Atmospheric Measurement Techniques Discussions

Atmos. Meas. Tech. Discuss., community comment CC2
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Reply on AC1

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Community comment on "Atmospheric tomography using the Nordic Meteor Radar Cluster and Chilean Observation Network De Meteor Radars: network details and 3D-Var retrieval" by Gunter Stober et al., Atmos. Meas. Tech. Discuss., https://doi.org/10.5194/amt-2021-124-CC2, 2021

Thanks for explaining and clarifying what is shown as vertical velocity estimates in the paper. It is clear now that the statement

"**Furthermore, the vertical wind mean bias and variances are significantly reduced compared to other studies (Egito et al., 2016; Chau et al., 2021; Conte et al.,2021) without including additional damping terms or regularization constraints to the fitted vertical wind."**

is a guess, since in the case of meteor radar estimates the contribution of not including WGS84 geometry has not been separated from the other considerations described (e.g., advanced complicated mathematics, a spatio-temporal Laplace filter, preference to solutions that are physical more likely, etc.).

We indeed used WGS84 geometry in our estimates. Although not explicitly mentioned in Chau et al. (2021) and Conte et al. (2021) since we considered trivial after our previous works including Stober et al. (2018), here is some implicit information to consider:

- a) WGS84 is explicitly mentioned in Chau and Clahsen (2019) which is referenced in Chau et al. (2021).
- b) In Conte et al. (2021) after EQ 1 it is written **"where u = (u, v, w) is the neutral wind vector, with u, v, and w being its zonal (east-west), meridional (north-south), and vertical (up-down) components, respectively. k = (ku, kv, kw) is the Bragg wave vector (scattered minus incident) in the meteor-centered east-north-up coordinate system"**, i.e., we use local ENU coordinates.

The gradient method is implemented in spherical coordinate systems, but using the local distance to the center of the earth (local radius) calculated using WGS84. Bragg vectors are all calculated respect to the ENU of each meteor.

In our works, besides WGS84 we also consider error propagation and geometrical aspects, however we have preferred to avoid regularizing the data with expected physical values for the vertical wind. Instead we focus on understanding what we get. As I mentioned before 3D wind field analysis like yours are very welcome since, among other aspects,

they would help reduce the observed variability of vertical velocity estimates.

As in your case, we also do not claim we are getting the true vertical winds, and definitely our philosophies to attack the interesting topic of MLT vertical winds are different. I find these differences positive since they enrich our research activities.

Looking forward to your published paper.

Koki Chau

References

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