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Adjusted monthly temperature and precipitation values for Guinea Conakry (1941-2010) using HOMER.

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Africa is a data sparse region and there are very few studies presenting homogenized monthly records. In this work, we introduce a dataset consisting of 12 stations spread over Guinea Conakry containing daily values of maximum and minimum temperature and accumulated rainfall for the period 1941-2010. The daily values have been quality controlled using R-Climdex routines, plus other interactive quality control applications, coded by the authors. After applying the different tests, more than 200 daily values were flagged as doubtful and carefully checked against the statistical distribution of the series and the rest of the dataset. Finally, 40 values were modified or set to missing and the rest were validated.

The quality controlled daily dataset was used to produce monthly means and homogenized with HOMER, a new R-pacakge which includes the relative methods that performed better in the experiments conducted in the framework of the COST-HOME action. A total number of 38 inhomogeneities were found for temperature. As a total of 788 years of data were analyzed, the average ratio was one break every 20.7 years. The station with a larger number of inhomogeneities was Conakry (5 breaks) and one station, Kissidougou, was identified as homogeneous. The average number of breaks/station was 3.2. The mean value of the monthly factors applied to maximum (minimum) temperature was 0.17 ºC (-1.08 ºC) . For precipitation, due to the demand of a denser network to correctly homogenize this variable, only two major inhomogeneities in Conakry (1941-1961, -12%) and Kindia (1941-1976, -10%) were corrected.

The adjusted dataset was used to compute regional series for the three variables and trends for the 1941-2010 period. The regional mean has been computed by simply averaging anomalies to 1971-2000 of the 12 time series. Two different versions have been obtained: a first one (A) makes use of the missing values interpolation made by HOMER (so all annual values in the regional series are an average of 12 anomalies); the second one (B) removes the missing values, and each value of the regional series is an average of 5 to 12 anomalies. In this case, a variance stabilization factor has been applied.

As a last step a trend analysis has been applied over the regional series. This has been done using two different approaches: standard least squares regression (LS) and the implementation by Zhang of the Sen slope estimator (SEN), applied using the zyp R-package. The results for the A & B series and the different trend calculations are very similar, in terms of slopes and signification. All the identified trends are significant at the 95% confidence level or better. Using the A series and the SEN slope, the annual regional mean of maximum temperatures has increased 0.135 ºC/decade (95% confidence interval: 0.087 / 0.173) and the annual regional mean of minimum temperatures 0.092 ºC/decade (0.050/0.135). Maximum temperatures present high values in the 1940s to 1950s and a large increase in the last decades. In contrast, minimum temperatures were relatively cooler in the 1940s and 1950s and the increase in the last decades is more moderate. Finally, the regional mean of annual accumulated precipitation decreased between 1941 and 2010 by -2.20 mm (-3.82/-0.64). The precipitation series are dominated by the high values before 1970, followed by a well known decrease in rainfall.

This homogenized monthly series will improve future analysis over this portion of Western Africa.