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"Calibration of 3-D wind measurements on a single engine research aircraft"
By C. Mallaun, A. Giez, and R. Baumann

General comment: This is a useful addition to the body of knowledge of wind measurement on research aircraft, and as such deserves publication after some revision. It covers the bases fairly well with carefully developed procedures, but the readability of the narrative would benefit from use of references to existing material (especially to the extensive discussion in the recently published *Airborne Measurements for Environmental Research* (Wendisch, M. and Brenguier, eds., 2013)—for example, Eqs. 2 and 3 are really not necessary for the purposes of this paper.

Issues: References are to page/line numbers.

1. P1736/15 and Fig. 1b: Drift angle is customarily angle from aircraft forward x-coordinate to ground speed vector, not as shown in figure, but as correctly stated later (p1736/20): "The drift angle (δ) is the difference of the true heading (Ψ) – the direction the nose of the aircraft points to relative to the North – and the actual track angle (ATA) – the direction the aircraft moves relative to the Earth fixed CS." The next sentence is not quite right either ("δ determines the strength of the cross wind component while the wind component along the aircraft results from the difference of the respective ground speed component and the TAS.") since aircraft x-component is not always along the TAS vector.

2. P1735/14-17: Sentence "The sequence…" replace with "Bange et al. (2013) describe the methodology for rotating aircraft to earth coordinate axes". Then replace "The authors derive…" to " Lenschow (1986) simplified the wind equations in level flight to be:…" Lenschow, D.H., 1986: *Probing the atmospheric boundary layer*. American Meteorological Society, 270 pp.

3. P1738/25ff: In Eq. (7), the assumption is that the sensitivities (partial derivatives in equation) are independent. I.e. in the turns, beta is the issue and in the straight legs, alpha is the issue. Actually, in the turns, both alpha and beta are involved. So I don't think this procedure makes sense.

   Also, I don't see how the upwash (or sidewash) effects are accounted for in this procedure. In the turn, the attack angle will increase to hold altitude, increasing the upwash effect.

   At the very least, the authors should rewrite this section to be far more explicit.

4. P1740/1: Why show data from the Falcon20 in Fig. 2? Later (Fig. 9), the Caravan results for ε_b and η_b are shown. I didn't catch that Fig. 2 is about Falcon20 data right away which lead to some confusion as I tried to reconcile your statements later.
5. P1740/16ff: The important measurements for this paper are Rosemount 858 air velocity, the IGI/AEROcontrol GPS/IMU system, and the static pressure. The extensive discussion, for example, of humidity (P1743/5ff and Fig. 4) is distracting to the narrative, and consideration might be given to shortening the overall discussion of instrumentation and sensor calibration and accuracy.

6. P1742/3 and Tables 2 and 3: Are the IGI/AEROcontrol accuracies real-time, or after post-processing? Model IId is indicated but not shown in http://www.igi.eu/aerocontrol.html?file=tl_files/IGI/Brochures/AEROcontrol/AEROcontrol_specs.pdf . I think some discussion should be added about the extraordinary heading accuracy (.01 deg). Were differential GPS antennas on the aircraft used to obtain this level of accuracy? Some mention of airframe and noseboom flexing should be added to indicated how this could degrade the accuracies.

7. P1747/11ff and Eqs. 13-14: K=0.0789 from the Rosemount report is also the potential flow prediction. Rodi and Leon (2012), working with a Rosemount 858 on a somewhat heavier twin-engine aircraft, report K to be smaller (about 0.0583), as suggested by their wind tunnel study and theoretical analysis (Traub and Rediniotis, 2003). Would this modify any of this paper's results if verified on the Caravan? At least some mention of this should be added.

   Traub, L. and Rediniotis, O.: Analytic prediction of surface pressures over a hemisphere-cylinder at incidence, J. Aircraft, 40, 645–652, doi:10.2514/2.3168, 2003.

8. P1748/22ff and Fig. 6: : If K is actually smaller than 0.0789, the magnitude of α_{ind} values would increase, and the slope of the line through the data would be smaller, indicating a larger upwash effect. Could this possibly be the case?

9. P1749/19ff: "orientation of the gust probe is more stable compared to the IRS and gives better reference." I don't understand this. Please explain.

10. P1750/21: Asymmetry in pressure deviation with sideslipping: A brief explanation (speculation) about why having the 5HP with static ports on a boom under the left wing causes asymmetry would be useful.

11. P1752/23 and Fig. 8a: Again, if K is actually smaller than 0.0789, the magnitude of β_{ind} values would increase, and the slope of the line through the data would be smaller, indicating a larger sidewash effect. Could this possibly be the case?

12. P1757/16: Three bladed propeller? Would there be propeller frequency components at 180 Hz aliased back into the spectrum (say at 20Hz?) – what frequencies were filtered (Table 3 cites "appropriate filtering").

13. P1758/28: No white noise in the raw data. This has to do with the filtering, and also the resolution of the digitization.
    P1759/3: …white noise added to the "raw" data time series – i.e. differential pressures, total temperature, etc.

14. P1757/22ff: Error analysis: Injecting white noise into a non-linear set of equations is a known method to determine sensitivity. However, I think interpreting the sigmas as measures of uncertainty (Table 5) is misleading and seriously underestimates the actual errors involved since it does not take into account the distinction between biases and random error, other factors causing bias and noise, nor cross-correlations in the measurements. I recommend this section be deleted, along with P1764/21-P1765/3, and the last sentence in the abstract. Perhaps this analysis can be re-worked and enhanced as the basis for a separate paper.

Minor issues:

15. P1748/16: “…is perfectly…” perhaps should be “…is in stabilized straight and level flight…”.
16. P1748/28: “demonstrated”
17. P1753/2: Perhaps “…too pessimistic…” should be “…too large…”.
18. P1763/22: “4 different…” should be “Four different…”.
19. P1763/23: “…mixing ratio…”