**Urbanization and Urban Heat Island Analysis of Lagos, Nigeria: Using Remote Sensing and GIS analysis to determine Urban Heat and Disease Outbreak**

**Background Information**

- **Exploring the Connection Between Urban Heat and SDG Goals**

Urbanization is a worldwide occurrence that has significant implications for sustainable development. The United Nations' Sustainable Development Goals (SDGs) aim to tackle global challenges, including those related to urbanization. One of the most notable impacts of urbanization is the urban heat island (UHI) effect, where urban areas experience higher temperatures than their surrounding rural areas due to human activities, changes in land use, and increased energy consumption. This phenomenon has a direct correlation with SDG Goal 11 (Sustainable Cities and Communities) and indirectly affects other goals such as Goal 3 (Good Health and Well-being) and Goal 13 (Climate Action).

- **Urban Health, Disease Occurrence, and Mental Well-being**

The UHI effect has negative impacts on urban health. Urban areas with high temperatures can cause heat-related illnesses and stress, especially during heat waves. Additionally, the UHI effect can worsen air pollution and increase the formation of ground-level ozone, which can lead to respiratory problems. These health concerns put a strain on healthcare systems and affect the mental well-being of those living in urban areas. It is essential to address the UHI effect to create healthier and more livable urban environments.

**Potential Data Sources**

In order to thoroughly examine the urban heat island effect in Lagos, Nigeria. I will be using data from two sources:

- **Earth Explorer:** A platform that grants access to a wide range of remote-sensing imagery
- **Landsat Images**: Specifically, Landsat 8/9 OLI/TIRS C2L2 band 10 images, which can capture surface temperature.

**Planned Method**

To perform an urban heat island analysis of Lagos, Nigeria. I will follow these steps:

- **Data Acquisition**: I will obtain raster images from EarthExplorer, specifically the following Landsat images:
  - LC08_L2SP_191055_20230808_20230812_02_T2
  - LC08_L2SP_191056_20230808_20230812_02_T2
  - LC09_L2SP_190056_20230809_20230811_02_T1
- **Data Processing**: To create new merged raster images, I will use the mosaic to new raster tool to merge the appropriate bands and then utilize the new raster tool.

- **Land Surface Temperature Analysis**: Once I have merged the data, we'll extract the Land Surface Temperature (LST). Using the multiplicative scale factor and additive offset factor provided in the science guide, I will convert these values to their corresponding Land Surface Temperature (LST) values in Kelvin. To convert to degrees Celsius, we'll subtract 273.15 from the LST values.
- **Urban Area Digitization:** Using polylines, I plan to digitize the boundaries of Lagos, Nigeria on the map.
- **Urban Heat Island Generation:** I will use the stack profile tool to create a graph of the urban heat island profile in Lagos. This graph will be based on LST values and will cover the entire urban area. I will also correlate the graph with the acquisition dates of the raster images.
- **Potential Challenges:** It is likely that I will face difficulties such as cloud cover, atmospheric interference, and calibration issues, which may affect the precision of the analysis.

**Expected Results**

- **Accuracy and Potential Limitations**

I anticipate some challenges in my analysis, but I will use various techniques to minimize inaccuracies. I expect the results to be around 85-90% accurate, considering aspects such as calibration accuracy, image quality, and the possibility of atmospheric interference. By acknowledging these limitations, I aim to provide a transparent assessment of the study's reliability.

It's essential to note that the month and year chosen for the analysis may influence the results. Therefore, the analysis should be viewed as a representation of the specific conditions during the chosen timeframe.

My proposed analysis of Lagos, Nigeria urbanization and urban heat island aims to offer valuable insights into the extent and impact of the UHI effect in the city. We will use remote sensing and GIS techniques to understand the relationship between urbanization, temperature variations, and their effects on urban health and well-being. The results of this analysis can guide policy decisions and urban planning strategies aimed at creating more sustainable and resilient cities.