Reviewer comments to the paper by Qian and Mursula

The paper is aimed to answering the question: how well the F10.7 and F30 solar fluxes represent solar EUV forcing in the thermosphere.

In the Introduction, the authors note that both proxies are often used in studies of long-term changes in the thermosphere and ionosphere.

Section 2 describes briefly the model and experimental data used in the analysis. The model simulation was conducted using the TIME-GCM model with the F10.7 and F30 fluxes as SA proxies. The set of thermospheric density from atmospheric drag observations (Emmert et al., 2021) was used to be compared to the simulation results. The measurements by the GOLD equipment onboard the SES-14 satellite were used to compare with the changes in the F10.7 and F30 fluxes in 2018-2024.

Figure 1 shows a comparison of the F10.7 and F30 solar fluxes over a period of 1961 – 2019. The most important point in Fig 1 is that during this period, F30 increased with respect to F10.7.

A comparison of the modeled (with F30 and F10.7 as a proxy) and observed (derived from satellite orbit changes) mass density for 1967 to 2019 is presented in Fig.2. It demonstrates distinctly that the ratio of two densities increases with time. However, the slope of the linear fit of that increase is much higher for F30 than for F10.7. If only a period to 1996 is considered, the above slope decreases for F10.7 but does not change for F30.The authors discuss the features seen in Fig 2 in terms of changes in the solar EUV fluxes with time.

Further, the authors compare in Fig. 3 the changes in GOLD Qeuv flux during 2018-2024 to the changes in the F30 and F10.7 solar proxies. Analyzing the Qeuv/F10.7 and Qeuv/F30 ratios, the authors note that the linear approximations of this ratio are different for the period of the extended SA minimum in 2018-2020 and the period after it.

Some aspects of the changes in the SA EUV flux related to the aforementioned results are considered in Discussion. For scientists involved in deriving long-term trends in the thermospheric and ionospheric parameters, the most important is the conclusion "…that the F30 flux is more suitable to be used as a solar EUV proxy in thermospheric modeling."

As far as a correct allowance for the SA changes is a very important step in attempts to reveal long-term trends in the thermosphere and ionosphere, the paper under review presents a very important study. I recommend publication of the paper with a minor revision.

My suggestions are as follows.

The increase with time in the ratio of modeled and observed densities in Fig 2c at the first sight leads to an inevitable assumption that it manifests a long-term trend in the density itself. In other words: if the model gives a "correct" density without trends, the real density becomes lower during the later years due to a negative trend in it. I think that such impression could visit many readers, so the point deserves at least a brief comment in the text.

In my opinion, it is worth mentioning that the conclusion that F30 is better than F10.7 has been obtained by several research groups based on the analysis of changes in F2-layer parameter data.