

NNV Energie- en Klimatsymposium, 9 juni 2017

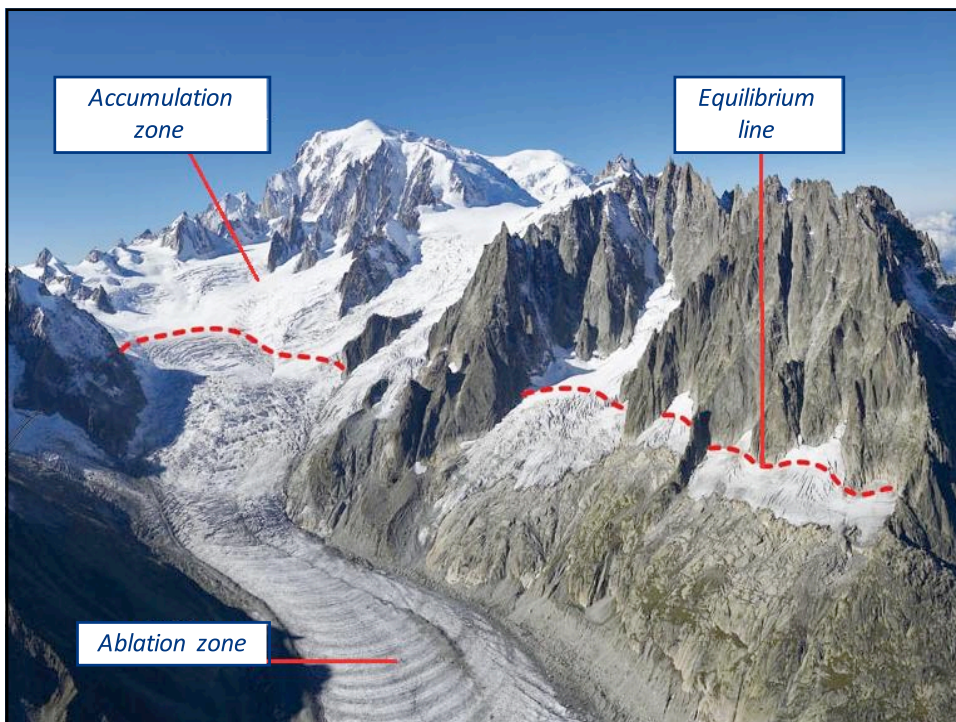
Kantelpunten in het smeltgedrag van ijsskappen

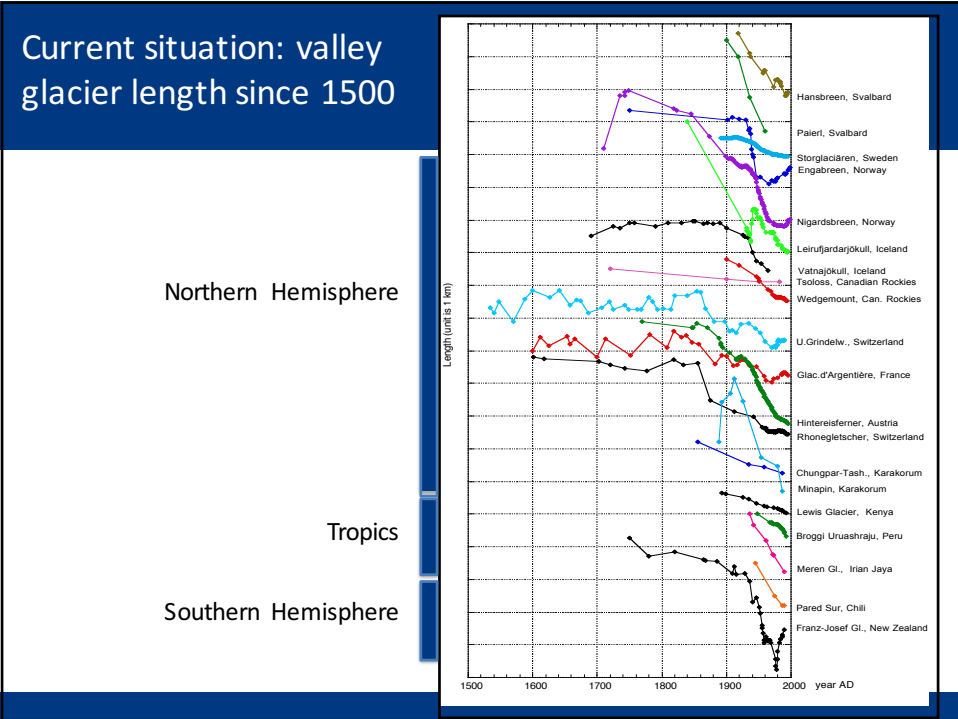
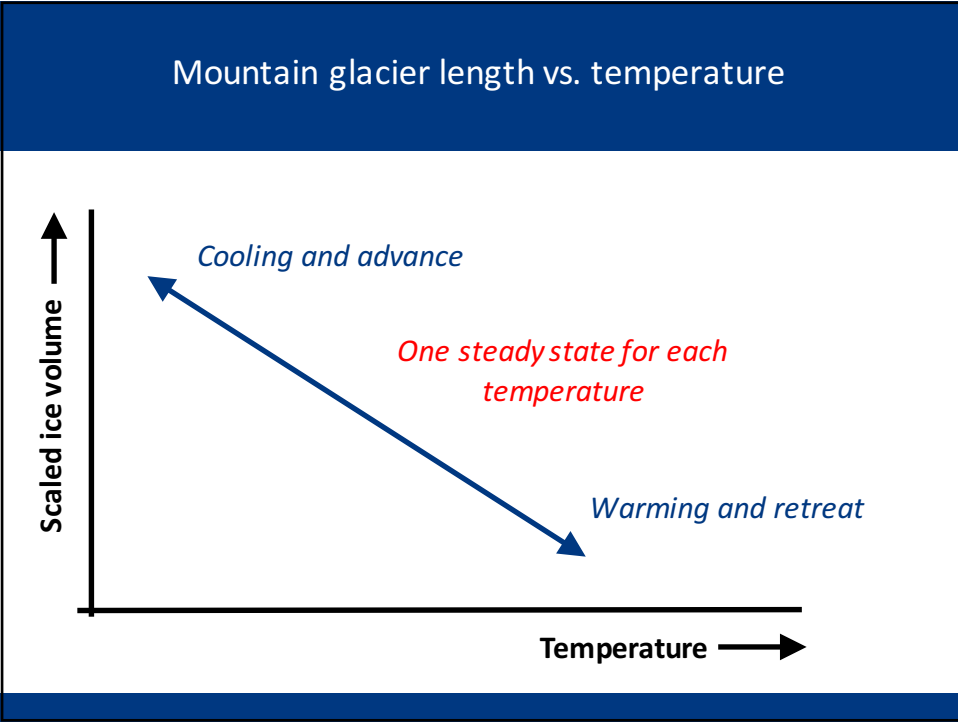
Michiel van den Broeke

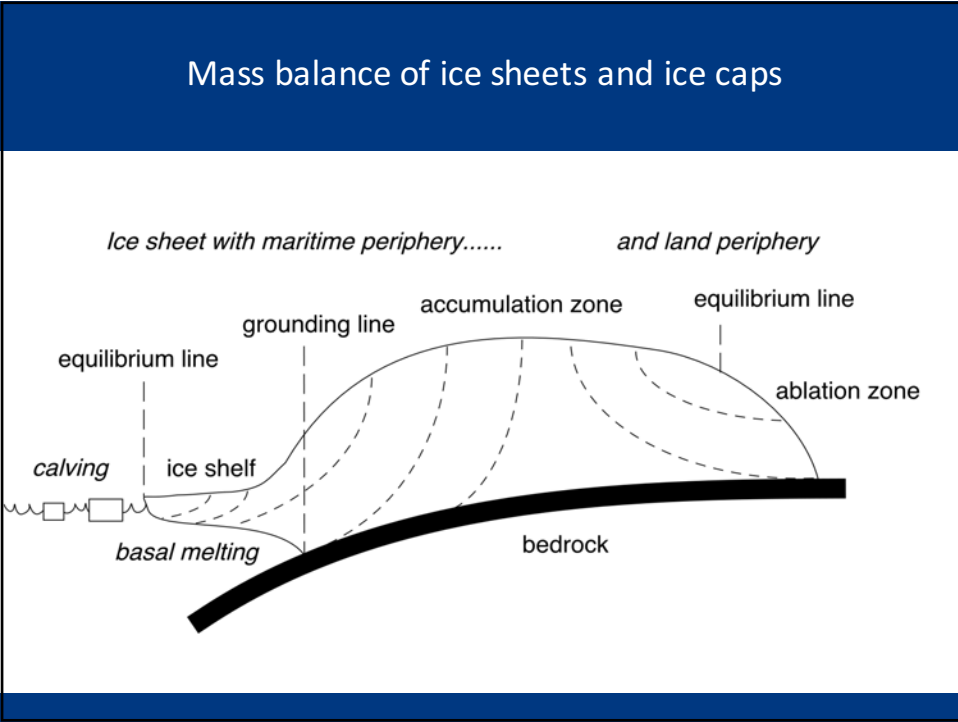
Universiteit Utrecht, Instituut voor Marien en Atmosferisch onderzoek Utrecht



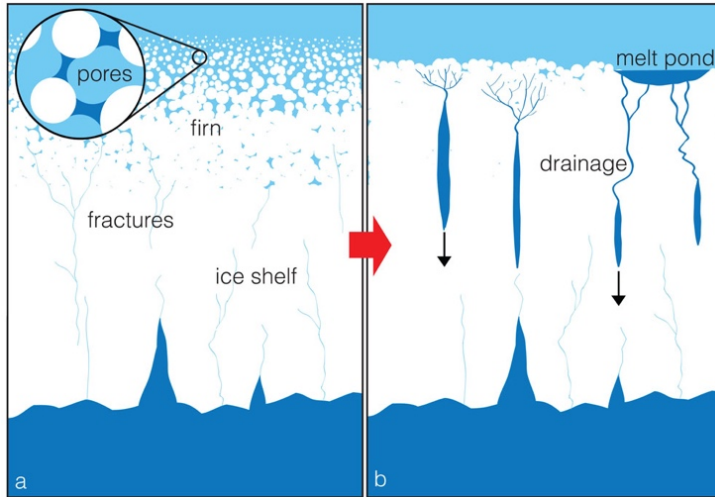
Universiteit Utrecht





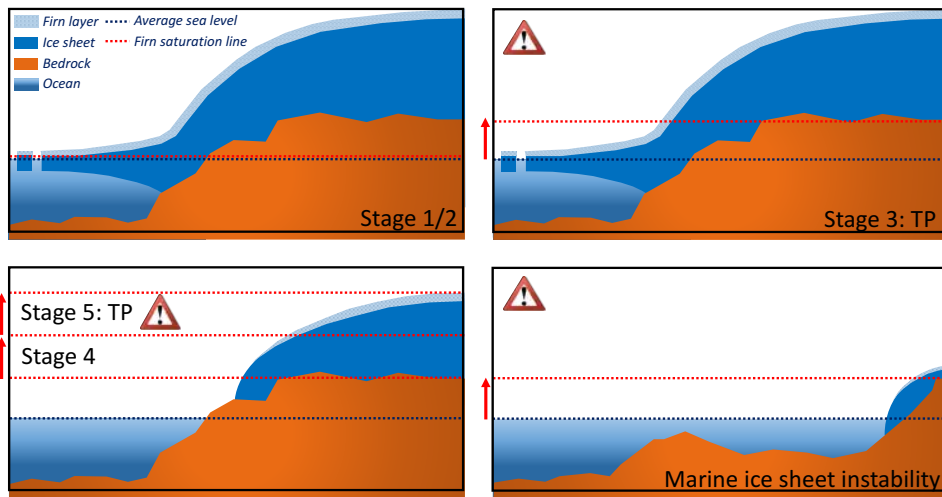


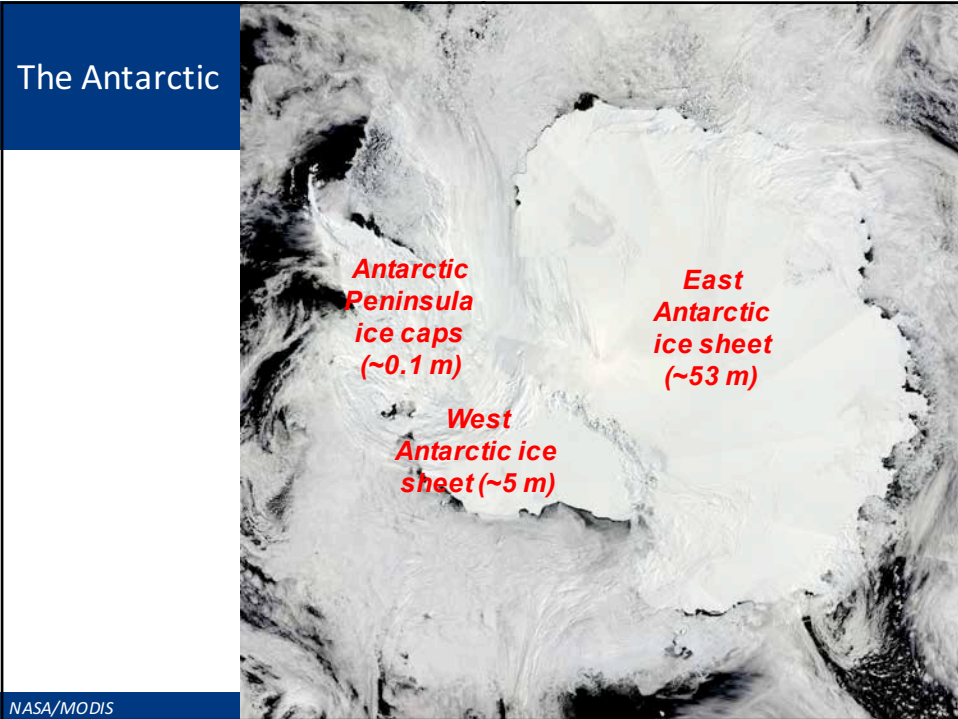
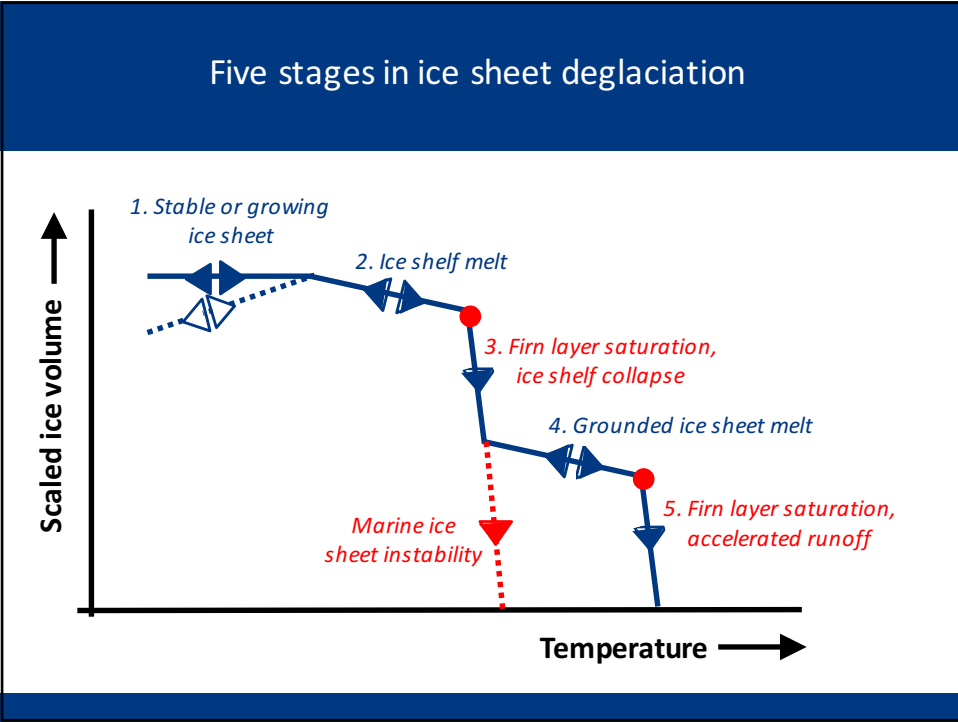
Firn layer saturation as a tipping point for ice shelf breakup

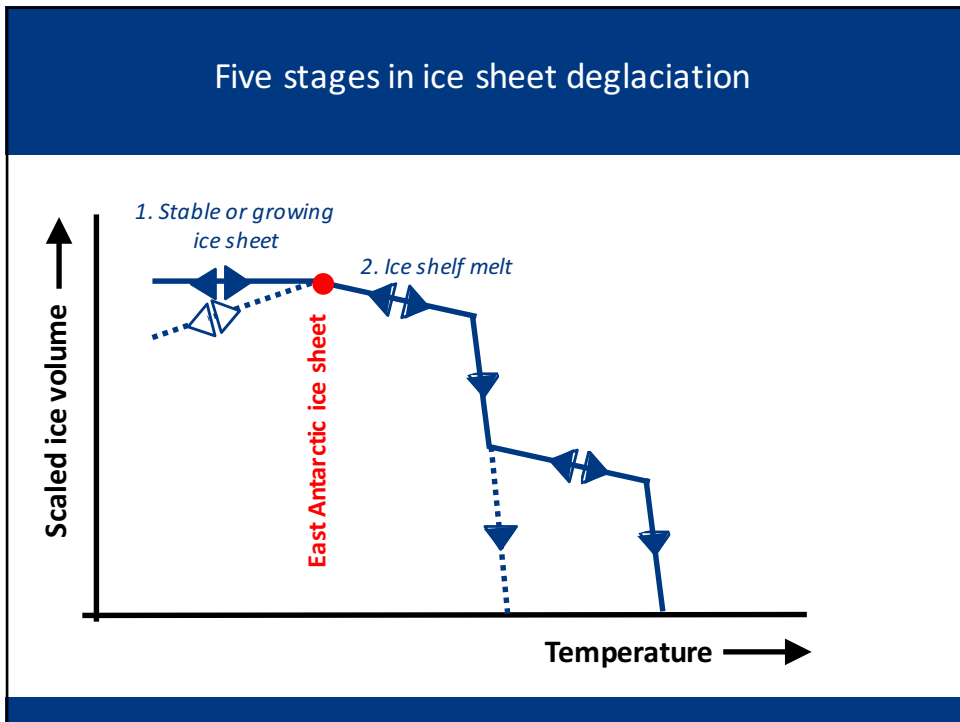
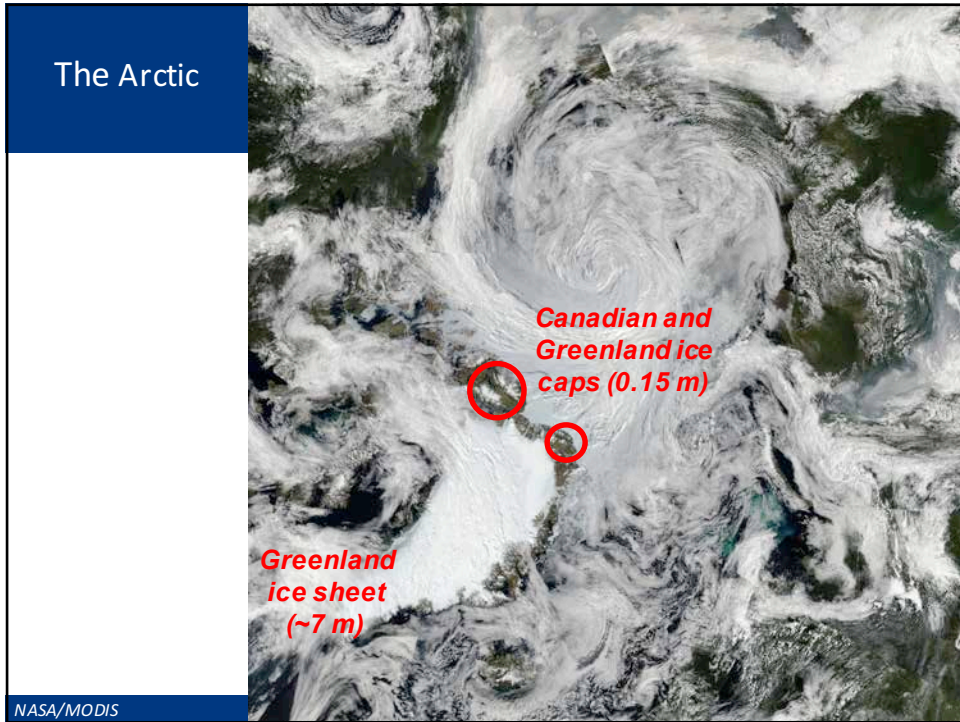


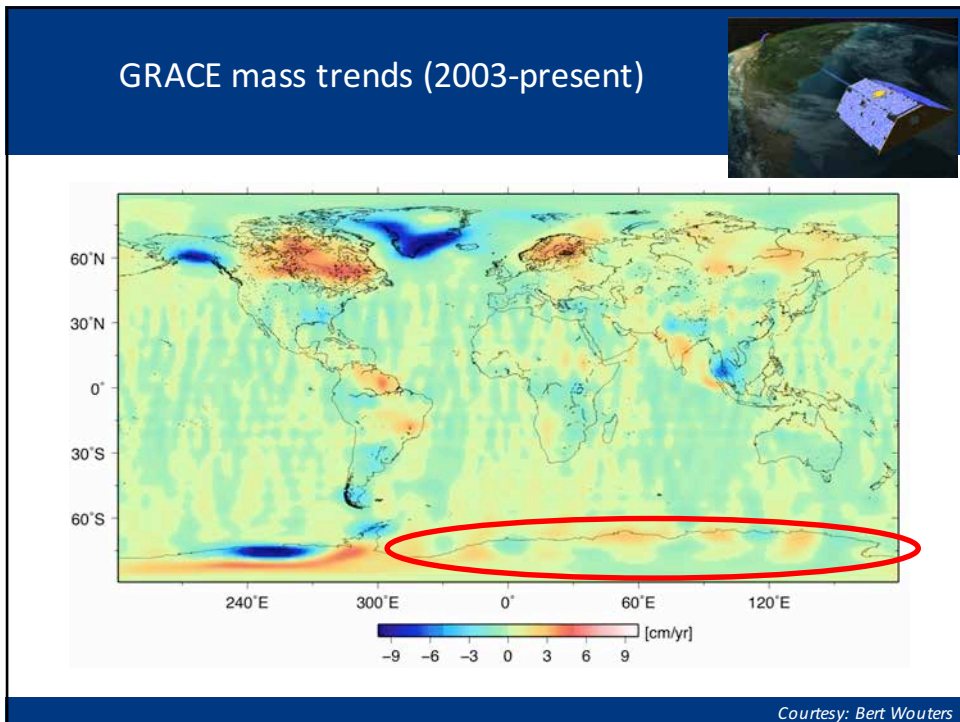
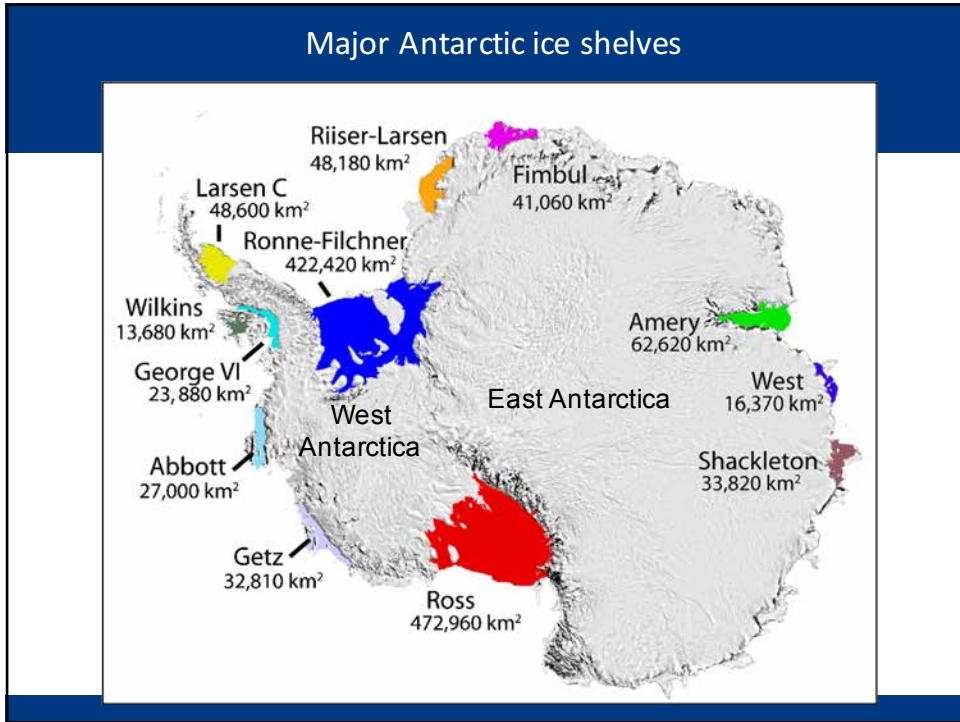
Kuipers Munneke and others, 2013

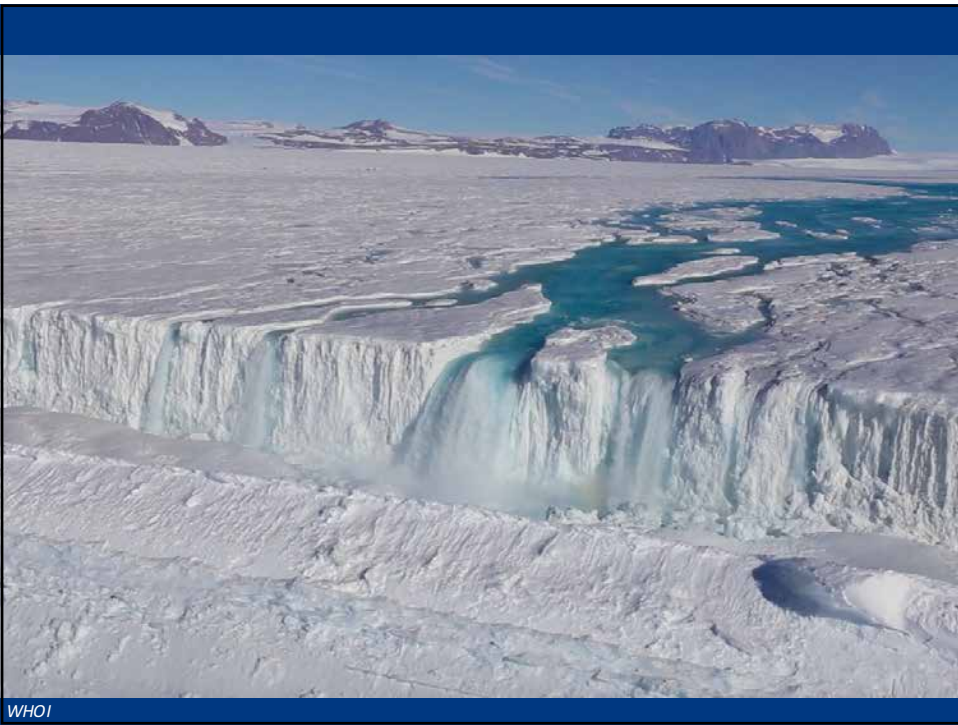
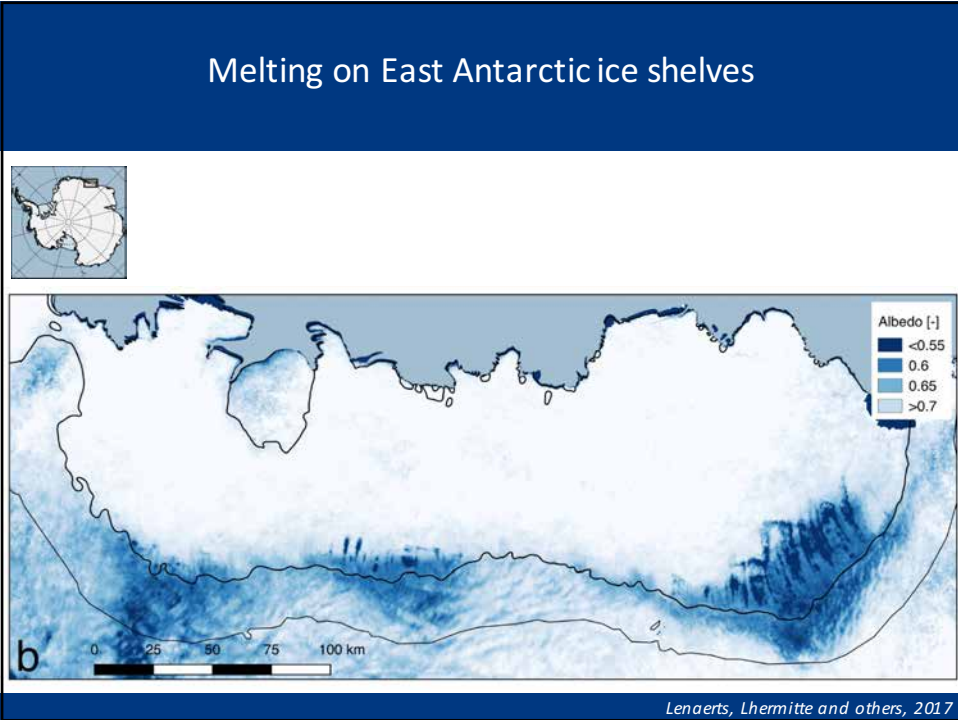
Tipping points and marine ice sheet instability

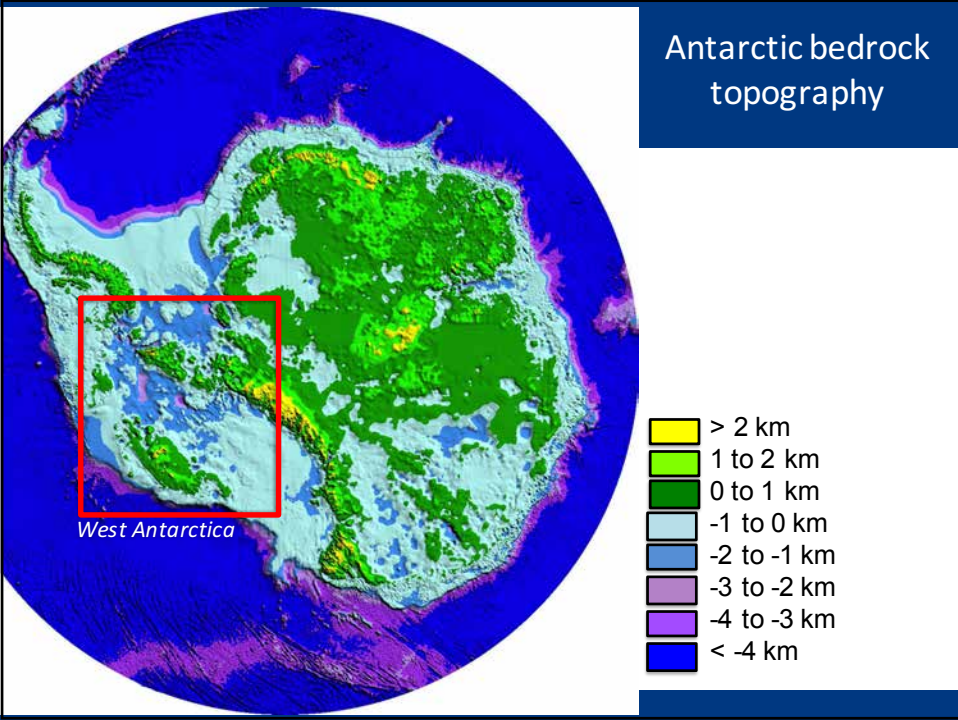
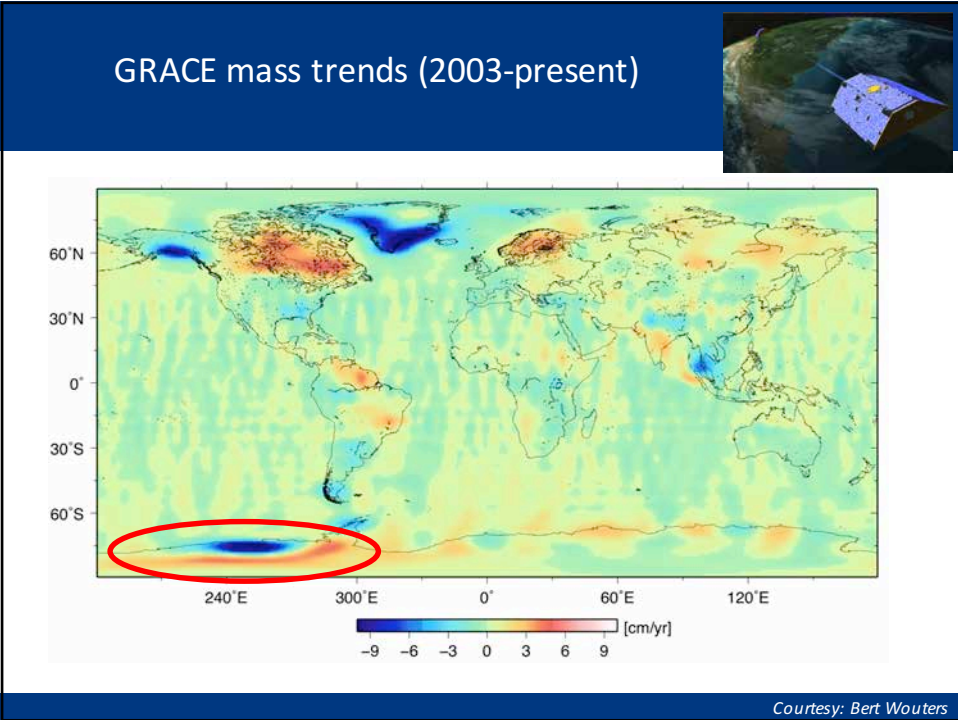


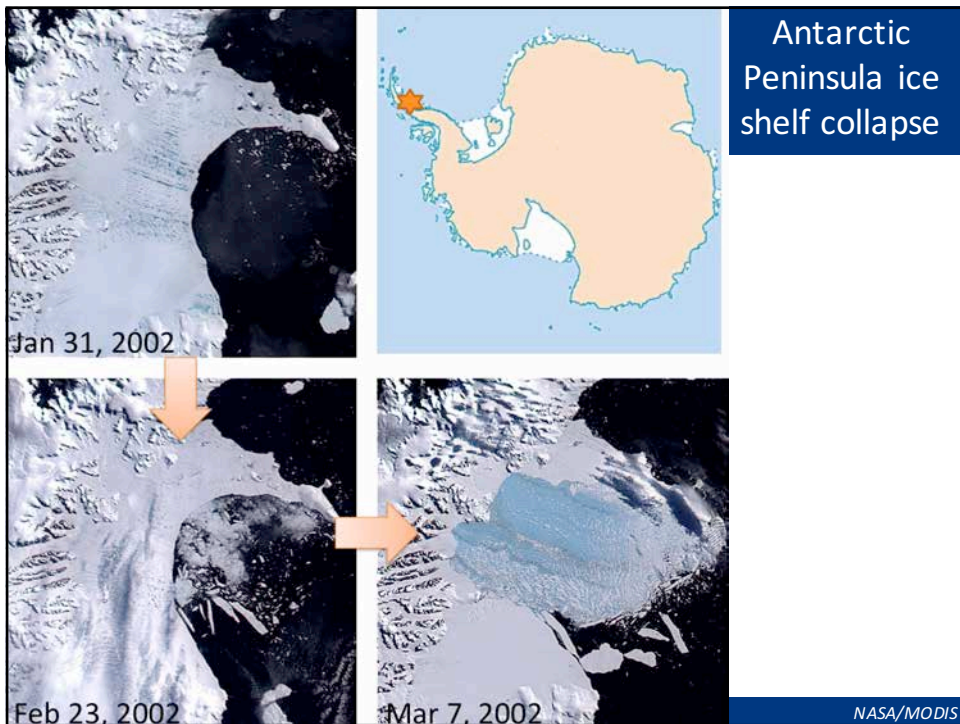
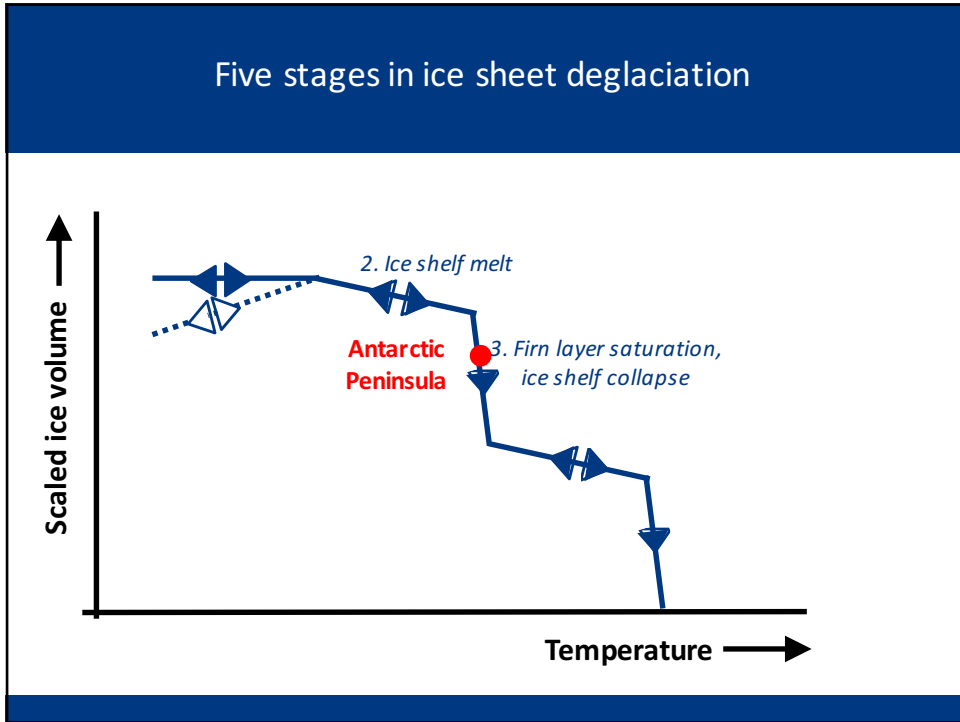


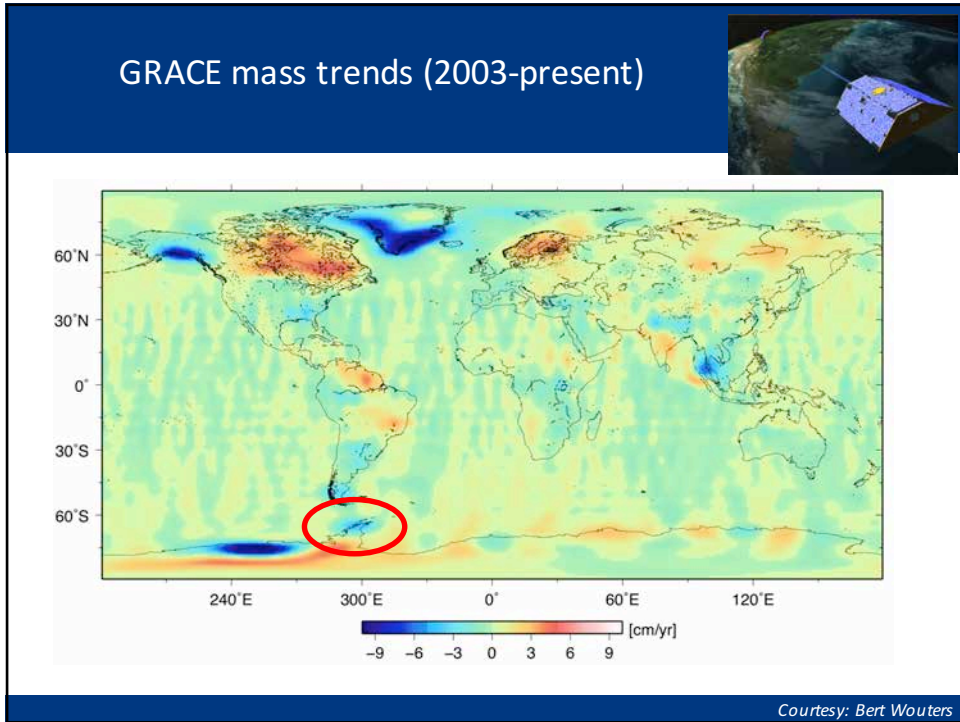












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Antarctic Peninsula ice shelf collapse

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Huge Antarctic iceberg poised to break away

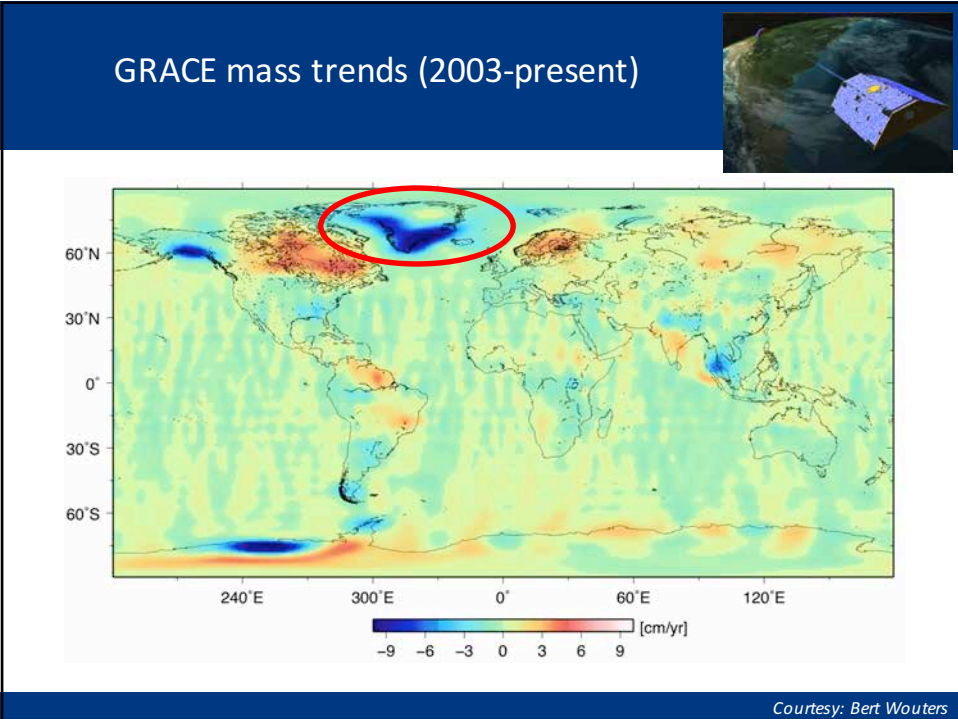
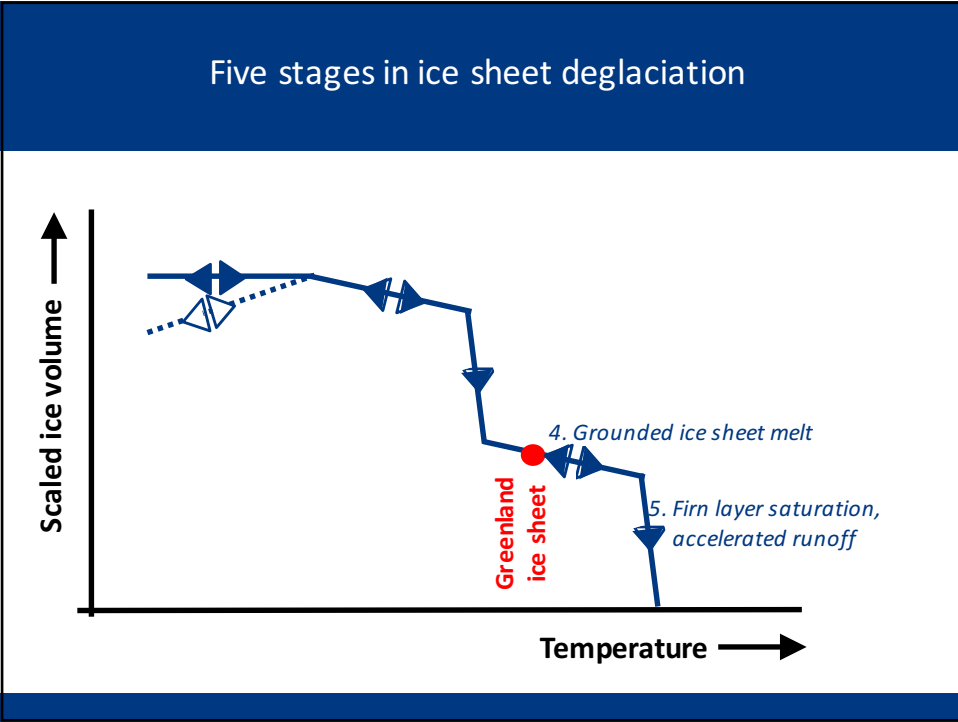
By Matt McGrath
Environment correspondent

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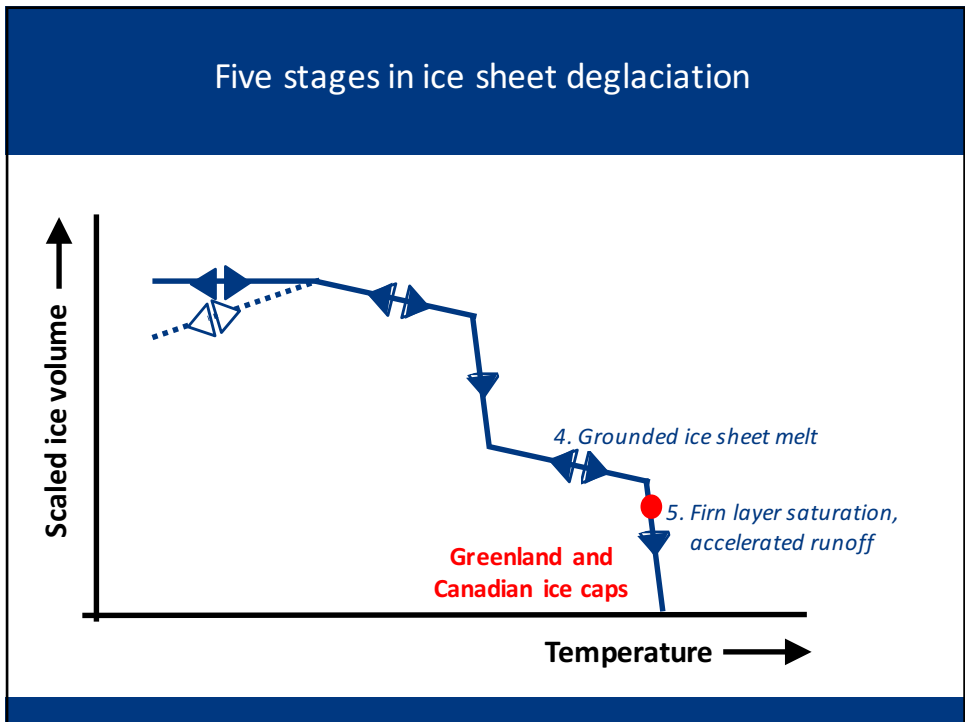
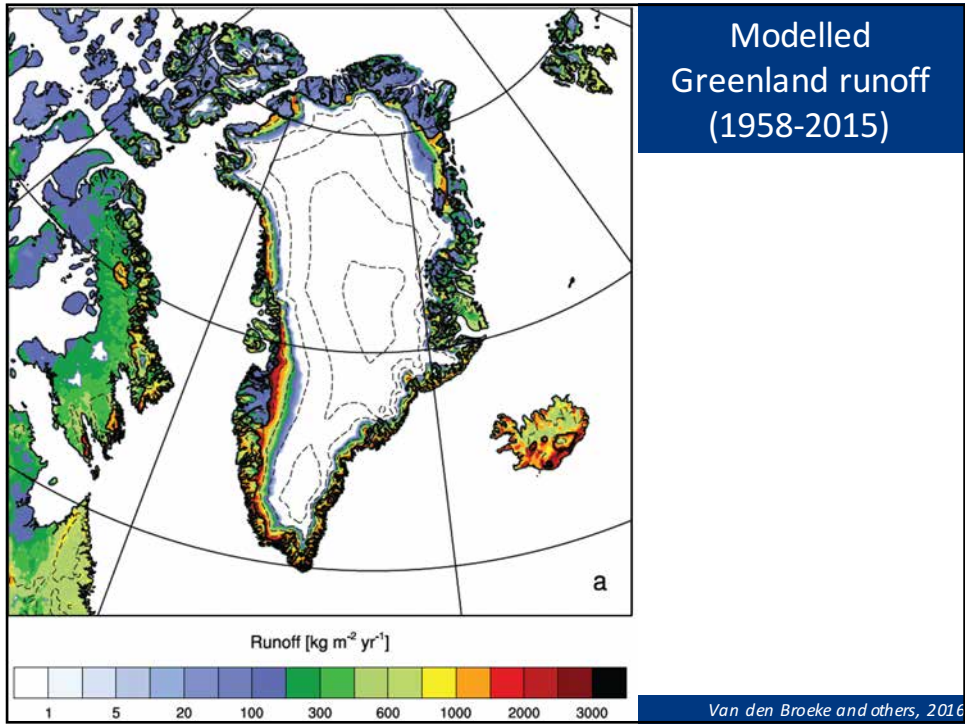
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The map shows the Larsen C Ice Shelf with a yellow line indicating the rift's path. Key dates along the rift are: Jan. 2017, Jun. 2016, Aug. 2014, and Nov. 2010. A scale bar shows 0 to 100 km. An inset map of Wales is shown for scale, with Swansea marked. The text 'Wales To same scale' is present.

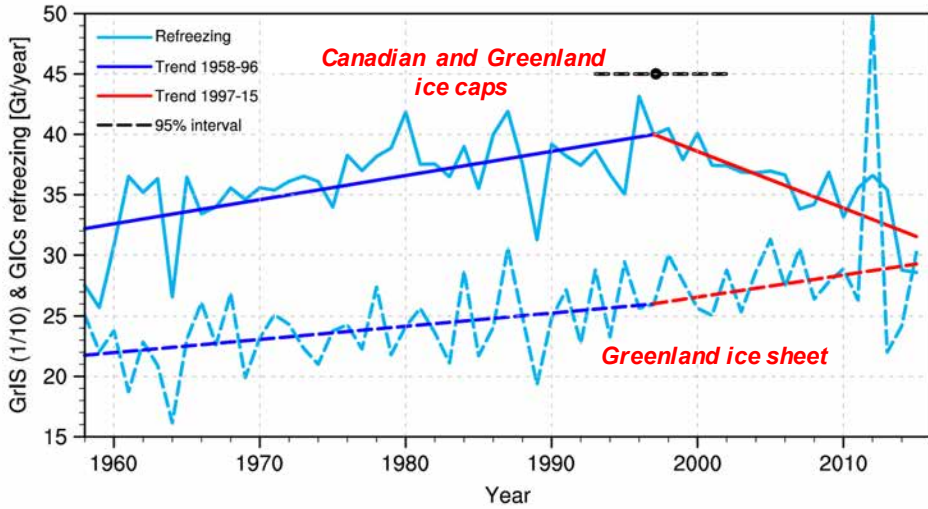
BBC



Courtesy: Bert Wouters

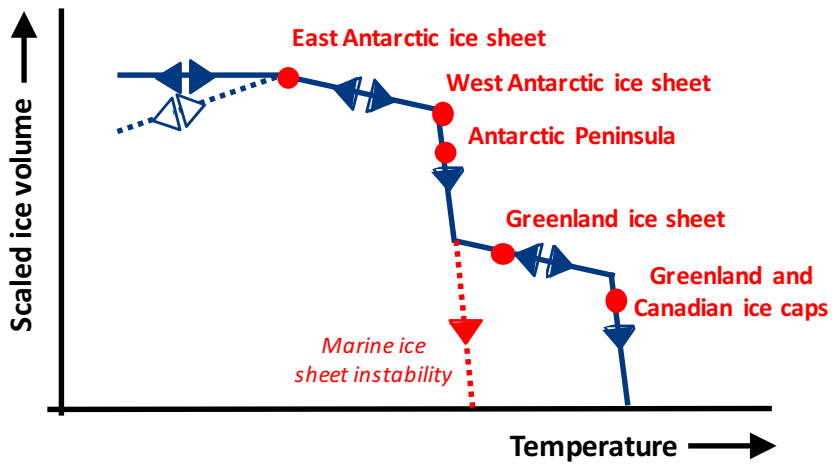


A tipping point in runoff from Arctic ice caps and glaciers



Noël and others, 2016

Five stages in ice sheet deglaciation

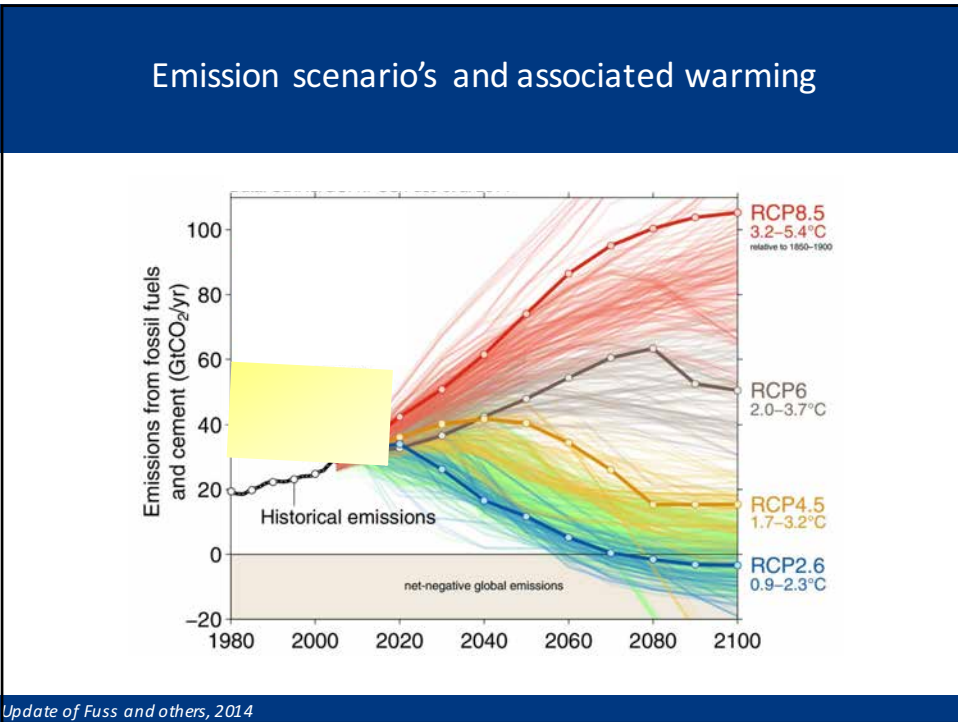


Conclusions based on observations

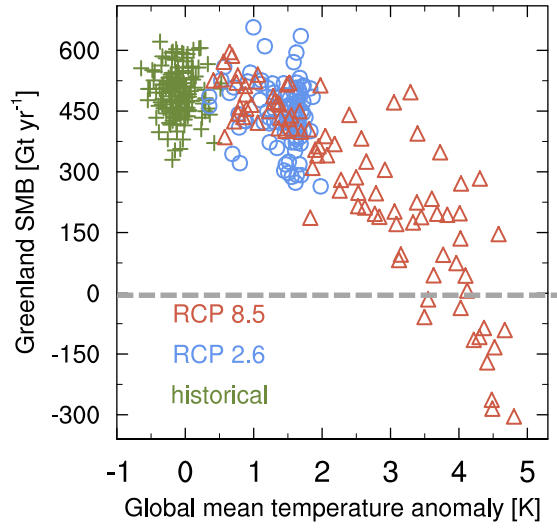
The great ice masses on Earth are currently in various stages of deglaciation, separated by tipping points

A great scientific challenge is to predict when the two largest ice masses, the ice sheets of East Antarctica and Greenland, reach their next tipping point

What do state-of-the-art climate models predict?

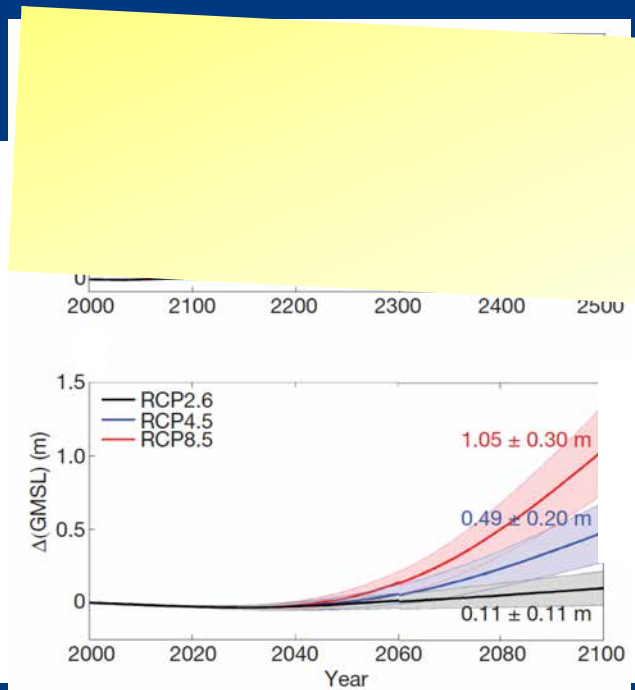


Greenland mass loss under various scenario's



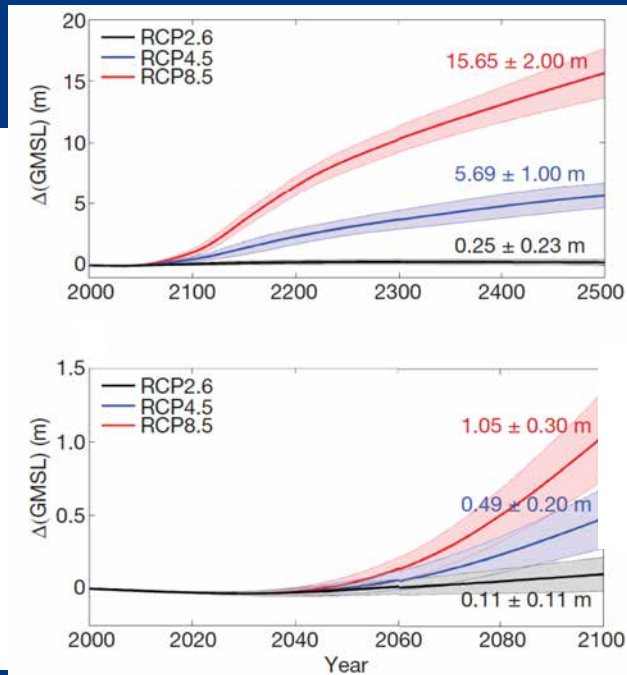
Courtesy: Jan Lenaerts

Projected sea level rise from Antarctic mass loss



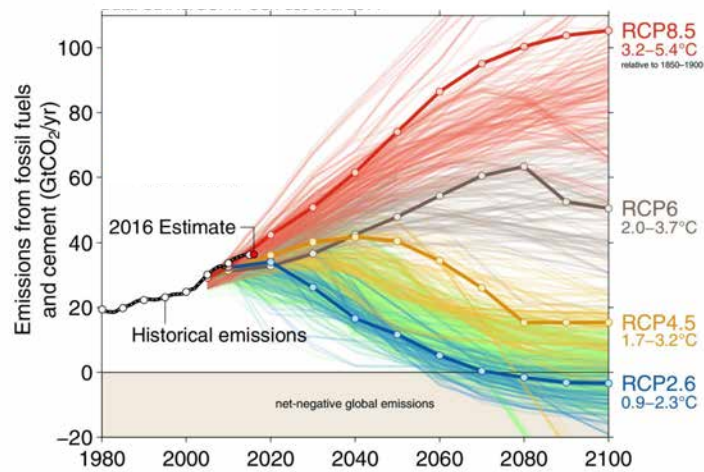
DeConto and Pollard, 2016

Projected sea level rise from Antarctic mass loss



DeConto and Pollard, 2016

So: there is a choice and there is hope!



Update of Fuss and others, 2014

Questions?

EACH DAY HUMBLE SUPPLIES ENOUGH ENERGY TO MELT 7 MILLION TONS OF GLACIER!

This giant glacier has remained unmelted for centuries. Yet, the petroleum energy Humble supplies—it converted into heat—could melt it at the rate of 80 tons each second! To meet the nation's growing needs for energy, Humble has applied science to nature's resources to become America's Leading Energy Company. Working wonders with oil through research, Humble provides energy in many forms—to help heat our homes, power our transportation, and to furnish industry with a great variety of versatile chemicals. Stop at a Humble station for new Enco Extra gasoline, and see why the "Happy Motoring" Sign is the World's First Choice!

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Life Magazine, 1962