Changes in the urban climate parameters due to the anthropic factors. Case study: Suceava metropolitan area from Romania

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City of Suceava, located in the NE Region of Romania, is an attraction pole for the regional inhabitants through its commercial, academic and tourist functions. The city population increased from 114462 in 1992 to 122654 in 2018. The urban area suffered major modifications between 1990 and 2018 which transposed themselves in the values of the climatic elements.

The general objective of the study consists in the evaluation of the climatogen impact of the mutations occurred in the city's demography, in the features of the active surface between 1990 (the period which followed immediately to the communist system) and 2018.

The working algorithm adopted consisted of: i) identification of modifications in the active surface structure, ii) identification of the land cover flows which determine the evolution of the artificial surfaces, iii) intersection of CORINE Land Cover sets, for the years 1990 and 2018, in ArcGis through the overlay technique, iv) obtaining a matrix of land cover categories, v) identification of the land cover flows according to the working technology implemented by the European Environment Agency, vi) highlighting the correlations between the modification of the artificial areas surfaces and the evolution of the climatic elements of Suceava's atmosphere.

Results. There were identified three types of land cover flows specific to the artificial surfaces, caused by six types of processes. The biggest share is held by LCF2 (urban residential sprawl) represented by a single type of land cover flows, urban diffuse residential sprawl (lcf22) which cumulated an area of 861.74ha (2.12% of study area total). The second category shows the intraurban space conversion, defined LCF1 (urban land management) with the presence of two types of specific processes: urban development/infilling (lcf11) with a surface of 75.82ha (0.19% of the study area) and recycling of developed urban land (lcf12) with an area of 376.88ha (0.93% of study area). In the end, there was identified a small share of conversions which show the third category LCF3 (sprawl of economic sites and infrastructures) with a total of 284.66ha (0.70% of study area) and which contains three types of processes: sprawl of industrial and commercial sites (lcf31) with 129.09ha (0.32%), sprawl of airports (lcf34) with 10.27ha (0.03%) and construction (lcf37) with 145.3ha (0.36%). In total, the anthropic space from the study area was affected by conversions on a surface of 1599.1ha (3.93% of the total study area of 40685.73ha) for period
1990-2018. Meteorological data obtained from Suceava Weather Station (1961-2018) and from the urban meteorological stations SV1 and SV2 for the interval 2009-2019 were correlated by the statistics of conversions.

Conclusions. At Suceava suburban weather station temperature increased with 0.4°C in the decade 1991-2000, with 0.5°C in decade 2001-2010 and with 0.9°C more in decade 2011-2019. Only in the interval 2009-2019 with hourly data from all 3 stations, the urban-suburban thermal difference was of +1.7°C in the city's favour. If the increase of temperature from suburban is allocated to the regional heating, the urban-suburban thermal difference was attributed to the amplification of the city's topoclimatic role per se.