Comments:

In this manuscript, the authors present an investigation of the total electron content (TEC) at a single station and low latitude region over Africa. They applied empirical orthogonal function (EOF) to model the seasonal and solar cycle and storm-time variations of TEC and to further determine the trend of TEC over the data period.

As the features of the ionosphere over Africa is relatively less studied, the work is possible for publication in AG after reasonable modifications as listed below.

Detailed comments/suggestions:

1. Equation (1): Did it require to include a mean term?
2. Page 3: Line 37: I cannot see the secondary maximum at about 20:00 UT from The figure.
3. Figure 1: What is the red curve? No words are given.
4. Page 4, Line 16: The statement is incorrect. Periods of 0 is not the linear variation.
5. Equation (4): Why such presentation is reasonable or enough. No words to support it, no references are cited.
6. Equation (5): Same to Equation (4). Moreover, (1) F10.7 in Equation (5), but F10.7av in Equation (6). (2) Is it enough to present the geomagnetic activity condition with Dst? And it is a linear relationship? Without any time delay? (3) How to simulate/reproduce the solar effect of TEC is essential for successful

model TEC and further estimate the trend of TEC. In this work, the solar index uses F10.7 av. It did not provide references (suggest to cite two key works, *Richards et al*., 1994: Richards, P. G., J. A. Fennelly, and D. G. Torr (1994), EUVAC: A solar EUV flux model for aeronomic calculations, *J. Geophys Res*., 99, 8981-8992; Liu et al., 2006: Liu, L., W. Wan, B. Ning, et al. (2006), Solar activity variations of the ionospheric peak electron density, *J. Geophys. Res*., 111, A08304, doi:10.1029/2006JA011598). (4) According to the investigation of Liu and Chen (2009) and Liu et al. (2009), the TEC is better to present as a second-order polynomial with F10.7, especially under the situation for estimating trend. References: Liu, L., and Y. Chen (2009), Statistical analysis on the solar activity variations of the TEC derived at JPL from global GPS observations, *J. Geophys. Res*., 114, A10311, doi:10.1029/2009JA014533.

Liu, L., W. Wan, B. Ning, and M.-L. Zhang (2009), Climatology of the mean TEC derived from GPS Global Ionospheric Maps, *J. Geophys. Res*., 114, A06308, doi:10.1029/2009JA014244

7. Figure 2: An equation is welcome to give the regression. I am curious as why there is a significant intercept.

8. Figure 4: The case on 07/11/2004 has no observation of GPS-TEC. If so, what is the value to include it here.

9. Figure 6: What are the white curves? So are those in Figures 8 and 10.

10. Page 12: Line 5: Since the processing of TEC may introduce biases to TEC, my question is how about the possible influence of your TEC on the trend?

11. Figure 10: An issue is the influence of different presentation of solar dependency of TEC, linear or higher order on the trend. According to the investigation of Liu and Chen (2009) and Liu et al. (2009), the TEC shows saturation in equatorial regions, such a linear presentation as in this work will introduce what influence on the estimated trend?

12. Page 11, Lines 18-21: The trend is positive. In contrast, in other works it is negative. What causes the difference?

13. According to Equation (1) and Equation (4), there is expected that we can estimate the trend as different local times. My next question is how about the local time variation of the trend of TEC?