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Are climate models telling us enough about climate feedback uncertainty?

S. Sherwood
University of New South Wales, Australia (s.sherwood@unsw.edu.au)

In the climate context, we are used to thinking of the planetary boundary layer as a well-mixed layer extending from the surface to an inversion height at least 1-1.5km above the surface (and much higher in some circumstances, e.g., over deserts.) In meteorological contexts however boundary-layer decoupling is an important phenomenon whereby an inversion can divide the PBL into disconnected sublayers; cold pools are an important phenomenon in convection that are very thin and close to the surface; and even over tropical oceans, clouds form at a variety of heights through the usual PBL range. In this talk I survey evidence from the literature and from some work in my group suggesting that internal structure within the customary PBL may be crucial for regulating the growth of all types of moist convection as well as cloud cover and shortwave feedback behaviour in climate changes.