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Interactive comment on "Ionosonde Total Electron Content Evaluation Using IGS Data" *by* Telmo dos Santos Klipp et al.

Anonymous Referee #2

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Interactive comment on "Ionosonde Total Electron Content Evaluation Using IGS Data" by Telmo dos Santos Klipp et al. Anonymous Referee #1 Received and published: 16 October 2019 The reviewer says: "1. The authors state that "they noticed" that ITEC systematically underestimates vTEC, and they explain this by claiming that the ITEC profile integration stops at 900 km. Both claims are not quite correct. Firstly, the original ITEC paper by Reinisch and Huang [2001], which the authors have cited, shows that the height integration for the ITEC calculation goes to infinity, and is not stopped at 900 km." This is not true. For the time window (2016-2017) considered by the authors the ITEC (Ionospheric - not Ionosonde - Total Electron Content) given as output by digisondes is the one calculated to approximately 1000 km of altitude. Reply by the reviewer: The ionosonde TEC calculation in the Digisonde is performed as part of the NHPC pro-

gram, and Reinisch and Huang [2001] state that the analytic integration for the topside goes from 0→inf. The DIDBase and SAO characteristic #38 contain this TEC value. In the literature this ionosonde-derived TEC value is occasionally referred to as ITEC. It could of course be that the authors have numerically recalculated the topside content up to 900 or 1000 km with the alpha-Chapman profile and constant scale height Hm. But even if they did, it could not explain the observed underestimation by the ionosonde technique. The reason is not an abrupt cutoff at 900 km, but an invalid scale height Hm (of ∼75km) that is way too small a value for heights above ∼700 km as discussed in several papers since 2001. The reviewer continues to saying: "The Digisonde calculations of ITEC assume an alpha-Chapman topside profile with constant scale height Hm. Secondly, extensive studies by Belehaki et al. [e.g., 2004, 2012] had shown as early as 2004 that the Digisonde ITEC systematically underestimates vTEC; Belehaki's explanation was that a constant scale height Hm (calculated from the bottomside profile for heights near hmF2) makes the topside profile decay too rapidly with height. They concluded that the plasma above about 900 km is practically not included in the Digisonde's ITEC value. Instead of saying "they noticed" the underestimate, it might be more correct to say that the Belehaki et al. results were "confirmed" to also apply in the equatorial region." The authors cannot consider what the reviewer is claiming, especially "the Belehaki et al. results were "confirmed" to also apply in the equatorial region" because the situation here is completely different from that faced by Belehaki et al. I repeat, ITEC values considered by the authors for the time window 2016-2017 are those calculated till 1000 km of altitude and not beyond.

Reply by the reviewer: Please see my response above for the 1000 km upper integration limit. You are right, the Belehaki et al. papers are for a completely different situation. This is why I recommended that your paper be published since it applies to the equatorial region.

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