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Dear Editor,

In this new version, we tried to include as much as we could the comments from the reviewers. We modified Figure 3 and did our best to satisfy the others issues even though reviewer #3 gave very little guideline in order to better incorporate geological/geomorphological data into the interpretation of the modelling (we added a full paragraph to discuss the creep process in the last section). Below, we answer in more details to the remarks you made.

Yours sincerely,

O. Cavalié, F. Cappa, and B. Pinel-Puysségur

Detailled answer to the editor comments

1. *Fig 3: both reviewers addressed the same issue and you added only two words in the captions. This has to be changed in the figure and not in the caption. Thus, I request to change the figure accordingly because two experts in the field it is not clear.*

   As I explained in the precedent letter, I initially was not inclined to change the sign of the deformation as the new representation clashes with the classical creep process representation (reviewer #2 let us the choice : "The authors can decide whether they will change the figure"). However, now we modified the figure accordingly and changed the sign of the deformation (we kept the colorbar, as it is largely used by the community). Finally, we think it's better to adapt the color-scale range for the three maps to visualize more accurately the deformation pattern. Actually, as the displacement range is twice larger for the ERS data than for the Sentinel-1 data, very little details is visible if we keep the same colorscale range (see figure below) and we can't realize that the deformation pattern stay very consistent from one period to another. Amplitude of the platform displacement is shown on the figure 3d and rates are explicitly given in the text.

2. *You did not address the comment about the lacking relevant novelty of reviewer # 3, neither in the response nor in the manuscript. He/she provided further ideas what additional information could be helpful. I kindly ask you to add more and convincing information about that in your response file and in the manuscript. If this is not*

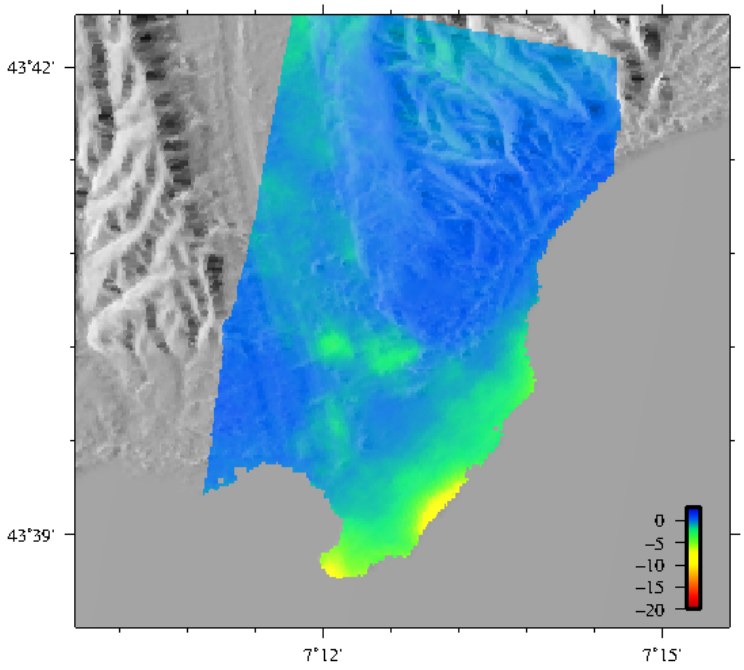

Figure 1: Projected vertical ground velocity (mm/yr) measured from Sentinel-1 (2015-2020) data with the ERS color scale range

the case I have to consider to reject the manuscript because this is one of the main objectives of NHESS journal

We are sorry that we did not take into account this comment of the reviewer # 3 who wrote : "The article, altough (sic) does not present any relevant novelty, just relying on the long-lasting availability of InSAR data, which is pretty common and diffuse nowadays, and on a creep modeling, shows an interesting case study which, in my honest opinion, deserves to be more analyzed".

We forgot to answer this point partly because, we insisted largely in the previous review about the novelty of this study. We respectfully disagree with reviewer #3 (for the first part of his assertion). Even if there is nothing utterly new in the article (except for the new data), the state-of-the-art InSAR processing combined with a physical interpretation of the coastal subsidence make this article very innovative. We tried to make it clear in the manuscript (in the version we highlighted in bold font what makes this study innovative) and below, we summarize the innovative aspects of the article :

- It is true that few studies present also long InSAR time series, but it is still extremely rare (compared to all the published InSAR studies and not yet "pretty common and diffuse nowadays"). What is new here, is that extending the observation window (from ∼10 to ∼30 years) reveals non-linear behavior of the deformation that couldn't be observed before. We also used the software Mulsar

developed by B. Pinel-Puyessgur to enhance the stability of the interferometric phase for the ERS data (the oldest dataset) and thus to improve the phase unwrapping. This is a crucial point in the InSAR processing to get reliable measurement. Noise analysis show a very low error bar in our measurement that make this InSAR data set of great quality.

- Among the dozens of article we read about coastal subsidence, this is the first time that a physical process is modelled with a rheological law. Here, we give a physical insight about the on-going deformation. Using a rheological law, we are able to find consistent mechanical values to properly reproduce the ground movement.

- Regarding the InSAR data. Very few InSAR studies analyse the error/uncertainties they get on the measurement. Here we estimate the uncertainty on the InSAR data with two independent methods. And they both give consistent results. I think it is a very nice side result. And it lends credence to the overall study.

- To conclude, several articles have been published about the undersea slope of the NCA airport platform, but only one study exists about the deformation of the emerged part of the airport (cavalié et al., 2015). Here, we show (as said previously) how increasing the temporal window of observation (and thus new data) allows to give a physical insight of the observed deformation.

Last, most papers that uses InSAR to study subsidence (but is also true for landslides, volcanoes or earthquakes) do not present relevant novelty on the processing point of view or modeling. The novelty in these papers consist more on the processed data and the study case. The more studies on subsidence (or landslides, volcanoes etc...) with new data and modelling, the better the comprehension of these phenomena.

3. *You added the requested information about the geological and geomorphological characterisation but this issue was not further addressed in the discussion or how additional information (available or if they were available) would allow a more comprehensive discussion. Therefore, I kindly ask you to include this in the discussion.*

   A full modelling of the airport platform in order to better quantify the risk of failure is very complicated and is beyond the scope of this paper. However, we added a full paragraph in the last section to discuss what factors could trigger the failure of the airport slope and what experiments and data could better evaluate this hazard.

4. *Please include the LOS as requested by reviewer # 3.*

   Done

   We believe that the additional paragraph in the discussion bring valuable information about the physical mechanism at play for the NCA airport deformation. And we hope that this new version will satisfy the NHESS expectations.