General Comments:

This paper describes design, wind tunnel and field testing of a new and commercially available CVI inlet used to sample cloud droplets. The steps taken to validate the new design are logical, and the text is concise and well written. Below are some technical questions and suggestions that should help to improve an already strong paper before final publication.

Specific Comments:

p. 1517, line 23-24: The dilution flow argument is unclear. In my experience, a lower sample flow rate (<10 l min^{-1}) is used to keep the same stream laminar, and this is usually sufficient without dilution for a wide variety of instruments. What is the Reynolds number in the sample stream using 15 l min^{-1}? Also, the rapidly expanding diffuser just behind the tip is likely to induce turbulence.

p. 1518, line 3: Insert “some” before “older CVI designs”. There are some CVI inlets that have operated for 20 years without having ever used siloxane.

p. 1518, line 20: What is the temperature of the add-flow and of the tip, and how is it controlled?

p. 1519, line 20: Based on subsequent information given, I assume the 15 l min^{-1} is volumetric, but it should be defined here especially since a MFC is specified as the control mechanism.

p. 1520, line 2: Define BMI here or on p. 1518 when Brechtel is mentioned.

p. 1520: Is there any measurement or estimate of the turbulence intensity inside the wind tunnel and how that compares to the typical flight conditions? This could affect the calibration results.

p. 1520, line 21: Is 1 l min^{-1} the lowest counterflow rate that could be used without getting particle contamination? If so, it might indicate high turbulence levels or poor alignment with the mean airflow (unlikely for the tunnel tests but possible for the aircraft work.)

p. 1521, line 4: Change “grew” to “increased”.

p. 1521: I believe there was some flow modeling done for this inlet; it should probably be at least briefly discussed here for comparison, unless published elsewhere.

p. 1522, line 6: This describes an optimization procedure for C1 which should produce a calculated cut size that is as close to the predicted cut size as possible; thus I would expect the mean error to be close to zero. I think the authors mean that

12.6% is the maximum error for the six conditions tested. Perhaps this could be rewritten to give the actual residual % differences for all six conditions, most of which actually seem to be less than 12.6% and vary in sign.

p. 1522, lines 25-27: It's surprising that the transmission efficiency is so low for particles slightly larger than the cut size, particularly when using glass beads that might be expected to stick less readily than water droplets. On the other hand, water droplets slightly larger than the cut size will be expected to partially evaporate as they stop, which would increase their transmission efficiency. Also, the flow through the porous tube (which apparently was not used in the transmission efficiency experiments) is expected to collimate the flow and trajectories of some particles (e.g., Laucks and Twohy, 1998), increasing transmission efficiency. These factors may change the laboratory-derived transmission efficiency from expected in-flight results, although they may be compensating. At any rate, it would be useful to know how sensitive the flight results shown in Fig. 6 are to the applied transmission efficiency curve. I.e., without it, would the slopes decrease to 1.5? 2.0? Also, dimensions for the CVI parts (as requested below in the figure comments) would help understand the potential losses. Perhaps lower sample flow rates would help reduce this problem.

p. 1523, line 18: How was the 4.2 l min^{-1} for the instruments controlled, and was it monitored by the CVI electronics or just assumed to be constant? With that many instruments, small errors could add up.

p. 1524-1525: I don't believe potential wake capture of small particles by large droplets can be tested in clear air, since the droplets are not present.

p. 1525, line 7: The alignment with the mean flow is laudable, but how far from the fuselage was the inlet tip located? This can also affect the sampled size distribution (e.g., King, JTECH, 1984.) p. 1525: Also, was there an instrument onboard to detect drizzle drops, and were drizzling clouds excluded due to potential artifacts of breakup? (e.g., Weber et al., 1998.) Large drops can breakup even upstream of the trap, due to inertial forces and wall impaction.

p. 1525, line 23 (Fig. 6): It looks like the difference between the CDP and CAS may be as large as the difference between these instruments and the CVI. The uncertainties in these instruments (in concentration and sizing near the cut size) should be discussed. Also, some idea of the droplet size distribution and the percentage of all droplets actually sampled by the CVI would be useful.

p. 1527-1528: The single larger residual mode could also be a result of the CVI missing smaller droplets, which are more likely to nucleate on smaller particles. This could particularly be true in a modified cloud with more, smaller droplets. Again, some details of the droplet distribution would be useful. Also, the actual data points should be included in Fig. 8 in order to assess the appropriateness of the fits.

Miscellaneous: One of the new features is an inlet that can be easily cleaned to avoid build up of material within the inlet; was this done and is there any evidence that it was helpful?

Fig. 1 & 2: Dimensions, both lengths and internal diameters, would be useful in assessing performance and suitability for other aircraft. A photograph of the CVI location on the Otter would also be helpful. In the Fig. 1 inset, it looks like the short porous tube extends through almost the entire tip upstream of the expansion, but in Fig 2., the tip looks very long. Which is not to scale?

Fig. 3 & 4: To avoid confusion, it should be made clear in the captions that Fig. 3 is based on tests in CVI counterflow mode, while Fig. 4 is for tests without the counterflow (and tip, apparently.)

Fig. 8: This figure should be enlarged for legibility.