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Now-Casting Thunderstorms in the Mediterranean Region using Lightning Data

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Thunderstorms are often the cause of severe and disastrous flash floods. Lightning activity within these storms can be detected and monitored continuously from thousands of kilometers away and can therefore be very useful in improving forecasts and now-casts of severe thunderstorms. An improvement in the now-casting of such storms can assist in reducing damages and saving lives.
Using the ZEUS ground-based VLF lightning detection network and the Warning Decision Support System – Integrated Information (WDSS-II) software, we performed now-casting simulations using two years of lightning data over the Mediterranean area. Thousands of thunderstorms were observed and now-casted 30, 60, 90 and 120 minutes ahead. Statistical analysis was then done by calculating the hit, miss and false alarm rates, as well as the POD, FAR and CSI scores in order to determine the success of the now-casting.
The results show that the algorithm is overall successful in now-casting the location of the lightning clusters, especially when applied to strong and consistent lightning events (it is these events which also have the strongest connection to flash floods). The probability of detection (POD) values range between 0.46 for 30 minute nowcasts and 0.25 for 120 minute nowcasts. The CSI values are quite similar, but slightly lower. The now-casting has a low false alarm rate, 0.03 for 30 minute nowcasts, which is also beneficial for operational use.
This method has been implemented for the use in real time now-casting and is used in the EU FLASH project to seek and track areas of thunderstorm risk according to lightning intensity. The experimental now-casts appear on the project website (www.flashprojects.org/).