A GPS water vapor tomography method based on a genetic algorithm

Review by André Sá

I find the work presented in the paper to be interesting and worthy to be published because it presents tomographic results based on a Genetic Algorithms, which are not dependent on constraints, a priori data and external data. Additionally, because of these characteristics, a missing point that also should be highlighted is the potential interest for real-time or near-real-time analysis/applicability. However by my opinion the manuscript requires revisions to be applied before it can be accepted. Therefore I ask the authors to address the below given comments.

Comments:
It is not fully clear to me the implementation of the Genetic Algorithm. Namely the selection of the settings and the sensitivity of the algorithm concerning these settings. The setup of the stopping criteria or calculation time.

Major recommendations:

I recommend a more effective and clear description concerning my previous comment.

P1L14-16: "By using the proposed approach, it is not necessary to perform the matrix inversion process, and the <u>water vapor tomography is no longer dependent on excessive constraints</u>, a priori information and external data, which give rise to many limitations and difficulties."
I think this is a very strong sentence. The ART algorithms are iterative processes; they also do not need to perform the matrix inversion process. I use SIRT algorithms to do GNSS tomography and I do not use constraints. Please note that the tomographic solution is not tightly constraint to the a priori field. It uses the a priori field as a first guess to start the iteration, but this value can be much different from the value that the tomography will converge to in each voxel. The used term <u>"no longer"</u> may indicate that all the other methodologies besides the one presented here, use excessive constraints. I advice to rephrase the sentence.

P1L18-21: Please add some numerical information (values of agreement). How significant are the "high levels of agreement", some overall numbers concerning the comparative results.

P3L18-21: "The mandatory use of excessive constraints". Please read my comments in P1L14-16. It also depends on the density and configuration of the GNSS network, data quality, etc. I am able to get nice tomographic results with good convergence behavior without constraints.