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Atmospheric Chemistry and Physics Discussions

Interactive comment on "A climatological view of the vertical stratification of RH, O_3 and CO within the PBL and at the interface with free troposphere as seen by IAGOS aircraft and ozonesondes at northern mid-latitudes over 1994–2016" *by* Hervé Petetin et al.

Anonymous Referee #1

Received and published: 12 June 2018

Major Comments and Recommendation.

Well-done study based on a novel approach to PBL (planetary boundary layer) definitions of EI and SBI. First, variability of these PBLs by season is given. Then, concentrations of ozone, CO and water vapor from IAGOS data are produced within these PBL layers to create climatologies better suited for comparisons to models. In the case of ozone ozonesonde data from stations near IAGOS airports are also used.

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Discussion paper

The paper should be published after addressing a few comments and after correcting many instances where English grammar or usage needs improvement.

Minor Comments

Page 2, Line 14. It is not accurate to say that in-situ data are lacking at altitude. In addition to IAGOS are literally hundreds of aircraft campaigns over many continents in which ozone, RH, CO profiles have been measured since the late 1980s and early 1990s. The data reside in many open archives such as in European databases and at NASA's Langley and Ames Research Centers.

Page 2, Line 18. GEOS-Chem is considered a CTM (global chemistry-transport model) not an "Air Quality" model. The latter typically has higher horizontal resolution, a more limited vertical range and different approaches to emissions inputs and chemical mechanisms.

Typo/Grammar Fixes on Petetin, Sauvage, Smit et al.

Page 1, Line 14 should have a comma before ozone instead of "and"

Page 1, Line 20 at the end, "novel" is a more appropriate word than original, makes a better impression

Page 1, Line 33 Instead of "Contrary" begin the sentence with "In contrast," ...

Page 1, Line 35 use "in" the presence of snow

Page 2, Line 9 better to day "numerous processes interacting in the PBL"

Page 2, lines 18 and 19. Insert "the" beofre GEOS and before Southeast United States

Page 2, line 23. "The possible error compensations" is awkward and meaning is not clear

Page 2, Line 25. Do you mean "the significance of any conclusions drawn from case studies"?

Page 2, Lines 26-27. Remove “with” on l 26. Line 27 should read “mixing would imply that its...”

Page 2, Line 29 “included” not “including”

Page 2, Line 35. Remove “the” before relative humidity

Page 2, Line 39. Replace “on which” with “from which”

Page 3, Line 6. PBL-FT interface. (End sentence - remove phrase in ())

Page 3, Line 8. “Vertical distributions of O3, CO and RH” - is more clear. At the end of Line 8 modify to “the study and additional perspectives”

Page 3, Line 18. “IAGOS aircraft used in this study are the barometic”

Page 3, Line 30. Calibrated for RH with respect to liquid

Page 3, last line. Uses ozonesonde observations (remove “the”)

Page 4, line 4. (“fewer” than 10% not “less” than 10%)

Page 4, Line 7. Factor “of” 3-5

Page 4, Line 24. Less problematic because the vertical variability (not “as”)

Page 4, Line 34 spelling United

Page 4, Line 35. Insert “the” Middle East

Page 4, Line 38. “allows smoothing of the vertical” is better

Page 6, Line 8. Allows “us” to maximize the number of profiles taken into account (remove “then”)

Page 6, Line 19 Eis are found “in” 16%...

Page 7, Line 15 top “of” the Eis Page 7, Line 20. Characteristics “exhibits” or “displays” is more acceptable word than “depicts”

Page 13. In “Summary and conclusion” standard usage is NOT to refer to Figure numbers again.

Page 13, Line 19 replace “performed” by “archived”

Page 13, Line 21 78% IAGOS profiles, 22% sonde profiles. (Remove “of” and singular sonde, not sondes)

Page 13, Line 23. “Strongly vary throughout the day” not “along”

Page 13, Line 24. “The results” or “Our results”

Page 13, Line 27. ..”approach allows us to”

Page 13, Line 30. Eis “displayed” not “depicted”

Page 13, Line 39. Top, “which supports out ability” is correct

Page 14, Line 30. Processes “at work” not “at stake”

Page 14, Line 31. “Interesting way” is weak .... “Better way” or “superior way” or “more meaningful way”

Page 14, Line 34. “resolution” not “resolutions” Replace “deeply” with “thoroughly”

Page 14, Line 39. Replace “interesting” with “rich” or “significant”

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