Sensitivity of Specific Enthalpy Variation on the Predictability of the Atmosphere

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The composition of the atmosphere has spatial as well as temporal variability with scale of few meters to continent and few minutes to climate respectively. This variability leads to variability in the specific entropy of the atmosphere ($h = c_p T$; where c_p specific heat at constant pressure and T is dry bulb temperature) and hence the internal energy of the atmosphere.

Generally in mesoscale and global atmospheric models the equation of internal energy is simplified as

$$c_p \frac{dT}{dt} - \frac{RT}{p} \omega = Q \tag{1}$$

However, variable composition

of the atmosphere atmosphere cause variability in $c_{\rm p}\,$ and therefore above equation need to be modified as

$$\frac{dh}{dt} - \frac{RT}{p}\omega = Q \qquad (2)$$

In this study we have presented sensitivity of predictability of atmospheric models (WRF and GFS) to variability of the enthalpy on diurnal to seasonal scale with different atmospheric composition scenarios so as to make this study is useful for improvement in regional climate models.

References

- [1] R. A., Akmaev and H. -M. H. Juang, Q. J. R. Meteorol. Soc., 134: 2193-2197 (2008).
- [2] J. R. Holtan, Academic Press: San Diego, CA, USA, 535 pp (1992).