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## Effects of air quality on the health of Mediterranean forests

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The climate change has turned out to be a determining factor in the development of forest in Spain. Production systems have emitted polluting gases and other particles into the atmosphere, for which some plants have not yet developed adaptation systems. Among the most harmful pollutants for the environment are gases such as nitrous oxides, ozone, particulate matter.

However, this condition is not the same in Peninsular Spain, and the Balearic Islands since the plant compositions differ in the territory and the bioclimatic, topographic, and anthropic characteristics. Monitoring the vegetation with sufficient spatial and temporal resolution, studying variables conditioning plant health is a challenge from the nature of the variables and the amount of data to be handled.

The Mediterranean forest is one of the most ecosystem affected by climate change because of usually experimented long periods of drought that, in combination with increased temperatures, can drastically reduce the photosynthetic activity of trees and therefore the biomass of forests.

That is why the application of environmental technologies based on Remote Sensing (which provide plant health indices from passive sensors on satellite platforms and other variables of interest), Geographic Information Systems (to integrate, process, analyze spatial and temporal data) and machine learning models (which facilitate the extraction of relationships between variables, conditioning factors and predict patterns).

In this regard, this work's objective is to evaluate the possible effect that different pollutants have on the health of the vegetation, measured from the annual values of the Normalized Difference Vegetation Index (NDVI), in the Mediterranean forests of Peninsular Spain. To achieve this, we are used machine learning techniques using the Random Forest algorithm. The study has also been done with various climatic, topographic, and anthropic variables that characterize the forest to carry it out.

The results showed that certain variables such as the aridity index had generated the NDVI values and therefore plant development, while others are limiting factors such as the concentration of certain pollutants and the direct relationship between them particulates and NO<sub>x</sub>. This study can verify how the Random Forest algorithm offers reliable results, even when working with heterogeneous variables.