A NEW METHOD OF CALCULATING VERTICAL MOTION IN ISENTROPIC SPACE

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ABSTRACT

A full isentropic vertical motion (ω_θ) has long been difficult to calculate in an operational forecasting environment. However, recent interactions with the Springfield, MO National Weather Service Office spurred the development of the current method of estimating the total ω_θ. During the winter of 2012-13, this expression was developed into its current form, and initial tests were undertaken to test its usefulness. Using output from NCEP's operational WRF-NAM model, individual points were evaluated for isentropic surfaces RH values $\geq$ 95% and compared against the existing isobaric omega (ω) as a truth value. Results show that the difference between ω_θ and ω, or ADER, performed best on isentropic surfaces closer to the ground, with an overall trend of better performance the further the forecast was from the initialization time. As the area of calculations decreased from 17x17 to a 7x7 grid-space each at 80km apart, errors were reduced by nearly an order of magnitude. The inclusion of the diabatic term to the isentropic vertical motion equation has been demonstrated to reveal average over-estimated errors of 2μbs^{-1}.