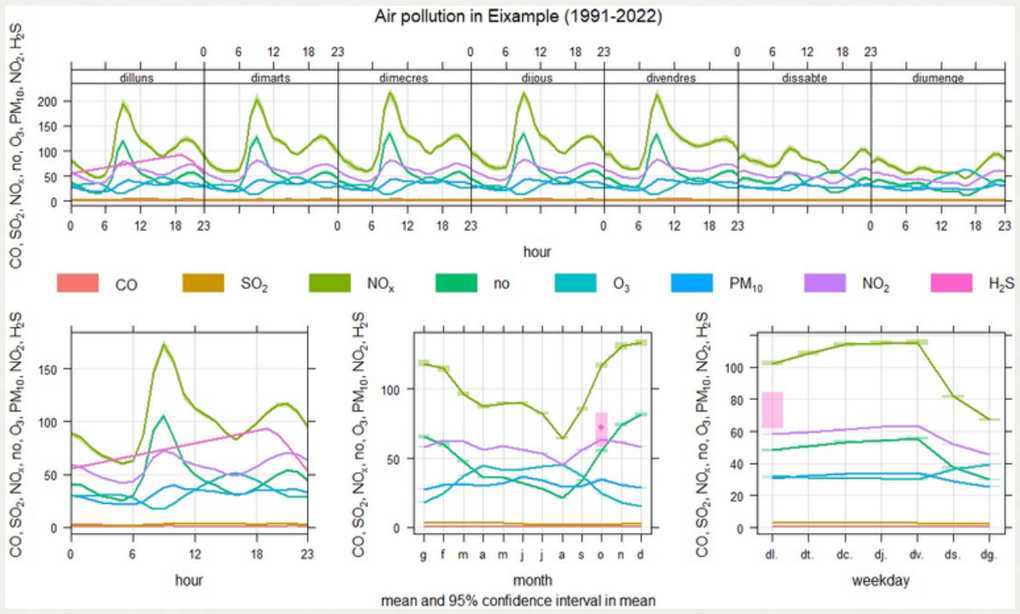
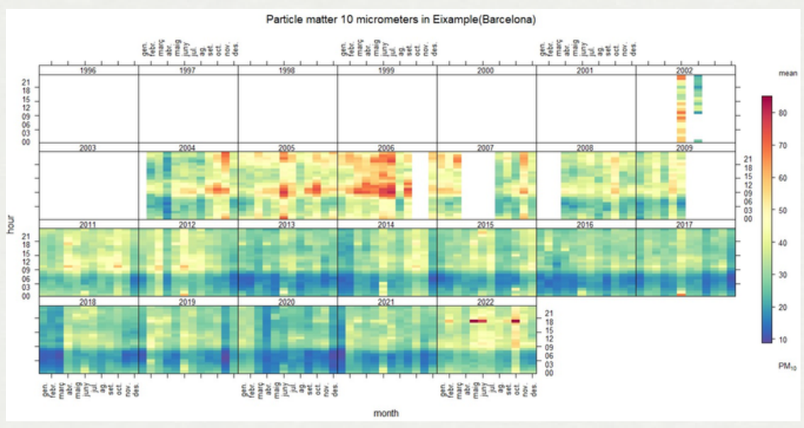
AiR POLLUTiON iN EiXAMPLE(BARCELONA)

Fabián Birch Torrejón, student of the Pompeu Fabra high school, in the B1 F class done by the teacher Francesc Perez

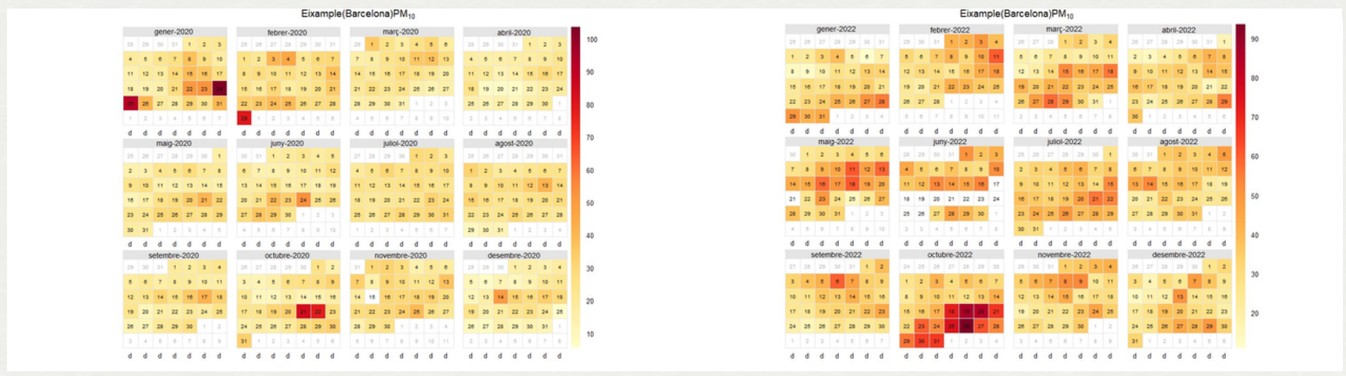
This work consists of seeing how pollution varies from 1991 to 2022 on an hourly, daily, monthly and annual basis, the second objective is to check if it complies with European regulations and the World Health Organization and the third and final objective is to see where the contamination comes from and where it is going.
All this work has been done with the databases: XEMA and XPVCA, and the openair and tidyverse library methods of R



In this article we can analyze the different 8 types of polluting particles that have existed from 1991 to 2022, in this initial graph we can see how the great part of their concentration is based between the week, and on weekends we can see how the concentrations drop drastically, we can also see that most of the high concentrations happen to be between 6pm and 12pm, and finally monthly the pollution reduces in the summer months and at the beginning of autumn they rise again.
In this graph only 95% of the data are represented.

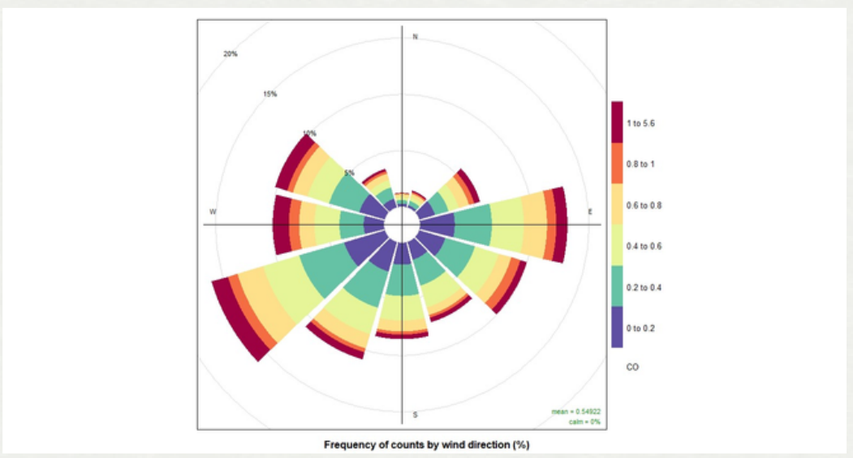


The concentration of PM10 increased in 2005-2007 and decreased afterwards, particularly low levels were recorded in 2020 compared to previous years. although in 2022 a rebound is observed during the afternoons.



The first graph shows that during the year 2020 there was a decrease in the levels of PM10 pollutant in the air. However, the second graph shows that in the year 2022 pollution levels have returned to normal and have increased significantly. It is likely that the decrease in pollution in 2020 is due to the containment measures and mobility restrictions imposed by the pandemic, which reduced industrial activity and vehicular circulation. However, in 2022, with the relaxation of these measures and the return to normality, pollution levels have increased again.

According to the data presented, the pollution limits established by the World Health Organization (WHO) for carbon monoxide (CO) and sulfur dioxide (SO2) are met in all months and years without exception. Ozone (O3) complies with the limits established by the European Union (EU) in all months and years.
In the case of PM10 particles, EU regulations establish that they can only be exceeded for a maximum of 35 days a year, however, in some specific years, such as 2004, 2005, 2006 and 2022, the limit is exceeded. allowed, with 44, 109, 114 and 36 days exceeded, respectively. In the other years, the established regulations are complied with.
On the other hand, in the case of nitrogen dioxide (NO2), the EU establishes an annual limit of 18 hours of excess, and only in some specific years, such as 1998 and 2007, is this limit exceeded, with 25 and 21 hours exceeded, respectively. In the other years, the established regulations are complied with.
These data show the importance of continuing to work on measures to reduce air pollution, especially in areas where the permitted limits of PM10 and NO2 are exceeded. It is necessary to continue monitoring air quality and apply effective measures to protect public health.



Eixample is an area with a high density of traffic and urban activity, which leads to a high emission of pollutants into the air. According to studies carried out, it has been determined that most of the pollution that affects this area comes from the west of the city, where the port and a significant amount of vehicular traffic are located.
In addition, a significant amount of pollution has also been detected coming from the east of the city, particularly from the Zona Franca, where numerous factories and industrial zones are located. These pollutant emission sources, added to vehicular activity, contribute to the high concentration of pollutants in the air in the Eixample.
On the other hand, it has been observed that the predominant direction of the winds in the city of Barcelona is from north to south, which contributes to the fact that pollution does not arrive in large quantities from the north of the city towards the Eixample.