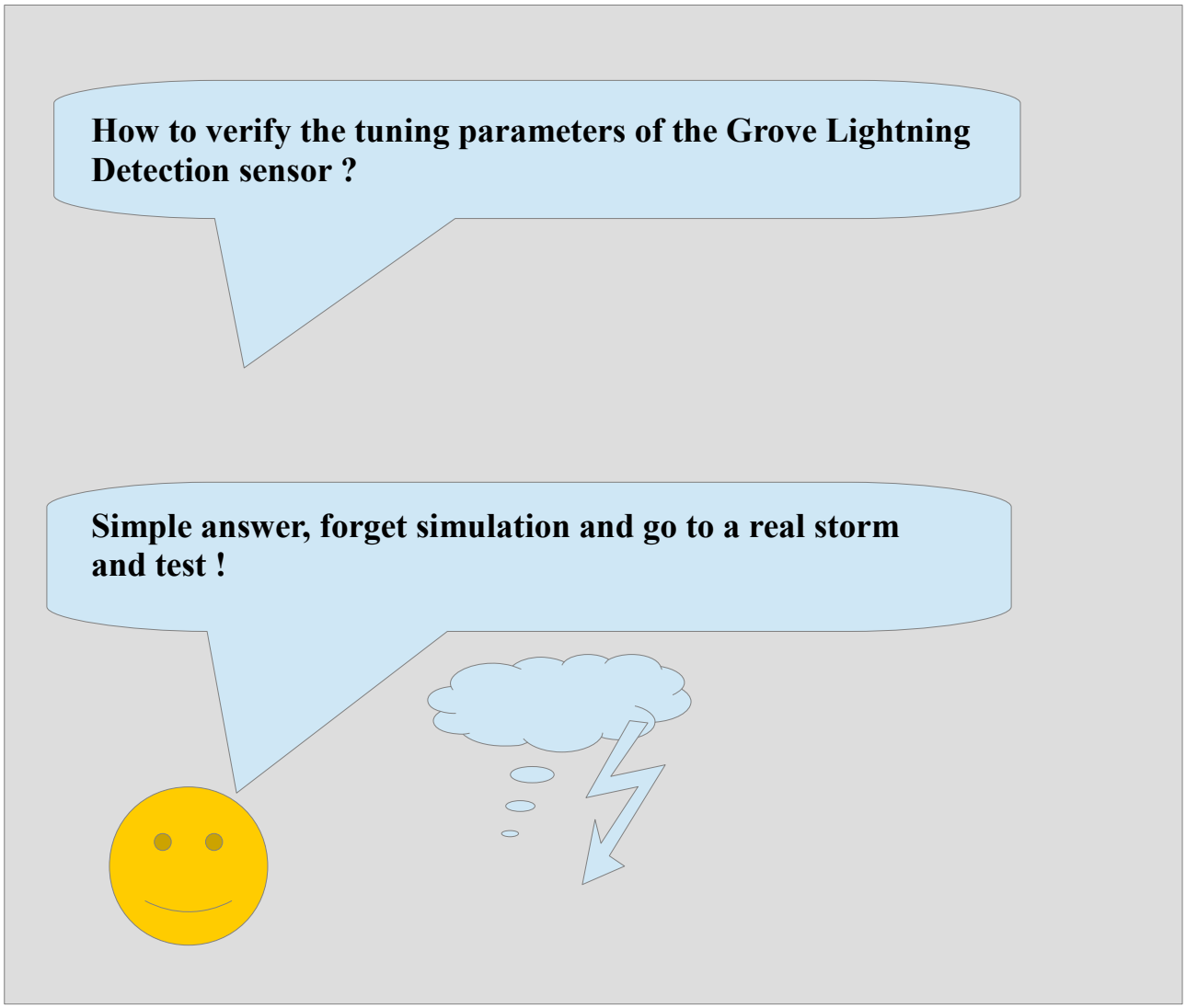
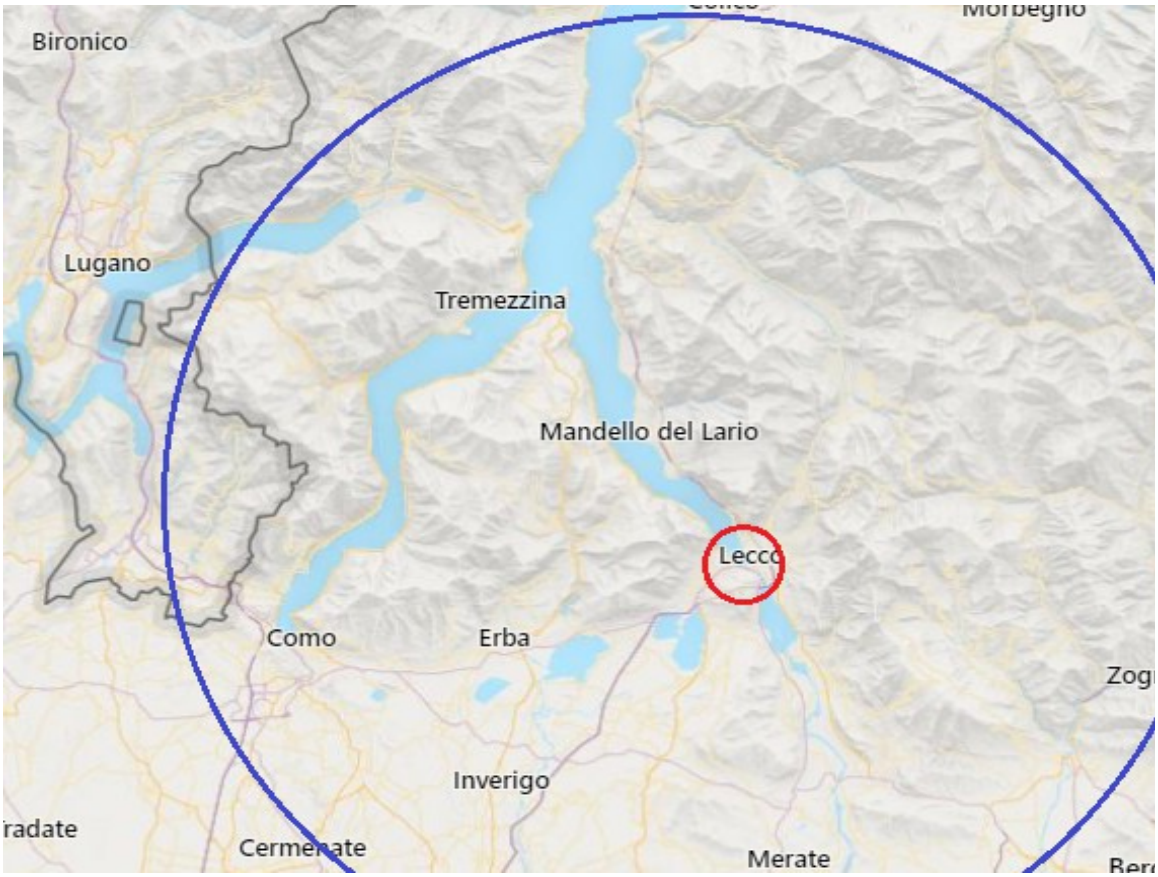
TUNING EXAMPLE

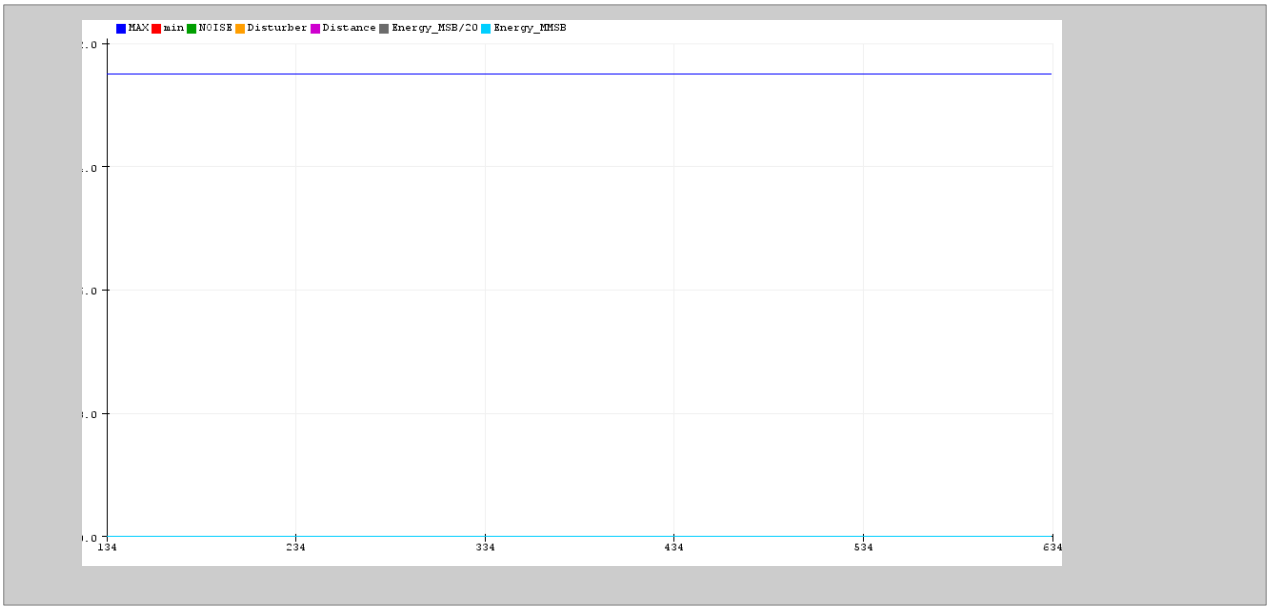


It's a fact reality is better than simulation if you finally want to test all you made. Simulation is very well to start up the board, verify that is working and detecting electrical signal around, but of course a final test or more are necessary to tune in the best way the parameters of the sensor board.
To do this watch to meteoroligal forecast and prepare all the board and Arduino running with the "**GROVE-AS3935-I2C_2.ino"** set for the SERIAL PLOTTER output.

This was done in a day with forecasted rain and probability of lightning and generally when this happens it is better to disconnect electronic equipment if sensitive to lightning events that make them go damaged.

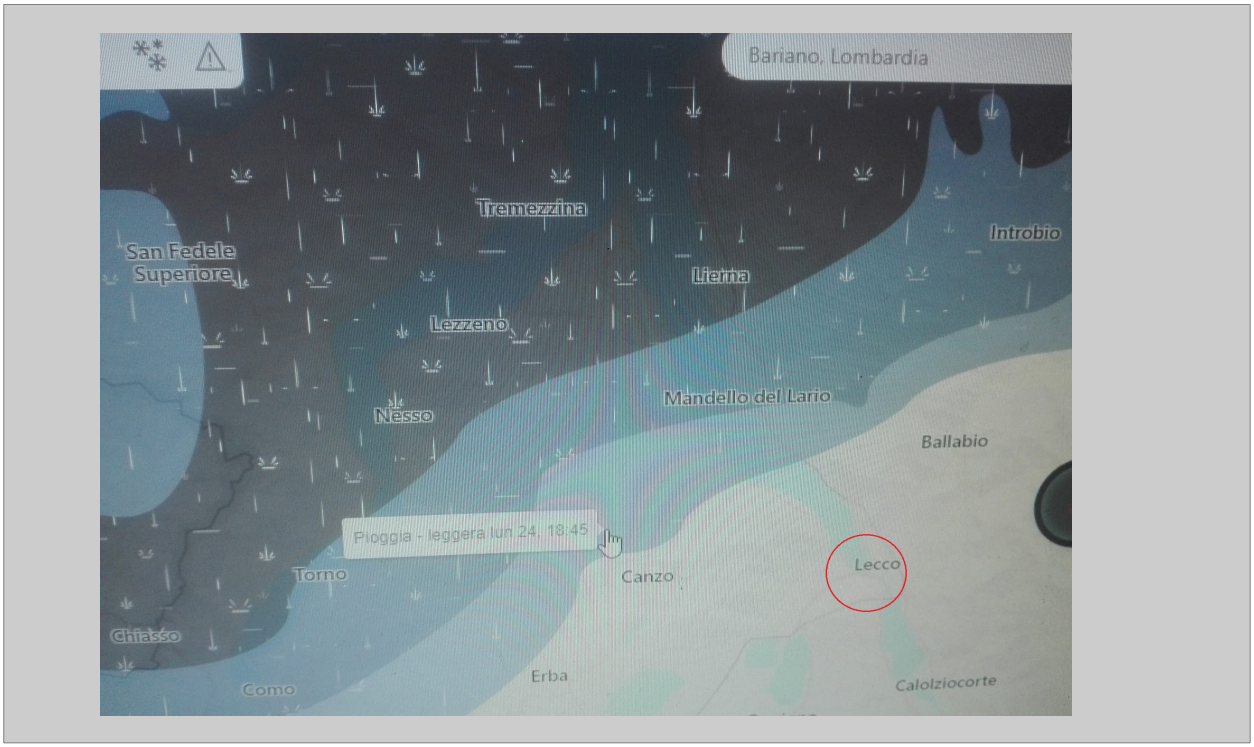


First of all define the area to be scanned, in this case the center was on Lecco (Italy) and an observation radius of almost 30 km was traced on the Meteorological map taken from a weather forecast Web page in a sunny day with no clouds.
Make a scan with SERIAL PLOTTER of Arduino and check if there are alarms due to noise, disturbances or any other occasional discharge detected in free air (arch soldering, radio waves flashes, etc...). This was made in INDOOR mode of the sensor and there was no detected lightning that in this case are false detection (it could be typical for the explored area). In the following picture 2 the situation is shown.

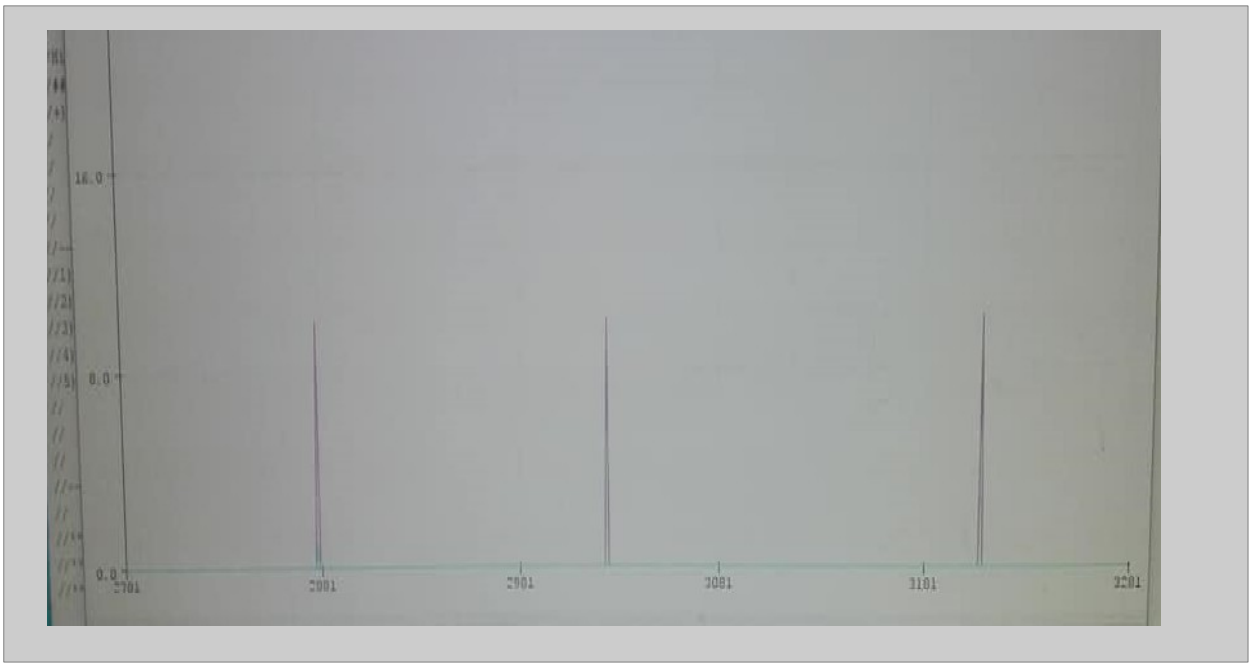


Picture 2. no clouds, sunny day.

The situation changes when a rainy day was forecasted and reached the area of exploration as can be seen in picture 3. Here the storm is above the area of interest and the SERIAL PLOTTER is showing several detections for lightning events with an increasing count when the rain most intense area came above the area of interest, in the red circle.



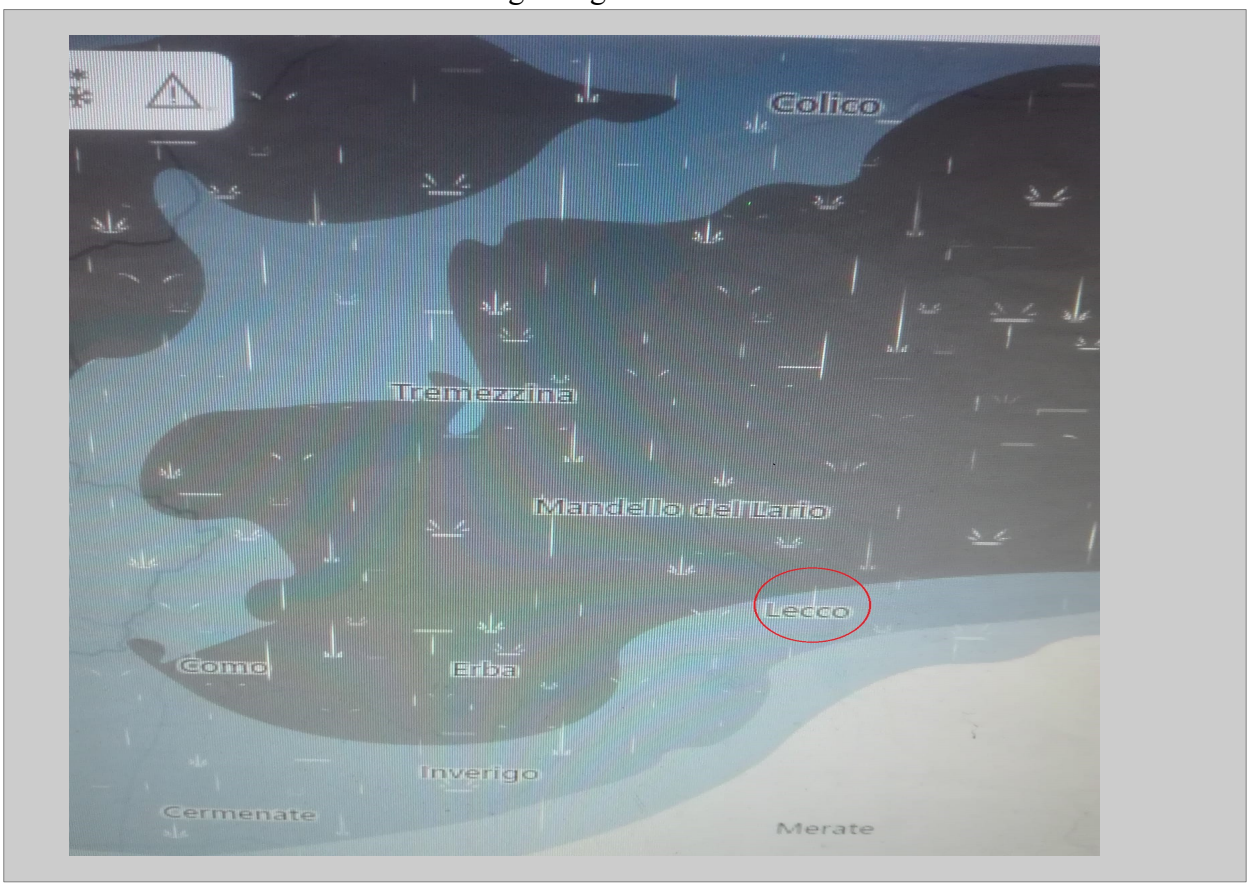
Picture -3-



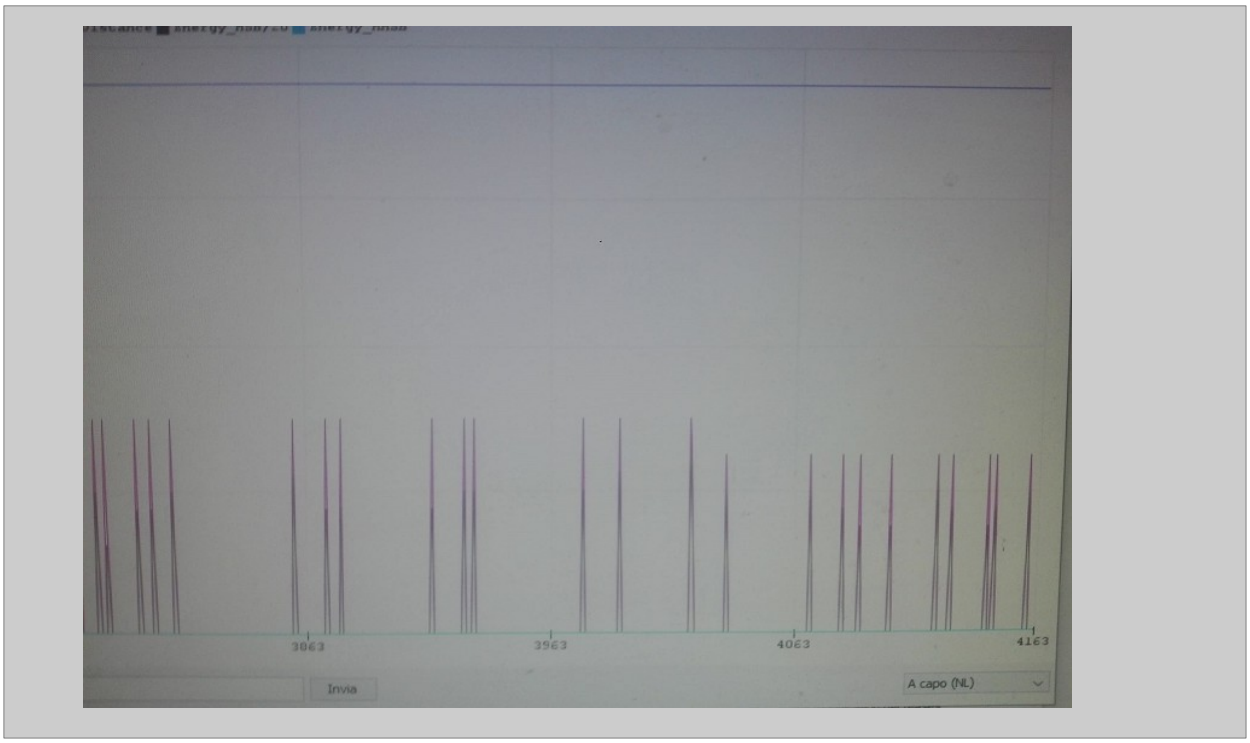
Picture -4-

In picture 4 there are some detections estimated at about 10 km from the red area of interest. This is well before the rain started falling on the area of interest, some very low thunder could be heard facing the window. Hardly hearable, this area has many mountains that slow down thunder sound.

After some time, about 30 minutes the rain front moved toward the area of interest (red circle) and some changes happened in the SERIAL PLOTTER shown detections for lightnings.
In picture 5 there is the weather real time map of the area of interest, in picture 6 there is the detection and estimated distance for the lightnings.



Picture 5. rain front came toward area of interest



Picture 6. Now the SERIAL PLOTTER show more frequent detections

At this time to make some rule of thumb evaluation of the estimated distance I faced the window and thunders could be heard, not strong, weak sound just compatible with the estimated distance by the sensor board. The calculation approximately based on speed of sound of 330 m/ sec show a good accordance with estimated distance.

This was not a very strong lightning storm, they could not be seen by sight but only weakly heard so probably lightning are cloud – to- cloud and the sensor board was capable to capture these events out of sight.
This practical on field verification was a direct method to verify the good working and set up of the board.

Conclusions.

To end this simple and direct way to test the board some conclusions are welcome. There is a very good accordance between the detection of the sensor board and the reality shown by the meteorological maps in real time above the area of interest. The board was set up with the INDOOR configuration, using the standard register values, no optimization was necessary on their values. What is reported in the plotting was verified by sight and by hearing to the thunders during the detection and some detections happened even without hearing the thunder or seeing the lightning flash in the sky. This gives a very useful way to monitor the storms not relying on human senses but on electronic sensor devices opening the way to interesting alert and protection devices at benefit of human and electrical equipment.