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Uncertainty in precipitation field estimations from radar and raingauge measurements

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Precipitation shows space and time variability at all scales leading to uncertainty in derived high resolution rainfall maps. Doppler radar products can overcome the small scale limitations of point measurements. Nevertheless, despite efforts, radar derived estimations have not reached the quantitative accuracy of precipitation terrain measurements. A methodology is presented to reconstruct high-resolution rainfall maps by combining historical raingauge and radar measurements in order to capture the small scale variability. Following the standard Z-R relationship calibration, the confidence intervals of the model are estimated and used as the bounds of the reconstructed rainfall. Radar data is used to capture the spatial variability eluding the interpolation of point measurements, while the temporal variability of precipitation is accounted for using motion interpolation of the radar scans. This methodology was applied in two precipitation events that occurred in the island of Crete in 2008 and 2009, respectively and were covered by the local raingauge network and the C-band radar. Results show that this methodology produces realistic high resolution daily rainfall maps that are useful in various environmental applications.