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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Atmospheric gas-phase composition over the Indian Ocean" *by* Susann Tegtmeier et al.

Anonymous Referee #4

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The paper is essentially a review of atmospheric composition over the Indian ocean which follows an earlier review by Lawrence and Lelieveld in 2010. The authors attempt to summarise current knowledge, with particular emphasis on post-2010 research, identifying trends and gaps in our current understanding. There is some new work presented, but this is a relatively small contribution to the overall document.

In many ways the paper is a major achievement and would be a valuable resource for researchers interested in this region. However, although the paper is very thorough and generally well written, it is probably over ambitious and I found it to be overly long and somewhat repetitive. There is a lot of detailed information regarding such things as ocean parameters (currents, salinity, etc) and climatology (MJO, IOD, etc) and some

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Discussion paper

of this material, although clearly important for the region generally, is probably not of specific interest to readers of ACP. There is a lot of "background" material which is available elsewhere. Indeed, it is not until page 14 that atmospheric composition begins to be discussed. Some of the introductory atmospheric chemistry is rather basic for ACP readers and could be cut down.

The region clearly suffers from a paucity of data which is a common theme throughout the discussion, and it makes the drawing of clear conclusions very difficult. Because of this, the document tends to drift into speculation. This was particularly apparent in the latter sections (section 6) where there are a number of cases where it was suggested that a specific process "could" have an impact whilst presenting little actual evidence. Section 6 could be reduced in length considerably (as could several other sections) with the main points made more succinctly, and with less speculation. The lack of clear conclusions and future directions was somewhat disappointing. The paper appears to be part of a special issue but doesn't seem to refer to any other papers in the issue. As an overview, or review paper, this is perhaps something that could be considered.

The paper is somewhat difficult to review as, being largely a summary of previously published work, there are hopefully few mistakes or errors. The authors appear confident that they have included all relevant literature, although I note that they have not included any results from the recent StratoClim campaign. I was also surprised to see that there are so few longer-term ozone measurements in the region. Did the authors refer to the recent TOAR assessment? It is not clear whether the South China Sea region is included or not. If so, there are various datasets (including WMO GAW stations) from this region which have not been considered. The paper would benefit from having a simple regional map (in section 1.1) which clearly defines the region of interest.

I don't feel the title does the document justice. It is far more than a review of gas-phase composition. Perhaps need to refer to the marine aspect in the title as well.

Please explain how the various figures are derived. Which model is being used to show

the emission regions and the surface mixing ratio contour plots?

I found the wind arrows in Figure 1 a little hard to see (print version). Could these be made a little clearer?

Do you really need to include all the campaign details on page 14? Much of this is superfluous or could have been restricted to Table 1.

In section 6 there are several paragraphs which have no associated references (e.g. p47-48) although refs are included later in the section (p49). Was this deliberate?

It is not always clear where some of the calculations come from. For example, the isoprene fluxes on p29, line 4. Were these derived by the authors are they taken from the Booge papers?

P36, line 20: do you mean the Straits of Malacca?

Check spelling of Lelieveld throughout the document (e.g. p48, line 29, 32)

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