INVESTIGACIÓN EN MARCHA

TESIS DOCTORAL
CURSO 2022-23

UNIVERSITAS Miguel Hernández

DOCTORADO EN
MEDIO AMBIENTE Y SOSTENIBILIDAD

PROGRAMA DE DOCTORADO EN
MEDIO AMBIENTE Y SOSTENIBILIDAD
UNIVERSITAS Miguel Hernández

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NIVELES DE OZONO TROPOSFÉRICO:

EVOLUCIÓN HISTÓRICA Y SITUACIÓN ACTUAL EN EL SURESTE DE ESPAÑA.

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FINALIDAD:

El Ozono troposférico es uno de los principales contaminantes del aire que afectan la salud humana y el medio ambiente (OMS).

Se pretende analizar la variación en los niveles de O3 alcanzados en el sureste de España a lo largo de los últimos 20 años. Se observarán sus tendencias y se estudiará la implicación de diferentes variables.

OBJETIVOS:

1. Determinar las concentraciones de ozono de fondo existentes en la zona de medición.
2. Identificar las variables que justifiquen la tendencia
3. Caracterizar escenarios

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ESTADO DE LA CUESTIÓN:

Formación:

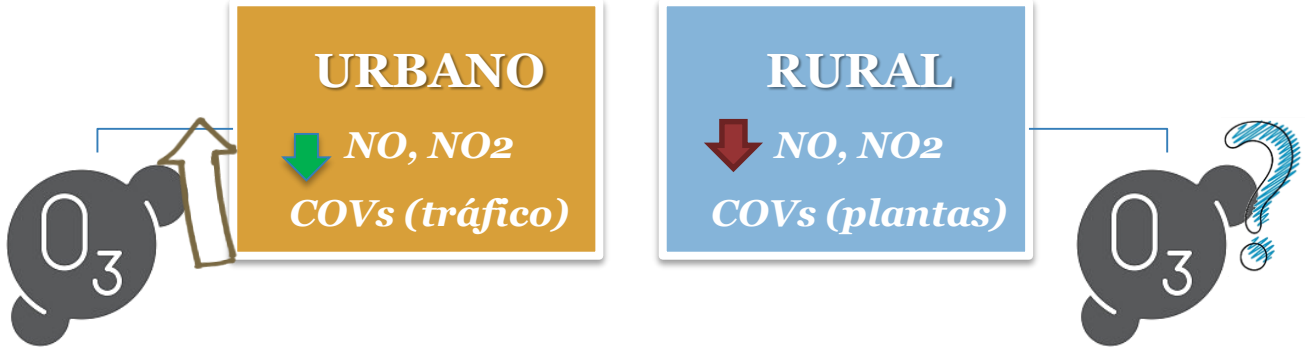
$$O_2 + O \rightarrow O_3$$

$$NO_2 + hv \rightarrow NO + O$$

Eliminación:

$$O_3 + NO \rightarrow NO_2 + O_2$$

Situación actual: ↓NOx emitidos =NO_2 + NO
Aumento ratio NO_2/NO



METODOLOGÍA

A) Área de estudio y obtención de datos

Para conseguir los objetivos, se empleará la base de datos de la

Red Valenciana de Vigilancia y Control de la Contaminación Atmosférica (RVVCCA) *de la Generalitat Valenciana.*

PASOS:

Selección de emplazamientos objeto de estudio Incluidos en RVVCCA → Descarga ficheros de RVVCCA Y elaboración base de datos → **Análisis*** de variabilidad de contaminantes y tendencias

*Análisis datos

Openair ® Version 2.9-1Environmental Modelling- Sofware

R Development Core Team (2011)

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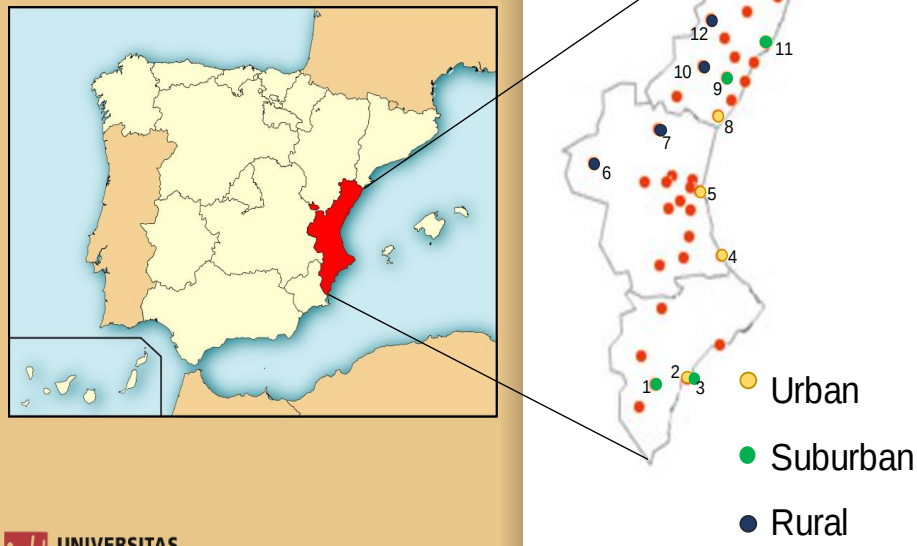
RESULTADOS:
1-Emplazamientos

16 Emplazamientos seleccionados (5-6 por tipo):

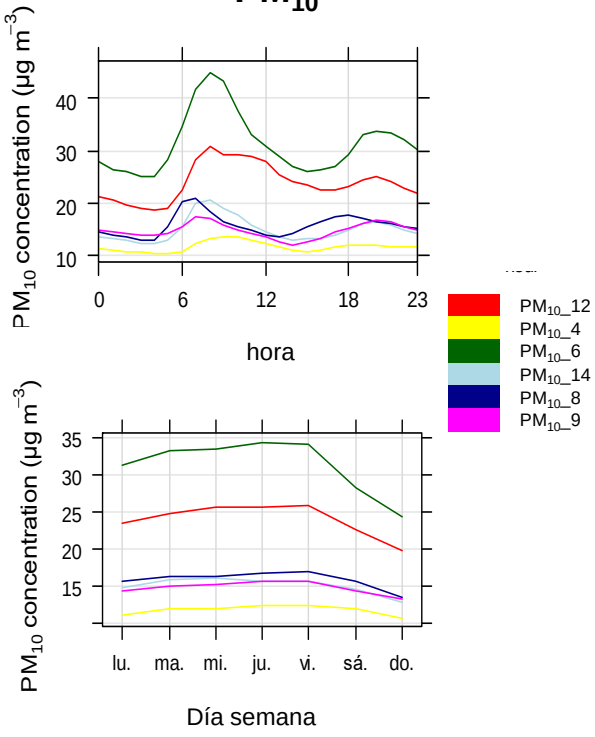


No.	Station	Type	Period	NO_x	O_3	PM_{10}	$PM_{2.5}$	PM_1
1	Morella	Rural	2000-2019	X	X			
2	Villafranca del Cid	Rural	2000-2019	X	X			
3	Cirat	Rural	2006-2019	X	X			
4	Penyeta	Suburban	2000-2019	X	X	X	X	X
5	Castellón PD	Urban	2006-2019	X	X			
6	L'Alcora	Suburban	2004-2019	X	X	X	X	
7	Onda	Suburban	2000-2019	X	X			
8	Villar del Arzobispo	Rural	2005-2019	X	X	X	X	X
9	Caudete de las Fuentes	Rural	2006-2019	X	X	X	X	X
10	Paterna	Suburban	2006-2019	X	X			
11	Burjassot	Urban	2002-2019	X	X			
12	Pista de Silla	Urban	2000-2019	X	X	X		
13	Gandía	Urban	2000-2019	X	X	X		
14	Rabassa	Suburban	2010-2019	X	X	X	X	X
15	Pla	Urban	2003-2019	X	X			
16	Agroalimentari	Suburban	2003-2019	X	X			

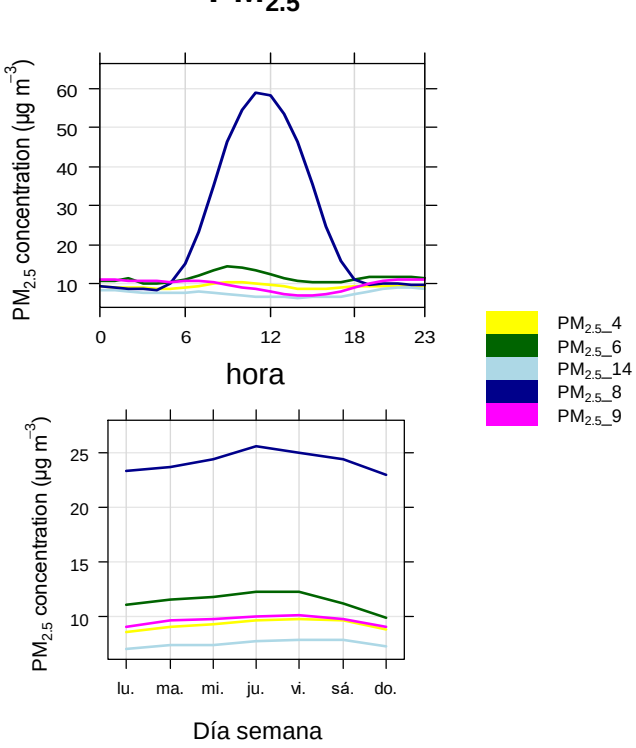
RESULTADOS:
2-Evolución de contaminantes

Evolución Partículas diaria

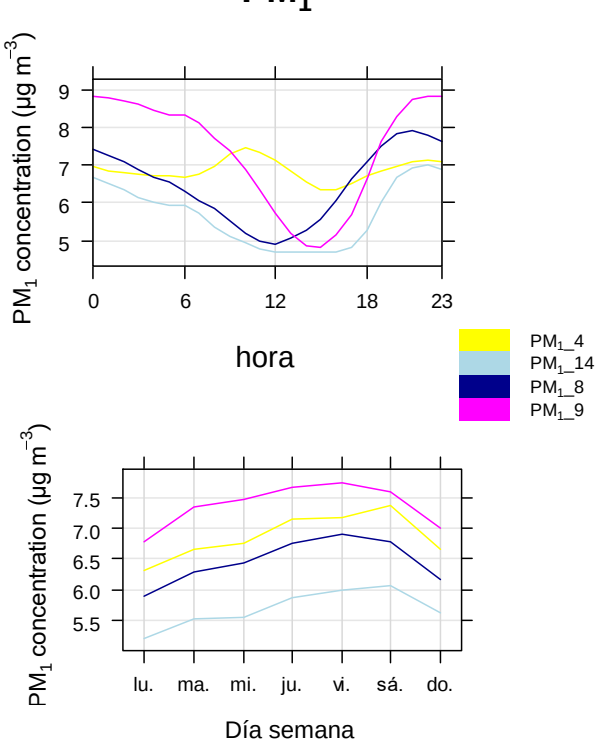
PM_{10}



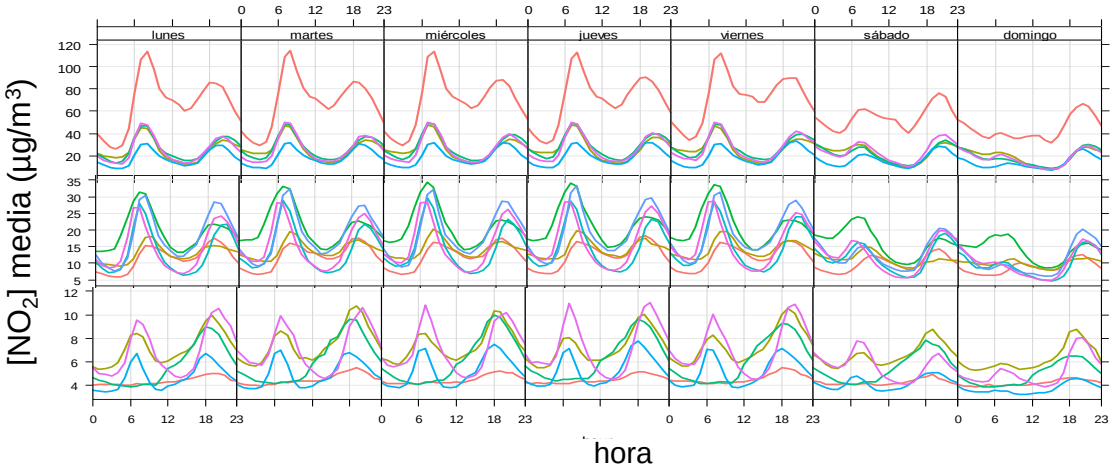
$PM_{2.5}$



PM_1



Evolución NO_2 semanal

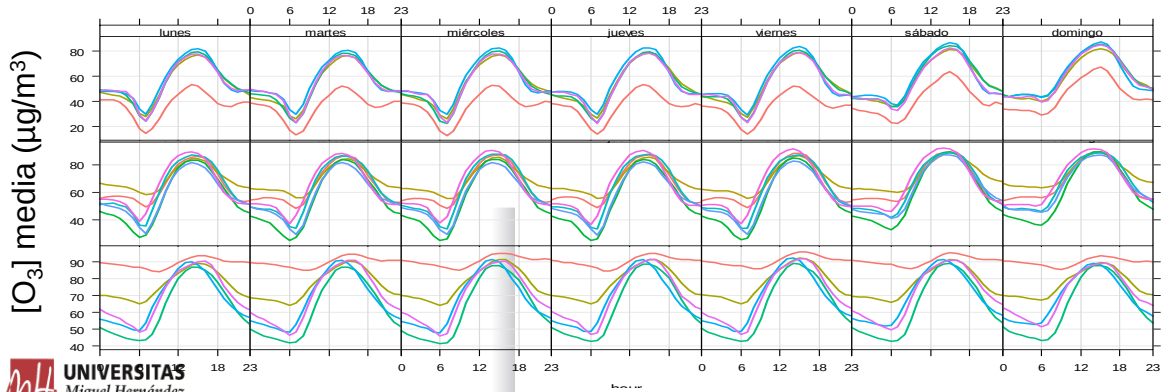


URBANA: NO_2_12, NO_2_5, NO_2_11, NO_2_13, NO_2_15

SUBURBANA: NO_2_7, NO_2_4, NO_2_6, NO_2_14, NO_2_10, NO_2_16

RURAL: NO_2_1, NO_2_2, NO_2_3, NO_2_8, NO_2_9

Evolución O_3 semanal



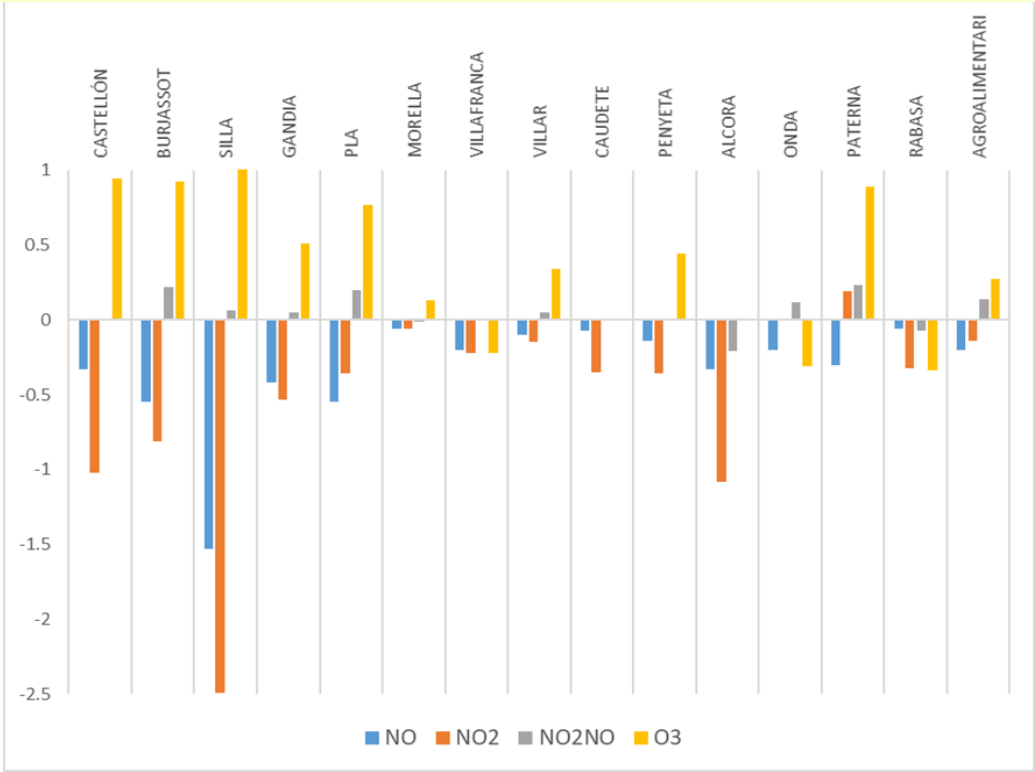
URBANA: O_3_12, O_3_5, O_3_11, O_3_13, O_3_15

SUBURBANA: O_3_7, O_3_4, O_3_6, O_3_14, O_3_10, O_3_16

RURAL: O_3_1, O_3_2, O_3_3, O_3_8, O_3_9

RESULTADOS:
4-Tendencias a largo plazo

Evolución contaminantes a lo largo del año



Evolución de las concentraciones de NO, NO2 y O3 en las estaciones de medida. Los valores se dan en µg m^{-3} $año^{-1}$.
También se muestra la tendencia de la relación NO2 a NO.

ACCIONES DE FUTURO:

¿Qué nos queda?

To do list:

- ☑ Búsqueda bibliográfica
- ☑ Revisión de bases de datos
- ☑ Análisis de datos y tendencias
- ☑ Estudio de influencia de variables
- ☑ Tratamiento estadístico
- ☑ Discusión de Hallazgos
- ☐ **Publicación de resultados**

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ARTICLE

Twenty years of air pollution in eastern Spain: long-term trends and cycles

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The present study examines daily, weekly and seasonal patterns, as well as long-term trends in nitrogen oxides, ozone and particulate matter (PM_{10}, $PM_{2.5}$, and PM_1) concentrations in the eastern Spanish Mediterranean coast. Daily cycles were also analysed as a function of the day of the week and season of the year. For this, data from urban, suburban and rural sites of the Regional Air Quality Monitoring Network from 2000 to 2019 were used. In general, daily, weekly and seasonal cycles for NO_x, $PM_{2.5}$ and PM_{10} were mainly driven by traffic emissions, meteorological conditions and the variability of the mixing layer height. Alternatively, solar radiation intensity was a key factor, although not the only one, controlling O_3 concentrations. Some differences in the variability of pollutant concentrations at different time scales depending on the type and specific characteristics of the monitoring station were found. For instance, all urban stations showed an increasing O_3 long-term trend, while heterogeneous results were obtained for suburban and rural sites.

Introduction

Despite the efforts for improving air quality in Europe, atmospheric pollution continues to be one of the main environmental and social issues, particularly in large urban areas due to vehicle and industrial emissions. According to the European Environment Agency[1], around 0.5 million premature deaths in Europe are associated with air pollution. Particulate matter with a diameter lower than 2.5 μm ($PM_{2.5}$), ozone (O_3) and nitrogen dioxide (NO_2) are among the pollutants causing greatest concern in Europe

PM is emitted by a great variety sources or formed in the at produce secondary a significant decreasi across Europe in t to a reduction decrease in se spite of this, pollutant[1,4]. Th include cardiovas

Traffic is also th areas. Tailpipes emit atmosphere is rapidly oxidi dioxide). As a consequence, NO_2 higher at urban stations than at rural and 2018, 95% of the exceedances of the annual limit value establi by the European legislation were observed at traffic stations.[1] A number of studies have demonstrated the association between exposure to NO_2 and human health hazards.[8,9] Furthermore, nitrogen dioxide also plays a crucial role in the production of secondary pollutants such as nitrate particles and ozone.

Ground-level O_3 is formed from chemical reactions of NO_x and volatile organic compounds (VOCs) in the presence of sunlight. In urban centres where NO_x emissions from traffic are high, a fraction of O_3 is removed by reaction with NO, which explains the fact that O_3 levels are usually lower at urban areas than at nearby rural sites. The health and vegetation are now well airway inflammation and types of breathing damage both phenological years, an been sites.[14] nue to th and forts have ly at densely cused on specific olled.[4] In this context, al to detect pollution problems of the plans implemented.

Some works on the variability of pollutant concentrations have been carried out in Spain in last decade. However, these studies were focused either on short-term variations[16,17] or long-term trends of specific pollutants.[3,18] In this paper, we show the results of an integrated study aimed at analysing trends of key pollutants in the western Mediterranean basin on daily, weekly, seasonal and yearly time scales.

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Electronic Supplementary Information (ESI) available: [details of any supplementary information available should be included here]. See DOI: 10.1039/x0xx00000x

Actualmente contamos con un artículo en proceso de revisión por revista de alto impacto

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GRACIAS!

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