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Spatial and temporal precipitation variability in Honduras - data-quality assessment, spatial interpolation and dataset creation

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An accurate description of temporal and spatial precipitation variability in Central America is important for local farming, water supply and hydropower generation. Data-quality problems and lack of a coherent precipitation database impede hydro-meteorological modelling and analysis in the 7500 km^2 Choluteca river basin in central Honduras, encompassing the capital Tegucigalpa. Honduran precipitation data from 54 daily stations and 15 monthly stations in 1913 – 2005 were collected from four local authorities and the Global Historical Climatology Network (monthly data), quality controlled, and used to set up a database. Quality-control routines were developed to tackle the specific data-quality problems and the quality-controlled data were validated against regional- and larger-scale datasets. The performance of two methods for patching shorter gaps in the time series and three methods for the spatial interpolation of monthly and mean annual precipitation was assessed. The methods for patching shorter gaps were the Coefficient of Correlation Weighting Method (CCWM) and the Inverse squared Distance Weighting method (IDW). The methods for spatial interpolation were IDW, ordinary kriging, and universal kriging with coordinate base functions. Lacking homogeneity was the main quality problem and 20% or more of the daily precipitation data from 1970 to 2005 had too low quality to be used. The temporal coverage of data was scattered and the most appropriate period for spatial interpolation was 1970 – 2005, having around 30 stations with monthly data. The

CCWM-method provided the best results to fill short gaps in the time series. Differences were small between the three spatial interpolation methods, and the best spatial distribution of precipitation in the upper catchment was obtained for 1990 – 2005. The spatial autocorrelation for monthly precipitation (estimated with the ordinary kriging variogram) was predominantly low during the dry season. Correlation-coefficient values between stations were generally low for daily data and decreased rapidly with distance between stations. There was a marked increase in correlation when data were temporally aggregated from 1 day to 4-5 days. This increase was much larger than the increase going from 4-5 days to monthly aggregation.