



Australian Government
Department of the Environment
Australian Antarctic Division

Challenges and opportunities facing National Antarctic programmes over the coming decade; an Australian perspective

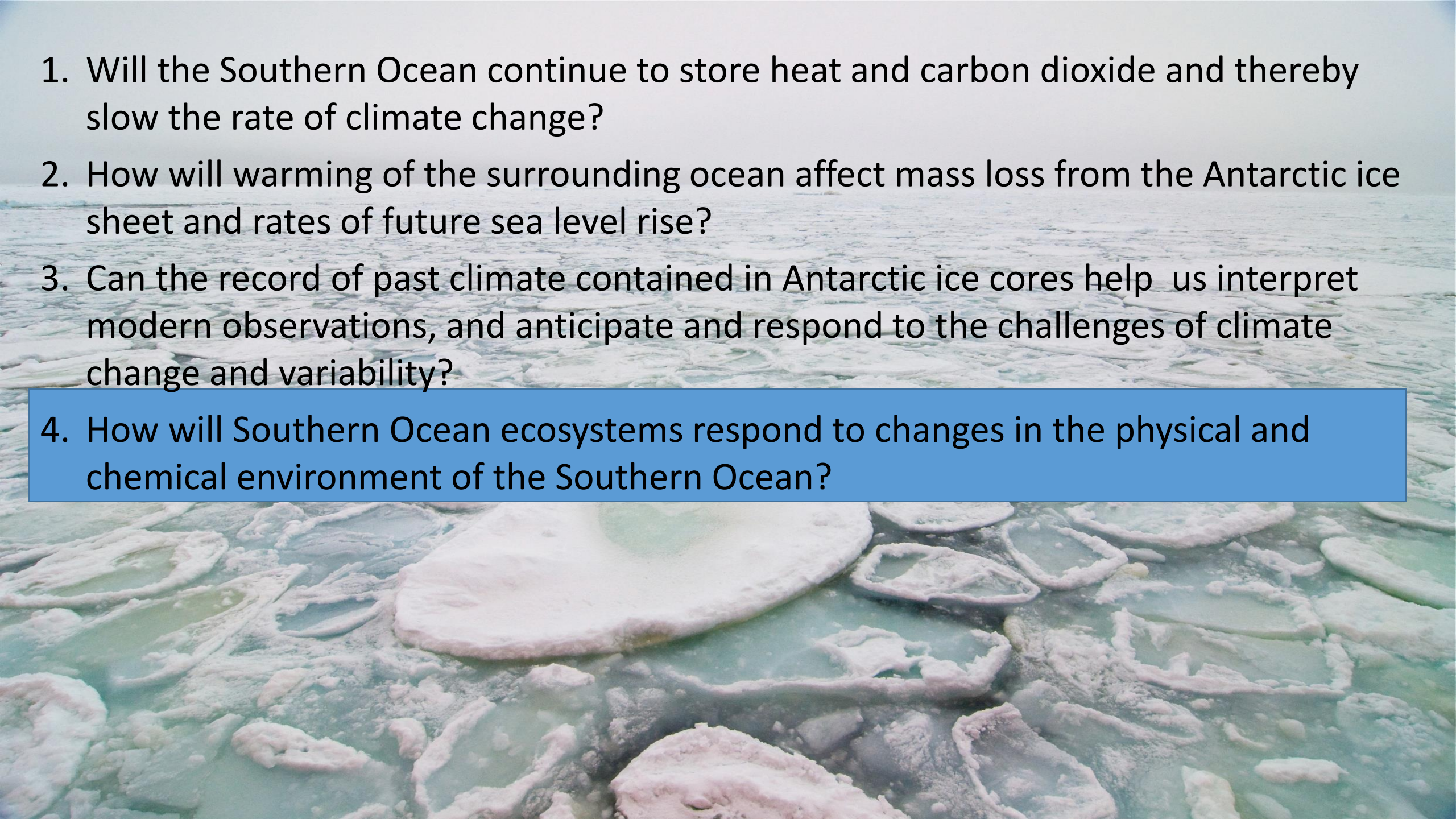
Nick Gales



The Big Science Questions

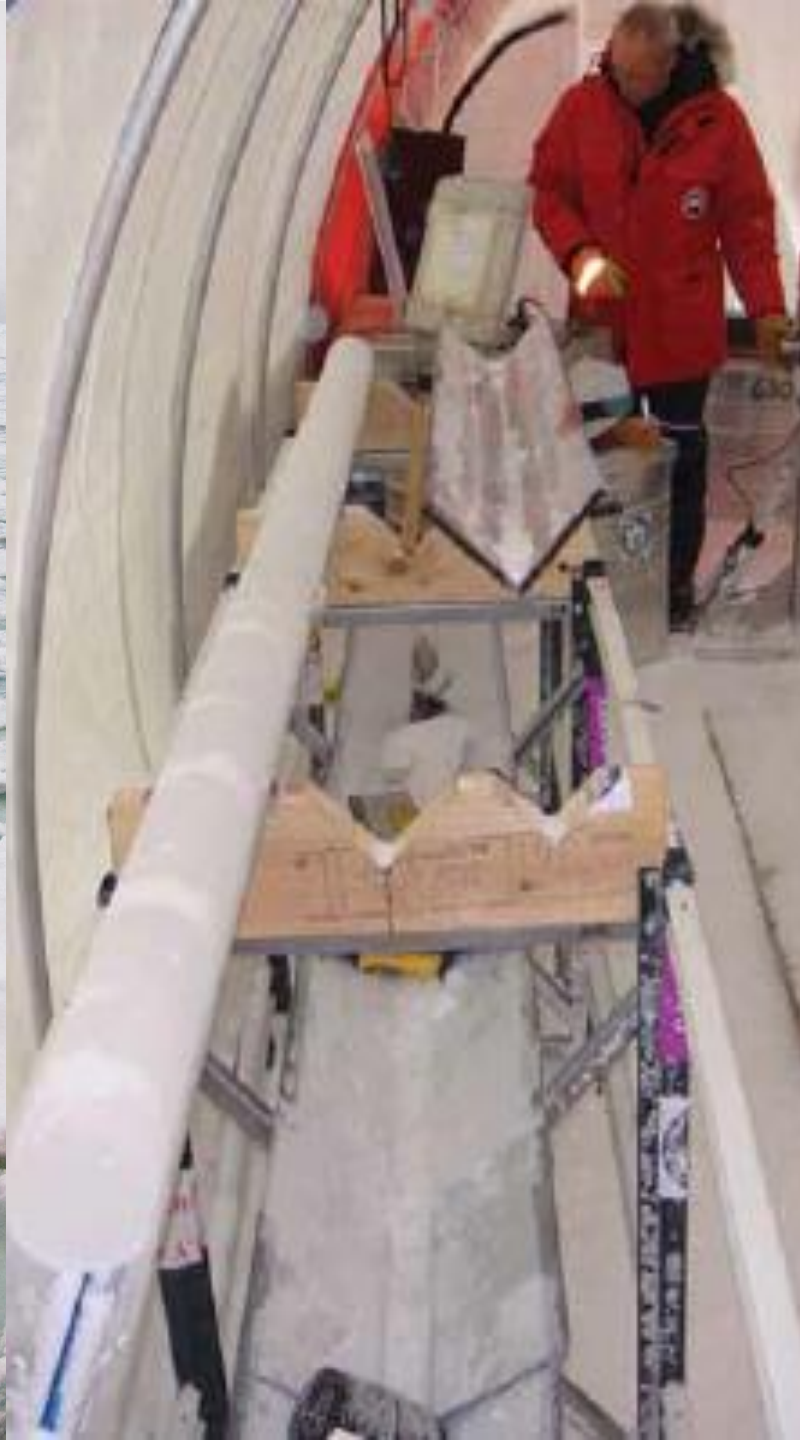
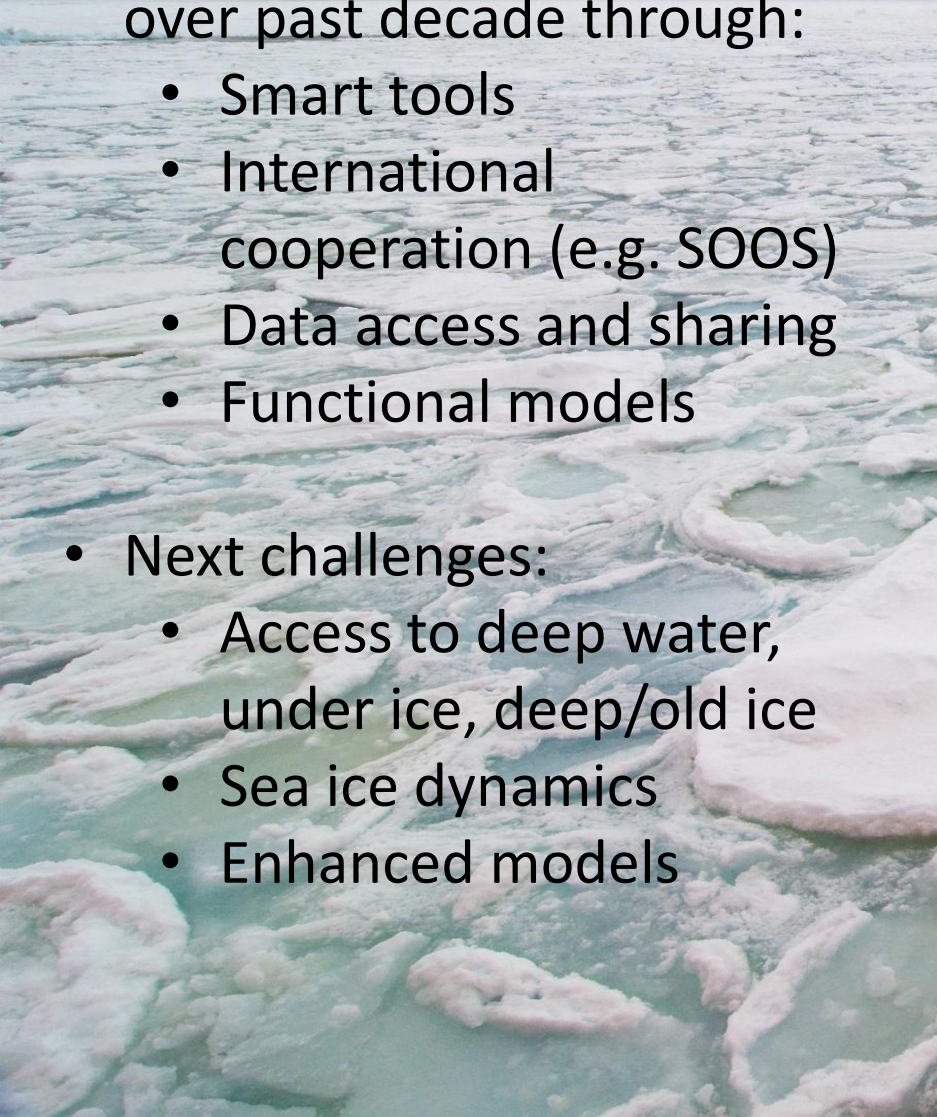


- How are humans affecting Antarctica?
- How does (a changing) Antarctica affect humans?

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1. Will the Southern Ocean continue to store heat and carbon dioxide and thereby slow the rate of climate change?
 2. How will warming of the surrounding ocean affect mass loss from the Antarctic ice sheet and rates of future sea level rise?
 3. Can the record of past climate contained in Antarctic ice cores help us interpret modern observations, and anticipate and respond to the challenges of climate change and variability?
 4. How will Southern Ocean ecosystems respond to changes in the physical and chemical environment of the Southern Ocean?

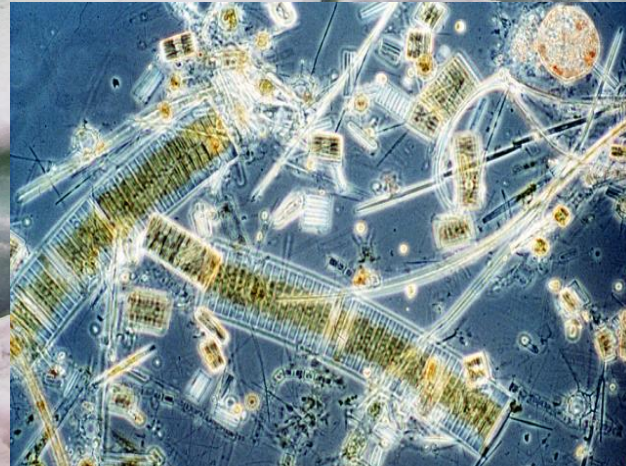
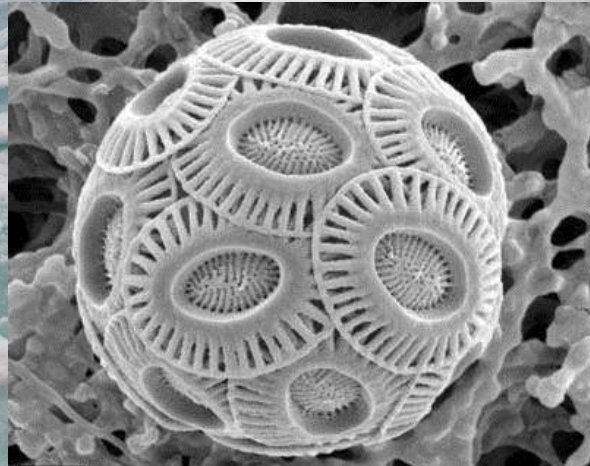
Physics and Chemistry:

- Extraordinary achievements over past decade through:
 - Smart tools
 - International cooperation (e.g. SOOS)
 - Data access and sharing
 - Functional models
- Next challenges:
 - Access to deep water, under ice, deep/old ice
 - Sea ice dynamics
 - Enhanced models



Biology:

- Highly complex system:
 - Processes difficult to model
 - What should be measured?
 - Multiple drivers (past exploitation, climate change, natural variability)
 - Multiple stressors (temp, pH, circulation, radiation, sea ice)
 - Naïve models



Biology:

- Huge challenge and opportunities
 - Smart technology (EEV) – linked to achievements in ocean physics/chemistry (SOCCOM, SOOS)
 - Data access/sharing
 - Improved methods for measuring biodiversity and biomass (acoustics, CPR/genomics)
 - Laboratory and Field experiments (not just observations)
 - Understanding cumulative impacts
 - Improved models
 - International collaboration – opportunities for industry partnerships
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