[R2.1] *In passing from (5) to (6) it seems implicitly assumed that L in the RHS of (5) is constant when integrating, whereas the resulting expression (6) implies that a substantial evolution of L is possible. Could the problem be closed by presenting an equation such as dL/dphi = f(L, phi)?*

Unfortunately, when taking variations in L with ϕ into account, the integration of (5) does not yield an analytical solution for the porosity (or ΔL). We comment on this, and justify an assumed constant value of L in lines 98-102 of the revised manuscript:

"*While we recognise that L varies with ϕ, integration of (5) does not yield an analytical solution when taking $L = f(\phi)$. Fortunately, as will be shown later, we find that the inferred variations in L are of the order of 10-20% of the absolute value of L, warranting a first-order approximation of a constant value of L. By integrating the above relation from the initial porosity ϕ_0 up to ϕ (c.f. van den Ende et al., 2018), and recognising that $\Delta L/L = (\phi - \phi_0)/(1 - \phi)$ (for $L \approx L_0$), we obtain an expression for the dilatancy ΔL as a function of slip δ*"

[R2.2] *Equation (11): wouldn't the linear stability analysis results of Ruina, in which (b-a) takes the place of (b) in (11), provide a more relevant critical stiffness close to steady state?*

In this section, we evaluate the criterion for unstable slip, which may be either seismic or aseismic (e.g. in the form of a slow slip transient). The Ruina-criterion (in terms of (b-a)) provides a criterion for a seismic slip instability, which is harder to derive and thereby less illustrative for the purpose of this section. Moreover, since we did not include a time-dependent compaction mechanism in our simplified CNS formulations, the model system is unable to attain steady-state, which precludes a derivation following the approach of Ruina. For a detailed analysis of the stability of a CNS system, we now include a reference to the work of Chen & Niemeijer (2017) in lines 259-260.

[R2.3] *Could the authors flesh out more directly why there is such a strong dependence on the initial porosity (e.g., Fig. 4)?*

In the original manuscript, it was already mentioned in lines 150-152 that the exponential sensitivity of the slip rate to porosity leads to critical behaviour. We've expanded on this by stating (lines 155-156 of the revised manuscript):

"*Since the rate of increase in porosity is proportional to the shear strain rate, which in turn is an exponential function of porosity (refer to Eq. (1b) and (3)), the positive feedback loop leads to an extremely rapidly diverging state.*"

[R2.4] *Line 94, typo: "an"*

Corrected