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A global study of the sensitivity of liquid water content estimates to the temperature dependent cloud thermodynamic phase using CloudSAT data

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Using four years of global CloudSAT data (2B-CWC-RVOD product), we investigate the sensitivity of liquid water content estimates to the temperature dependent cloud thermodynamic phase. Total cloud condensate is often partitioned into the liquid and ice phases using either linear, quadratic or some form of sigmoid relationship with sub-zero temperature profile between 0C and -20C in climate models and reanalysis data that do not have sophisticated prognostic solutions. We highlight relative biases that are likely to be incurred and examine which cloud types are most likely to be influenced by such assumptions. The seasonal variations in these relative differences are also discussed.