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A comparative verification of raw and bias-corrected ECMWF seasonal ensemble precipitation forecasts in Java (Indonesia)

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The impact of climate variability on agriculture and hydrology is large in countries affected by ENSO, such as Indonesia. In those sectors, stakeholders and decision makers need seasonal forecasts to assist them in their planning strategy. However, seasonal forecasts from global circulation models are afflicted with biases to a degree that precludes their direct use, including seasonal ensemble forecasts of precipitation from the new ECMWF Seasonal Forecast System 5 (ECMWF-SEAS5). Bias correction using the Empirical Quantile Mapping (EQM) method is effective for correcting this bias even though it cannot correct most other systematic errors in the raw ensemble forecasts. In this study we have used ECMWF-SEAS5 forecast data, consisting of 7-months lead time, 25 ensemble members, the 1981 – 2016 period, 24-hour accumulated rainfall with a 35 km gaussian grid resolution. For the observations we have used a new high-resolution (0.25degree) land-only gridded South-East Asia dataset (SA-OBS). A comparative verification of both raw and bias-corrected seasonal precipitation forecasts is performed based on several verification metrics. In this verification, the daily rainfall data was aggregated to monthly accumulated rainfall. We focus on July, Augustus and September because these are the important months for farmers to decide whether it is possible to grow a third rice crop or not. The first 2 to 3-month lead times for those months show improved and mostly positive continuous ranked probability skill scores (CRPSS) after bias correction. Brier skill score (BSS) values as a function of precipitation threshold, for the 1-month lead time, show that overall the ECMWF bias-corrected seasonal ensemble forecasts have better BSS than the raw forecasts. Finally, bias-corrected forecasts have good reliability, based on the reliability diagrams for events that exceed the 75% climatological quantile. These improved precipitation forecasts are expected to lead to better crop and hydrological forecasts on the seasonal time scale.