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Towards investigating the race of two Marine Ice instabilities: Sheet vs. Cliff

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Due to ocean warming in the Amundsen sea, pine island glacier and thwaites glacier could lose their buttressing ice shelves in the near future. This would lead to glacier retreat through the marine ice sheet instability and could be accelerated by additional cliff calving (marine ice cliff instability). Using the Parallel Ice Sheet Model (PISM-PIK) we investigate this in a regional setup of the West Antarctic Ice Sheet. We remove floating ice in the Amundsen sea and investigate the resulting glacier retreat without additional cliff calving and with cliff calving with a range of maximum calving rates. We find that without additional cliff calving, the removal of the ice shelves in the Amundsen sea leads to a glacier retreat that is equivalent to 0.4-0.6m of sea level rise in 100 years, consistent with earlier simulations of other models (ABUMIP and LARMIP-2). Cliff calving can more than double this number.