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Dear Referee,

Thank you for the positive review. We modified the manuscript accordingly to yours comments and answered your questions below.

Yours sincerely,

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

1. *My main suggestion is to insert a geological section, even simplified, of the area under study so that you can better confirm your hypotheses about the processes in place.*

Effectively, we didn't discuss the geology in this paper as we did it for the first paper (Cavalié et al., 2015). But, we agree that it would be good to add few elements and to refer specifically to the figures of the previous paper to backup the hypothesis of subsidence compaction. We added this section in the introduction :

Cavalié et al. (2015) published a first study showing that between 2003 and 2011 (the acquisition period of Envisat) **the Var delta as well as the airport that is located at its mouth, is subsiding. The spatial extent of this subsidence is strictly limited to the quaternary alluvium deposits of the delta and Var riverbed (Figure 4 in Cavalié et al. (2015))** Actually, on both sides of the riverbed, the subsidence rate quickly drops to zero where the transition from alluvium to conglomerate occurs. Moreover, the downward displacement rate increases toward the sea as the sediment layers get thicker and more recent (Figure 6 in Cavalié et al. (2015)). Indeed, it ranges from less than 1 mm/yr in the Var valley to a maximum rate of 10 mm/yr on the airport platform where sediments got brought in the 1970s to built the runways.

2. *I would also suggest that you include some references to the theoretical bases concerning creep phenomena (consolidation processes?) in clayey soils, appropriately accompanied by bibliographical references.*

Soils and rocks can exhibit creep behavior, which is the development of time-dependent strains at a state of constant effective stress (Bland, 1960; Findley et al., 1976; Jaeger and Cook, 1979). Creep behavior influences the long-term stability of grounds and movement of slopes. This time-dependent material behavior exhibits viscoelastic or viscoplastic

characteristics that can be reproduced with different creep models of increasing complexity depending on the type of material and loading conditions (Jaeger and Cook, 1979). Several constitutive laws have been introduced in the past to study creep and this still is an active field of research in the rock physics labs and geophysical field studies.

Creep is the tendency of solid material to deform permanently under certain load that depend on time and temperature. Typical creep process has three phases which are primary creep (creep rate decreasing over time), secondary creep (constant creep rate) and tertiary creep (increasing creep rate until failure) as shown in Fig. 5a.

In this work, tertiary creep is not modelled. We used the Burgers model, composed of a Kelvin model and a Maxwell model (Jiand and Wang, 2022), which is well adapted to accurately describe the characteristics of the primary and secondary creep stages (Jaeger and Cook, 1979), a behavior representative of the surface displacement measured by InSAR on the airport platform. A number of research works have previously demonstrated that this creep model was successfully used to model deformation of soils and surface displacement of landslides (You et al., 2013; Liao et al., 2022)

Bellow are the new references that we added in the manuscript :

- Bland, D. R., The Theory of Linear Viscoelasticity, New York: Pergamon Press, 1960.
- Findley, W. N., J. S. Lai, and K. Onaran, Creep and Relaxation of Nonlinear Viscoelastic Materials, New York: North-Holland Publishing Company, 1976.
- Jiang Z., Wang H., 2022, Study on Shear Creep Characteristics and Creep Model of Soil-Rock Mixture Considering the Influence of Water Content, Front. Phys., 21 June 2022, Sec. Interdisciplinary Physics Volume 10 - 2022, <https://doi.org/10.3389/fphy.2022.819709>
- Liao, M., Cui, D.; Bao, X., Qiao, Z., Zhao, C. Creep Characteristics of Soil in the Sliding Zone of Huangtupo Landslide. Appl. Sci. 2022, 12, 12439. <https://doi.org/10.3390/app122312439>

### 3. *Title and other comments*

We agree that starting with 28 years is not the best way for a title. As the duration of the subsidence is important, we change for :

”Three decades of coastal subsidence on the slow-moving Nice-Côte d’Azur airport area (France) revealed by InSAR : Insights into the deformation mechanism”

We also modified the manuscript according for your comments.

- L25: done
- L44: There are actually 2 brackets and global isostatic adjustment and tectonics are included in natural phenomena
- L48: We added a recent reference
- L63: The comment focused only on the constant rate and not on the nature of the phenomena

## References

Cavalié, O., Sladen, A., and Kelner, M.: Detailed quantification of delta subsidence, compaction and interaction with man-made structures : the case of the NCA airport, France, *Nat. Hazards Earth Syst. Sci.*, 15, 1–12, <https://doi.org/10.5194/nhess-15-1-2015>, 2015.