Análisis de las características de las olas de calor en el norte de África

Assessing heat wave characteristics across North Africa

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RESUMEN

Dominated by arid and semi-arid climates, North Africa (Morocco, Algeria, Tunisia, Libya, and Egypt) is recognised as a climate change hotspot, characterised by rising mean temperatures that exacerbate the region's vulnerability to extreme thermal events. This study utilises high-resolution ERA5-Land reanalysis data to examine the characteristics of heat waves (HWs) across North Africa during the extended summer season (May–September) from 2000 to 2024. In this analysis, an extreme temperature event is classified as an HW when both daily maximum and minimum temperatures surpass their respective calendar-day 99th percentiles for at least three consecutive days and affect more than 10% of the area. On average, the annual frequency of HWs ranged from 2.8 to 5 events per year, with the highest frequency observed in Morocco. Results also indicate a statistically significant positive trend in HW frequency, ranging from 1.2 to 1.9 events per decade. Egypt exhibits the strongest trend, while Tunisia and Morocco show the lowest rates of increase. An analysis of the HW life cycle revealed that these events are relatively short-lived, with a mean duration of approximately 6 days across the region. These findings align with the annual average number of HW days, which peaks in Morocco at 31.5 days. The application of a Lagrangian diagnostic allowed for the attribution of sensible heat sources associated with the HWs. Outcomes indicate that temperature increases are predominantly driven by local sensible heating, fostered by intense solar radiation, with secondary contributions from sources close to the target region. Interestingly, a small fraction of sensible heat is advected from southern Europe, particularly during HWs in Libya and Egypt. Overall, these results underscore the critical need for further in-depth analysis to contextualise recent extremes within the framework of future climate projections, thereby aiding in the development of robust regional adaptation strategies.