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# CMIP5 temperature underestimated due to deficiencies in the representation of land-surface processes?

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Global climate models are used for projections of future climate. How well the current climate is simulated by the models has an implication on the reliability of future projections. In this study, we show that climate models participating in the CMIP5 have simulated evapotranspiration (ET) rates that are too high, and that this overestimation might contribute to the systematic bias in model simulated temperature [Mueller and Seneviratne, 2014].
Within the GEWEX-sponsored LandFlux-EVAL project, we compiled synthesis data sets of global land ET. Using one of these products, we analyze ET from the historical CMIP5 and the twentieth century CMIP3 simulations. The results reveal systematic ET biases in the CMIP5 simulations, with an overestimation in most regions, especially in Europe, Africa, China, Australia, Western North America and part of the Amazon region. The global average overestimation amounts to 0.17mm/d. This bias is more pronounced than in the previous CMIP3 ensemble (overestimation of 0.09mm/d). Further analyses reveal that precipitation is also overestimated in regions with ET overestimation. As most of these regions are in soil moisture-limited ET regimes, additional precipitation is generally used by ET, which can explain the common biases. Furthermore, we suggest that the identified biases in ET can explain respective systematic biases in temperature in many of the considered regions. The study points to deficiencies in the representation of land-surface processes of the models and shows their direct impact on the simulation of temperature. This new knowledge improves our understanding of model behavior at both regional and global scales.

References:
Mueller, B. and S.I. Seneviratne (2014), Systematic land climate and evapotranspiration biases in CMIP5 simulations, Geophys. Res. Lett., 41, doi:10.1002/2013GL058055.