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Interactive comment on "Regional Ionosphere Mapping Using Zero Difference GPS Carrier Phase" *by* Heba Tawfeek et al.

Anonymous Referee #2

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The manuscript reports development of an algorithm capable of producing hourly VTEC regional maps using carrier phase observations from a single station, dual frequency GPS receiver. In order to achieve this objective, the authors have used Sequential Least Square Adjustment (SLSA) method to fix the carrier phase ambiguity and developed a MATLAB code named ZDPID. Data from two IGS stations (ANKR and BSHM) are used to develop this code and the outputs are compared with the Global Ionospheric Maps (GIM) to gain confidence. Afterwards, GPS observations from three stations in over Nile Delta in Egypt (SAID, HELW and BORG) are used to generate the regional ionospheric maps for three cases and they found the comparison of these outputs with the IGS VTEC satisfactory. The importance of the work lies in its supposed ability to reproduce regional TEC maps using single station data. I have several

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[Discussion paper]

concerns regarding this work and would like the authors to be more critical in claiming the targeted objective. The concerns are as follows.

1. GIMS are uncertain themselves! What are typical uncertainties in GIMs? When the authors use comparison with the GIMs to validate their code, they are already comparing with gross maps! Therefore, they need to be careful with the mean difference values. 2. ZDPID code uses cut-off angle of 10 deg. Therefore, the data that go into the ZDPID contain huge uncertainty due to multi-path errors etc. 3. The final outputs for the three stations are significantly different amongst themselves on many occasions. Yet, they match very well with the IGS values! How? For what latitude/longitude bin? 4. The authors should think of using large scale ionospheric features like plasma fountain over the African sector to validate the maps from these three stations. At present the work does not use any physical process to validate the TEC maps. 5. What is rational of taking IPP at 450 km and not at 350 km? 6. The abstract is lengthy, contain general information. There is no discussion of earlier works and the novelty of the present work. Is similar approach not followed earlier? 7. Put error bars in Figures 6 and 10. Mention which lat/long bin are you comparing? 8. Figure 2 is not readable.

I am not able to recommend this work for publication in the present form.

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