



Interaction of marine ice-sheet instabilities in two drainage basins

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Recent regional simulations and observations suggest a destabilization of the Amundsen Sea sector of West Antarctica. Whether the initiated ice drainage will be limited to Pine Island and Thwaites basin or extend to the Filchner–Ronne or Ross basin depends on the possibility of an interaction of the different drainage basins. Using a conceptual flow-line geometry, we investigate the possibility of whether a marine ice-sheet instability (MISI) can be triggered from the direction of the ice divide as opposed to coastal forcing and investigate the interaction between connected basins. We find that the initiation of a MISI in one basin can induce a destabilization in the other. The underlying mechanism of basin interaction is based on dynamic thinning and a consecutive motion of the ice divide which induces a thinning in the adjacent basin and a successive initiation of the instability. Altering the central bed elevation we find that the extent of grounding line retreat in one basin determines the degree of interaction with the other. We conclude that for the three-dimensional case the possibility of drainage basin interaction on time scales in the order of 1 kyr or larger cannot be excluded and hence needs further investigation.