The development of an Early Warning System for Severe Weather Events (EWSSWE), as a Key Project of the Special Funds of Social Public Good for Scientific Research Institutions of China under grant 2002DIA20013, aims at providing the meteorological services with a prototype of the early warning system for severe convective weather (heavy rains, hails, thunderstorms & high winds) that can respond promptly with the advanced functions of prediction and a potential of application as a future operational system.

The system of EWSSWE consists of the following eight components (see her Home, as shown in the figure below): (i) the data collection and preprocessing subsystem; (ii) a meso-scale forecasting subsystem; (iii) severe convection parameter diagnosis and forecast subsystem; (iv) nowcasting system for cloud clusters based on satellites; (v) nowcasting subsystem for severe convective cells based on radars; (vi) distributing subsystem for early warning products; and (vii) verification subsystem; and (viii) man-machine interactive demonstrative subsystem.

Since EWSSWE takes the disastrous weather such as heavy rains and thunderstorms & high winds as the focal points of warning, a great number of severe convective parameters (SCPs) are employed for physical representation of potential dangerous weather. Some of them are reconstructed and localized based on the intensive observations and numerical results of experiments, which includes CAPE, SRH, SSI, EHI, and WINDEX that are among the most informative parameters during the quasi-operational phase.
EWSSWE is developed according to the working face determined by the idea of digital engineering and combines the nowcasting techniques based on satellite/Doppler data where a new technique of extrapolation is developed (see the figure above) and the NWP products which has been improved by a new method of physical dissipation created by C.Liu and Y.Liu.

This system is operating, at the current stage, in some demostrative regions such as Tianjin with a quasi-operational test, and applied to some provinces/cities (such as Jiangxi province and Chongqing), with significant results.

Here, as an example of early warning, we would like to mention the heavy rain process occurred in the north China between 10-12 October 2003 beyond the flood season. Under the interaction between the warm-moist currents from the southern part of China and broad East China sea and the stronger cold air from the north, the torrential rain covers extensively the area of the northern China during the late autumn. Especially, the Jinghai county of Tianjin located at the heavy rain center area experienced the rainfall of 181.1mm within the period of 48 h from 00Z 10 October to 00Z 12 October, which is the strongest rainfall occurred at this county in 2003 and the strongest one for this period in the past 50 years as well. With application of EWSSWE to this case, a forecast of higher accuracy reached under a quasi-operational framework, compared with the routine one.

One of the most prominent points for the EWSSWE is to integrate smoothly all the outputs such as ones from the satellites, radars, and NWP models, into a final product as the early warning issue for distributing.

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