

## ***Interactive comment on “Global Climatology of Equatorial Plasma Bubbles based on GPS Radio Occultation from FormoSat-3/COSMIC” by Ankur Kepkar et al.***

### **Anonymous Referee #3**

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Global Climatology of Equatorial Plasma Bubbles based on GPS Radio Occultation from FormoSat-3/COSMIC by Kepkar et al looks at the seasonal, longitudinal, annual, altitude and local time variations in the occurrence of equatorial plasma bubbles as indicated by the COSMIC S4 index. The authors have failed to highlight the novelty of the work, and as such I can not recommend it for publication. Their work is very similar to Carter et al 2013, whom they cite in reference to variation with solar activity. However, they have failed to discuss the work in the context of this paper even though Carter et al 2013 looked at the seasonal, longitudinal, annual and local time variations of equatorial plasma bubbles as indicated by the COSMIC S4 index. Indeed Figure 6 of this paper is very similar to Figure 4 of Carter et al 2013. The years of data used are

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different. However, the differences and similarities between Figure 6 and the results from Carter et al 2013 are not discussed and it is showing how this work provides something new that is currently missing from the manuscript.

The main findings chosen to be highlighted in the abstract are "The analysis revealed that the F-region irregularities, associated with plasma bubbles occur mainly post sunset close to Earth's geomagnetic equator. Dependence on the solar cycle as well as distinctive seasonal variation is observed when analyzed for different years. In contrast to the other ionospheric remote sensing methods, GPS Radio Occultation technique uniquely personifies the activity of the plasma bubbles based on altitude resolution on a global scale." Taking each sentence in turn below it can be seen that no new information is currently being highlighted by the authors "The analysis revealed that the F-region irregularities, associated with plasma bubbles occur mainly post sunset close to Earth's geomagnetic equator."- This has been known and written in many papers, including ones such as Sultan 1996 and others that look at the mechanism and growth rate of post sunset plasma bubbles. "Dependence on the solar cycle as well as distinctive seasonal variation is observed when analyzed for different years." -Bourke et al 2004 looked at the climatology of plasma bubbles for both low and high solar activity, and Carter et al 2013 looked at the climatology of plasma bubbles using COSMIC S4 as a function of year "In contrast to the other ionospheric remote sensing methods, GPS Radio Occultation technique uniquely personifies the activity of the plasma bubbles based on altitude resolution on a global scale." –As mentioned throughout this review, Carter et al 2013 used COSMIC RO data to look at plasma bubbles, so more is needed to make this a new finding.

Minor comments: In section 2.1.1 Derivation of amplitude scintillation index it is unclear if the authors have used the provided s4max9sec data and are explaining how it is derived, or if they have used raw data and re-analysed it themselves. If it is the later the reasoning also needs to be made clear to the reader.

It is unclear why the authors have chosen to use the average S4 rather than some

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occurrence calculation. Averages can be misleading if the distribution between cells varies, or the number of points vary etc. A justification should be added or another way to demonstrate the data should be used.

In Figures 5 & 6 the captions state that the Figures show the EPB occurrence. In Figure 5 the numbers seem very low for this to be the case and in Figure 6 it is clearly the S4 average again, this is inconsistent, confusing and needs to be fixed

In order to make this work worthy of publication the authors need to carefully discuss the results in the context of similar papers that are currently not included in the discussion of the results. Following this they need to assess and highlight what is new and different to determine if the work is novel.

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