

AMAP Efforts on Short-Lived Climate Forcing Agents and Other Air Pollutants

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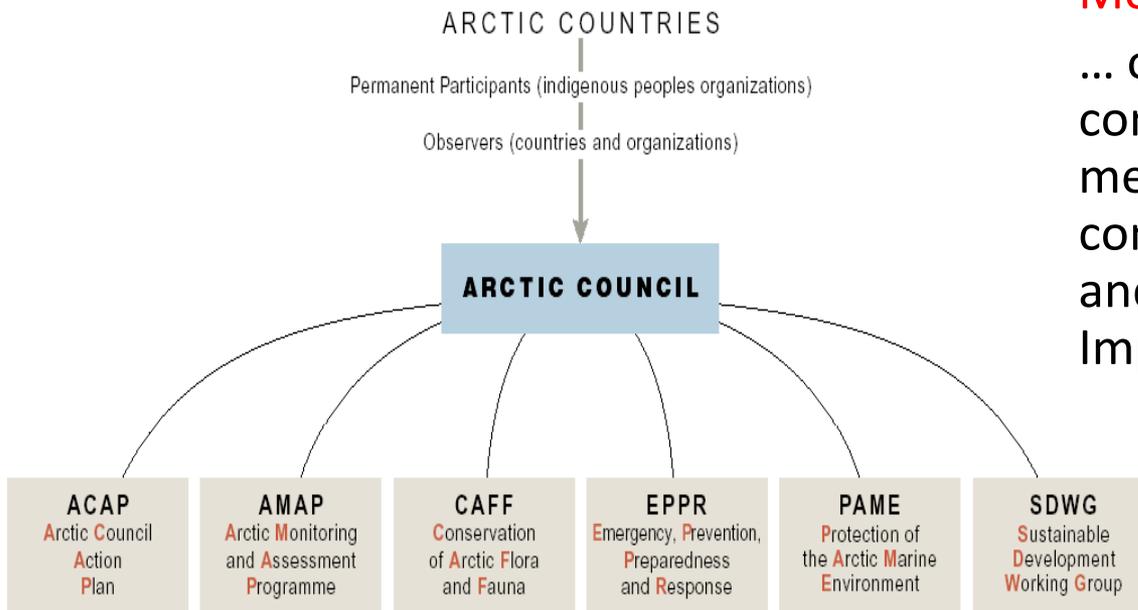
Arctic Monitoring and Assessment Programme (AMAP)

A Working Group of the Arctic Council

8 Arctic countries (CAN, DK/GL, FIN, ICE, NOR, RUS, SWE, USA) and indigenous peoples representatives

Monitoring and Assessment

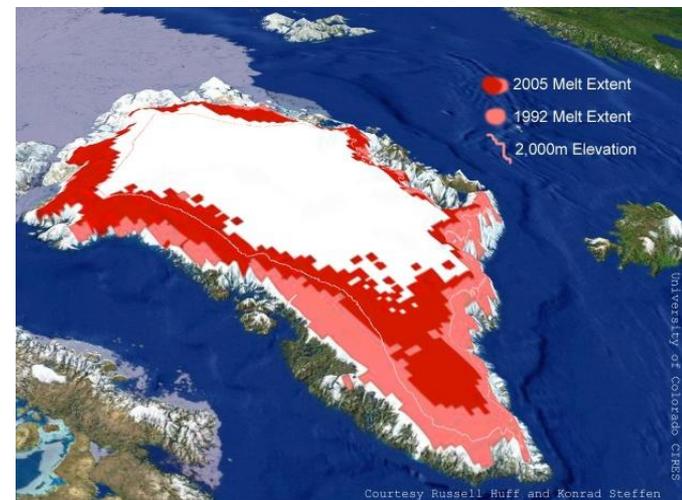
... of priority pollution issues: contaminants (POPs, metals/mercury, radionuclides), contaminants and human health) and climate change (Arctic Climate Impact Assessment, ACIA 2004)



Mandate

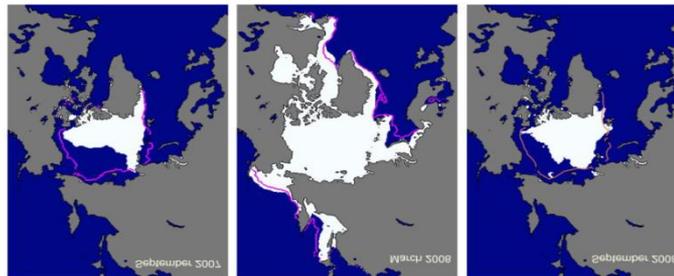
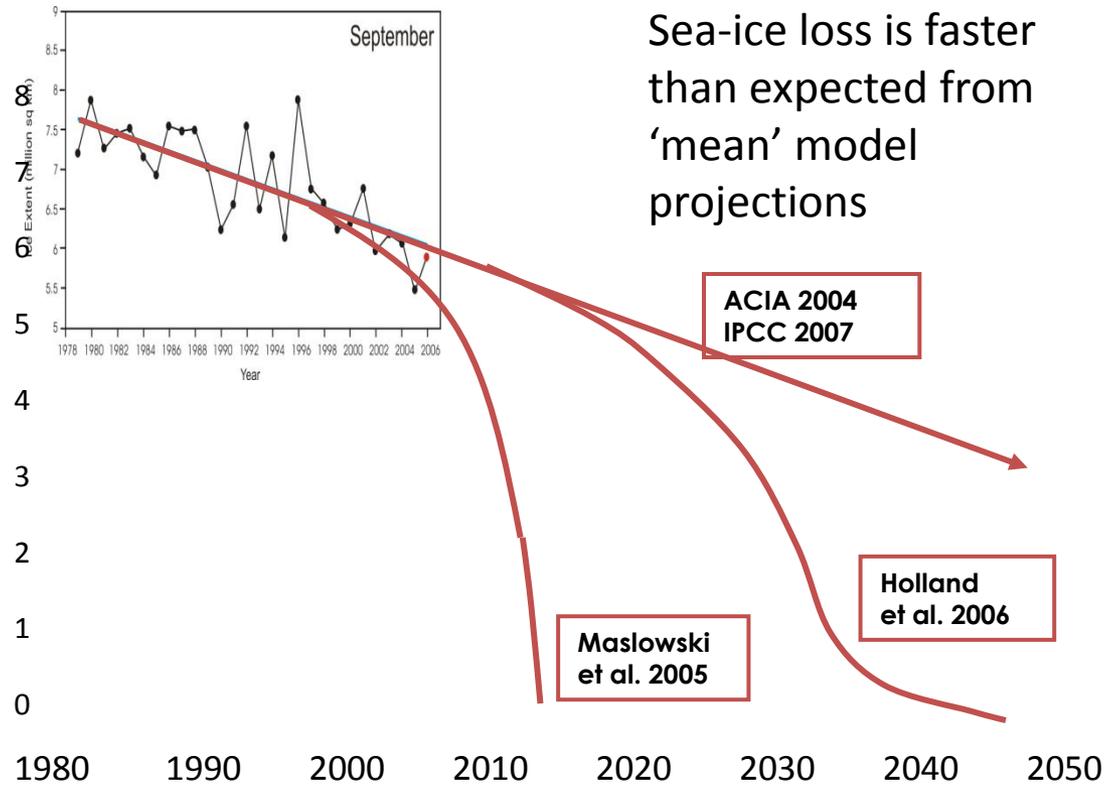
The Arctic Council Ministers have requested AMAP to:

- produce integrated assessment reports on the status and trends of the conditions of the Arctic ecosystems, including humans;
- identify **possible causes for the changing conditions**;
- **detect emerging problems, their possible causes**, and the potential risk to Arctic ecosystems including indigenous peoples and other
- Arctic residents; and to **recommend actions required to reduce risks to Arctic ecosystems**.



Short-lived climate forcers – why?

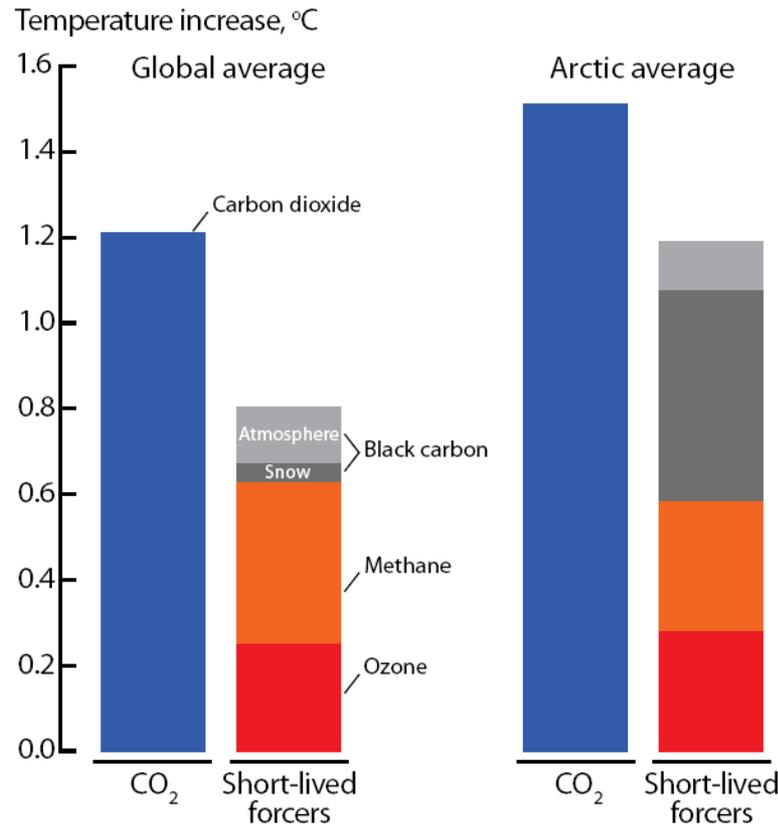
- IPCC global to regional focus
- Rapid rate of climate change in the Arctic, e.g, melting of Greenland Ice sheet, sea-ice)
- Possible role of SLCFs?



Short-lived climate forcers – what?

- Black-carbon (days to weeks)
- Tropospheric ozone (months)
- Methane (ca. 10 years)

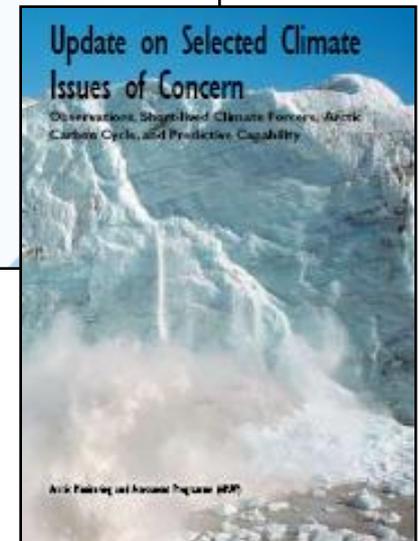
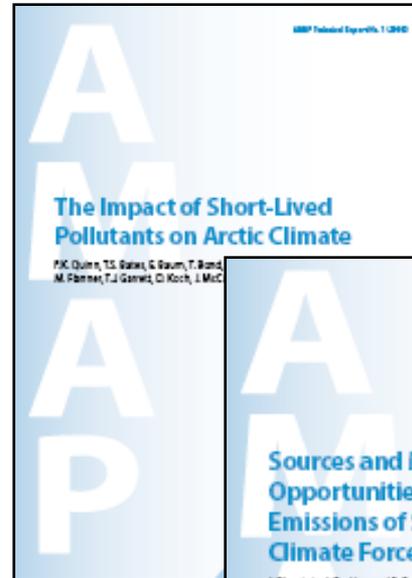
(Compared to CO₂ - 200 years)



◀ Short-lived climate forcers such as black carbon, methane and ozone may have warming effects similar in magnitude to the long-lived greenhouse gases such as CO₂. Estimates of the warming due to SLCFs are still very uncertain and need to be further refined.

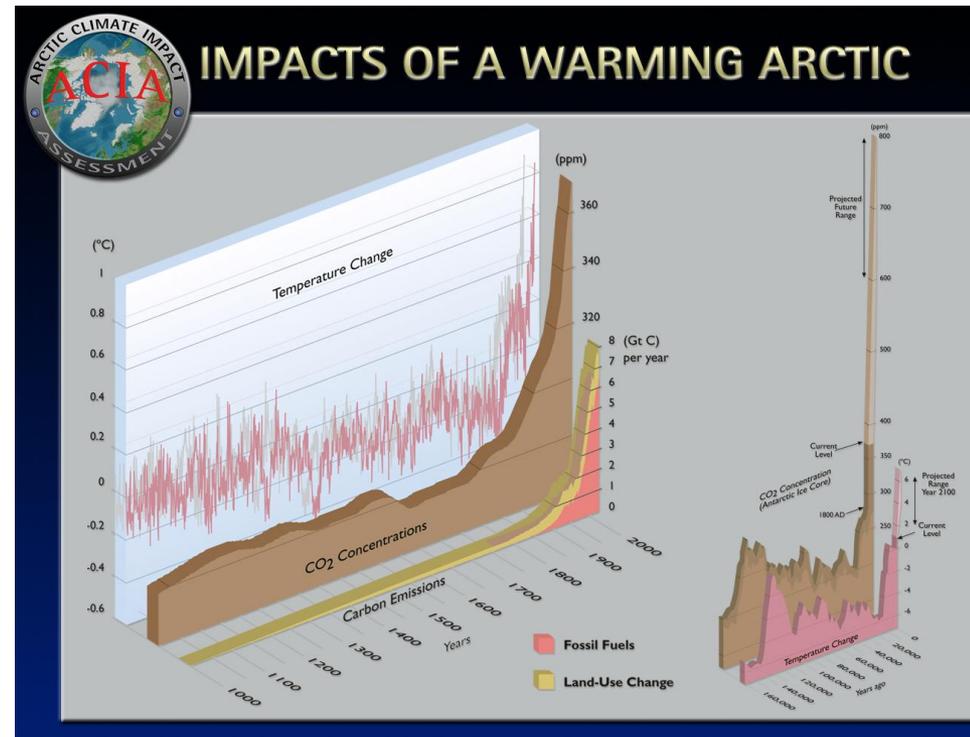
Cooperation

- Utilise information from AMAP plus other programmes/activities
- 3 workshops
- Close cooperation with Climate Policy Centre and Oslo Group
- 2 technical reports (experts)(www.amap.no)
- Update Report for April 2009 Arctic Council Ministerial Meeting (AMAP WG)



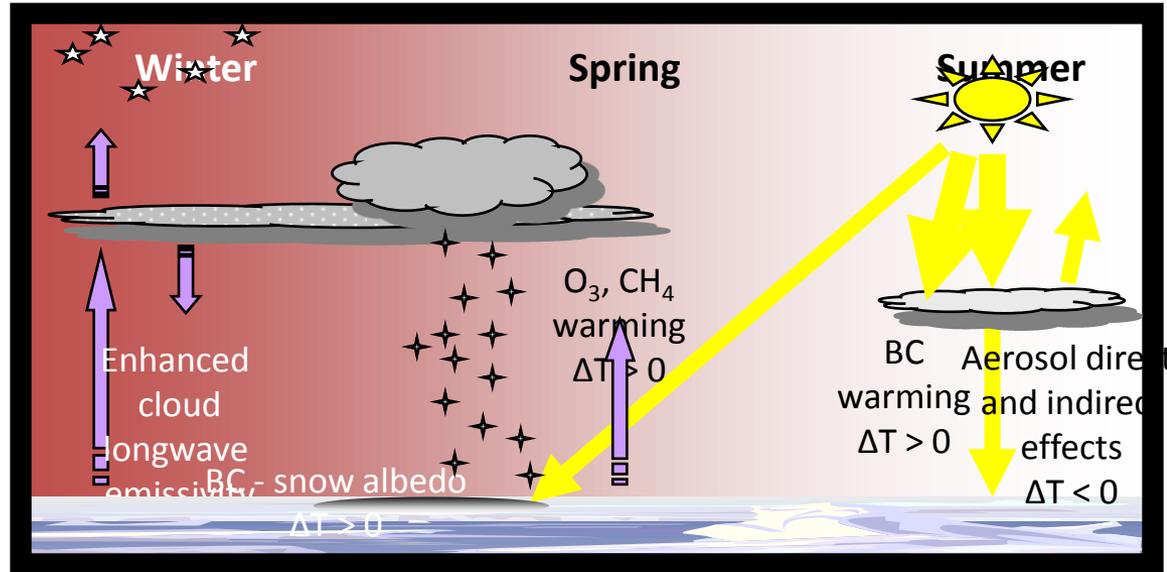
Some conclusions #1

- Any meaningful effort to mitigate global climate warming requires reductions in emissions of CO₂
action on SLCFs is not an alternative to action on CO₂
- Black carbon, tropospheric ozone, and methane may contribute to Arctic warming to a degree comparable to the impacts of carbon dioxide
... still considerable uncertainty regarding the magnitude of their effects



Some conclusions #2

- Black carbon and ozone have a strong seasonal pattern ... impacts particularly important in the Arctic, especially during spring melt



Seasonal scenario of radiation, sources, and transport within the Arctic

Winter/Early Spring

- Solar radiation is limited so that the radiation balance is driven primarily by thermal fluxes
- Also the time of the year when transport of pollutants from the mid-latitudes is most efficient (Arctic Haze)
- Build-up of ozone and aerosol precursors

Spring

- Solar radiation becomes available for photochemical production of ozone and aerosols
- Transport of pollutants from mid-latitudes still efficient (Arctic Haze)
- Agricultural fires begin

Late Spring/Summer

- Solar radiation is at a maximum
- Surface melt begins
- Snow-albedo feedback maximizes
- More powerful greenhouse effect due to warmer temperatures
- Boreal forest fire season

Some conclusions #3

- These climate forcers are also relatively short-lived and have the potential for relatively rapid reductions in emissions and thus in atmospheric levels.
- There are various options for emissions reductions that can be taken in northern regions and globally.
- Improving quantitative estimates of the potential benefits of reducing emissions of short-lived climate forcers requires improved climate modelling capability.



Workshop Mitigation Options #1

Magnitude – Technical – Costs - Implementation Issues

- Reduce BC emissions by adopting diesel particulate control measures
- Reduce BC (and some CO) emissions by reducing and/or changing the timing of agricultural burning in Europe and northern Asia
- Reduce CO, NO_x, and NMVOC emissions (O₃ precursors) by adopting vehicle and fuel storage emissions control measures (exhaust catalysts, vehicle inspection and maintenance, addition of oxygen containing compounds to gasoline, etc.)

Workshop Mitigation Options #2

Magnitude – Technical – Costs - Implementation Issues

- Reduce methane emissions through coal mine degasification and mine ventilation air capture.
- Reduce emissions from natural gas systems through leak reduction activities, including options including replacing high-bleed pneumatic devices, and enhanced inspection and maintenance programs.

Monitoring and research

- *Enhance and expand networks of monitoring and observation points for short-lived climate forcers
... building on existing networks*
- *Conduct studies on non-carbon dioxide climate forcers to improve understanding of their role in Arctic climate and develop recommendations for national and international follow-up action*

Follow-up

Don't yet know what Ministers response will be, but ...

Expectation is for follow-up work on:

- Monitoring
- Modelling
- Mitigation options

Opportunities to develop cooperation with UN ECE HTAP

Thankyou

ARCTIC WARMING NOT A NEW IDEA

“temperature of the Arctic regions would rise about 8 degrees or 9 degrees Celsius, if the carbonic acid increased 2.5 to 3 times its present value”

Svante Arrhenius, 1895

