

## ***Interactive comment on “Modeling Total Electron Content derived from radio occultation measurements by COSMIC satellites over the African Region” by Patrick Mungufeni et al.***

### **Anonymous Referee #1**

Received and published: 24 December 2019

**General comments** This paper examines the possibility to Total Electron Content (TEC) over the African region TEC data derived from radio occultation measurements done by the Constellation Observing System for Meteorology, Ionosphere, and Climate (COSMIC) satellites for Geomagnetically quiet time ( $K_p < 3$  and  $Dst > -20$  nT) data during the years 2008 - 2011, and 2013 – 2017.

**Specific comments** 1) An author of this paper (Patrick Mungufeni) along with a long list of other authors have recently published the following paper Okoh, D., Seemala, G., Rabiu, B., Habarulema, J. B., Jin, S., Shiokawa, K., et al. (2019). A neural network-based ionospheric model over Africa from Constellation Observ-

C1

ing System for Meteorology, Ionosphere, and Climate and Ground Global Positioning System observations. *Journal of Geophysical Research: Space Physics*, 124. <https://doi.org/10.1029/2019JA027065>

In that particular paper the authors perform an adjustment using Neural Networks according to which they correct the reasonable discrepancy between TEC from ground based receivers (up to 22000 Km) and occultation measurements (up to 700 Km). They seem to apply no such procedure in this paper. This is a major problem of this paper. They also need to make special reference to that paper. 2) Maybe they should compare the output of the NN model out of that paper with the output of the spline model for this paper despite that the COSMIC dataset is used as a basis for both models. In this way they will prove their approach for this paper (omitting any correction for the plasmaspheric contribution which is expected to be high at middle African latitudes). 3) The authors do not provide any scheme by which they would reject any unrealistic COSMIC profiles. There have been numerous validation studies with Digisondes that verify this problem especially in the bottomside. 4) I strongly suggest to compare the output of their model with ionospheric TEC (up to 700 km) from all over four stations Digisonde stations over South Africa <https://spaceweather.sansa.org.za/products-and-services/current-conditions/ionograms> . This will provide a much more realistic comparison test to their model.

---

Interactive comment on Ann. Geophys. Discuss., <https://doi.org/10.5194/angeo-2019-160>, 2019.

C2