

CORRESPONDENCE

Comments on "A Comparison of Turbulence Measurements from Aircraft"

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In a recent paper, Lemone and Pennell (1980) compare turbulence measurements from three GATE aircraft including the NOAA DC-6. Among their findings was a consistent "bias in the w'^2 measurements" in which the measurements made by the DC-6 gust probe were significantly higher than those made by the other aircraft. The data they present in their Figs. 4c, 5, 6b and 9 indicate that this bias ranges from 20% to as much as 60%. Based on Fig. 6 they conclude that the bias is confined to low frequencies (below 2 Hz) and explain the difference as being due to computational procedures. They end the discussion with "we cannot conclude from these data which approach is right."

There is another published data set which bears directly on this question. Moss and Merceret (1977) compared velocity spectra from the DC-6 gust probe with those from a hot-film anemometer aboard the same aircraft at the same time, thus eliminating environmental variability as a factor in the intercomparison. Dissipation rates were computed from gust probe w' spectra and hot-film u' spectra. The comparison was made using different components because w' wasn't measured by the hot-film and u' wasn't working on the gust probe during

the intercomparison. The result was consistent with a w' spectrum too large (or a u' spectrum too small) by ~55%. Here again no certain conclusion could be drawn about which approach was correct.

The hot-film comparison was made in the range 5–15 Hz which is above that cited by Lemone and Pennell (and also well above the 2 Hz anomaly they report), but their frequency limitation was based on a figure about which they themselves comment "the roll-off problem is rare." Assuming more typical spectral shapes (such as the $f^{-5/3}$ inertial subrange behavior observed in the hot-film comparison), the two data sets taken together strongly suggest that the w'^2 values for the DC-6 in GATE were too large and should be used with caution. Using the DC-6 gust probe as a reference, the values from the other GATE aircraft gust probes compare favorably with those from the DC-6 hot-film anemometer.

REFERENCES

- Lemone, Margaret A., and William T. Pennell, 1980: A comparison of turbulence measurements from aircraft. *J. Appl. Meteor.*, **19**, 1420–1437.
- Moss, Michael S., and Francis J. Merceret, 1977: A comparison of velocity spectra from hot-film anemometer and gust probe measurements. *J. Appl. Meteor.*, **16**, 219–320.