Air pollution and weather types at a background EMEP station in northern Spain: a fourteen-year study

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INTRODUCTION

Air pollution is a problem that affects both the environment and the human health [1], caused by the emission of particles, substances or forms of energy into the atmosphere [2]. According to the European Environment Agency, the emissions of some pollutants are suffering a reduction in recent years, as a result of the emergence of new air pollution policies.

This study focuses on the evolution of the concentrations of atmospheric pollutants in the background EMEP station of Niembro (Asturias)(Fig. 1 and 2) during the period 2001-2014. In addition, it is intended to establish the relationships between the concentration of atmospheric pollutants (Table 1) and the different weather types (Table 2) in the same period.

STUDY AREA

NIEMBRO EMEP STATION

Prov.: Asturias
Lat./Long. (Degrees): 43.439/-4.850
Height (m.a.s.l): 134

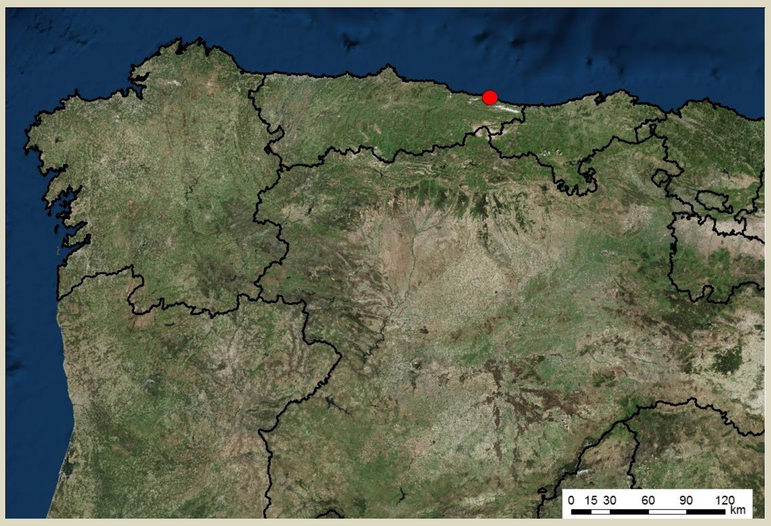

Fig. 1. Niembro EMEP station location.

METHODOLOGY

Table 1. Instrumentation and analysis techniques

Pollutant	Instrumentation	Analysis techniques
PM10	High Volume Sampler	Gravimetric method
SO_4^{2-} y NO_3^-		Ion cromatography

Fig. 2. Niembro instrumentation and High Volume Sampler

Table 2. Lamb Weather Types (LWTs) [3]

Anticyclonic	Pure Directional	Cyclonic
A		C
ANE	NE	CNE
AE	E	CE
ASE	SE	CSE
AS	S	CS
ASW	SW	CSW
AW	W	CW
ANW	NW	CNW
AN	N	CN

RESULTS & CONCLUSIONS

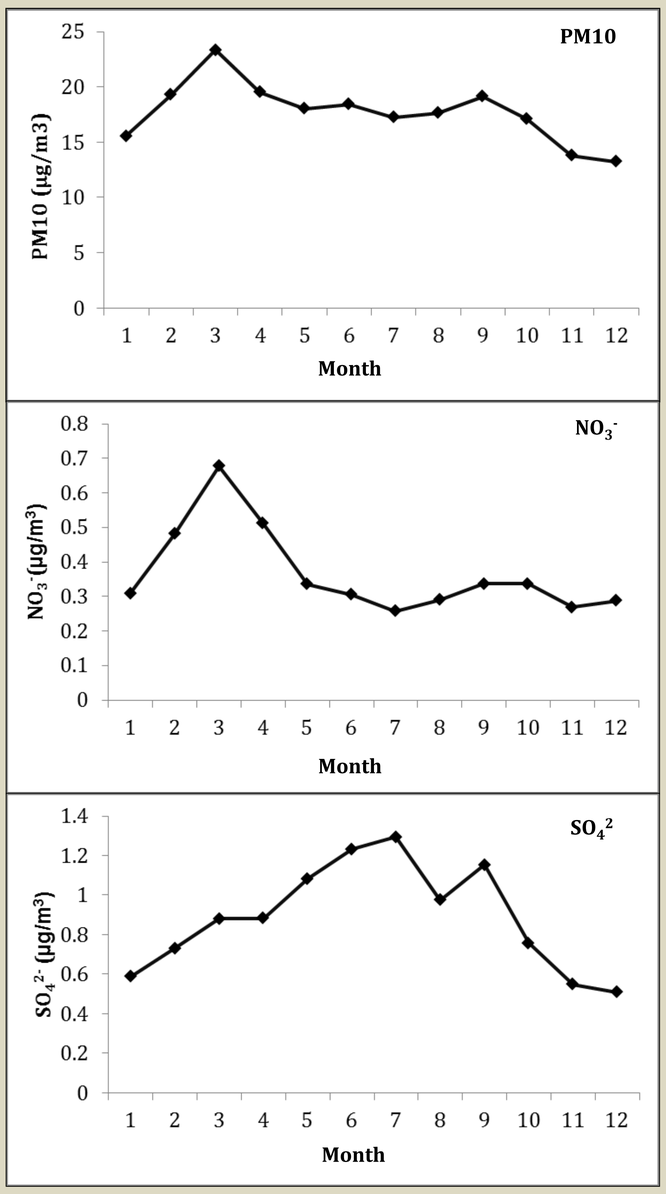

Fig. 3. Monthly evolution for PM10, NO_3^- and SO_4^{2-}.

- NO_3^- reaches its minimum during summer months. In this period, SO_4^{2-} reaches its maximum (Fig. 3).
- PM10, NO_3^- and SO_4^{2-} decreasing trends are statistically significant for the period 2001-2014 (Fig. 4).
- Weather type A is the most frequent and is associated to the highest percentage of concentration (Fig. 5).
- Weather type W presents low concentrations, especially for NO_3^- (Fig. 5).

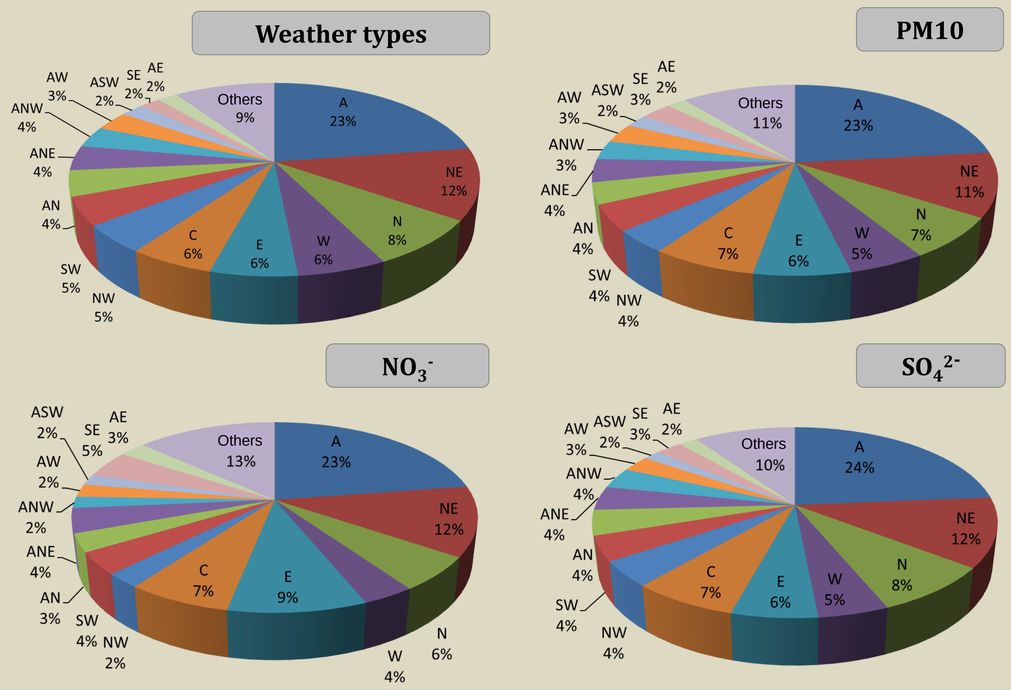

Fig. 5. Percentage of days for each weather type and PM10, NO_3^- and SO_4^{2-} percentage of concentration for each weather type.

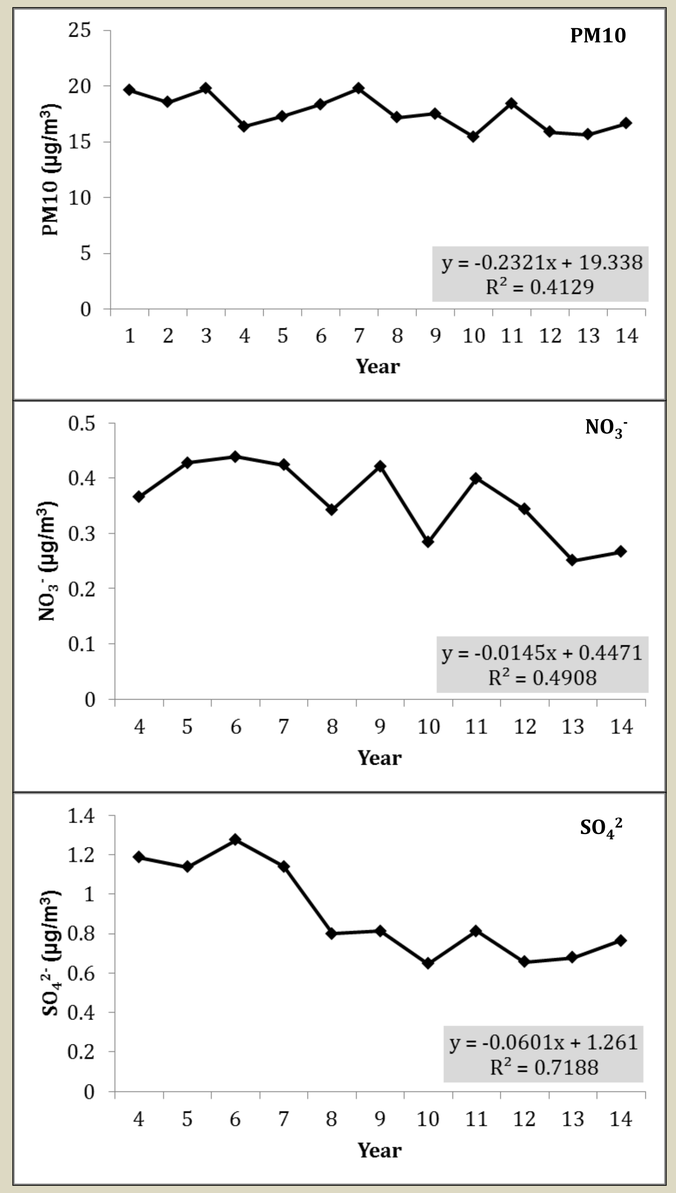

Fig. 4. Annual evolution and trends for PM10, NO_3^- and SO_4^{2-} during the period 2001-2014 (PM10) and 2004-2014 (NO_3^- and SO_4^{2-}).

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ACKNOWLEDGEMENTS

This work has been partially financed by the Ministry of Economy and Competitiveness (TEC2014-57821-R), the University of León (Own Program 2015/00054/001) and the AERORAIN project (Ministry of Economy and Competitiveness, CGL2014-52556-R, co-financed with FEDER funds). The data was facilitated by the EMEP program. F. Oduber acknowledges the grant BES-2015-074473 from the Ministry of Economy and Competitiveness. C. del Blanco Alegre acknowledges the grant FPU16/05764 from the Ministry of Education, Culture and Sports.