Department of Sciences and Environmental Engeneering

DYNOZONE

CENSE/Climate Change Sustainable Energy

universidade de aveiro

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Objectives

The Project team intends to contribute for the comprehension of the processes responsible for high ozone levels at earth surface, untangling those with stratospheric origin from the surface source processes, either in winter or summer time.
Why is this important? Due to its strong oxidising power, surface ozone may cause serious damages on humans, crops productions (Figure 1) and materials.
Ozone is legislated in Portugal by the Portuguese decree 320/2003 and in the European Community by the 2002/3/EC Directive, repealed by the 2008/50/EC Directive of the European Parliament and the Council of 21 May 2008, to act in force after June 11th 2010

Methodology

Integrated long time series analysis based on **surface measurements** in operational and campaigns modes.
- Pollutants of interest measured in the Portuguese air quality network: O_3, NO-NO_2, CO, PM_{10} and $PM_{2.5}$
- Atmospheric radioactivity assessment through aerosol particle collection, focus on ^7Be activity (major source are stratospheric air masses)
Air Quality modelling with **satellite** data assimilation of vertical ozone profiles will help to understand the dynamics of vertical ozone movements through the model system WRF-EURAD-IM.

Expected Results

Gather a knowledge of the weather patterns associated with the dynamical movements that brings stratospheric ozone down to the surface

Establish clear relations between surface measurements for further statistical applications (Figures 2 and Figures 3 as preliminary results)
Be able to numerically simulate these movements in a diagnostic mode

Provide a reasonable ozone forecast in the presence of this type of situations with numerical models and/or statistical neural networks models.

Figure 1: Ozone damages in crops.
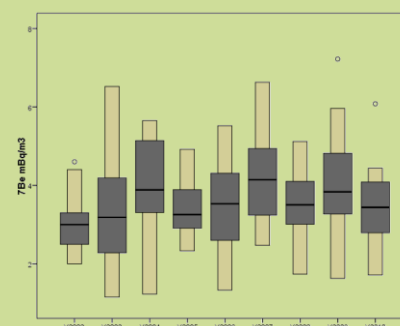Credit: Fitzgerald Booker
North Carolina State University
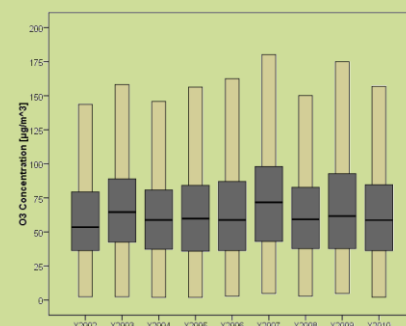

Figure 2: Yearly ^7Be variability near Lisbon.

Figure 3: Yearly Ozone variability in Lisbon.