

Comparison between C-band and S-band radar rainfall for hydrological simulations in Marikina River Basin, Philippines

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Radar-based rainfall retrieval is particularly important in the Philippines where torrential and sustained rainfall from tropical cyclones, monsoon, and thunderstorms regularly affect the country. In 2011, the Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA) started to establish a weather radar network, which by now consists of eight radar devices, including two dual-polarized C-band radars.

This study sets the starting point in investigating the potential of radar-based rainfall estimates for hydrological simulations in the Philippines. As a first step, we evaluate the performance of a semi-distributed hydrological model for the Marikina River Basin (MRB), using different rainfall products as forcing. The MRB is the largest river basin draining to the Metropolitan Manila and poses the most serious flood hazard to the region. The basin has regularly been affected by major flood events in the past years.

In the present analysis, we focus on the extreme South-West monsoon event in 2012 which was enhanced by a typhoon passage north of the Philippines. For this event, rainfall was estimated at an hourly resolution by using different retrieval methods and radar devices: a single-polarized S-band radar near Subic city and a dual-polarized C-band radar near Tagaytay city. Both radars provide coverage for the MRB. As a benchmark rainfall estimate, we use rain gauge observations interpolated by Inverse Distance Weighting. In order to compare the performance of the different rainfall products for simulating discharge, we recalibrated the hydrological model separately for each rainfall input.

In this study, we consistently apply Open Source Software tools. All rainfall retrieval methods are based on the open weather radar processing library wradlib (<http://wradlib.bitbucket.org>) while the hydrological model is based on the Eco-Hydrological Simulation Environment (ECHSE, <http://echse.bitbucket.org>).