



Systematic errors in temperature of saturated air parcels

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The assumption that air parcel or grid-box model variables are taken to be uniform and assume their average value is not problematic for linear functions of those variables, typical for ideal gases. However, for materials with a nonlinear equation of state this can be an issue. Here we show that for saturated air, parcel average temperatures systematically underestimate the expected temperature based on consistent moist thermodynamic processes inside the parcel or grid box. This systematic temperature error is proportional to the sub-grid temperature variance inside the parcel or grid box.