Lighnting detection and tracking with consumer electronics

Gilbert Kamau (1) and Nick van de Giesen (2)

(1) Jomo Kenyatta University of Agriculture and Technology, Electrical & Electronic Engineering Department, Juja, Kenya, (2) Delft University of Technology, Water Resources Management, Delft, Netherlands (n.c.vandegiesen@tudelft.nl)

Lightning data is not only important for environment and weather monitoring but also for safety purposes. The AS3935 Franklin Lightning Sensor (AMS, Unterpremstaetten, Austria) is a lightning sensor developed for inclusion in consumer electronics such as watches and mobile phones. The AS3935 is small (4mmx4mm) and relatively cost effective (Eu 5). The downside is that only rough distance estimates are provided, as average power is assumed for every lightning strike. To be able to track lightning, a network of devices that monitor and keep track of occurrences of lightning strikes was developed. A communication interface was established between the sensors, a data logging circuit and a microcontroller. The digital outputs of the lightning sensor and data from a GPS are processed by the microcontroller and logged onto an SD card. The interface program enables sampling parameters such as distance from the lightning strike, time of strike occurrence and geographical location of the device. For archiving and analysis purposes, the data can be transferred from the SD card to a PC and results displayed using a graphical user interface program. Data gathered shows that the device can track the frequency and movement of lightning strikes in an area. The device has many advantages as compared to other lightning sensor stations in terms of huge memory, lower power consumption, small size, greater portability and lower cost. The devices were used in a network around Nairobi, Kenya. Through multi-lateration, lightning strikes could be located with a RMSE of 2 km or better.