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Identifying drivers controlling the synchronicity of Heinrich-type ice sheet surges from the European and North American ice sheets

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Heinrich-type ice sheet surge events are among the most prominent signals in the paleoclimate data records. Even though these events have previously been intensely studied, it still remains an open question whether the cyclic ice sheet surges are triggered by internal ice dynamics, climate forcing, or a combination of the two. In simulations of the last deglaciation using the fully-coupled Max Planck Institute Earth System Model, surges from the European and North American ice sheets often occur in synchronicity. This model behaviour is in agreement with observations from sediment cores that find a similar pattern in the isotopic fingerprint of the deposited ice-rafted detritus. The synchronicity indicates that climate forcing is playing an important role in initiating ice sheet surges. In this study, we use the coupled ice-sheet-solid earth model PISM-VILMA in a northern hemispheric setup to investigate the modelled synchronicity of the surge events. More specifically, we perform an ensemble of simulations to study if the modelled synchronicity is a direct result of one of the surge locations causing other surge locations to be a activated as well. Moreover, we aim to investigate whether previously suggested trigger mechanisms such as regional changes in sea level or ocean temperatures are indeed key processes in controlling the synchronicity of these surge events.