

As I mentioned at the previous review, this paper does not deliver new science regarding bubbles. I would rate the scientific value of the paper to be medium low. However, I do not object publication of this paper because this paper can be a reference to other researcher who are interested to use the GPS RO data.

Writing was significantly improved compared with the previous version. The paper is readable as is, although it is not a well written paper. The editor may decide whether to request further elaboration of writing. Below I point out some expressions that bothered me.

I'd like to note one thing. The authors considered scintillation as a proxy to detect bubbles. It can be true because scintillations would be caused by bubbles in low latitudes, but there is a limitation. Let's think about the factors that determine the scintillation intensity. The S4 index is determined by the strength of the irregularity. The irregularity strength is a function of the background density. So, the scintillation distribution is biased by the background density. The occurrence rate of bubbles should be the maximum at the magnetic equator because they initiate there. Satellite observations showed the peak occurrence rate at the magnetic equator. But, in Figure 3 in the manuscript, the occurrence rate is not maximum at the magnetic equator. This result is expected because an ionization trough forms at the magnetic equator. The hemispheric, seasonal, and solar cycle dependence of scintillation will also be affected by the variation of the background density with those factors. An explanation about this (the effect of background plasma density on the distribution of scintillation) is necessary.

### **Abstract**

I am not a native English speaker, so I cannot thoroughly review English. But "the" may not necessary in front of "bubbles" because Abstract does not describe specific bubbles. The same in other sections. Please check this.

Line 7: The expression "significant distribution" does not make sense. I would write line 6-8 as "The occurrence of bubbles shows a strong dependence on longitude, season, and solar cycle with the peak occurrence rate in the African sector during March equinox during high solar activity."

Page 1 Line 19: "EPBs instigated by plasma irregularities" is not a good expression. Just "EPBs" is good enough.

Page 2 Line 1-3: Simply say that "EPBs appear as plume-like structure in radar observations and emission depletions in airglow images"

Page 2 line 11: Where do the polarization electric fields that cause bubbles develop? Is it E region?

Page 7 line 13-14: "when the polarization electric field shorts E-region conductivity causing a rapid loss of plasma". I do not understand what it meant. Does the polarization electric field determine the E region conductivity? Does the polarization electric field or E region conductivity cause the rapid plasma loss?

Page 11 line 16: The authors may add following references regarding the relationship between PRE and bubbles:

*Anderson, D. N., B. Reinisch, C. Valladares, J. Chau, and O. Veliz (2004), Forecasting the occurrence of ionospheric scintillation activity in the equatorial ionosphere on a day-to-day basis, JASTP, 66, 1567-1572.*

*Fejer, B. G., L. Scherliess, and E. R. de Paula (1999), Effects of the vertical plasma drift velocity on the generation and evolution of equatorial spread F, J. Geophys. Res., 104, 19,859-19,869.*

*Kil, H., L. J. Paxton, and S.-J. Oh (2009), Global bubble distribution seen from ROCSAT-1 and its association with the pre-reversal enhancement, J. Geophys. Res., 114, A06307, doi:10.1029/2008JA013672.*

*Li, G., B. Ning, L. Liu, Z. Ren, J. Lei, and S.-Y. Su (2008), The correlation of longitudinal/seasonal variations of evening equatorial pre-reversal drift and of plasma bubbles, Ann. Geophys., 25, 2571-2578.*

*Su, S. -Y., C. K. Chao, and C. H. Liu (2008), On monthly/seasonal/longitudinal variations of equatorial irregularity occurrences and their relationship with the post-sunset vertical drift velocities, J. Geophys. Res, 113, A05307, doi:10.1029/2007JA012809.*

Page 11 line 18-19: “The seed perturbation along with the altitudinal variation of the EPBs is largely attributed to the PRE.” I am confused of the seed perturbation mentioned in this sentence. Do you mean seed perturbations such as AGWs? If it is, how do they have a connection to the PRE?

Page 11 line 25: I am not sure of the meaning of “materialize”