



Tropical sea surface temperature variability in an idealized atmosphere-ocean column

Jenny Glashoff, Hartmut Borth, and Klaus Fraedrich

Meteorological Institute, KlimaCampus, University of Hamburg, Hamburg, Germany (jenny.glashoff@zmaw.de)

The variability of the tropical sea surface temperature (SST) is analyzed based on an atmospheric single column model coupled to a slab ocean of varying depth. The column is part of a global spectral atmospheric circulation model (Planet Simulator) used with insolation and ozone distribution fixed at equinox conditions in the tropics. Analyses of hundred year time series show a broad range of dynamical behaviours: (i) In a certain window of insolation an intraseasonal to seasonal regular SST oscillation is observed, depending on the mixed layer depth, even without an annual cycle in the external forcings. (ii) An increasing mixed-layer depth leads to an increasing oscillation period. For higher insolation ($> 1300 \text{ W/m}^2$) the oscillation gets chaotic and starts to be independent of the atmosphere-ocean coupling. (iii) The tropical atmosphere attains in two stable states with essentially different moisture content leading to SST differences of up to 8 K. (iv) In addition to regular oscillations and multiple states we find chaotic fluctuations and sudden transitions between different radiation dependent regimes.