

**Review of the manuscript „The influence of mid-latitude cyclones on European background surface ozone” by K.E. Knowland et al., 2017**

**acp-2017-318**

This study investigates the influence of springtime cyclones on surface ozone concentrations of two surface measurement sites in Ireland (Mace Head) and Portugal (Monte Velho). After a statistical evaluation of reanalysis data, the authors present four case studies - two for each measurement site – of cyclones leading to high ozone values at the surface. The results show that cyclones passing the measurement sites within a certain range can have a recognizable effect on the surface ozone concentration – either by transporting ozone-rich air directly from the stratosphere or by lower aged stratospheric air.

This manuscript is interesting and very carefully written and therefore in the scope of ACP.

**Major comments**

My only major comment deals with the cyclone intensity. Why did you chose the most intense cyclones? Would it be better to investigate in addition also “normal” or “weaker” cyclones to get a broader picture of the influence of cyclones on surface ozone? Do only strong cyclones have this impact on the ground stations? Is there a clear relationship of high ozone and intense cyclones? Can weaker cyclones have a stronger impact on the measured ozone by advecting aged low-level ozone-rich air to the measurement sites?

Why not selecting the case studies by using only the criteria regarding the high ozone values (two or more time steps with  $>75^{\text{th}}$  pc  $O_3$ )? Maybe you can illustrate your motivation of the cyclone selection in more detail.

**Technical corrections**

Page 4, line 31: Do not use italics for units. Use  $m^2 kg^{-1} s^{-1}$  instead of *m<sup>2</sup> kg<sup>-1</sup> s<sup>-1</sup>*

Section 2.2.2 Please indicate already here the spatial resolution of the MACC data (it follows in Sec 3.1, but for completeness it would be nice to have it already in the data description part)

Page 9, line 14: Are two time steps enough to justify the term “persistent”?

Figure 4: something went completely wrong with the labelling (see screenshot) -> please check

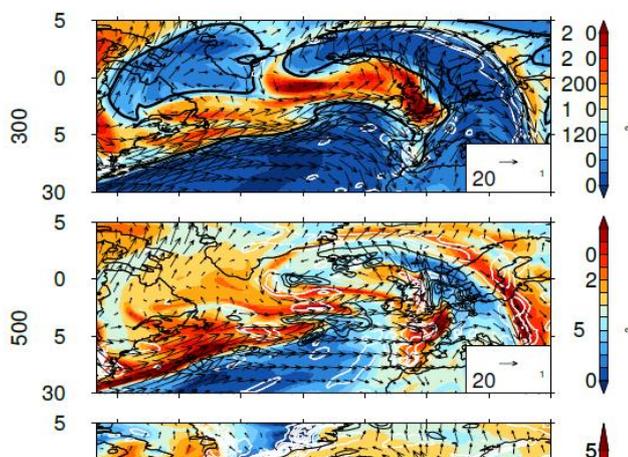


Figure 11: a,b,c,d labels are missing.