

Manuscript Title: The cooperative IGS RT-GIMs: a reliable estimation of the global ionospheric electron content distribution in real-time

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Dear editor, dear anonymous referees,

We thank you for constructive comments and suggestions. They can be very helpful to improve the quality of manuscript and also to increase the readability.

We will provide a point-by-point response to your kind comments in red font.

Thank you.

Please note that reviewers' comments are in italics while our answers are not.

Yours sincerely, on behalf of the co-authors,

Qi Liu and Manuel Hernández-Pajares

Answers to Editor Christian Voigt,

Comment E1.1 *Thank you for your through revision of the manuscript. You will see that Referee 1 agrees with your modifications adressing his/her concerns. Nevertheless, a few mistakes appear in the revised document that need to be corrected.*

Answer to E1.1 *Many thanks for your professional editing of our manuscript. We have just made a modified version of manuscript according to the suggestions.*

Answers to Anonymous Referee 1,

Comment R1.1 *I would like to thank the authors for addressing my concerns. With the longer time span presented in the revision, the switch of the UPC interpolation strategy can be seen much clearer. The presented equations are now consistent. I only have a few very small comments*

Answer to R1.1 Many thanks for your professional editing of our manuscript. We have just made a modified version of manuscript according to your kind suggestions.

Comment R1.2 *End of Eq. 3: There is a ')' too much.*

Answer to R1.2 Thank you. This is corrected.

Comment R1.3 *L126: DCB has already been defined in L95.*

Answer to R1.3 Yes. Sorry, we forget this. Now it is corrected.

Comment R1.4 *L262: 'N' should be 'N_J'*

Answer to R1.4 Thank you. This is modified.

Comment R1.5 *L256 and L292: The two sentences starting with 'And' should be reformulated, as they don't seem to be full sentences to me.*

Answer to R1.5 Thanks for your kind suggestion.

Now the L256 sentence "And Jason3-VTEC has been proven to be a reliable reference of VTEC on the oceans where are the most challenging regions for GIMs (containing few nearby receivers in such regions) and typically far from permanent GNSS receivers potentially contributing to the GIM"

has been replaced by

"Jason3-VTEC has been proven to be a reliable reference of VTEC over the oceans. The oceans are the most challenging regions for GIMs where permanent GNSS receivers are typically far away".

The L292 sentence "And the mapping function is used by GNSS users to convert GIM-VTEC to GIM-STECC for GNSS positioning. Therefore, the dSTECC observations, containing different geometries and mapping function error, are accurate and direct measurements for evaluating ray path GIM-STECC which is commonly used by GNSS users to calculate ionospheric correction."

has been replaced by

"As it has been introduced before, the STECC is proportional to VTECC by means of the ionospheric mapping function. Therefore, the dSTECC error observations (see Eq. 8), containing different geometries and mapping function error, are direct measurements for evaluating GIM-STECC which is commonly used by GNSS users to calculate ionospheric correction."

Comment R1.6 *Eq. 10: 'O...' needs to have an index 't' and 'i' in the second and third line, respectively (otherwise also the sum in the third line wouldn't make sense).*

Answer to R1.6 You're right. Thank you. This is modified.

Comment R1.7 *Fig. 5b: In the legend it should not say 'weight of ...', as the figure represents a number of epochs, not a weight.*

Answer to R1.7 Thanks for your kind suggestion. Now the legend of Figure 5b has been changed.