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## The joint dependence of longwave feedback on surface temperature and relative humidity

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The longwave clear-sky feedback (the dependence of outgoing longwave radiation on surface temperature) is a major determinant of the climate's stability. Various studies have suggested that the feedback is largely independent of both surface temperature and relative humidity, which implies that the climate stability is also independent of surface temperature and relative humidity. However, this uniformity seems to contradict other work which shows that the subtropics are relatively stable and the deep tropics are relatively unstable, implying the feedback must vary between the two regions. We resolve this apparent contradiction by systematically computing the feedback as a function of both surface temperature and relative humidity. Above 275 K, the feedback depends significantly on relative humidity. We then show the feedback does indeed vary in the tropics and that this difference arises from regional differences in relative humidity. Finally, we estimate the effects of clouds on the feedback with a simple model and find that although clouds have a destabilizing influence, the significant dependence on relative humidity persists. Our work gives a renewed appreciation for how the feedback can vary significantly with both surface temperature and relative humidity.