

GPM and Weather Radar Integration in Colombia for Precipitation Measurement

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During the first half of year 2017, heavy rainfall in Colombia caused widespread casualties and damages in more than 900 properties. It should be noted that flash flooding in this region remains one of the biggest concern. In April 2017, heavy precipitation caused an avalanche due to which more than 360 people died. During this event, rainfall accumulation was measured up to 106 mm in just four hours. On the other hand, Colombia is also highly dependent on rainfall for production of electrical energy. 70% of the nation's total electrical energy generation comes from hydroelectricity. During El Niño season, slightest changes in rainfall pattern could have a dramatic effect on the country's total electricity production which may lead to an energy deficit. In conclusion, monitoring precipitations in Colombia is a critical issue to, first, generate early warnings that could save lives and second, to preserve electrical energy during contingent El Niño season. However, the country does not have enough sensors for closely monitoring precipitations.

Given the necessity for monitoring rainfall and the lack of precipitation sensors in Colombia, a state of the art solution is proposed to overcome this observational deficit. Taking into account that precipitations can be monitored in a wide range by ground based radars and, recently, through satellites, a solution that integrates both the technologies is presented in this paper. Weather radar has proved to be a good approach to monitor precipitation in the US. Nevertheless, Colombia has three dual polarized C-band weather radars, one in Corozal (north of the country), another in Tablazo (closed to Bogota DC) and another in San Andres Island (Caribbean Ocean). Aero Civil bought those radars to route commercial flights, but not other agencies in the country use them actively. On the other hand, GPM (Global Precipitation Measurement) core observatory is equipped with a Dual-frequency Precipitation Radar which is capable of measuring precipitation simultaneously at both Ku-band and Ka-band. Hence, this paper presents an integration between GPM and Weather Radars as a feasible solution to monitor rainfall in Colombia.