NOTES AND CORRESPONDENCE

Comments on "A Decision Tree Method of Forecasting Thunderstorms and Tornadoes"

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In a recent paper, Colquhoun (1987) made a valuble contribution to the forecasting of thunderstorms. The complexity of the decision tree in his paper reflects the immense difficulties in forecasting thunderstorms and accompanying phenomena. The difficulties of verifying the many parameters in that tree are also evident.

Nevertheless, I believe that at least two important parameters are missing from Colquhoun's decision tree method, time of day and season. In all climates, thunderstorms, severe or not, are most frequent during specific times of day and during certain seasons. (This does not mean that they are confined to these specific periods. They do occur at other times though much less frequently.) Research is usually conducted when thunderstorms are most frequent. If we actually knew the relevant physical factors that cause thunderstorms, this would not be a drawback; i.e., if conditions for thunderstorms were met, they would occur regardless of the time of day and season. A thunder index that works well in the afternoon may not do so in the evening. An example is shown in Fig. 1 (Andersson et al. 1988a). The index depicted is the forecasted KO defined as

$$KO = (\theta e\ 500 + \theta e\ 700 - \theta e\ 1000 - \theta e\ 850)/2,$$

where θe 500 is the pseudadiabatic equivalent potential temperature at 500 hpa.

The investigation area was a square (240 × 240 km^2) in southern Sweden during the summer of 1987. It is evident that the probability of detecting thunderstorms (pd) is at a maximum in the afternoon when the probability of false alarms (pf) is at a minimum. Hence, the performance of this index is much better in the afternoon than in the evening. The reason for this may be that convective mechanisms during the daytime are different than those at night. For example, if slantwise convection was responsible for a night thunderstorm, it would not be detected by a KO index. However, radar characteristics for thunderstorms also seem to be dependent upon the time of day (Lopez et al. 1986; Andersson et al. 1988b). This indicates that the parameters measurable with the radar, which mainly give a measure of the water content and its vertical distribution, are associated with the probability of thunder, but that the thunder is also dependent on the time of day.

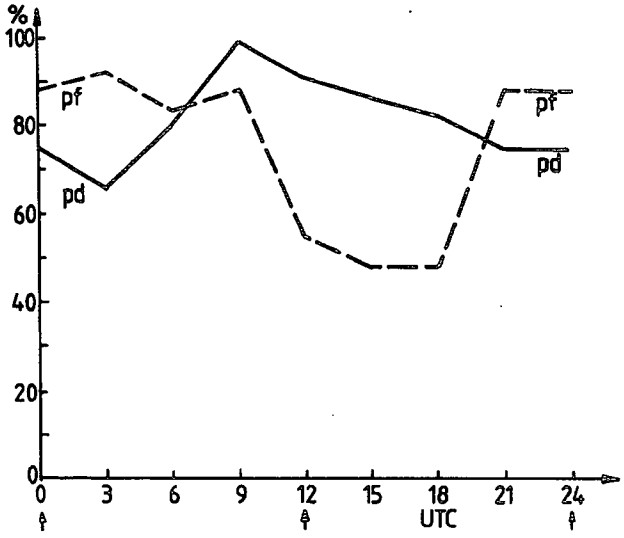

FIG. 1. Diurnal variation of the performance of the forecasted KO index as thunder indicator. Arrows give valid time for the KO; pd is probability of detection and pf, probability of false alarm.

I therefore conclude that the time of day and season should be explicitly included in the forecast scheme. (They are already included by the experienced forecaster.) In addition, more attention should be paid to thunderstorms during the hours and seasons when they are rare, but, nonetheless, important to the public.

REFERENCES

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