Weather Clim. Dynam. Discuss., community comment CC1
https://doi.org/10.5194/wcd-2021-34-CC1, 2021

Moist Heat Stress on a Hotter Earth

Jonathan Buzan

Community comment on "Future summer warming pattern under climate change is affected by lapse-rate changes" by Roman Brogli et al., Weather Clim. Dynam. Discuss., https://doi.org/10.5194/wcd-2021-34-CC1, 2021

The review article "Moist Heat Stress on a Hotter Earth" Buzan and Huber, 2020 poses that moist adiabats control extreme heat. The ideas are built upon by theory from Williams, Pierrehumbert, and Huber, 2009 where subcloud theta_e is tied to tropopause theta_e. Recently, observations confirmed subcloud theta_e changes with climate change in Williams and Pierrehumbert, 2017. Buzan and Huber, 2020 demonstrated that this applies to all CMIP5 models, and that CMIP5 models nearly have the same change in theta_e per degree of global change. de Lima et al., 2021 demonstrates that the moist adiabat changes applies to temperature, humidity, and surface radiation covaiances. Furthermore, the idea that extreme heat is tied to moist adiabats was independently confirmed using statistical methods in McKinnon and Poppick and Poppick and McKinnon 2020. Lastly, the methods posed by Buzan and Huber 2020 are applied to the CMIP6 archive (Schwingshackl et al., 2021).

This all demonstrats that moist adiabt scaling with global change is robust across atmospheric model versions, backed up by independent statistical theory, and is observed in remote sensing. The author's manuscript would be greatly enhanced by citing these manuscripts, provided below.

Buzan J R and Huber M 2020 Annu. Rev. Earth Planet. Sci.48 623–55

Williams, I. N., and Pierrehumbert, R. T. (2017), Observational evidence against strongly stabilizing tropical cloud feedbacks, *Geophys. Res. Lett.*, 44, 1503–1510, doi:10.1002/2016GL072202.

Williams, I. N., R. T. Pierrehumbert, and M. Huber (2009), Global warming, convective threshold and false thermostats, Geophys. Res. Lett., 36,L21805, doi:10.1029/2009GL039849.

McKinnon, KA., and Poppick, A. Estimating Changes in the Observed Relationship Between Humidity and Temperature Using Noncrossing Quantile Smoothing Splines. JABES 25, 292–314 2020. https://doi.org/10.1007/s13253-020-00393-4

Poppick, A., and K. A. McKinnon, Observation-based Simulations of Humidity and Temperature Using Quantile Regression. J. Climate, 2020, doi: https://doi.org/10.1175/JCLI-D-20-0403.1.