

## Replies to reviewers' comments

### Comment to reviewers

*The Authors are grateful to the the reviewers very much for their important comments that helped us to improve the original manuscript. We have responded to all comments and have revised the paper in light of them. Details of our responses to each comment are shown below.*

### Reviewer 2:

#### Comment (1):

Kp index, which represents geomagnetic activity, on April 15, 2015 was 2+3-3-5 5+4-5-4- This condition is moderately disturbed. Horizontal distribution of TEC could not be homogeneous compared to that on geomagnetically quiet conditions. It would be better to describe geomagnetic conditions in this paper.

#### Response:

We are really studied the Kp index for the dates of the used data, but we could not find a serious change due to the magnetic activities. Additionally, we try to focus on the evaluation of the IONEX over the areas with poor data. The interpolation techniques that are used within IGS computing centers are not accurate enough to rely. We should consider how we can fill the gaps of data, at least we can utilize LEO data to cover as long as the regimes there refuse to exchange the data.

#### Comment (2):

Figure 4 What is shown in the horizontal axis? Local standard time in Egypt? TEC at "alex" is highest at 0 LT(?). Is this TEC correct value? Why is TEC is highest around midnight?.

#### Response:

In this figure, the Alex station has a different receiver that may be the receiver code bias is not correctly fit and/or may be the ambiguity initialization for this station is not fixed correctly. So If you feel that removing it will harmonise the results we can do it. However, all the given baseline results used the nearest station, namely BORG, just 50 km from it.

#### Comment (3):

Figures 8-10  $\tilde{A}^A$  , the reviewer considers that it is worth showing comparison of TEC obtained form GIM and modified GIM at the two locations used as the baseline to show how much TEC affect the accuracy of the positioning.

#### Response:

The main objective of the current research is to evaluate the IONEX produced by IGS computing centers over the areas with poor data like Egypt. To prove this, we studied the effect of VTEC on the positioning through computing the differences between the CRCS-PPP solution and the two positioning solution of

normal default processing parameters (D.D) and with using modified IONEX values (D.D.M-GIM). The figures 8-10 show the epoch by epoch position solution and the comparison given in the table attached with the figure show the over all statistical parameters of the solution.

**Comment (4):**

Minor comments - l. 148, at a unit of TEC: "2" should be a superscript of "m". - l. 165, "10<sup>11</sup>:10<sup>12</sup>": Change ":" to "-" or "i;d". Unit of this values should be e/m<sup>3</sup>. - l. 176: "ECEP" appears in this line firstly. Describe its full name here, instead of l. 182. - l. 180: Explain X\_N, X\_E, and X\_U. - Figure 6: In the 3th column of the left-hand side: Third line cannot be seen. - Figure 7: Insert a space between "April" and "15".

**Response:**

**Considered: all minor comments were adapted according to this comment.**