

## ***Interactive comment on “Simultaneous Ground-based and In Situ Swarm Observations of Equatorial F-region Irregularities over Jicamarca” by Sharon Aol et al.***

### **Anonymous Referee #2**

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General comment:

The authors compare density irregularities observed in-situ by the Swarm satellites with ground-based observations of plumes made by the Jicamarca unattended long term investigations of the ionosphere and atmosphere (JULIA) radar and ionosondes. Using data between 2014 and 2018, the authors investigate whether Swarm can be used as indicator of plasma plumes/Spread F observed on the ground. Showing a few case studies and by comparing the statistical trends between the in-situ and ground-based instruments, the authors conclude that Swarm can be used to detect the presence of well-developed plumes. The manuscript is carefully organized, the figures and pre-

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sentation are clear, and the text is generally well written. While comparisons between in-situ and ground-based is worthwhile, and the datasets well suited, the novelty and importance of the findings are not significant enough, in my opinion. However, I think this work has potential values after significant additional work and resubmission.

Suggestions and comments are given below.

Major comments:

1. The author mention that their main focus is to determine whether Swarm can be used to detect plumes and Spread F. Even though previous studies used lower sampling resolution/single cases, I have difficulties understanding why the previous work(s) is(are) not sufficient to determine whether Swarm can detect plumes or not? There is even a standard Swarm data product called the Ionospheric Bubble Index (IBI) to detect equatorial irregularities (which does not seem to be referred to).

2. I agree that statistical studies can provide additional information. However, it is not clear to me what the authors actually get from their statistics, except for similar trends as the ones published in the literature (both from ground-based and Swarm “irregularity” studies). I am fairly certain that with their interesting dataset, the authors can reach more substantial conclusions, especially with the spatial/altitudinal separation and sampling rate of Swarm.

3. (section 3.3) The description of the method to calculate the statistics (selection of events, number of events, how occurrence rates are calculated, exact months, description of quantities shown in figures etc. ) is insufficient.

Minor comments: P=page, l=line

P.3 l.30: Doesn't the faceplate actually record  $N_i$ , from which  $N_e$  is calculated?

P.4 l.18: “vs” should be “versus”

P.4 l.29: "Ngwira et al. (2013)" should have (...)

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P.4 I.30: Is the standard deviation also calculated on a 2sec running window? Are the scales selected important for you results?

P.5 I.7: "Smith et. Al (2015); Zhan et al. (2018)" should have (...)

P.5 I.12: Definition of ISR.

P.5 I.14: How exactly do the authors define "nighttime"?

P.5 I.19: Space between "explorer" and (Galkin...)

P.5 I.28: Definition of "QLat".

P.5 I.28: "Much higher altitude". This is very subjective.

P.7 Figure 3. This figure and the explanation are not clear: do the authors bin the data by day of the month, and take the maximum for each day over 4 years?.

P.8 I.14: Definition of "EIA".

P.8 I.30: "20:05 LT to 21:00 LT" I don't read the same time interval from the Figure.

P.15-16 Figure 10 and Figure 11: Could the authors describe in more detail how those figures are obtained?

P.16 I.2: Didn't the authors use the 16 Hz? (Why is 2 Hz relevant here?)

P.17. I.1-3: The purpose of these sentences is unclear to me. It is well known that equatorial irregularities can cause scintillations.

P.17 I.12: "directory" – "directly"?

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Interactive comment on Ann. Geophys. Discuss., <https://doi.org/10.5194/angeo-2019-153>, 2019.