



Past and future changes of the tropical atmospheric circulation and associated moisture transports

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Changing movements of moisture laden air alter tropical precipitation patterns and thus influence water supply for tropical communities. We used high time and space resolution wind and humidity data from ERA-interim and ECHAM5 to calculate moisture transports into the tropical regions of convection (ASC, referring to ascending vertical air movement) over decades, for the recent past and for an assumed anthropogenic warmed future. Unlike most other studies we do not base our investigations on time and space averages, but on instantaneous variables as well.

For the past we found a statistically significant increase of transported moisture into ASC at the lower levels, and also a statistically significant increase of transported moisture out of ASC at the mid levels. Nearly stable values of atmospheric humidity indicate an intensification of the wind circulation. Since strengthening of the in- and outflow neutralize each other, at least to some extent, the signal in the total budget only is weakly positive.

For an assumed IPCC-AR4 A1B future we also find an intensification of the hydrological cycle, higher inward as well as higher outward moisture transports towards the end of a simulated 21st century climate compared to those of the mid 20th century. This intensification is found to be due to the higher amount of water in the atmosphere, while the contribution of weakening wind counteracts this response marginally. The highest increase is projected for events of the highest percentiles in terms of moisture transport amount (commonly referred to as extreme events).