



Accelerated retreat of Pine Island Bay glaciers, West Antarctica

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Pine Island Glacier accelerated 34 percent between 1996 and 2006. Comparison with model predictions from Thomas et al. (2004) suggest that the glacier grounding line may now have retreated over its entire ice plain. This means that the glacier is now at the edge of retreating into the deeper, well lubricated interior basins, which would significantly increase its discharge in years to come, and possibly double or triple its speed. The glacier acceleration was larger in 1996-2006 than in the prior 2 decades. Its neighbor Smith Glacier sped up 75 percent during 1996-2006 and its grounding line must have also retreated considerably over the ice plain. Meanwhile Thwaites Glacier is widening, and the progressive collapse of its eastern ice shelf suggest the glacier width could double in years to come. Total discharge from this sector increased 21 percent in 10 years, but the loss increased 120 percent from 39 ± 15 to 85 ± 25 Gt/yr. Long-term velocity changes reveal that the mass loss was near zero in the 1970s, which suggest that a dramatic change in ocean properties near the glacier grounding lines took place around that time. This coincides with a period of more positive Southern Annual Mode oscillations, which indeed tend to favor upwelling of heat water sources on the continental shelf. The glacier acceleration and mass loss are on a strong upward trend at present, with no sign of stabilization.