

## ***Interactive comment on “The response of super pressure balloons to gravity wave motions” by R. A. Vincent and A. Hertzog***

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### Specific point

We have rephrased the corresponding paragraph to improve our discussion. We argue that the  $180^\circ$  ambiguity in the horizontal direction of propagation of the wave ( $\theta$ ), which appears during the first stages of the retrieval process, is fully resolved by the end of the process. This is emphasised implicitly in Fig. 6, where we show that we can retrieve  $\theta$  to an accuracy within a few degrees for every wave packet, irrespective of its vertical propagation direction. Hence, we can identify between westward-upward propagating waves and eastward-downward propagating waves.

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### Minor Comments

- P799 L11: The Reviewer’s remarks have been taken into account. The Introduction has been modified in several places to stress better the characteristics of SPB observations as compared to other wave-observing techniques, as well as to better explain why an update of Boccara et al. (2008) was necessary to treat the most recent balloon campaigns.
- We agree with the Reviewer, but our point here was to state that high-frequency waves, which are expected to (at least) partly contribute to the momentum transport in the tropics, were not resolved in previous SPB campaigns. Therefore, if we want to use SPB in the tropics, we obviously had first to increase our sampling frequency. The recent article in JGR is now included in the reference.
- P804 L2: The sentence has been rephrased to be more explicit: yes, the fact that the first harmonic dominates in the balloon response to gravity-wave disturbances implies that a linear relationship between the balloon vertical displacement ( $\zeta'_b$ ) and that of an air parcel ( $\zeta'$ ) is a good approximation.
- P805 L9: We actually use Equations (7) and (11) to determine  $\zeta'_b$  when  $\zeta'$  is imposed. This is now stated in the article.
- P805 L16: Corrected.
- P806 L14: Rephrased.
- P806 L22: Agreed.
- Figure 3: The caption has been modified accordingly (see also item “P10806 L1-3 and Fig. 3” in the response to the first Reviewer).
- Eq (24): we use italics here, as for every other equation.

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- P815 L11: Agreed.
- Figure 6: We think that the Reviewer may have been confused by the sentence “This threshold was then applied to the full analysis.” which appeared on P10815, L23. It was meant in the context of discussing the impact of low amplitude waves on the retrieval process, such as the results displayed in Fig. 6. The application really applies in the discussion of the effect of low amplitude waves starting on P10817, L13. To save any further confusion the sentence has been deleted.
- P818 L12: The first sentences of the Conclusions have been rephrased to take account of the comment.
- “use of apparent”: According to the Reviewer suggestion, we do no longer use “apparent” in the text, but synonyms instead: “evident”, “manifest”, “noticeable” etc.

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