An early severe weather warning system in Meteorological Service of Catalonia.
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**Motivation**
Severe hail occurs 10 days per year in average in Catalonia, according to a SMC internal database (other severe weather phenomena has not been included).

**Main Goal**
Implementation of an early severe weather warning based on a Lightning Jump (LJ) algorithm adapted to Catalonia (Farnell et al., 2013) in order to forecast severe weather events.

**Area of Study**
Catalonia is located in the NE of the Iberian Peninsula. This area covers 32,000 km\textsuperscript{2}.

**Lightning jump: Technique, Results and Verification**
Lightning data is analyzed every minute. Flashes are grouped in geo-referenced density matrix of 1x1 km\textsuperscript{2} cells.

**Results and Verification**

<table>
<thead>
<tr>
<th>LJ verification</th>
<th>Period</th>
<th>events</th>
<th>POD</th>
<th>FAR</th>
<th>BIAS</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006-2013\textsuperscript{1}</td>
<td>49</td>
<td>0.73</td>
<td>0.11</td>
<td>0.70</td>
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</tr>
<tr>
<td>2016\textsuperscript{2}</td>
<td>69</td>
<td>0.94</td>
<td>0.25</td>
<td>1.00</td>
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<tr>
<td>2017\textsuperscript{3}</td>
<td>109</td>
<td>0.82</td>
<td>0.22</td>
<td>1.01</td>
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</tr>
<tr>
<td>2018\textsuperscript{3}</td>
<td>146</td>
<td>0.88</td>
<td>0.19</td>
<td>0.89</td>
<td></td>
</tr>
<tr>
<td>2019\textsuperscript{3}</td>
<td>14</td>
<td>0.82</td>
<td>0.25</td>
<td>1.09</td>
<td></td>
</tr>
</tbody>
</table>

\textsuperscript{1}Severe weather and small hail
\textsuperscript{2}Only severe weather

**The Severe Weather Warning System of the SMC and the Catalan Emergency Centre**
SMC has developed a specific software to visualize LJ. It shows:
- LJ level (with or without flash multiplicity)
- time and position of every LJ
- a summary of whole electrical evolution.

Once a LJ warning is triggered, the software:
- estimates direction nowcasting of the storm with radar data (Rigo and Llasat, 2016). This nowcasting is overlaid at the map with concentric coloured circles.
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Finally, forecaster analyses the different probability levels of occurrence in the next two hours.

**Examples**

**18/09/2019**
Large and vast hail Heavy rain

**17/07/2019**
Heavy rain Gusts wind

**References**