Review of paper "The FengYun-3C radio occultation sounder GNOS: a review 1 of the mission and its early results and science applications" by Yueqiang Sun et al.

The paper reviews the Global Navigation Satellite System (GNSS) occultation sounder (GNOS), data processing, data quality evaluation, and research applications. The data validation demonstrates that the FY-3C GNOS mission can provide atmospheric and ionospheric RO profiles of a quality that is reasonably good for numerical weather prediction (NWP), global climate monitoring (GCM) and space weather research (SWR). The paper can be published after minor revisions, mostly consisting in providing statements that are more accurate, as well as missing definitions.

Page 8: What is the motivation for the 100 Hz sampling rate in open loop? Is it optimal?
Page 12: *The radio occultation processing package (ROPP) software (V6.0) developed at ROM SAF (radio occultation meteorology satellite application facility) is used for this purpose. More specifically, from the excess phase the Doppler frequency can be obtained, then the bending angles are determined from the Doppler frequency shift and the corresponding satellite positions and velocities (e.g., Kursinski et al., 1997).*
Does not ROPP utilize the technique based on Fourier Integral Operators?
M. E. Gorbunov and K. B. Lauritsen, Analysis of wave fields by Fourier Integral Operators and its application for radio occultations, Radio Science, 2004, 39(4), RS4010, doi:10. 1029/2003RS002971.
Page 13: *However, there are some higher-order ionospheric effects that still remain in the bending angle profiles (Kursinski et al., 1997; Liu et al., 2013, 2015, 2016, 2017a). To reduce the ionospheric residual errors and other small-scale noise, the statistical optimization technique is used together with the MSISE-90 climatology model. An optimal linear combination is expressed as a matrix equation to compute the neutral atmospheric bending angle and the ionospheric bending angle.*
The term "optimal linear combination" was used be M.Gorbunov. See:
M. E. Gorbunov, Ionospheric correction and statistical optimization of radio occultation data, Radio Science, 2002, 37(5), 17-1–17-9, doi: 10.1029/2000RS002370.
Provide more detail on your optimal linear combination. In what terms is the "matrix equation" formulated?
Page 14: *When GNSS signals transmitted through the ionosphere from GNSS satellites to the FY-3C 14 satellite are bent and delayed …*
It is better to say that bent are the signal propagation paths rather than the signals themselves.
Page 14, Eq. (5). Add some comments on accuracy of this inversion. How large are effects due to horizontal gradients, and the contribution of the ionospheric layers above the LEO.
Page 16–17: *The statistical BDS and GPS GNOS RO data analyses, by using 17 pairs of 22 BDS/GPS GNOS RO events in a week, showed that the BDS/GPS difference standard deviation of refractivity, temperature, humidity, pressure and ionospheric electron density are lower than 2 %, 2 K, 1.5 g/kg, 2 %, and 15.6 %, respectively. Therefore, the BDS observations/products are in general consistent with those from GPS (Wang et al., 2015).*
Are there any systematic differences?
Page 18: How can you explain the difference between the lower-tropospheric bias structures in Figures 5 and 6?
Page 17 and 19: "mean bias" and "average bias" should probably refer to the same quantity. Is it defined as systematic difference averaged over a height interval? If so, such a quantity is not very informative. More interesting is the maximum bias.
Page 20: Define NmF2 (maximum electron density in F2 layer).
Page 22: Define hmF2 (the height of the F2 maximum).

Page 21: The black lines in Figure 8 can hardly be seen under the blue lines. Consider using a different representation, e.g. differences of anomaly correlations.
Page 21–22: *Figure 9 shows an evaluation score card of the effects of the GPS and BDS FY-3C GNOS RO data … better … worse"*
Is it GPS that is better/worse than BDS? The difference between "Far better/worse" and "better/worse" can hardly be seen. Provide the definition of "far" and "not significant".