1.3. TX_x, Monthly mean value of daily maximum temperature

Project Name: CLEVER Cities (Grant Agreement no. 776604) and GROW GREEN (Grant Agreement no. 730283)

Author/s and affiliations: Maddalen Mendizabal[1]

[1] *TECNALIA, Basque Research and Technology Alliance (BRTA), Mikeletegi Pasealekua 2, 20009 Donostia-San Sebastián, Spain*

Mean of daily maximum temperature (TX)	Climate Resilience
Description and justification	Mean of the daily maximum temperatures observed during specific time period, either for a specific year or over a specific period of years[1]. Proposed to detect Tº increment
Definition[2]	Let TX_{ij} be the maximum temperature at day i of period j. Then mean values in period j are given by: $TX_j = \sum_{i=1}^{I} TX_{ij} / I$
Strengths and weaknesses	It is a good indicator together with the mean of daily minimum temperature that can gives an idea of the high temperature effects in urban comfort and human health.
Measurement procedure and tool	Sensors: measuring instruments (measurement stations or manual instruments e.g., TESTO multi-function); thermography camera (e.g., FLIR). The average of the summer period or a hot summer day can be considered from one specific year or range or years Summer is the most common season in which it is assessed (spring and autumn are considered in relatively fewer studies: e.g., Yan H., Wang X., et al. 2012; Shashua-Bar L., Tsiros I.X., Hoffman M.E. 2010) The maximum is the category most employed in the literature, but the average also is relevant and used. For this indicator the average is proposed.
Scale of measurement	It depends on the sensors network coverage; it can be a point or in case there are several localizations it ca be transformed to a grid (through interpolation)
Data source	
Required data	A time series of air Tº data (measured in ºC)
Data input type	Quantitative

[1] http://glossary.ametsoc.org/wiki/Mean_daily_maximum_temperature_for_a_month
[2] https://eca.knmi.nl/indicesextremes/indicesdictionary.php#8

Data collection frequency	The sensors can collect the data every 10 minutes. In case the effectiveness of a NBS is analysed this should be measured at least hourly. At midday, the cooling effect reaches its maximum so, for example, the heat effect on health can be analysed; at night, the effectiveness is less, but the effect of the night temperature on sleep disturbance can be analysed. Regardless of the adaptation aim, the best time to measure the higher effect on heat reduction is midday, as this is the hottest time of the day where the cooling effect reaches the maximum (Georgi and Dimitriou, 2010; Shashua-Bar et al., 2012; Tan et al., 2016).
Level of expertise required	The sensors must be calibrated and located in the same place during all the measurement period. Not any sensor is valid
Synergies with other indicators	Synergies with the mean of daily minimum temperature.
Connection with SDGs	SDG 3 Good health and well-being, SDG 11 Sustainable cities and communities, SDG 13 Climate action
Opportunities for participatory data collection	Participatory data collection is feasible with supervision
Additional information	
References	[1] http://glossary.ametsoc.org/wiki/Mean_daily_maximum_temperature_for_a_month [2] https://eca.knmi.nl/indicesextremes/indicesdictionary.php#8

1.4. TN_n, Monthly mean value of daily minimum temperature

Project Name: CLEVER Cities (Grant Agreement no. 776604) and GROW GREEN (Grant Agreement no. 730283)

Author/s and affiliations: Maddalen Mendizabal[1]

[1] *TECNALIA, Basque Research and Technology Alliance (BRTA), Mikeletegi Pasealekua 2, 20009 Donostia-San Sebastián, Spain*

Mean of daily minimum temperature (TN)	Climate Resilience
Description and justification	Mean of the daily minimum temperatures observed during specific time period, either for a specific year or over a specific period of years[3]. Proposed to detect Tº increment at night.

[3] http://glossary.ametsoc.org/wiki/Mean_daily_maximum_temperature_for_a_month