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*Interactive comment on* "A Bayesian model to correct underestimated 3D wind speeds from sonic anemometers increases turbulent components of the surface energy balance" *by John M. Frank et al.*

**Anonymous Referee #3**

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The present manuscript proposes a novel method to correct eddy covariance fluxes from sonic anemometers. It works by jointly estimating "true" standard deviation of components of wind field, a parameter related to the precision of the standard deviation of the un-corrected observations, and a matrix of correction parameters (which contains correction terms for different wind directions).

It is clear that a lot of work went into a paper and the results present a clear improvement over a previously used Kaimal correction. The method is innovative, however it is extremely slow to implement. (This may be solved by potential future numerical

improvements or by an increase in computing power).

Before publication, several points need to be ironed out.

First, no cross-validation of the correction field has been performed. Such a cross-validation is recommended before the method can be generalized to other datasets.

Second, the MCMC chains are very short, even though they use more than a hundred of parameters. Short chains might be prone to misconvergence. In my practice, I needed hundreds of thousands of samples to achieve robust results for around just 10 parameters. Even though the results look similar for different priors, this shortcoming needs to be at least mentioned.

Some of the mathematical notation is confusing; for example the difference between the upper and lower case subscripts need to be better explained. In addition, more attention can be given to explaining the dimensionality of variables (e.g., scalar, matrix, vector).

I encourage the authors to take a final look at the paper to correct some typos. e.g., l. 103 statistics is singular not plural l. 107 data are plural not singular