

Interactive comment on “Assessments of land subsidence along Rizhao-Lankao High-speed Railway at Heze, China between 2015 and 2019 with Sentinel-1 data” by Chuanguang Zhu et al.

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Dear Referee and Editors,

We gratefully thank you for your constructive remarks and useful suggestion, which has enable us to improve the manuscript. Our responses and revisions are as follows:

1-Some of the figures need to be fixed through not good visibility and some algorithms used need references.

Response: Thanks a lot. These suggests are very helpful. We have supplemented some essential references according to the direct notes on the manuscript. According

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to the comments, we have also updated the Fig.9 and Fig. 10, which can be checked on the attached supplements.

2-Maybe it's quite interesting to show results from a GNSS Time-series compared to InSAR results to validate the findings.

Response: Thanks a lot. It's exactly as you said that in-situ measurements (collected from GNSS or precise leveling) are generally used to evaluate the accuracy and precise of InSAR results.

Unfortunately, no in-situ data is publicly available in the study area until now.

Therefore, we assessed the consistency and precision of InSAR results by a cross comparison of displacement rates derived from different datasets (i.e., S1-40 and S1-142). 232, 984 common MPs are finally identified. Based on so many common MPs, we calculated the Pearson correlation and the differences (i.e., the mean and standard deviation) of the two measurements. The statistical calculation shows that the two measurements agree well with each, which suggest the availability and reliability of InSAR results.

3-The hypothesis that the ground subsidence is caused by both the hydraulic head change and the seasonal groundwater variations and also that the time lag is induced by the groundwater level increases arising from the seasonal precipitation needs more data to be clear and a graph of temperature and humidity along with the other three graphs is missing.

Response: This is a very good and professional suggest. Thanks a lot. We have supplemented the time series of the groundwater level (page 10, line 33-34; page 11, line 4-6; page 12, line 11; Fig. 7a and 7b). Fig.7 can be checked on the attached supplements.

However, the aquifer's detailed information is not public, we only have access to shallow groundwater data collected from July 2016 to July 2017 and deep groundwater

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data collected from July 2015 to October 2017. Nevertheless, the limited groundwater information confirms our hypothesis.

We acknowledge that the temperature and humidity is related to the precipitation. However, we have obtained the detailed time series precipitation, which is enough to investigate the relationship between the subsidence and the groundwater and precipitation. So we don't perform the analysis of the temperature and humidity. We look forward to hearing from you regarding our submission. We would be glad to respond to any further questions and comments that you may have.

Please also note the supplement to this comment:

<https://nhess.copernicus.org/preprints/nhess-2020-176/nhess-2020-176-AC2-supplement.pdf>

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