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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Characteristics of Monsoon inversions over Arabian Sea observed by satellite sounder and reanalysis data sets" *by* Sanjeev Dwivedi et al.

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The present study investigates the atmospheric inversions over the Arabian sea observed by Satellite observations (IASI and AIRS) and also a reanalysis data set of ERA interim. The analysis included mean patterns, differences between active and break spells, weak and strong monsoons. Over all, the paper is well written and the results are interesting. Even though there are reports on monsoon inversions, the present study provides more details of the monsoon inversions. Therefore, I would like to recommend the paper for publication. However, the authors may please examine the following comments/ suggestions to improve the quality of the paper before it is

published.

Reply: First of all we wish to thank the reviewer for going through the manuscript, offering suggestions and appreciating the contents of the work. We have taken care all the comments/suggestions made by the three reviwers.

1) The inversion values reported are positive. I am not able to appreciate why the values are positive. How you subtracted? From higher level to lower level or other way? Another big issue is that you have fixed the pressure levels same for all the days to retrieve temperature differences, which may not be appropriate. You should examine each profile separately and identify the inversion layer and then find the difference between the layers of the inversion. Therefore, for each profile, you have track where is the inversion layer. Since the paper already documents that these layers can vary on different dates, fixing the pressure levels is not appropriate.

Reply: In the manuscript under Section 3 Methodology and Analysis procedure (Page 35284, Para 2) - we have mentioned the way ΔT values are calculated. Conventionally the lapse rate is the difference in Temperature at higher level minus Temperature at lower level and is a negative quantity. However, in this study (as also in the work of N & R 1981) we have considered ΔT as temperature difference between lower and higher level i.e. ΔT = T(950 hPa) – T (850 hPa) which is thus a positive quantity.

We have examined each and every individual profile to capture inversion height, depth and strength. On the basis of this computation, Fig 3 has been generated. From this figure it could be ascertained that in more than 95 % of cases, the inversion over Arabian sea is lying in the region 950 and 850 hPa. We have also metioned in the text (Page 35285, lines 24 – 25) that “This level criteria (950 – 850 hPa) was arrived at after a detailed examination of ΔT at a few more level intervals (. . .. .)”.

As we had to analyse a huge volume of data, we had to adopt an automatic criterion for representing the inversion strength ΔT. An average ΔT for all the profiles in each 1 deg x 1 deg boxfor each day was computed.

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As mentioned in the manuscript, the upper / lower levels of inversion vary on individual days in a small amount ($\sim$ 25 hPa). Even if the lower or upper level of inversion were at levels above 850 or below 950 hPa by this small amount, the inversions would still be captured in the overall ΔT, though of a lesser magnitude.

2) The ERA data is not showing any resemblance of that of observed in satellite data. I am not sure therefore the discussion on ERA data is required. Recommendation: Revision

Reply: As mentioned in the manuscript there is no ground truth (after 1979) over the Arabian sea to compare with our results. Hence we have compared with ERA, the only available standard option of comparison over AS.3rd conclusion in our paper (Page 35297 lines 09-10) mentions about ERA's smoothed spatio temporal variability of ΔT. ERA – interim results match qualitatively with satellite results, but vary in numbers.

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Interactive comment on Atmos. Chem. Phys. Discuss., 15, 35277, 2015.