RE: NHESS-2021-35

We thank Deodato Tapete and two anonymous reviewers for their invaluable comments that have helped improve our manuscript. Our responses to the comments are highlighted in bold. Please refer to the tracked-change version for the line numbers addressed in this letter.

RC1 (Anonymous Referee #1)

This paper evaluated the subsidence of Wuhan during 2015-2019 with Sentinel-1 InSAR dataset. They find the distribution of deformed areas are spatially correlated with engineering geological regions and rapid urbanization. Moreover, they discovered the time series displacements of karst areas are affect by the Yangtze water level variations. This research fits the scope of *NHESS* and I suggest a minor revision. My detailed comments are listed as follows:

1.In Section 4.6，©Google Earth™ images are acquired at July 2013 and time-series analysis starts from 2015.4，Whether the construction date can be explained in detail in order to better explain the accelerated deformation(As described in line 252-257).

Yes, we updated Figure 12 and corresponding text in section 4.6 (Line 251-255) to better explain the accelerations. Optical images acquired in August 2016 and December 2017 are shown in Figure 12(c) and (d). The also updated Fig. 8.

2. Line 261, the authors proposed water level correlated displacement might exist in the first terrace. Can you show us some examples?

Previous study by Li et al. (2013) and Chen (2016) indicated the groundwater level in the first terrace correlate with river level. Han et al. (2020) and (Bai et al. 2016) also identified water level correlated displacement in the first terrace covered by soft soils. In our opinion, the water level related displacement should exist along banks of rivers.

PS pixels located on natural ground can be selected to analyze the interaction between subsidence and river water level. However, the bank area was flooded in July 2016 caused by concentrated rainfall. As a results, very sparse pixels are detected on the natural ground as we can see from in Figure 8(a) and 10(a).

The pixels we selected on manmade structures as shown in Fig. R1 at the bank of Yangtze River shows obvious seasonal signal which might correlated with river level. However, we cannot exclude the thermal impact caused by temperatures which is very common in manmade structures. Therefore, the relationship between displacement and water level in the first terrace were not given in the manuscript.

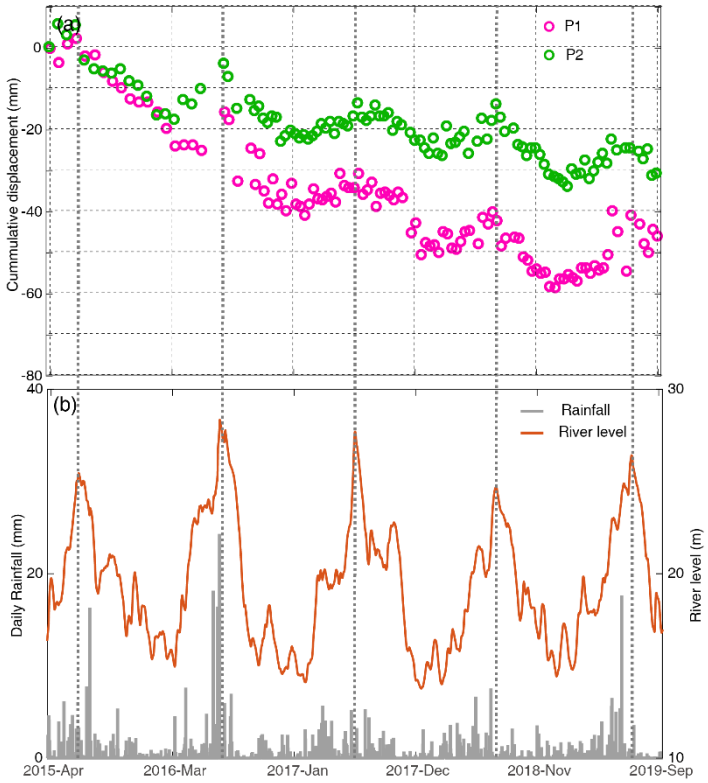

Fig.R1 (a) Cumulative subsidence of selected points P1 (lon=114.2749, lat = 30.5100) and P2 (lon0 = 114.2369; lat0 = 30.4634), (b) Water level of Yangtze River and rainfall.

3. The authors should carefully check the type errors. The legend and scale in subsidence rate map should be consistent (eg. section 4.5, 4.6).

We check our manuscript carefully and correct all the type errors and updated figures.

4. Line 279, “The subsidence of HH1 might be dominant by construction activities.” After 2017-Dec, the interaction between river level changes and subsidence is not so remarkable at point HH1, can you describe the construction activities details or activities which were different from QL1?

In our opinion, HH1 is affected by human activities and QL1 is correlated with rainfall or river water level. We rearranged section 5.2 (Line 300-312).

The subsidence of HH1 is dominated by continuous construction activities which can be inferred from Fig. 7(c) and (d) and Fig. S4. Many land conversions occurred during 2015 and 2019 in Fig. 7(c) and (d). The subsidence of HH1 was caused mostly by the deep foundation pit dewatering. Construction activities were observed at the area marked by the red rectangle located extremely near HH1 during February 2016 and December 2017. Although we don’t know the exact data of construction activities, accelerations was observed at HH1 after January 2017.

The construction intensities at QL1 are extremely low than that of HH1 during 2015-2019. At the meantime, many of karst collapse caused by natural factors, such as rainfall and water level, were observed in Qingling area. The displacement of HH1 was originally very small before 2016. The trigger factor of the accelerations might be the extremely rainfall. Since then, the displacement of HH1 presented clearly seasonal patterns.