Major recommendation 1

>>>>Line 205ff: "A test was carried out by segregating the receiver stations to three zones: Northern Hemisphere, Southern Hemisphere and the Tropics. This test does not reveal the sources of the positive bias ...". As reader of the manuscript, I am not very happy that the analysis stops at this point. I would have expected that the developed ray-tracer is compared to other existing ray-tracers, e.g. as provided by TU Vienna: https://vmf.geo.tuwien.ac.at/. On line 240 it is concluded that the positive bias "is very likely due to an approximation made in the LTT code". However, no justification for this statement is provided in the manuscript yet. In addition or as alternative, the forecasted refraction field from the OpenIFS system could have been compared to operational forecast data to make clear whether the positive bias is caused by ray-tracing or the input field.

We want to thank the referee for this recommendation specifically, as although the recommendation is centainly valid, this paper was meant to introduce the possibility of directly couple both the Precise Orbit Determination Solver (GROOPS) and the Numerical Weather Prediction Model (OpenIFS), in this case using the ray-tracer of Least Travel Time (LTT). Due to this, we agree on the lack of necessity to add the test with segregated stations, since this is part of a different study and only adds confusion to the reader, thus this sentence has been removed. Once the couple of OpenIFS and GROOPS had been proven, a second study comparing the suggested ray-tracer and the LTT started developing, leading to the improvement of the LTT ray-tracer and to the prove of the validity of such ray-tracer.

Respect to the second part of the recommendation, we would like to appreciate this comment from the referee as we did not notice that the explanation was not given in the introduction, although it was given in Section 2.3 (Slant Delays), regarding our implementation. We have added a brief explanation in the introduction and extended the explanation in Section 2.3, so that now the wording on line 240 has a reference to these explanations.

Major recommedations 2

>>>>Line 250f: The statement that the "azimuthal asymmetries of the tropospheric delay that are present in the experimental system but are missing from the default system do matter and contribute to the orbit solutions" is not supported by the data. The same is valid for line 277f. Please provide the corresponding justification, i.e. by repeating the analysis without azimuthal asymmetries (remove them from the ray-traced delays priori to GNSS data processing).

The main difference between the experimental system and the default system relies in the production of the skyviews. The default system uses a map function that depends on the elevation angle and three constants that change only every certain time, thus it has no variation over the azimuth angle, losing valuable information. In the experimental system the skyview is produced including the azimuth component, so the delays vary with respect the azimuth angle. This effect is expect to be occuring in the skies as the troposphere varies a lot. Including these 'asymmetries' leads to an improvement of the tropospheric model and removing them would mean the elimination of the main difference between both systems. Even though we are trying to show the possibility of coupling a Weather Model to a Precise Orbit Determination Solver, we also would like to show the importance on these asymmetries in the calculation of the slant delays and their posterior effect in orbit determination.

Minor recommedation 1

>>>>Lines 1-6: This part is a bit confusing. I suggest: "Neutral gas atmosphere bends and delays propagation of microwave signals in satellite-based navigation. Weather prediction models can be

used to estimate these effects by providing 3-dimensional refraction fields to ray-trace the signal delays. In this study, a global numerical weather prediction model (Open Integrated Forecasting System (OpenIFS) licensed for Academic use by the European Centre for Medium-RangeWeather Forecast) is used to generate the refraction fields. The ray-traced slant delays are supplied as such for an orbit solver (GROOPS (Gravity Recovery Object Oriented Programming System) software toolkit of the Technical University of Graz) which applies the raw observation method.

We agree with the referee suggestion, as the modifications improve the text and makes it easier for the reader.

Minor recommendation 2

>>>>Lines 10-11: Remove "as measured with the midnight discontinuity of Global Navigation Satellite System (GNSS) satellite orbits" since it is not relevant at this point.

We agree with the referee, and that line will be removed from the text.

Minor recommendation 3

>>>>Line 14: What is meant by "precision-reducing mapping"? Please rephrase.

This part has not been correctly explained, and some text needs to be added. "Moreover, the direct coupling helps in identifying deficiencies in the slant delay computation because the modelling errors are not convoluted in the mapping functions, which can reduce the precision due to the loss of information."

Minor recommendation 4

>>>>Line 155: "Here the LTT solver is applied such that instead of computing ray paths exactly in direction of the GNSS satellites in view, so-called sky-views are generated."

We agree with the suggestion made by the referee, and the modifications will be applied to the text.