

Interactive comment on “Ionospheric Plasma Density Measurements by Swarm Langmuir Probes: Limitations and possible Corrections” by Piero Diego et al.

Piero Diego et al.

piero.diego@inaf.it

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Dear Dr. Xiuying Wang, Thank you for the comment. The paper you have suggested ascribes the Ne uncertainty to that relevant to the detection of plasma potential in the classic Langmuir procedure. This is a well-known issue in plasma diagnostic. In addition, the authors quoted the work of Godyak and Alexandrovich (Comparative analysis of plasma probe diagnostic, 2015) that estimates the Ne uncertainty up to one order of magnitude in some extreme conditions. This issue is addressed by Rui Yan et al., (The Langmuir probe onboard CSES: data inversion analysis method and first results, EEP, 479-488, 2018, doi:10.26464/epp2018046), who introduce the iterative method

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to minimize the plasma potential computational error that reduces the Ne uncertainty as well. Moreover, the use of a large probe (i.e. collecting larger current from plasma) allows a better identification of the inflection point in the characteristic curve. In our work, we used data collected by the larger CSES Lp probe with 5 cm diameter rather than the one with 1 cm. The very good agreement between the time series trend of Ne and Te of Swarm and CSES is, in our opinion, a proof that both instruments work properly but there is some lack in the accuracy of the current collected. In fact, as known, such issue would affect the Ne (that depends on the current level) rather than Te (that depends on the shape of the I-V curve) that shows indeed a high correlation. For these reasons our paper focuses on identifying the reasons for the large discrepancies (a factor from 4 up to 20) based on physical effects on the particles collection by the Swarm probe. We consider such physical effects of greater importance in determining the discrepancy between measurements. Best regards. Piero Diego

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