Challenge Proposal:

[Understanding the effect of COVID-19 in Urban pollution through Remote Sensing]

Context / Description

Atmospheric pollution is a major environmental concern in developed and emerging industrialized countries worldwide. Fossil fuel-based energy production and road traffic are both critical drivers of serious public health issues at the local, regional, and national level. The World Health Organization reports that 91% of the world's population inhabits unhealthy environments, breathe air that includes elevated levels of toxins, and as a result of exposure to ambient air pollution and smoke, 7 million deaths occur annually. Different research have established direct relationships between diseases and traffic or industrial emissions, particularly in major cities where NO2, particulate matter (PM2.5, PM10), CO, ozone, methane and other gases contribute to deteriorate the population's health, such as respiratory and cardiovascular diseases, impacting all population age classes, children included.

In the current COVID-19 pandemic context, we aim to build a comparative analysis of the spatial distribution and quantification of atmospheric pollutants for the Lisbon Metropolitan Area, between similar months from 2019 and pandemic months up to the present situation, corresponding to the transition from a normal condition situation (peak emissions from traffic and power plants) to the current pandemic context, characterized by a decrease of traffic intensities and a limitation of industrial power consumption generated by fossil fuel burning (and also expected atmospheric pollution fluctuations between late spring/summer 2020 and winter 2020/2021).

Goals

Understand the contribution of the COVID-19 pandemic to the monthly evolution of the spatial patterns of urban atmospheric pollution and related pollution quantities across the Metropolitan Lisbon Area, using data from the latest available remote sensing platforms and sensors.

Challenges/Questions

C1: Evolution of spatial patterns in urban atmospheric pollution
Q1: What were the patterns in the spatial distribution of urban pollution before February 2020 and what was their evolution up to the present situation?

C2: Quantification of urban atmospheric pollution
Q2: What was the total monthly amount of urban atmospheric pollution before February 2020 and what was its monthly evolution up to the present situation?

Outcome

For each challenge answer the questions and identify a methodology or approach to solve the challenge using data provided and/or available.
The questions mentioned are guidelines and examples. We also encourage the formulation and answering of different questions related to the challenge.

Data sources

The data sets for each challenge will be presented in depth prior the start of the challenge and comprise essentially the following major topics:

- Temporal series of appropriate remote sensing images
- Ancillary data regarding the metropolitan area of Lisbon, such as major circulation axes, building location and urban plans, amongst others.