Review of "Comparison of Single Doppler and Multiple DopplerWind Retrievals in Hurricane Matthew (2016)"

<u>General comments</u>:

This paper evaluates the accuracy of the generalized velocity track display (GVTD) technique by comparing the wind field obtained from the airborne tail Doppler radar (TDR) data. The evaluation of the GVTD technique in a real case has not been done so far and has been desired. Additionally, this paper re-derives the GVTD technique to obtain a more accurate wind field. Generally speaking, it is hard to compare the difference between observations from different measurements because it is necessary to consider the strengths and weaknesses of each observing capability. The authors did a great job working on this difficulty by carefully looking at the retrieved wind field.

This paper is well written, and the purpose and results of this study are clear. Although I have some questions to better understand the GVTD technique, I recommend acceptance once the authors address the questions.

Recommendation: Minor revisions

<u>Specific comments</u>:

L180: Here, I'd like to make sure which variables can actually be retrieved from Eqs. 15-19. The sentence describes that the GVTD provides the along-beam component of the mean flow (i.e., Eq. 15), axisymmetric tangential wind (i.e., Eq. 16), axisymmetric radial wind (i.e., Eq. 17), and asymmetric tangential winds (n=1-2) (i.e., Eqs. 18 and 19). But, how can we obtain axisymmetric radial wind and the along-beam component of the mean flow? Eq. 15 includes axisymmetric radial wind on the right hand side and Eq. 17 includes the along-beam component of the mean flow on the right hand side. Rearranging Eqs. 15 and 17 is needed to obtain axisymmetric radial wind and the along-beam component of the mean flow.

Here, $V_{M||}$ indicates $V_M \cos()$, α indicates R/R_T, and the storm motion is assumed to be zero.

Eq. 15: $V_{M||} = A0 - \alpha*VR\_C0 + 1/2*VT\_S1$

Eq: 17: $VR\_C0 = (A0+A1+A2+A3+A4)/(1+\alpha) - V_{M||}$

$VT\_S1 = 2*A2 + 2*A4$ (from Eq. 18)

Substituting Eq. 17 into Eq. 15 yields

$V_{M||} = A0 - \alpha*((A0+A1+A2+A3+A4)/(1+\alpha) - V_{M||}) + A2 + A4$

$(1-\alpha) * V_{M||} = A0 + A2 + A4 - \alpha*(A0+A1+A2+A3+A4)/(1+\alpha)$

Then, $V_{M||}$ = (A0+A2+A4)/(1–α) – α*(A0+A1+A2+A3+A4)/(1–$α^2$)
Substituting $V_{M||}$ into Eq. 17 yields

$$VR\_C0 = (A0+A1+A2+A3+A4) *(1-\alpha)/(1-\alpha^2) - (A0+A2+A4)/(1-\alpha) - \alpha*(A0+A1+A2+A3+A4)/(1-\alpha^2)$$

Then, $VR\_C0 = -(A0+A2+A4)/(1-\alpha) + (A0+A1+A2+A3+A4)/(1-\alpha^2)$

Is this derivation wrong?

Additionally, I wonder why the authors don't evaluate the accuracy of axisymmetric radial wind in this study. If we find that both axisymmetric tangential and radial winds can be retrieved from the GVTD technique with acceptable accuracy, then the GVTD-retrieved winds can be useful for diagnosing a possibility of changes in storm size.

L218: This is just a comment. In my experience, a method from Bell and Lee (2012) provides better centers in terms of time consistency. That being said, I understand that you use the dynamic centers.

L225: Specify the mean wind component is an unknown variable or a given value? If it is a given value, how did the authors obtain it?

Figs. 3a and b: KAMX is not located at the center of the figure.

Figs. 3c and d: There is no caption about these figures.

L303: This description appears to me that the problem comes from the airborne "dual" Doppler analysis method, which essentially uses the fore/aft scanning technique. However, I don't think that the problem here is from the steady-state assumption in the dual Doppler analysis. As described in section 1, the forward and aft scannings are conducted within a few seconds, allowing for a nearly simultaneous observation, at least, near the aircraft (thus, the steady-state assumption is valid). I thought the problem here is that retrieved wind vectors observed at different times within ~45 min are synthesized into one picture in SAMURAI software, assuming that they are steady-state (e.g., Fig. 3b). Is my understanding wrong?