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National Oceanic and Atmospheric Administration

NATIONAL WEATHER SERVICE CENTRAL REGION
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MEMORANDUM FOR: CRH Highlights TA Distribution

FROM:

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SUBJECT:

Change to Central Region Technical Attachment
93-03

The attached pages make changes to CR Technical Attachment 93-03, which was previously distributed. These changes clarify the location of grid points in the ETA-X model in relation to the mountain topography shown in Figure 2b. As shown by the dashed line, the topography is incorporated in a step-function manner resulting in grid points lying on the surface. Details of this methodology can be found in Mesinger et al. (1988).

Reference:

Mesinger, F., Z. Janjic, S. Nickovic, D. Gavrilov and D. Deaven, 1988: "The step-mountain coordinate: Model description and performance for cases of lee cyclogenesis and for a case of an Appalachian redevelopment", Mon. Wea. Rev., 116, 1493-1518.

Attachments



and are allowed to intersect the underlying topography (Fig. 2b)². This approach prevents steeply sloping coordinate surfaces. The ETA-X recognizes that the terrain intersects vertical coordinate surfaces and is able to handle this numerically (a discussion of which is beyond the scope of this Technical Attachment). In doing this, the model is able to better represent horizontal pressure gradients, associated wind fields, and subsequently the vertical motion fields in regions of greatly varying terrain. This is one of the primary advantages the ETA-X has over the NGM and LFM.

PCGRIDS users should also be aware of the differences between the models' representation of moisture within the gridded output data. The NGM boguses moisture values to grid points on pressure surfaces which are actually located below terrain level. On the other hand, the ETA-X does not have moisture values for points which fall below the terrain and does not attempt to bogus in the moisture values. This may be misleading in viewing relative humidity at 850 mb over the West, since this field will suspiciously resemble, the underlying terrain using ETA-X output data. For example, Fig. 3a displays the NGM's representation of the relative humidity field at 850 mb, while in comparison, the ETA-X (Fig. 3b) looks substantially different due to the differences discussed above. In other words, the zero relative humidity contour will encompass the region where the terrain falls below the 850 mb level (in this particular example). It is important to understand that neither model predicts moisture below the earth's surface, and that the moisture output for a pressure surface below ground is handled differently.

²Model topography similar to that indicated by dashed line.

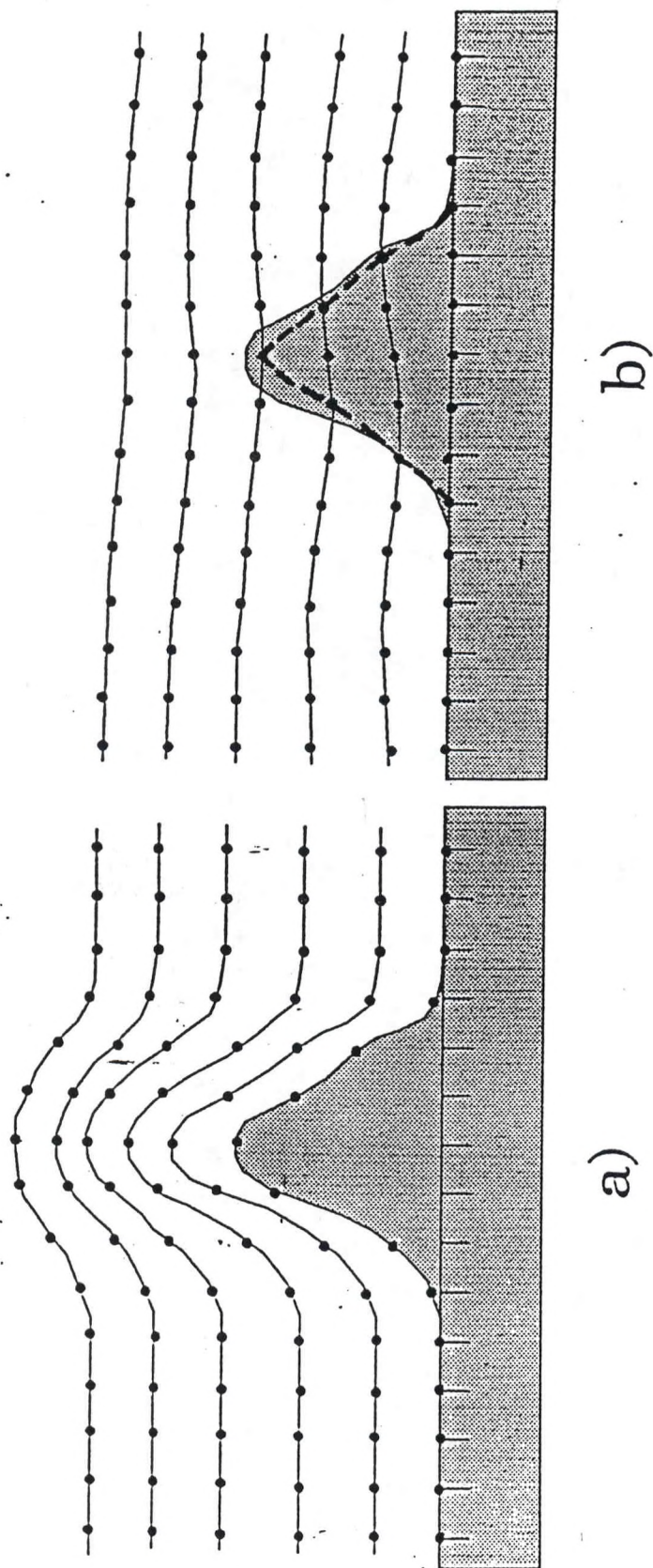


Fig. 2