

Lightning Forecasting Using the High Resolution WRF Model

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ABSTRACT: Because explicit prediction of the electrical activity in storms is computationally expensive and the processes are still poorly understood, an attractive way for forecasting lightning using numerical models is to rely on possible correlations between the lightning occurrence and available model parameters. For this study, two new approaches are proposed and developed for inferring the probability of lightning occurrence based on model variables (surface-based CAPE, Lifted Index, K-index, average vertical velocity between 850 and 700 hPa and integrated ice mixing ratio from 700 to 500 hPa) obtained from high resolution simulations with WRF model. Ratios between WRF grid points with lightning associated and all WRF grid points of the 3 km domain were the basis for the development of these two methods: the Linear and Normalized Methods. Their main differences are in how the correlations between the model parameters and the lightning occurrence were established. From the fourteen thunderstorms cases analyzed, two of them and one day without lightning occurrence were used to test both methods and find physical aspects relevant to the lightning activity in southeastern Brazil. Although the differences in the results for both methods were not large, the Normalized Method showed promise as a means of better generating qualitatively fields of lightning occurrence threat.

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