

**Reply to Referee #2, about the article Intercomparison of polar ozone profiles by IASI/MetOp sounder with 2010 Concordiasi ozonesonde observations by Gazeaux et al.**

Thank you for the time you took to review this paper, and for the constructive comments that helped to improve the paper.

Each correction is given in the same order as the review. Comments from the referee are highlighted in green, and texts added to the article are printed in italic.

We also provide a pdf-file of the article with the main corrections highlighted in yellow.

[..but with a reduced explanation on the retrieval of vertical ozone distribution from ozone sounding balloons as well as from satellite.]

This comment was also done by Referee 1 : more explanation is now provided regarding the ozone profile retrieval from satellite, the corresponding text is now:

*Ozone profiles are retrieved in near real time and globally twice daily using an optimal estimation approach, implemented in the Fast Optimal Retrievals on Layers for IASI (FORLI) software (Hurtmans2012). FORLI-O3 inputs are: i) the spectral radiances extracted from IASI L1C data; ii) cloud cover, temperature and humidity profiles selected from IASI L2 records, and provided by European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT) (e.g. August2012). Version 20100815 of FORLI was used for this study. The algorithm uses the IASI 10  $\mu$ m spectral region and 2 to 4 independent pieces of information are retrieved, depending on the location and on the season. It was designed to allow the fast delivery of a global near real time product from the about 1.3 million IASI observations per day. Ozone retrievals are performed in the 1025-1075  $\text{cm}^{-1}$  spectral range, in order to minimize the computation time and avoid interferences with water vapour lines. Previous studies have shown that at high latitudes sensitivity towards the surface highly depends on thermal contrast (Clerbaux2009). The profiles are retrieved in 39 fair spaced layers of 1 km thickness, with an extra layer from 39 km to the top of the atmosphere. The FORLI-O3 products have been validated with different ground-based, aircraft, and satellite data (Scannell2012, Anton2011, Pommier2012). Along with the retrieved profiles, error covariance and Averaging Kernel (AK) matrices are also provided. The latter are essential to quantify the vertical sensitivity of the retrieved profiles (Figure 2). The AK are function of several factors as surface properties, temperature profile, thermal contrast and atmospheric composition. Applications range from the study and the monitoring of the stratospheric ozone hole to tropospheric chemistry and air quality (e.g. Scannell2012, Parrington2012, Wespes2011).*

[I do not like the use of the first plural person (we did, we found, we calculated ...) I think a depersonalization of the work make]

The uses of "we" or "our" have been removed throughout the text.

- [P7924 L7 - Please insert measurements or field between Concordiasi campaign]

Correction done

- [P7924 L7\_L10 - I believe this sentence could be : "The main objective of the campaign was the satellite data validation. With this aim 20 zero-pressure...."]

Correction done

- [P7924 L11 - replace those with the]

Correction done

- [P7924 L20 - This study allows FOR a better.....]

Correction done

- [P7925 L6 - please remove see from (see Fig. 1) here and also in the following]

Correction done

- [P7925 L18 - remove launched from McMurdo and]

Correction done

- [P7925 L20 - with radiosondes and WITH Electro-....."]

Correction done

- [P7925 L21 - replace will be with is]

Correction done

- [P7925 L23 - replace will be with is]

Correction done

- [P7925 L24 - remove the before ozone]

Correction done

- [P7925 L27 - ...retrieved by IASI and measured by... became: ...retrieved from IASI and measured with the.... ]

Correction done

[P7925 L29 \_ P7926 L2 - I suggest: The paper is organized as follows: section 2 gives a description...; section 3 presents and explains the...; in section 4 the results are presented and discussed and section 5....]

Correction done

- [P7926 L10 - replace which provide with providing]

Correction done

- [P7926 L12 - replace ..IASI provide data with high... with ...IASI data have high... and As it use the... with As the spectrometer measures/analyzes the..."]

Correction done

- [P7926 L17.L19 - I suggest the authors to modify with: FORLI-O3 inputs are: i) the spectral radiances extracted from IASI L1C data; ii) cloud cover, temperature and humidity profiles selected from IASI L2 records. These last dataset is retrieved by European.....(EUMETSAT)]

Correction done

- [P7926 L24.L25 - please modify ...39 fair spaced layers of 1 km thickness... and remove from the surface to 39km.]

Correction done

- [P7927 L2 - I believe there is something missing. I suggest: The AK are function of several factors as surface properties, temperature profiles and atmospheric composition.]

Rephrased by: *The AK are function of several factors as surface properties, temperature profile, thermal contrast and atmospheric composition.*

- [P7927 L9.L11 - ...were aimed to document three highly interrelated topics: i) the depletion..., ii)the ozone layer...,iii) the stratospheric dynamics.]

Correction done

- [P7927 L12 - replace by with with]

Correction done

- [P7927 L17.L20 - Please move sentences to the end of line 13]

Correction done

- [P7928 L9 - move at 475K after ...(PVUs)]

Correction done

- [P7928 L21.L22 - modify with: ...high-resolution ozone profiles measured with the sonde and with IASI profiles... ]

Correction done

- [P7929 L2 - replace profile with vertical distribution]

Correction done

- [P7930 L11 - replace own with specific ]

Correction done

- [P7930 L19 - add away between far and from]

Correction done

- [P7931 L1 - replace dependent with depending]

Correction done

- [P7931 L11 - remove by]

Correction done

- [P7931 L11.L12 - I suggest: In the lower stratosphere, this difference confirms....]

Correction done

- [P7931 L17 - how large is this variation? Please define and specify.]

Rephrased by: *A large ozone loss ( $\approx 0.3$ - $0.5$  ppm ozone loss for each altitude) can be seen on the ozonesonde profiles (blue lines) measured between 10 km and 20 km from 19th September (Figure 5).*

- [P7932 L16 - replace cold with low and please give some more infos regarding the range of temperature in the McMurdo region.]

Correction done

- [P7932 L19 - replace data with retrieved ozone profiles.]

Correction done

- [P7932 L19.L21- I suggest: Some of the launched balloons were equipped with GPS receivers....as the closest IASI profiles are selected.]

Correction done

- [P7933 L1 - replace by with with]

Correction done

- [P7933 L2.L4 - What do you mean with regular events? maybe when there is no ozone depletion. Please rephrase and clarify.]

The paragraph is rephrased by: *The positive bias was found to occur both for ozone depleting and standard conditions. Consequently, this means that IASI achieves to measure ozone depletion events as well as it measures ozone distribution during non depletion events.*

- [P7933 L2.L4 - please quantify and specify how much is the high gradient.]

The sentence is clarified by: *A large ozone loss ( $\approx 0.3$ - $0.5$  ppm ozone loss for each altitude) can be seen on the ozonesonde profiles (blue lines) measured between 10 km and 20 km from 19th September (Figure 5).*

Best regards,

The coauthors.