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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Impact of convection on the upper-tropospheric composition (water vapor/ozone) over a subtropical site (Réunion Island, 21.1° S–55.5° E) in the Indian Ocean" *by* Damien Héron et al.

Anonymous Referee #3

Received and published: 17 March 2020

The paper presents an analysis of tropical upper tropospheric ozone and relative humidity based on 3 years of observations over Reunion Island, located in the Southern subtropics. Using backtrajectories from FLEXPART, the influence of deep convection is examined. The analyses focus on austral summer events of low ozone and high relative humidity, which are linked in several cases to air transported from the boundary layer by tropical cyclones passing within a radius of 2100 km around the island.

Overall the study presents novel analyses of quality data which provide interesting insights on the variability of humidity and ozone in the subtropical upper troposphere, it

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Discussion paper

is well written and the information is presented in a clear manner. Below I list my minor comments and technical corrections.

Minor comments:

- The authors could put their results a bit more into context, in particular when describing the seasonality of humidity and ozone in the subtropical region. For instance, the dry values in JJA as compared to DJF are connected to the ITCZ movement. Similarly, for the ozone only biomass burning is considered to explain the seasonality. But is there a role of other mechanisms such as transport from the stratosphere or from middle latitudes? This seems to be the case for the high ozone – low water vapour layers, which are ubiquitous over Reunion Island in JJA.

- Given the important role of the MJO for deep convection over the Indian Ocean, its possible influence on convective activity deserves more discussion: you could at least identify the phases in the period under study and try to establish a connection.

Technical corrections:

- L13: verb tense concordance: in general you use past tense, but some times present. This should be homogenized. For example here “are analyzed” should be “were analyzed”-

- L168-170 and L175-176: These two sentences are almost exactly the same, no need to repeat.

- L 183: remove ‘several’

- L 184: ‘Correlated’ should be ‘Consistent’?

- L185: The outflow from two tropical cyclones

- L186-189: This was already said before (L172-174)

- L203: tropical free troposphere

- L219: in the tropical marine. . .
- L225: In the Solomon et al. Study. . .
- L231: This explains. . .
- L250: Remove comma after Although
- L268: was the advected eastward
- L289: estimated by FLEXPART
- L 293 Swap letters G and H
- L293: missing letters C and D

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