



## Heat waves monitoring over West African cities: uncertainties, characterization and recent trends

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Heat waves can be one of the most dangerous climatic hazards affecting the planet; having dramatic impacts on the health of humans and natural ecosystems as well as on anthropogenic activities, infrastructures and economy. Based on climatic conditions in West Africa, the urban centers of the region appear to be vulnerable to heat waves. The goals of this work is firstly to assess the potential uncertainties encountered in heat waves detection; and secondly analyze their recent trend in West Africa cities during the period 1993-2020. This is done using two state-of-the-art reanalysis products, namely ERA5 and MERRA, as well as two local station datasets, namely Yoff Dakar in Senegal and Aéroport Félix Houphouët Boigny Abidjan in Ivory Coast. An estimate of station data from reanalyses is processed using an interpolation technique : the nearest neighbor to the station with a land sea mask  $\geq 0.5$ ; the interpolated temperatures from local station in Dakar and Abidjan, show slightly better correlation with ERA5 than MERRA. Three types of uncertainties are discussed: the first type of uncertainty is related to the reanalyses themselves, the second is related to the sensitivity of heat waves frequency and duration to the threshold values used to monitor them; and the last one is linked to the choice of indicators and the methodology used to define heat waves. Three sorts of heat waves have been analyzed, namely those occurring during daytime, nighttime and both daytime and nighttime concomitantly. Four indicators have been used to analyze heat waves based on 2-m temperature, humidity, 10-m wind or a combination of these. We found that humidity plays an important role in nighttime events; concomitant events detected with wet-bulb temperature are more frequent and located over the north Sahel. For all indicators, we identified 6 years with a significantly higher frequency of events (1998, 2005, 2010, 2016, 2019 and 2020) possibly due to higher sea surface temperatures in the equatorial Atlantic ocean corresponding to El Nino events for some years. A significant increase in the frequency, duration and intensity of heat waves in the cities has been observed during the last decade(2012-2020); this is thought to be a consequence of climate change acting on extreme events