

The Lightning Threshold and The Thunderstorm Rule

Lightning occurs when the thunderstorm inflow rises through the cumulus cloud as an updraft that exceeds the **Lightning Threshold** speed of 7 m/s or 25 km/h. The updraft carries water droplets above the deep convective freezing level with some forming ice crystals or larger super cooled ice crystals joined together. They fall at different speeds producing lightning. The threshold cumulus updraft speed for the occurrence of lightning is 7 m/s or 25 km/h (Del Genio, 2007). This threshold is identical to that given for a storm with lightning by the Law of Storms (Ellis, 2014).

The Lightning Threshold is exceeded when the sea level **pressure falls more than 3.0 mb over 3 hours (or less) to below 1009 mb (The Thunderstorm Rule)**. We can rely on this Rule because of its link to the Lightning Threshold and the laws of Physics on which we all depend.

The Wind Speed Threshold for the smallest storm is **25 km / hour**.

The smallest storm ever recorded, with a 3 mb fall in barometric pressure over 3 hours (1009 mb to 1006 mb), was recorded at Middlebury, Vermont, US on 7 June 2011. Del Genio *ibid* showed that the Lightning Threshold will be reached sooner and the updraft speed will increase by about 1 m/s if the atmospheric CO₂ content doubles.

