# Ice/ocean interface wants YOU!

#### March 10, 2002

B22 iceberg breaks off of Thwaites' ice tongue. Melt & undercutting from the ocean along with crevasses (from motions such as tidal flexure) weaken floating ice. Loss of floating ice results in a decrease in buttressing, giving rise to upstream speed-up and thinning, that eventually initiate grounding line retreat. Images from NASA.

**B22** 



Crevassing on Thwaites, '14. Jim Yungel

 Many underrepresented processes that occur at or near the ice/ocean interface propagate far upstream, affecting glacier dynamics:

*Buttressing* capacity of floating ice tongues is weakened by subshelf melt & calving....

*Calving* is modulated by undercutting & distribution of crevasses arising from tidal flexure & grounding-line dynamics...



Fig. 2. Schematic of key drivers and some of their effects for the Thwaites Glacier – Amundsen Sea region.

#### From Scambos et. al., 2017.

The ocean is a critical modulator of dynamics on Thwaites glacier, as well as many other outlet glaciers. Many of these ice-ocean interactions are not captured in models of this key outlet glacier. These ocean forcings evolve with time, affecting dynamics upglacier.

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Grounding-line dynamics are largely a function of basal sliding...

*Basal sliding* in the grounding zone is altered by lubrication beneath the ice...

...the list goes on!

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Without detailed time-evolving ocean forcing in models, we miss critical feedbacks that

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## could alter stability tipping points of key outlet glaciers.