

Twenty-First Century Projected Changes in Extreme Temperature over Côte d'Ivoire (West Africa)

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The projection of the future climate change is of paramount importance in as much as it contributes to provide useful information for adaptation planning worldwide to local scales. This study investigated the future changes using four temperature related indices such are: the warm extreme indices such as the warm spell days index (HWFI), the very warm days frequency index (TX90P), the warm nights frequency index (TN90P) and the intra period extreme temperature range (ETR) index, based on an ensemble of 14 CORDEX-Africa simulations at $0.44^\circ \times 0.44^\circ$ (~50 km) of resolution under the RCP4.5 and RCP8.5 scenarios. These indices describe moderate extreme of ETCCDI based on temperature investigated over Côte d'Ivoire.

The results of this study show a general increase in HWFI, TX90P and TN90P indices over the entire country under both emission scenarios. The increase in these indices was higher under RCP8.5 scenario, especially in the period 2071–2100 and reached about 85, 72, and 90 % for HWFI, TX90P, and TN90P respectively. In addition, the magnitude of the changes is relevant along the coastal areas in the periods 2031–2060 and 2071–2100. Thus, the coastal areas might be vulnerable to heat wave episodes. Moreover, ETR index shows future decrease following a south-north gradient with values in the range $[-0.5; 1.5^\circ\text{C}]$ over the country during January–March (JFM) and October–December (OND) seasons whereas an increase ($\sim 0.5^\circ\text{C}$) is projected for April–June (AMJ) and July–September (JAS) seasons, particularly in the central and northern parts. This situation leads to a projected faster increase of the minimum temperature than the maximum, except in AMJ and in JAS seasons in the central and the northern regions. On the other hand, the changes in the different indices with respect to the mean value of the reference period (1976–2005) are in concordance to the expected warming at the end of the twenty-first century in west African region with significant increasing trends. The trends in the future period (2006–2100) under the RCPs forcing scenarios are generally more important than those in the historical period (1976–2005). Thus, significant modification mostly occurs in future climates under both mid-level (RCP4.5) and high-level (RCP8.5) Green House Gas (GHG) forcing scenarios albeit trends under RCP8.5 are higher compared to those under RCP4.5 scenario. The HWFI, TX90P and TN90P trends' consistently increase even in the historical and future periods. The projected changes are, however, subject to uncertainties, which are higher under RCP8.5 than under RCP4.5 scenarios and higher in the future period (2006–2100) than in the historical period (1976–2005). Overall, these changes are robust as all the 14 CORDEX-Africa simulations agree to an increase of warm extreme temperature for the end of the twenty first century.

Key words: West Africa, Côte d'Ivoire, extreme temperature, projected changes, RCPs scenarios, CORDEX.

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