

Review on the paper “Case study on complex sporadic E layers observed by GPS radio occultations”

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This study presents the interesting shape characteristics of the multiple peaks at Es layer altitude in RO profiles, special distribution of the RO profiles with Es layer characteristics, and comparison of the RO profiles between Lidar observations and ionogram. However, the discussions are fine, but it is not clear enough. The current version of this paper needs further consideration for publication before moderate and careful revision, and the two points in specific comment are the main reason why I make this paper as major revisions.

Specific comment:

1. Based on the current version of the paper, the multiple peaks Es layer have been discovered and mechanically explained by Smith & Miller (1980) and Wakabayashi & Ono (2005), respectively. What’s different between their and the authors’ findings for the multiple Es layer?
2. Based on the section 3 and section 4.3 of the current version of the paper, the authors connect the Es layer and wind shear theory by using the simultaneously occurrence of RO Es layer characteristic SNR profiles distributing in a broad region. The connection is weak based on the current description in the paper, which only show the Es layer can be non-sporadic. Please describe more detail of the connection or present the strong evidence to support the connection.

Minor comment:

1. In line 13 in page 9207, “while the DC electric field makes a significant contribution to the formation of the upper layer,” please use “direct current (DC)” to replace “DC”
2. In line 10 in page 9209, “In this study, only the cases that have maximum S4 index calculated from 50 Hz SNR larger 0.3 are considered.” I think the S4 index information used in this study is from scnLv1 files, the SNR is from atmPhs files and TEC is derived by using the excess phase recorded in atmPhs files. Please describe the relations between S4 index, SNR, TEC and their recorded files.
3. In line 24 in page 9212, “This area is defined as the Es Occurrence Area (EOA), as shown.....” should be replaced by “This area is defined as the EOA, as shown.....” because the abbreviation has been defined in line 18 in page 9212.