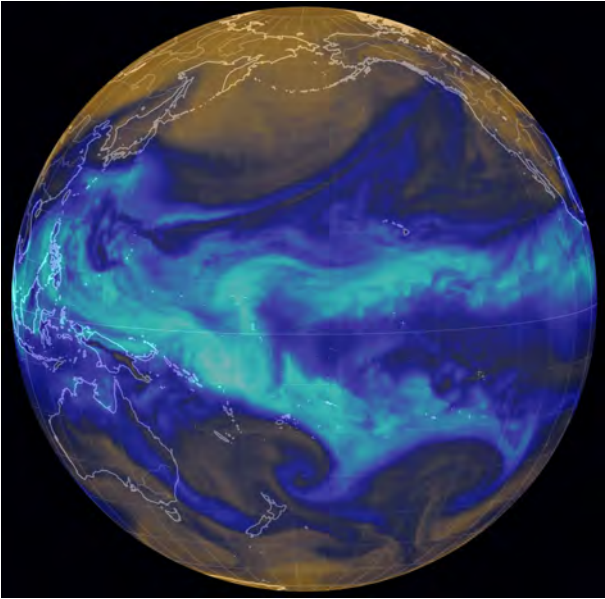


Climate change is a problem
(and we should use every tool to reduce how bad it will get)

Colin Goldblatt

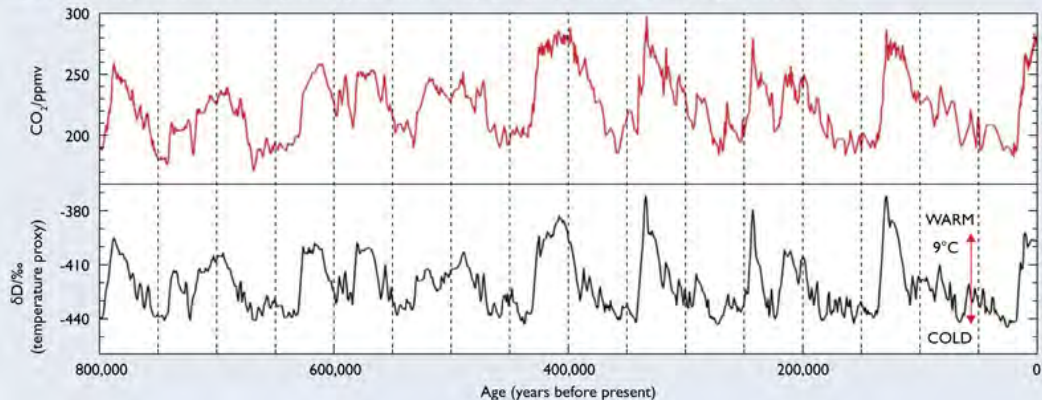
School of Earth and Ocean Sciences, University of Victoria

Our home: a rock orbiting a star in space



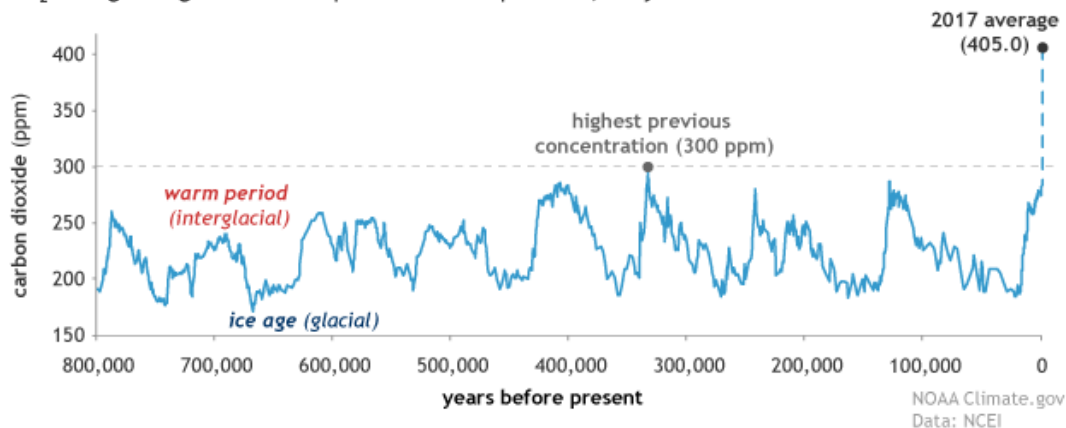
Climate Change

Fig. 3: Ice core data from the EPICA Dome C (Antarctica) ice core; deuterium (δD) is a proxy for local temperature; CO_2 from the ice core air¹⁵⁴

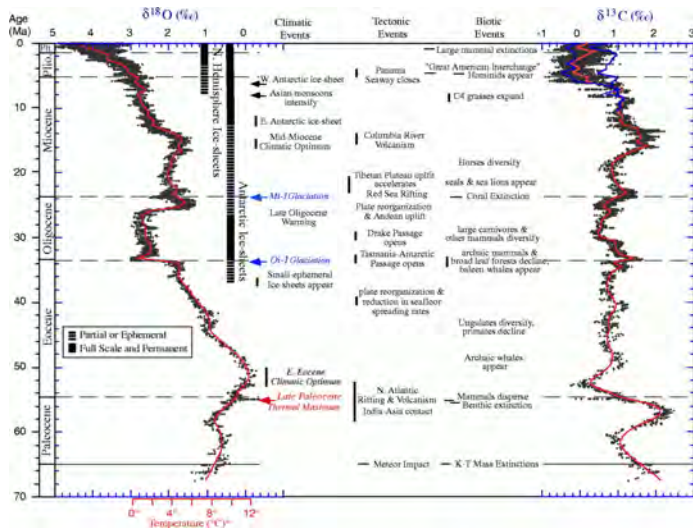


Rapid Climate Change

CO₂ during ice ages and warm periods for the past 800,000 years

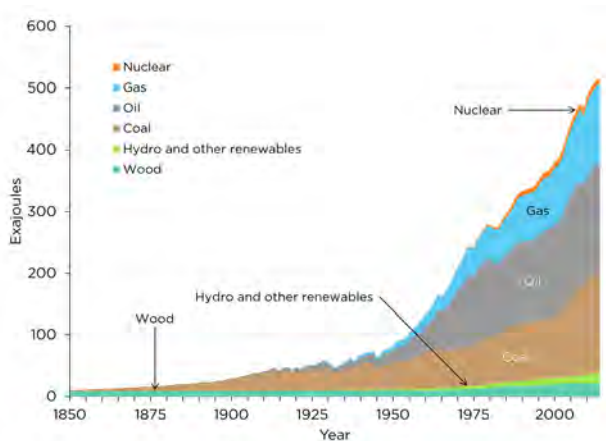


More Climate Change



65 million years: (L) oxygen isotopes are a proxy for ocean temperature (R) carbon isotopes show link between C cycle and temp. [Zachos+, *Science*, (2001)]

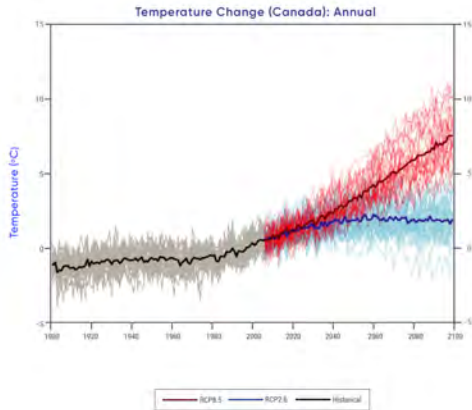
Carbon emissions from 500 million years of fossil fuels in 500 years



Canada's Changing Climate Report

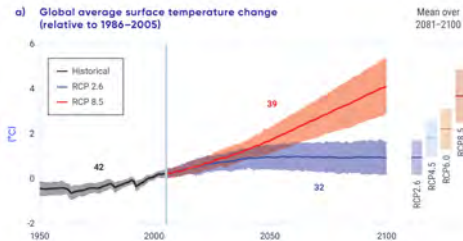
- ▶ changingclimate.ca/CCCR2019/
- ▶ Especially: changingclimate.ca/CCCR2019/chapter/headline-statements/
(text in italics generally quotes these)
- ▶ One-fifth of the chapter authors are Faculty/Adjunct Faculty in SEOS at UVic.
- ▶ UVic Climate Science: www.uvic.ca/climate

Global Climate: (1) Signal to noise, (2) Choices

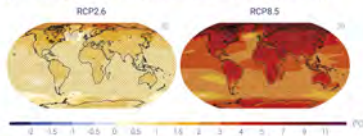


Canada's climate has warmed and will warm further in the future, driven by human influence. Global emissions of carbon dioxide from human activity will largely determine how much warming Canada and the world will experience in the future, and this warming is effectively irreversible

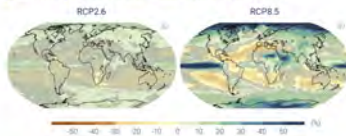
Implications: very different futures for Canada



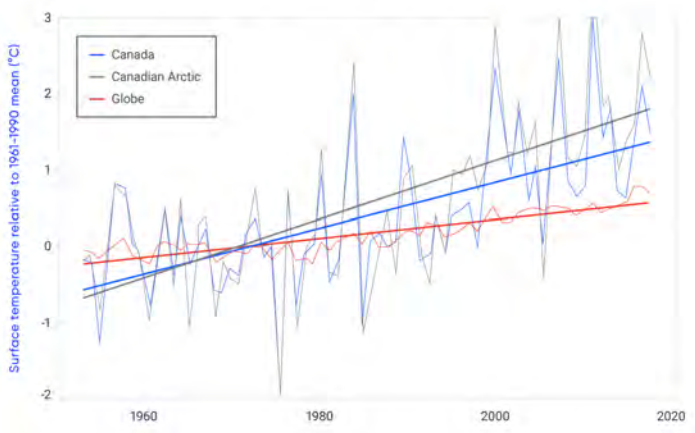
b) Change in average surface temperature (1986-2005 to 2081-2100)



c) Change in average precipitation (1986-2005 to 2081-2100)

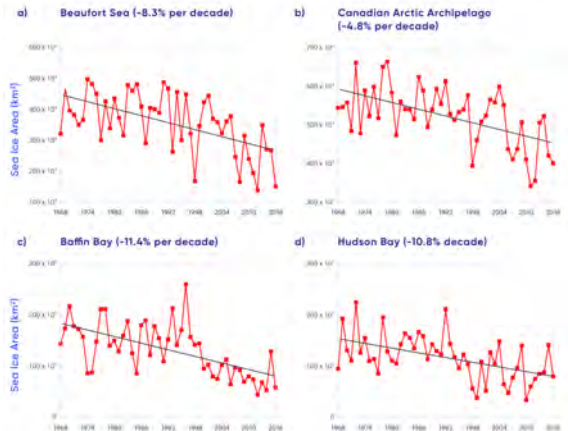


Polar Amplification



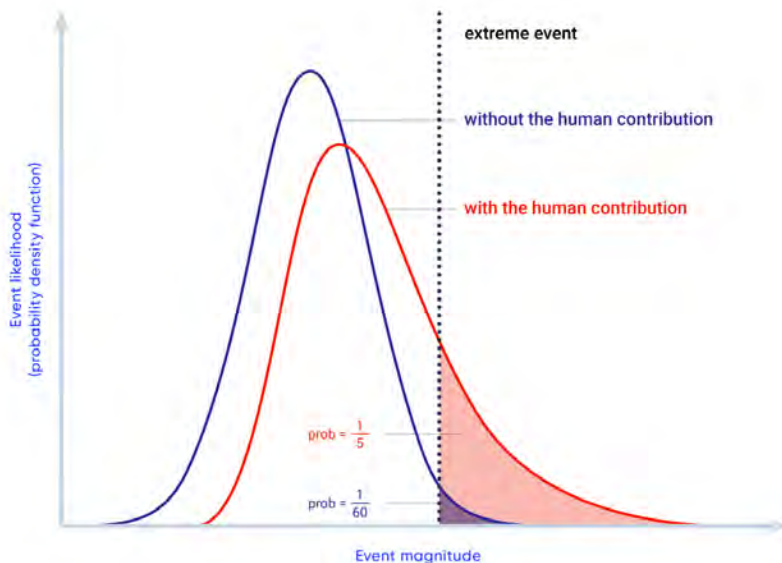
Both past and future warming in Canada is, on average, about double the magnitude of global warming. Northern Canada has warmed and will continue to warm at more than double the global rate.

Sea ice will be lost

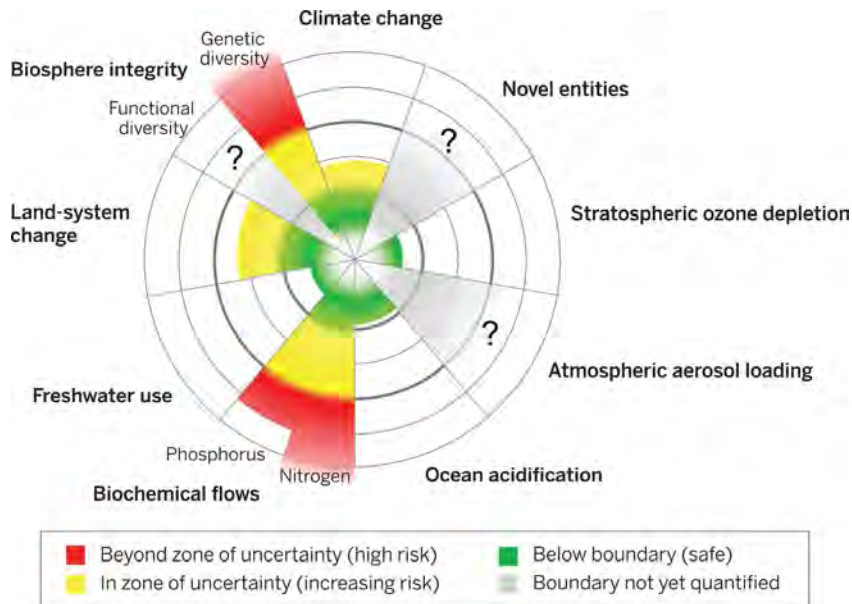


Canadian areas of the Arctic and Atlantic Oceans have experienced longer and more widespread sea-ice-free conditions. . . . The last area in the entire Arctic with summer sea ice is projected to be north of the Canadian Arctic Archipelago. This area will be an important refuge for ice-dependent species.

Current infrastructure is inappropriate for the future



Changes in physical climate are part of a system of problems



Thoughts for our future

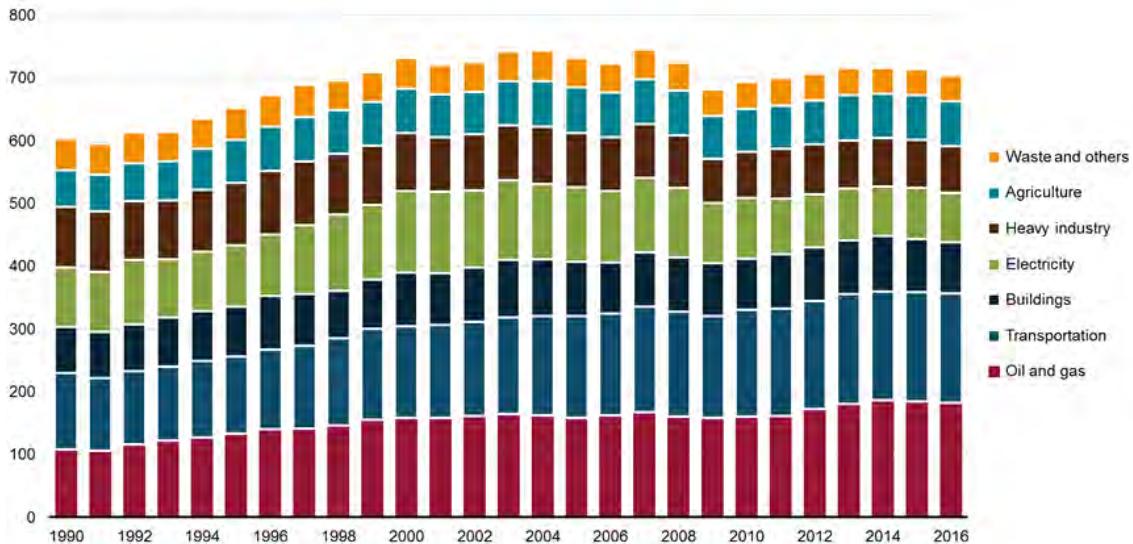
An Earth System perspective

- ▶ Our in which planetary resources/damage are not costed is not obviously compatible with stability of the present form of Earth-climate-life system.
- ▶ Destabilizations of the state of the Earth-climate-life system are common through Earth history. These typically involve (mass) extinction events.
- ▶ Even if change is not catastrophic, it will still be huge and costly.
- ▶ Our society developed during the Holocene, a period of very stable climate.

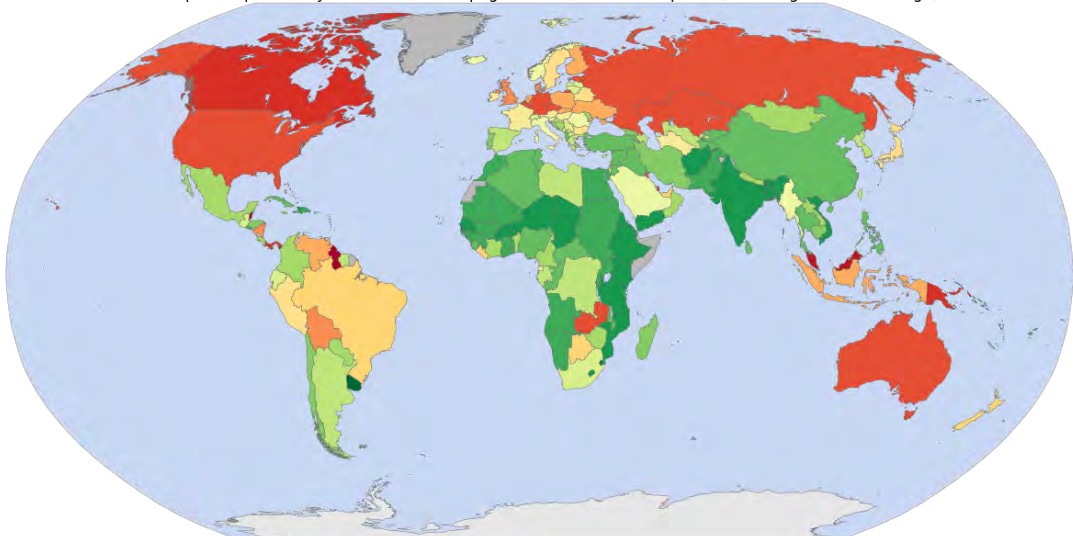
Change

- ▶ Significant effort will make climate change much less bad—a level of effort equivalent to the second world war would be sufficient.
- ▶ Collective action is required.
- ▶ We have more fossil fuel reserves than we can safely burn.
- ▶ We have more fossil fuel infrastructure than can safely be used in full.
- ▶ Fossil fuel companies are obviously part of the problem through (1) their work to damage climate science and policy (2) their basic economic model.

Megatonnes of carbon dioxide equivalent



Per capita responsibility for current anthropogenic CO₂ in the atmosphere (including land-use change)



Data: World Resources Institute CAIT
Blank map: Canuckguy & others

no data 0 100

© 1999-2008. Data compiled per capita anthropogenic
CO₂ emissions in 2000 including land-use change
See see CIA World Factbook, 2002-2003 Update Edition.