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Study of flash floods in Portugal by radar-rain gauge adjustment

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In the past decade (2008-2017), several episodes of flash floods affected mainland Portugal, being possible to highlight ten cases: 18th February and 22nd, 28th and 29th September 2008, 22nd September, 13th October and 26th and 27th November 2014, 1st November 2015 or, more recently, 11th of February 2017. These floods had a strong social, economic and environmental impact.
Densely populated areas, especially urban ones, are more likely to suffer from flash floods. For regions near the coast flash floods have two genesis from the meteorological point of view - storm surge and heavy precipitation. Additionally, the combination with other factor such as elevated water levels in estuarine regions or high tide must be taken into account.
This study will focus on urban areas close to the coast and subject to heavy rainfall, and the main objective is to obtain a better estimate of precipitation for two cases that occurred in Lisbon and the Algarve region, respectively, on September 22nd 2014, and November 1st 2015. The density of meteorological stations does not allow a detailed spatial field distribution of rainfall that occurred, during heavy precipitation events, and the probability that the maximum value occurs in a rain gauge is low. On the other hand, the information obtained by single polarization weather radars has high spatial resolution. For this purpose and considering the different and complementary nature of both types of observation (radar and rain gauges) adjustment techniques were applied to improve rainfall estimates. A third case, for dual polarization weather radar data, will also be analyzed.