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MedCLIVAR: Mediterranean Climate Variability - Temperature data homogenization and its impact on heatwave changes in the Eastern Mediterranean

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Heatwaves have discernible impacts on mortality and morbidity, infrastructure, agricultural resources, the retail industry, ecosystem and tourism and consequently affect human societies. A new definition of socially relevant heatwaves is presented and applied to new data sets of high-quality homogenized daily maximum and minimum summer air temperature series from 246 stations in the eastern Mediterranean region (including Albania, Bosnia-Herzegovina, Bulgaria, Croatia, Cyprus, Greece, Israel, Romania, Serbia, Slovenia, Turkey). Changes in heatwave number, length and intensity between 1960 and 2006 are quantified before and after data homogenization. Daily temperature homogeneity analyses suggest that many instrumental measurements in the 1960s are warm-biased, correcting for these biases regionally averaged heatwave trends are up to 8% higher. We find significant changes across the western Balkans, southwestern and western Turkey, and along the southern Black Sea coastline. Since the 1960s, the mean heatwave intensity, heatwave length and heatwave number across the eastern Mediterranean region have increased by a factor of 7.6 ± 1.3, 7.5 ± 1.3 and 6.2 ± 1.1, respectively. These findings suggest that the heatwave increase in this region is higher than previously reported. In order to perform similar studies on past and recent extreme temperature events, future projects will aim to develop Pan-European homogenized daily to sub-daily temperature datasets. Existing correction problems due to local climate effects such as foehn or temperature inversions will be solved by implementing more advanced homogenization methods.