

## ***Interactive comment on “Summertime tropospheric ozone variability over the Mediterranean basin observed with IASI” by C. Doche et al.***

**Anonymous Referee #2**

Received and published: 20 June 2014

This paper reports on the summer ozone maximum in the Mediterranean region within the 2007-2012 period and two ozone anomalies (positive in June 2008 whereas negative in June-July 2009), using the thermal infrared space-borne instrument IASI. To understand how the ozone variability is driven, this study examines ECMWF meteorological analysis. The authors found the meteorology is a major key factor to explain both variability and anomalies in the lower troposphere.

The paper, on a very interesting topic, is well in the scope of ACP. The manuscript is clear, well written and documented. I suggest this manuscript to be published in ACP after few corrections and address the following recommendations to the authors:

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Why do you provide the figure 1 on June-July over 1979-2012 and not over June-July-August, the summer period you study? Please check and revised if necessary.

Do you make your IASI validation with the WOUDC ozonesondes from coincident and collocated measurements? Could you provide more details on that? Could you suggest hypothesis to explain the negative bias around 3km and a positive bias around 10km as shown on Table 1?

P13024 L19-22 : I would suggest to add a reference and to replace by “These studies are mainly based on accurate in-situ observations – ozonesondes or MOZAIC/IAGOS vertical profiles and surface stations - (Kalabokas et al., 2013, 2008; Zbinden et al. 2013) but their specific geographic and temporal sampling provide an incomplete vertical tropospheric description over the entire basin.”

P 13024 L24 : “Coarse”, please evaluate. . .

P 13025 L4-6 : “. . .offer a maximum of sensitivity in the mid-troposphere with an effective vertical resolution of about 6–7km”. Please clarify what you meant by (IASI) “effective vertical resolution of about 6–7km”. . . Text could be improved, I am not sure “vertical resolution” is here the correct expression. . .

P 13025 L26 : I suggest “lower free troposphere” instead of “lower part of the free troposphere”.

P 13026 L19-21 : “Concerning ozone, the vertical information is sufficient to study separately different atmospheric layers within the troposphere”. Suppress “atmospheric” and give something more accurate than “different” (may be 2 or 3 layers???)

P 13028 L23-26 : “Due to the vertical sensitivity and resolution of IASI, the 10km level is used to describe the variability of ozone at the upper troposphere and lower stratosphere whereas the 3km level for the lower to middle troposphere. Ozone concentrations retrieved at 3km capture the ozone concentration and variability roughly from 2 to 8 km and retrievals at 10 km are sensitive to ozone changes approximately

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between 5 km and 14km". Condense, it will be clearer, this is important is the frame of your study.

P13029 L10-11 : "A land/sea mask has been applied to calculate the averages only over the Mediterranean sea." Could you explain more, it is not clear enough. . . You did not exclude land from your study. Furthermore the Fig 2a shows white areas on some continental regions that the caption does not describe. Could you explain and provide also a short information on that on Fig2a.

P13029 L15-17 : May be add the number of layers relevant to the 0-14km you are studying?

P13030 L11-12 : Better to specify in the title your study is on the summer variability, may be replace by "Ozone spatio-temporal variability in summer from IASI on a 2007-2012 period"?. . .

P13030 L 22-26: I suggest to condense and replace may be by : "At this altitude over the basin, a steep horizontal west/east ozone gradient is observed, with greater concentrations eastward of 15°E (by about 20ppbv) than westward".

Figure 3a : Please change the ppm into ppb in order to be consistent with your text.

P13031 L 20-21 : "This comparison shows that the ozone concentrations retrieved from IASI at 3 km and at 10 km". I can find out the 3km ozone concentrations on that figure 3.

P13032 L2-5 : Better to suppress "origin of" and replace by "the mixed stratospheric-tropospheric characteristics of air masses at this pressure level." Revised the following sentence also.

Figure 4 : Please provide an Y axis scaled to the minimum and maximum and not only between [62-70ppb]. Same for fig 5,6,7 and on fig 7 provide ppb instead of ppm.

P 13034 L 7 : Please keep constant the ozone units : it is sometime ppm, ppb and

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ppbv. . .

Take into account and refer to a study submitted recently to acpd "Summertime tropospheric ozone assessment over the Mediterranean region using the thermal infrared IASI/MetOp sounder and the WRF-Chem Model" by Safieddine et al, Atmos. Chem. Phys. Discuss., 14, 12377–12408, 2014.

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Interactive comment on Atmos. Chem. Phys. Discuss., 14, 13021, 2014.

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