

## ***Interactive comment on “A mechanism for dust-induced destabilization of glacial climates” by B. F. Farrell and D. S. Abbot***

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In his comment Ditlevsen suggests that in Fig. 1a stadials be identified with state 3 and the inflection point in our precipitation rate at dust factor near 25 be identified with the unstable fixed point in our Langevin model at  $x = 0.5$  in Fig. 2a. The simplicity of this identification is attractive but we believe that, as explained in the discussion section of the paper, there is too little dust source area available for activation to reach these levels of dust loading, which would correspond to inception of a global glaciation, as the tropical temperatures in this state indicate. While global glaciation states are possible and have occurred in Earth’s history, they are not the subject of this paper. The transition point we chose, which is consistent with the ice core data, corresponds to dust load 10x modern values rather than 25x. As a result state 3 is not reached, and

stadial corresponds in our model to dust factor 10 rather than 25.

We chose the time scale for transitions to be 1600 years in agreement with the typical waiting time for transitions of between 1000 and 2000 years as given in [1].

The temperatures are thermodynamic temperature in Celsius in Fig.1a rather than potential temperature, this has been corrected.

[1] P. Ditlevsen. Climate transitions on long timescales. Contemporary Physics, 50:511–532, 2009.

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Discussion Paper