. This Southern Ocean-tropical Pacific connection appears in models only with sufficiently strong stratocumulus cloud feedback.

*Mechanism for Southern Ocean-tropical Pacific teleconnection.*



Der Vortrag findet **am Freitag, den 08. November 2024 um 15:45 Uhr im Otto-Lehmann-Hörsaal**, Physik-Flachbau (Geb. 30.22), KIT-Campus Süd statt.