Reply to referee 2 comments:

We thank the referee for carefully reading the manuscript and providing us with detailed comments. We believe that in dealing with the concerns put forward by the referee, the clarity of the manuscript will be significantly improved. In responding here to the concerns, we copied part of each of the reviewer's comment (formatting with bold italics) to identify the issue, and our r is directly underneath it.

Major Concern #1. Unexpectedly small value of the parameter f that characterizes sensitivity of the 858 sensor

An aspect of these results that seems problematic to me is related to the sensitivity coefficient as measured by the parameter f. Potential flow predicts a value of f=2.25, while their results are around 1.67 even at the slowest flight speed. They show flow-model and wind-tunnel results that both suggest a substantially higher value of f should apply to their case, but they just present the results without discussion and don't offer any explanation for why these values are so different from what they determine from the flight data. With this variability and uncertainty in f, what is the reason for assuming that the same f applies to all the pressure ports? … This mixing of sensitivities in different directions seems to call for some justification for using the same value of f for both horizontally and vertically displaced ports.

Response:
We agree with the author's concern, which highlights the need for us to explain better in the manuscript what we are doing and the assumptions made. There is indeed the possibility that *f* depends on the port and also on the incidence angle. The concern in this paper however is static pressure measurement, and the empirical estimation of *f* that we developed from the TC flight (with *f* taken as a constant) is evaluated under less constrained flight conditions using the GNSS/IMU heights. The results show considerable skill in prediction of the static errors. We will explain more clearly in the revised manuscript our objectives, the assumptions made, and the limitations imposed on the results from those assumptions.

Regarding the low values of *f* we obtain, we argue that the configuration of the R858 as on the UWKA is considerably different than tested in the wind tunnel or modeling. Even the radome-fuselage model run does not include the wing, and that significant lift-producing element is likely to have a large affect. The tests and modeling were included to show that *f* can vary depending on the speed and configuration, and our flight results confirm that (both flights). In the revision, we will point this out.

It would seem straightforward to test if there is a difference in sensitivity for horizontal vs vertical displacement. This can be done easily by, e.g., varying pitch in level flight so as to produce known values for α, then use the second equation in (A11) to relate ΔP_α to tan α and so (using q determined either from the first equation in A11 or from a separate pitot-tube measurement) to determine the value of f relevant to ports displaced vertically. An analogous test could be used for sideslip.

Response:
The approach suggested is not as straightforward as the reviewer indicates. Using pitch as an estimate of α requires a correction for upwash (Crawford et al., 1996, *Boundary Layer Meteor.,* pp. 79-94). Further, using a separate pitot tube measurement for *q* would require correction for static defect, and induces altitude variation which also involves static defect. The problems extend to the horizontal with

sidewash effects. Thus, we think that independently estimating the values of *f* is problematic at best, difficult, and beyond the scope of this paper.

Major concern #2. An apparent error in the fundamental equations I think there is a problem with the solution for tan given by Eq. A12 in the Appendix.

Response:
There are indeed typographical errors in eqs. A11 and A12. The expressions for ΔP_1 and ΔP_R in eqn. A11 should be

$$\Delta P_1 = \frac{q[1-(f-1)\left(\tan^2\alpha + \tan^2\beta\right)]}{\tan^2\alpha + \tan^2\beta + 1}$$

$$\Delta P_R = \frac{f\,q(1-2\tan\beta - \tan^2\beta)}{2(1+\tan^2\alpha + \tan^2\beta)}$$

Equation A12 should be

$$\tan\beta = \frac{\sqrt{2(\Delta P_\beta{}^2 + 2\Delta P_\beta \Delta P_R + 2\Delta P_R{}^2)} - \Delta P_\beta - 2\Delta P_R}{\Delta P_\beta}$$

The authors thank the reviewer for helping find these typographical errors, and apologize for the inconvenience caused by them. However, we confirm that the equations used in the analysis were correct.

Major concern #3. Organization and emphasis

While I feel less strongly about the need to address this third point than about the preceding points, I did find the presentation confusing and felt it took longer to understand the paper than was necessary. The first distracting aspect was the emphasis in the title and in the start of the abstract on the acceleration effects. I think the core of the results is a method for correcting measurements of static pressure, and application of this correction to cases with accelerations is important and a good test of the method, but highlighting this slowed my realization of what was really being done. In addition, equations (A11) and a discussion of what is measured are needed to understand what is being done, and it's not enough to trust that answers will emerge from the equations if you don't know, for example, that one of the basic measurements is the difference between the pressure at the forward port and the static ports and thus is affected by errors in the static ports. So putting the fact that ΔP1 is measured in the Appendix, and misstating how it is measured there, just impeded my understanding of what was being done.

Response:
We appreciate the reviewer's comments here, echoing similar comments made at the beginning of the review. It is probably too late to change the title, but nonetheless we will take advantage of the opportunity to revise the manuscript to more clearly explain our objectives, the assumptions made, and the limitations imposed on the results from those assumptions. The abstract and the introduction will be modified to address the readability issues that reviewer raises at the beginning of the review.

Other minor comments:

Response:
The authors acknowledge the points made, and the manuscript will be edited to fix these issues, and also carefully edited to eliminate the grammatical issues.