



Using new Extreme Forecast Index parameters to forecast severe convection

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The threat to life and property posed by severe thunderstorms makes the forecasting of them important. Forecasts can provide decision-makers and users with the opportunity to take protective action. On the other hand, forecasting severe convection and accompanying weather phenomena such as tornadoes, strong wind gusts, large hail, lightning and heavy rainfall is an inherently challenging task at all time scales. A global forecasting system, such as the ECMWF IFS, is unable to fully capture all the processes and details at convective scales, but it is capable of forecasting relatively accurately the ingredients necessary for triggering severe convective outbreaks. The ensemble forecasting methodology can extend the predictability of such events in the medium range by providing information about forecast uncertainty. By applying an ingredient-based approach to forecasting deep moist convection, ECMWF was able to add, operationally, two parameters – CAPE and CAPE-shear – to the ensemble-based Extreme Forecast Index (EFI). These provide skilful pointers to outbreaks of severe thunderstorms in the medium range. A short description of the two EFI products will be provided. The Shift of Tails (SOT), which complements the EFI, will be introduced as well. Verification results based on the area under the Relative Operating Characteristic curve, over Europe and the U.S.A., will be presented. The high skill levels achieved indicate that both EFI fields provide very useful pointers to when outbreaks of severe convection are likely in the medium range. Important considerations when using these products will be provided. In particular, the importance of climatology and convective initiation will be discussed when determining the possibility of severe thunderstorms. Furthermore, both EFIs used together could shed further light on the types the environment that support severe convection. To demonstrate this, examples of the EFI in high CAPE-low shear vs. low CAPE-high shear environments will be shown. Some of the limitations of these products will be discussed as well.