CURRENT CONCENTRATIONS AND LONG-TERM TRENDS OF TROPOSPHERIC OZONE IN IRELAND

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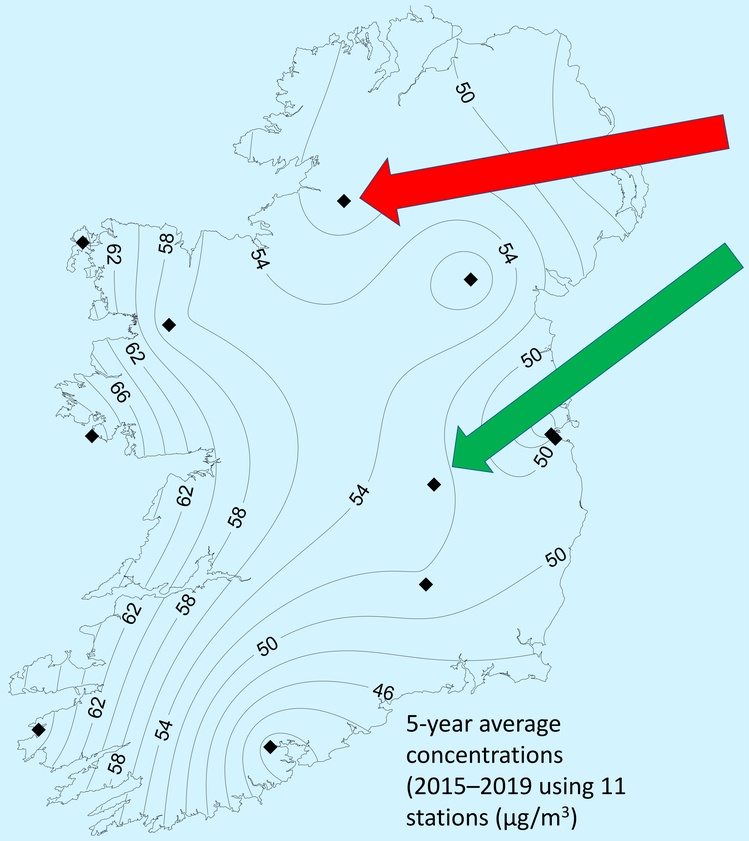
Introduction

Ground-level ozone can have damaging impacts on human health and vegetation, however, there have been relatively few studies carried out on tropospheric ozone in Ireland. There are 11 monitoring stations in Ireland with tropospheric ozone data for at least 5 years, and 2 stations with exceptionally long data sets of 30+ years. This study aims to provide a better understanding of the changing status of tropospheric ozone in Ireland.

Methods

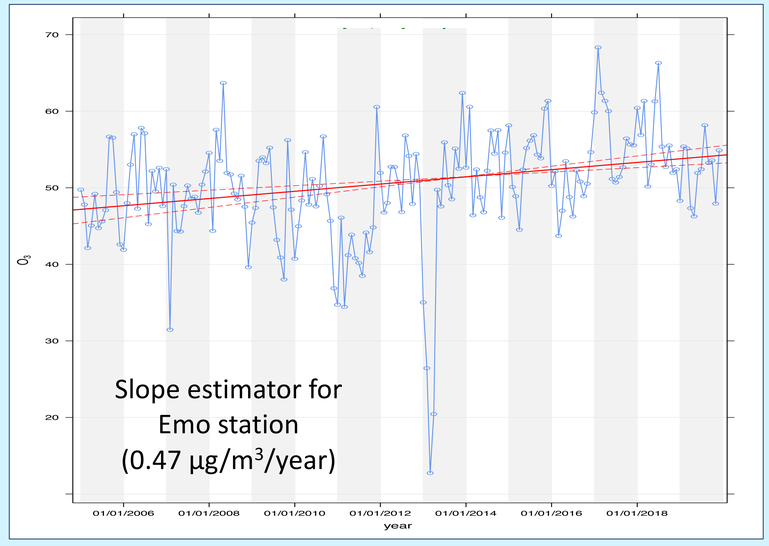
Current concentrations were based on the 5-year period 2015–2019 (n=11) and long-term trend detection was carried out on stations with at least 15 years of data (n=7) for the period 2005–2019. The Theil-Sen slope estimator and Mann-Kendall test for significance were used for long-term trend analysis, based on monthly mean concentrations.



5-year average concentrations (2015–2019 using 11 stations (µg/m^3)

Increasing long-term Trends

Slight increases were observed at 6 of the 7 stations over the period with a significant increase at two rural background stations of Lough Navar in county Fermanagh, and Emo in county Laois. The largest increases occurred in the winter period

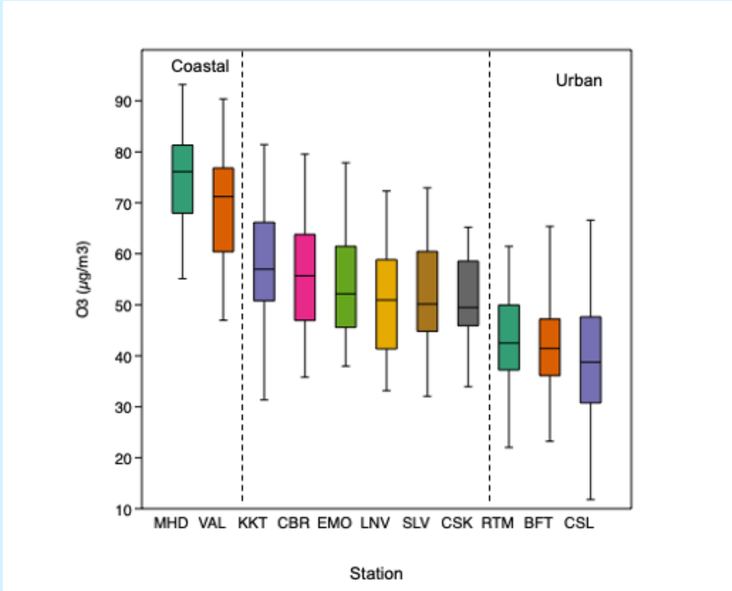


Slope estimator for Emo station (0.47 µg/m^3/year)

Current Concentrations

Annual mean concentrations ranged between 39 and 75 µg/m^3. Which is lower than than the European average concentration. The highest concentrations were found at western coastal stations and the lowest concentrations at urban centers (e.g., Dublin and Belfast).

There is a yearly pattern of spring maximum for all the stations, previously observed by Tripathi et al. (2010), and deKluizenaar et al. (2001)



Coastal vs Urban

Atlantic coastal areas experienced the highest concentrations, which may be as a result of sea breeze recirculation, higher insolation, and lower deposition velocity over water.

In contrast urban areas experience lower concentrations due to reactions between ozone and NOx emitted from vehicles, which leads to ozone destruction.

Acknowledgements

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Website: https://nemnucd.wpcomstaging.com/

References:

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