

## ***Interactive comment on “Evaluation of atmospheric profiles derived from single- and zero-difference excess phase processing of BeiDou System radio occultation data of the FY-3C GNOS mission” by Weihua Bai et al.***

**Anonymous Referee #3**

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This paper introduces, in a comprehensive way, the data processing of the first Beidou-based Chinese radio occultation mission - FY-3C GNOS and 3-month data were used for the study/data processing. The two strategies of data processing investigated are zero-differencing and single differencing. Differencing is a standard data process strategy in GNSS data process to mitigate (or cancel out) the various errors (e.g. signal generation/emission, signal propagation, signal transmission and signal reception) inherited with the technology. Various analyses of the atmospheric profiles based on the single- and zero-differencing data processing strategies and using three months'

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data, are carried out to evaluate the quality of BDS GNOS RO data and the robustness/quality of the zero-differencing data processing method. By comparing with ECMWF model and co-located radiosonde data, the BDS GNOS atmospheric profiles derived are fairly consistent.

Data processing algorithms are introduced in a fairly detailed way. The analyses are described and presented in a logical and clear manner. The discussions are comprehensive albeit some further clarification is needed. The conclusions given from the analysis are sound and reflect the current state-of-the-art in the field.

Following are my other comments/suggestions for correction

1) FY-3 C GNOS receivers can receive both the GPS and BDS signals for navigation and occultation modules, therefore GNOS provides a different way to validate its BDS RO data (i.e. based on the zero-difference processing and GPS RO retrievals). I wonder the reason why not to use the GPS GNOS RO retrievals to validate BDS's counterparts?

2) The current coverage of Beidou is regional. It would be great if the authors can comment over the issue of limited coverage of the Beidou system and how it affects the ROE occurrence?

3) Technical Corrections - Define the acronym for GRAS, GEO, IGSO and etc. when they appear in the first place in the text and use the acronyms thereafter. - Page 3, lines 13-14: the word "satellites" is repeated - Page 13, line 10: It looks like you might be missing a reference here. - Page 16, lines 4-5: Should be Allan deviation (ADEV), not Allen variance. - Be careful with some reference formats and typos. - be careful in using the differential technique, you need to be consistent to use differencing or differenced or difference. They do have minor differences. The "single-different" in figure 5 (a)/(b) is NOT right. - the title of the paper looks awkward and it needs to change "processing" and "data" need to be "data processing" - GNSS is commonly referred to The Global Navigation Satellite Systems (plural!!!) - the language usage

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ness to be sharpened and grammatical problems are spotted. - "sub-global" needs to be replaced as "regional"

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