To Reviewer#1

**Comment 1**: First of all, the bibliography related to previous research of GNSS in deformation monitoring is not based on high quality previous studies. More specifically, there are experimental studies of Psimoulis (Psimoulis et al. 2008, Journal of Sound and Vibration, Psimoulis and Stiros, Computer-Aided and Civil Infrastructure Engineering, Psimoulis et al., 2018, Geophysical Journal International), Haberling (Haberling et al., 2016, Journal of Geodesy) and Moschas (Moschas et al., 2014 Earthquake Engineering and Structural Dynamics, Moschas and Stiros, 2015 GPS Solutions) related to the assessment of the accuracy of GNSS measurements for structural/dynamic motion monitoring, which should be cited. Also, studies of Xiaolin Meng and others (Gethin Roberts) related to bridge monitoring (Meng et al., 2018 Sensors, Meng et al, 2019 Remote Sensing, etc.). Regarding the application of lowcost GNSS receivers, apart from the studies of Gili et al., there is the study of Xue et al., 2021 (Journal of Applied Geomatics), which analyse more extensively the accuracy of low-cost GNSS receivers.

**Response**:

These contents have been added to the revised manuscript according to your comments. Please refer to **lines 216-224** for detail.

**Comment 2**: There is a very thorough explanation about the Bayesian Inference method, the MCMC method and EKF method, which is very useful for readers who are not familiar who these methods. However, the EKF is presented for the explanation of how the GNSS data are processed. Since, the paper is not focused on that, but on the analysis of the GNSS timeseries, and the GNSS data are processed with RTK-Lib, there is no need to present EKF method.

**Response**:

Related content has been added to the revised manuscript according to your comment. Please refer to **lines 339-341** for detail.

**Comment 3**: The experiments are explained clearly and the application of the methodology is demonstrated. The GNSS time-series are known to be sensitive in long-period noise, mainly due to troposphere, ionosphere and multipath effects. The authors mention that the shortbaseline will limit the ionosphere/troposphere effect (but potentially not eliminate), while the multipath effect will remain. To my view, the GNSS time-series can be more noisy, which could make even more challenging the identification of the displacement. The results seem realistic. However, the experiments could be more controllable in order to avoid potential vibration of the plank, which was not part of the experiment. The authors should check, whether these fluctuations of the GNSS time-series, which do not coincide with the applied displacement, are not the result of changes in the satellites constellation/geometry, cycle slips, etc. These are sources of errors of the GNSS data with similar characteristics (see Msaewe et al., 2018, Roberts et al., 2018, etc.).

**Response**:

Related content has been added to the revised manuscript according to your comment. Please refer to **lines 339-341** for detail.

**Comment 4**: Furthermore, the authors only assess the proposed methodology on the vertical component, which generally is the least accurate of all the component of the GNSS data. It would be good to have a couple of tests for horizontal displacement, which can be potentially easier to control.

**Response**:

此外，作者仅对垂直分量的拟议方法进行评估，而垂直分量通常是全球导航卫星系统数据所有分量中精度最低的。最好进行两次水平位移测试，这可能更容易控制。

Related content has been added to the revised manuscript according to your comment. Please refer to **lines 339-341** for detail.

**Comment 5**: The manuscript needs improvement mainly in the justification of the results and the introduction. The topic is interesting, but further improvement is required, in order to be the material publishable.

**Response**:

手稿需要改进，主要是在结果的合理性和介绍方面。

这个主题很有趣，但还需要进一步改进，以使材料能够出版。

Related content has been added to the revised manuscript according to your comment. Please refer to **lines 339-341** for detail.

----------------------------------------------------------------------------------------------------------------------

To Reviewer#2

**Comment 1**: Highlight is not expressed correctly. For example, "Displacement is an important parameter in engineering analysis" is just a background, not the focus of the article.

**Response**:

突出显示未正确表达。

例如，“位移是工程分析中的一个重要参数”只是一个背景，而不是本文的重点。

**Comment 2**: In the second section, the authors introduced some classical theories such as Bayesian inference and Monte Carlo algorithm. Is it necessary to expand them in detail? Instead of writing down all the theories, the authors' contribution should be emphasized.

**Response**:

This section has been revised according to your comment. Classical theories such as RTK and MCMC have been simplified and only the processing options related to them have been retained. The probability model for displacement detection has been kept and emphasized. In addition, the structure of this section has been reconstructed for better presentation.

**Comment 3**: Is Bayesian inference the first time used in GNSS based displacement detection? Compared with previous studies, what is the greatest benefit of using Bayesian inference? The authors should explain it in detail.

**Response**:

Thank you for your constructive comments. Related content has been added to the revised manuscript according to your comment. Please refer to **lines 294-299** for detail.

**Comment 4**: In the introduction, the author points out that there are more researches on long-term displacement detection based on GNSS, but less researches on short-term displacement detection based on GNSS. How does the authors define long-term and short-term? Is there any essential difference between the two detections? In my opinion, the data processing should not be fundamentally different.

**Response**:

Definitions of long-term and short-term displacement detection have been added according to your comments. Yes, as in your opinion, the data processing procedures of the two are the same. The main difference between the two is that the static positioning accuracy of GNSS is higher than that of kinematic positioning. The long-term periodic displacement detection focuses on the long-term seasonal displacement change, and the short-term displacement detection focuses on the real-time near real-time sudden displacement detection. Therefore, the displacement detection probability models used in Bayesian displacement detection are different.

Please refer to **lines 64-68** for detail.

**Comment 5**: The author proposes that the displacement can be determined in a short time by Bayesian inference. Compared with the previous method, how much faster is it? Clearer comparative results should be given.

**Response**:

作者提出，通过贝叶斯推理可以在短时间内确定位移。

相对于指标方法的优势是鲁棒性和灵活性

与以前的方法相比，它快了多少？

它的优势并不是在速度上。

应该给出更明确的比较结果。

**Comment 6**: With respect to the displacement control platform proposed in Figure 7, what is the displacement control accuracy? Please provide more information.

**Response**:

**Comment 7**: The expression should be improved.

**Response**:

**Thank you again for your advice and hope to learn more from you.**

**Best wishes.**