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Title: Heat Islands in the city of San Francisco de Campeche: detection and solution

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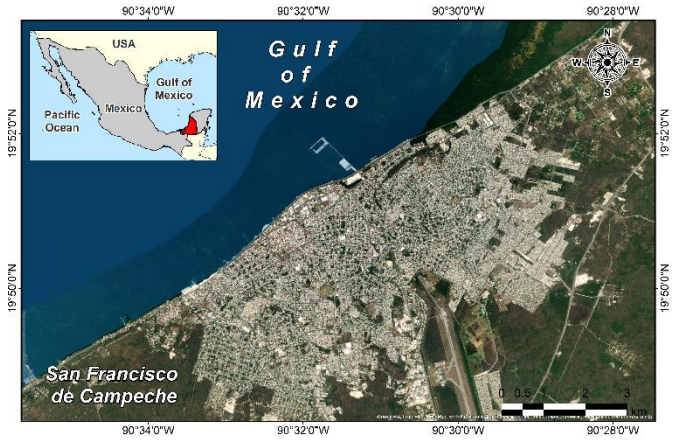
Introduction

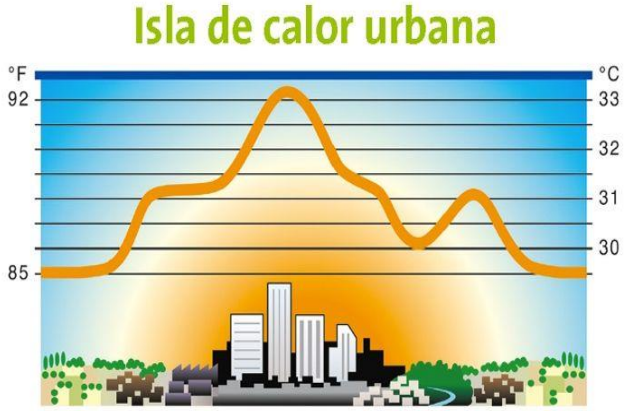
One of the phenomena generated in cities are the so-called Urban Heat Islands.

The Urban Heat Islands (UHI) is a phenomenon referred to the presence of warmer air in certain areas of a city compared to its surroundings and that can be exacerbated in coastal cities due to the climatic variations that occur.

Heat islands have acquired particular relevance in recent years due to the growing impact of climate change and its variability in urban spaces; therefore, these thermal anomalies aggravate the picture of pollution and degradation of the quality of the habitat (Fuentes Pérez 2014).



Study area
Source: self made.



Heat Island
Source: https: //www.tiempo.com/ram/340662/efecto-isla-calor-los-costos-del-cambio-climatico/

Methodology

+ Landsat 5 (TM), 7 (TM) y 8 (OLI) images

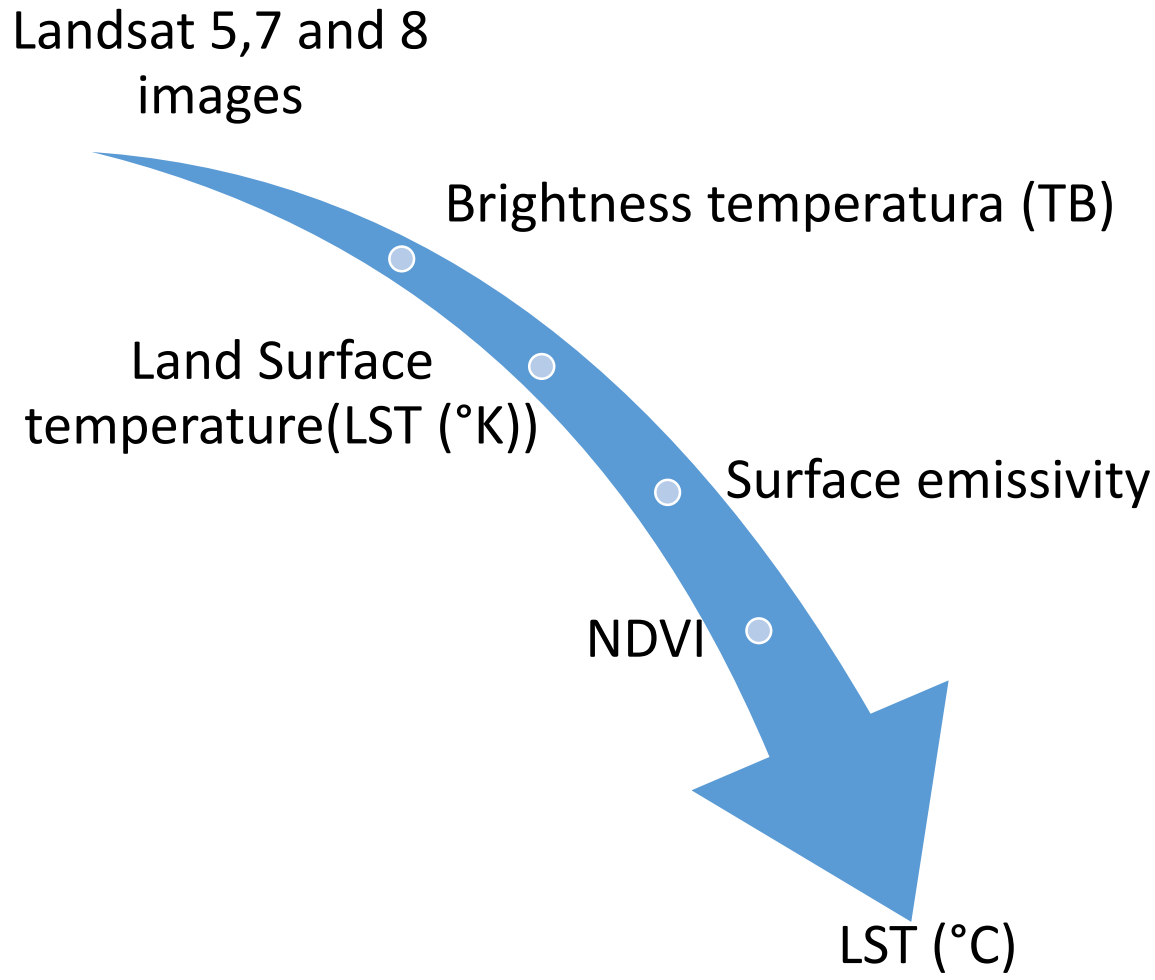
+ 1990 – 2020

+ USGS

+ TM images – band 6

+ OLI images – band 10

+ GIS



Results

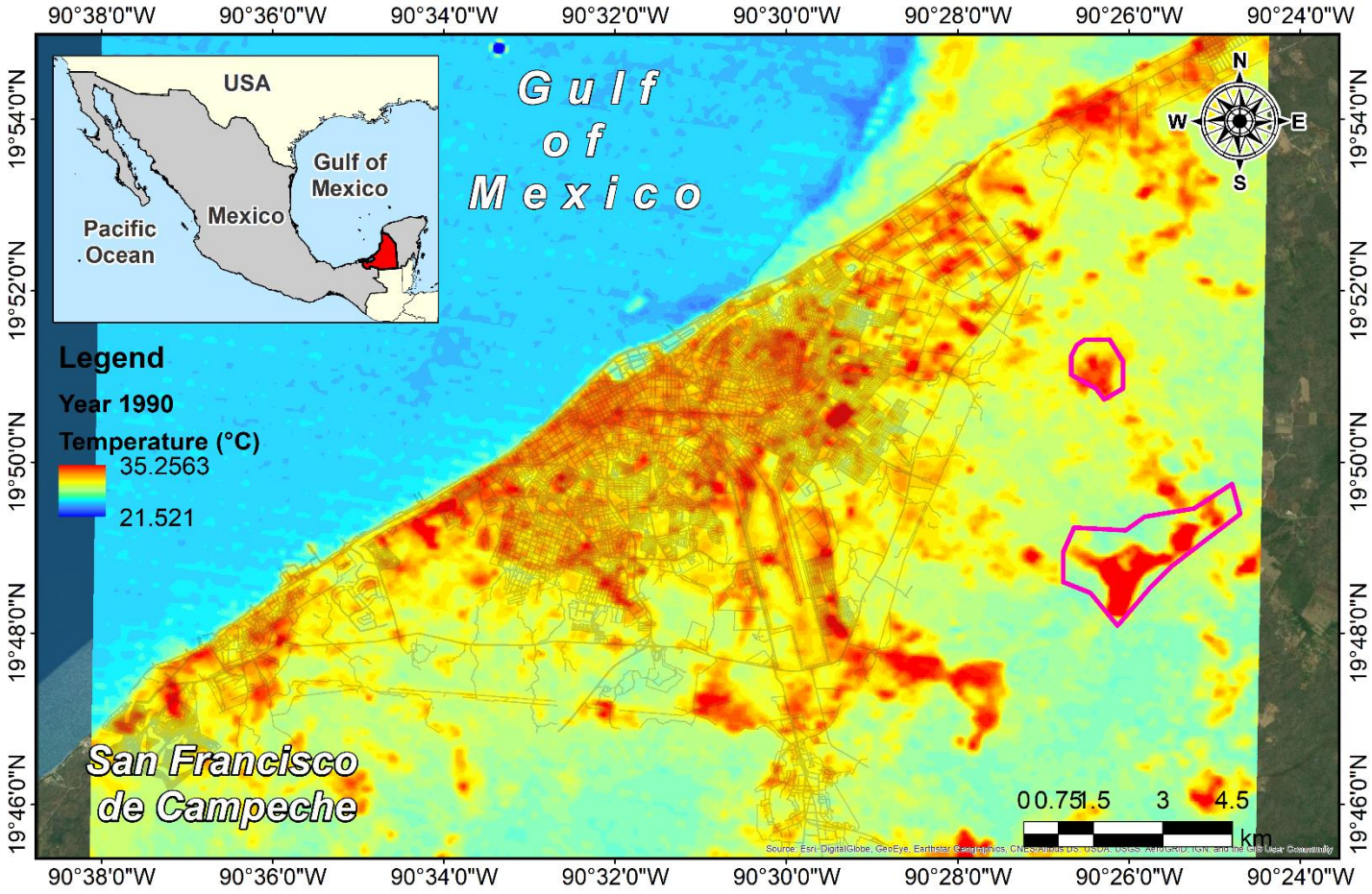
Between 1990 and 2020 there was a physical expansion of the city that was oriented in all directions.

It was found that the green areas of the city have reduced their surface by little more than 50% for the period 1990 - 2020.

There are areas with higher temperatures than their surroundings; areas such as the historic center and avenues that have been rebuilt in the last 5 years, a decrease in vegetation coverage has been observed and as a consequence an increase in surface temperature compared to previous years, which is why they present areas that we can call Heat Islands.

Results

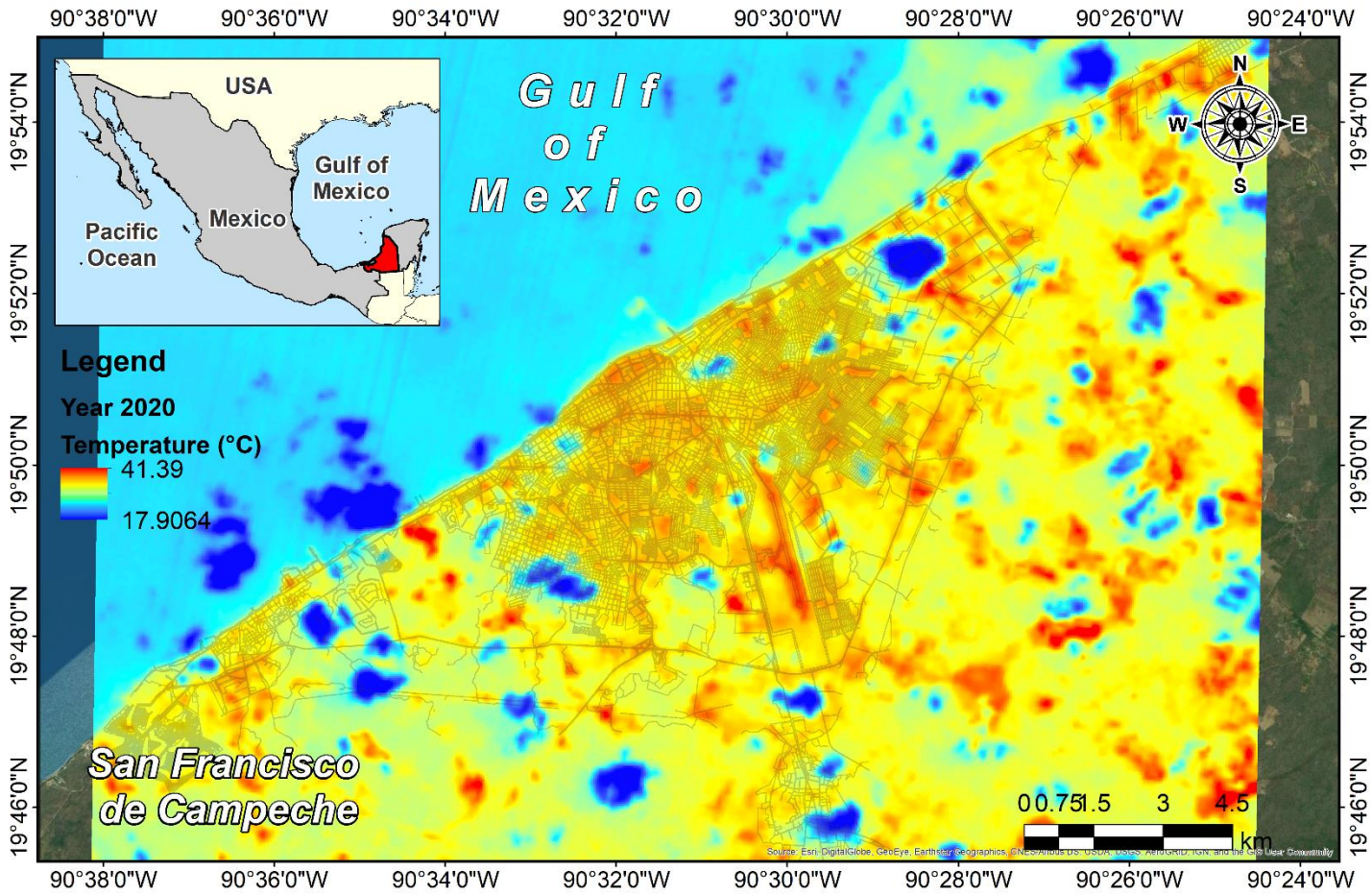
For the year 1990, it is observed that the maximum temperatures recorded correspond to 35°C on average and are located in the downtown area of the city, as well as in some points where there are constructions in process or changes in land use such as the change of a natural area to growing areas



Temperature distribution map for the year 1990.
Source: self made.

Results

For the year 2020 there are maximum temperatures close to 42°C and minimum temperatures of 17.9°C

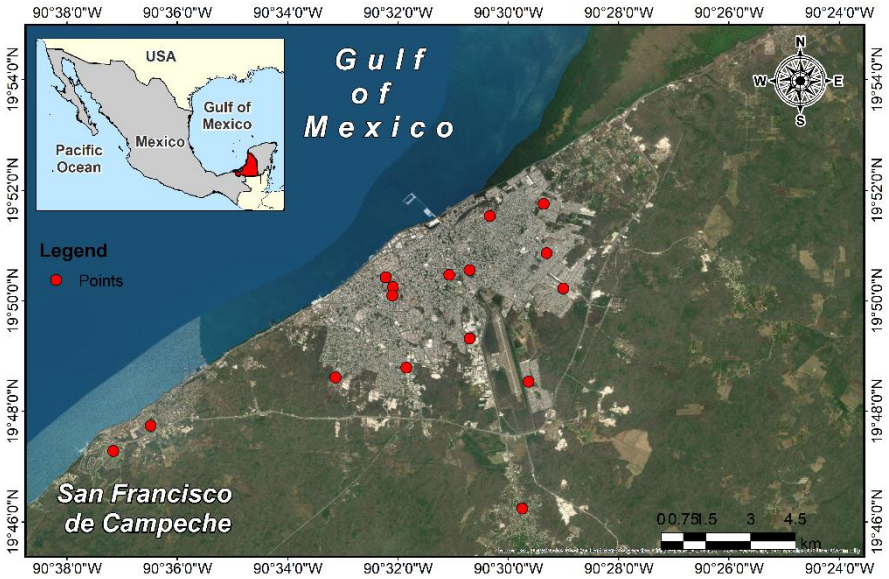


Temperature distribution map for the year 2020.
Source: self made.

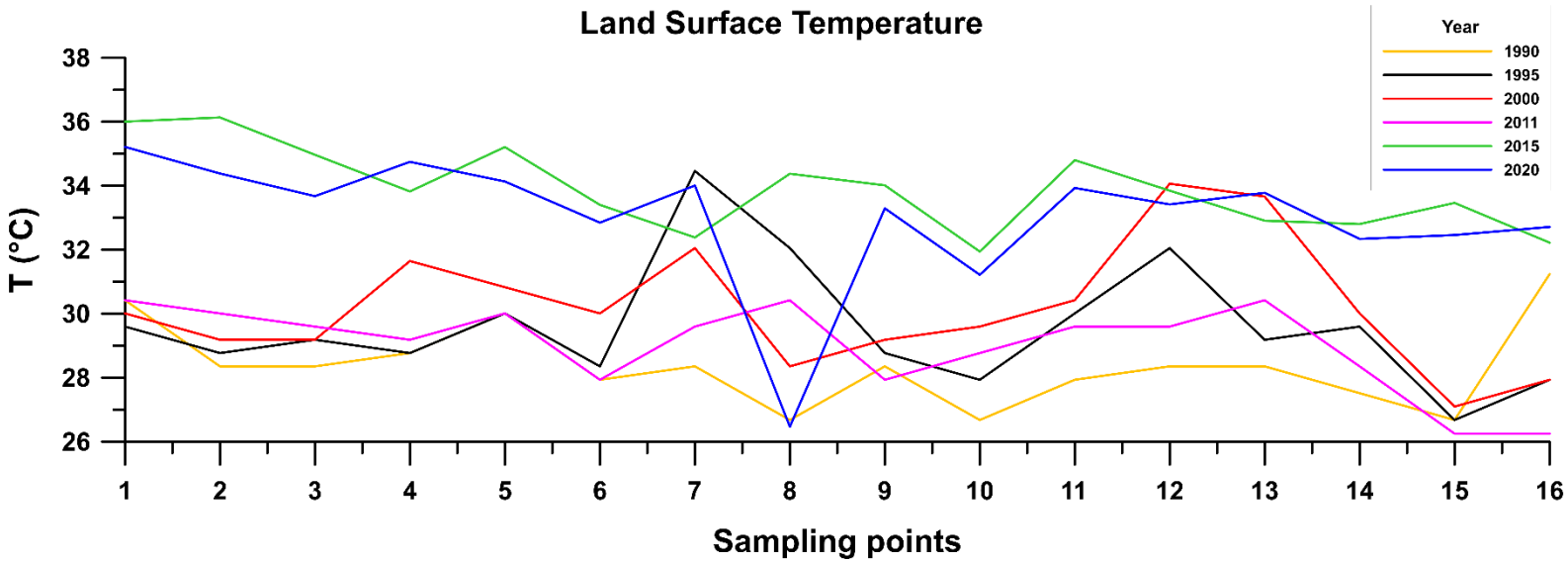
Results

16 points were analyzed.

It is observed that from the period 1990 to 2011 the temperature in most of the points has a variation range of ± 1°C; while between 2011 and 2015, the temperature had an average increase of 5°C.



Location of sampling points.
Source: self made.



Sample points and associated temperature for the years under analysis.
Source: self made.

Conclusions

+ The increase in soil temperature in the city of San Francisco de Campeche has a direct relationship with the reduction of vegetated areas.

+ There have been temperature increases of up to 7°C in a period of 30 years with an average rate of 0.23°C/year.

+ If the conditions continue in the next 10 years, temperatures above 40°C would be expected.

+ The use of air conditioning equipment increases, causing an increase in energy demand and generation of atmospheric pollutants.

+ The construction of green corridors at strategic points is proposed as a measure to mitigate and reduce heat islands.

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