commentary and analysis

Further Comments on "The Differentiation between Grid Spacing and Resolution and Their Application to Numerical Modeling"

The issue of the definition of the term "resolution," as we use it in the physical sciences, is more than a semantic issue, as suggested by Durran (2000). This subject was originally discussed in Pielke (1991) and Laprise (1992), and is added to by the correspondence of Walters (2000).

Users of numerical model output, for example, such as ecologists, social scientists, and hydrologists, generally interpret "resolution" as the scale at which a physical phenomenon is resolved. When we actually mean "grid increment" but use the term "resolution," we are misleading the users to assume the data (observed or modeled) have a finer spatial scale than is actually true.

The definition of "resolution," as applied to "physics" in *Webster's New World College Dictionary,* 3d ed. (Simon and Schuster, Inc. 1988) is "the capability of an optical system, or other imaging system, of making clear and distinguishable the separate parts or components of an object." In the context of models, the "image" is the physical feature of interest, such as a cumulus convective cloud system.

As Durran (2000) correctly states, the number of grid intervals (i.e., sampling points) needed to adequately resolve a feature has a subjective component. Ten grid intervals in each spatial direction to resolve one wavelength provides better resolution than four grid intervals. One grid interval obviously cannot resolve a feature with that wavelength, however, so that it is clear that the term "resolution" is *not* the same as "grid separation" or "grid spacing." The use of "resolution" and "grid increment" interchangeably is clearly inappropriate and misleading to the users of model output data. To avoid confusion, the terms "grid increment," "grid separation," and/or "grid interval" should always be used (instead of "resolution") when we refer to Δx, Δy, and Δz values.

References

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