

Arctic Sea Ice Loss –

Probably the most visible consequence of Global Warming

Arctic Climate Stability and Change

ECRA General Assembly 2021 –

“Climate Research: reflecting on the past and planning for the future”

March 10 14:30 – 17:00, 2021

Chair:

Lars H. Smedsrud, Bjerknnes Centre, Norway

Bjerknnes Centre
for Climate Research



Arctic Sea Ice Summer Loss: estimates

In September 1980 we had about 7.5 mill km² (about 2 m thick)

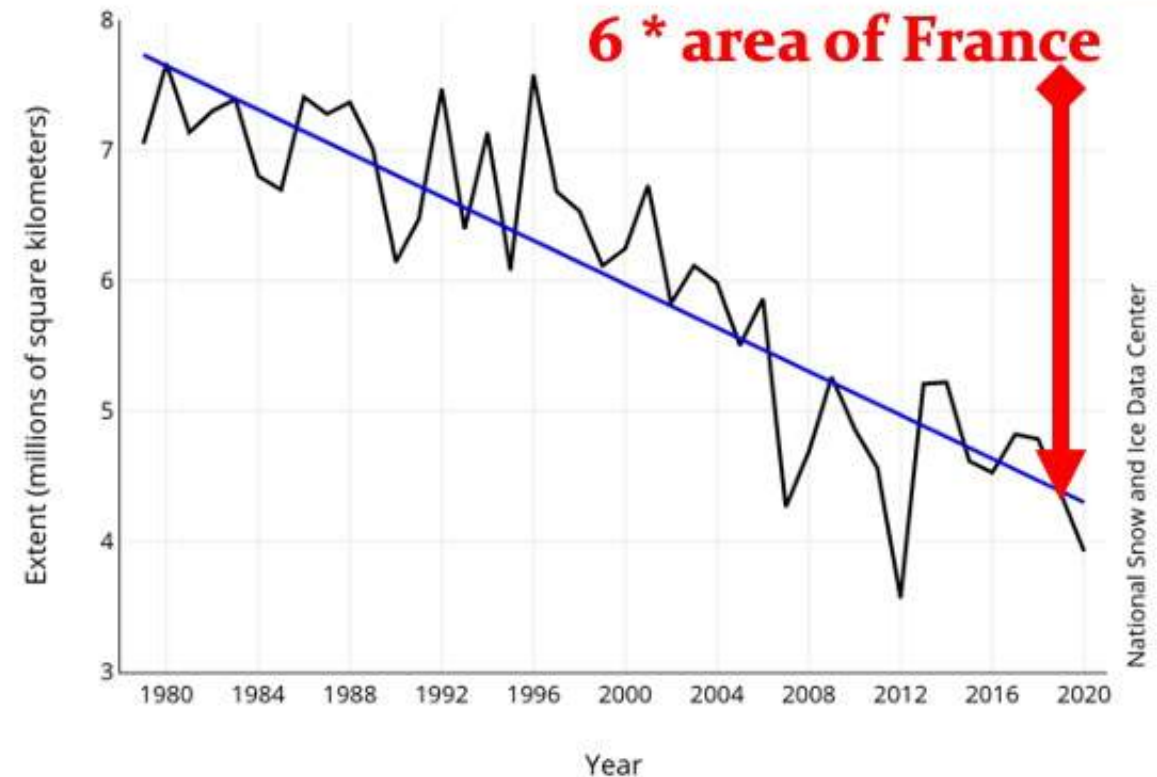
In september 2020 we had about 3.8 mill km² (about 1.0 m thick)

Loss of: $(7.5 + 3.7) \cdot 10^{12} \text{ m}^3 / 40 \text{ years} = 9.000 \text{ m}^3 / \text{s}$.

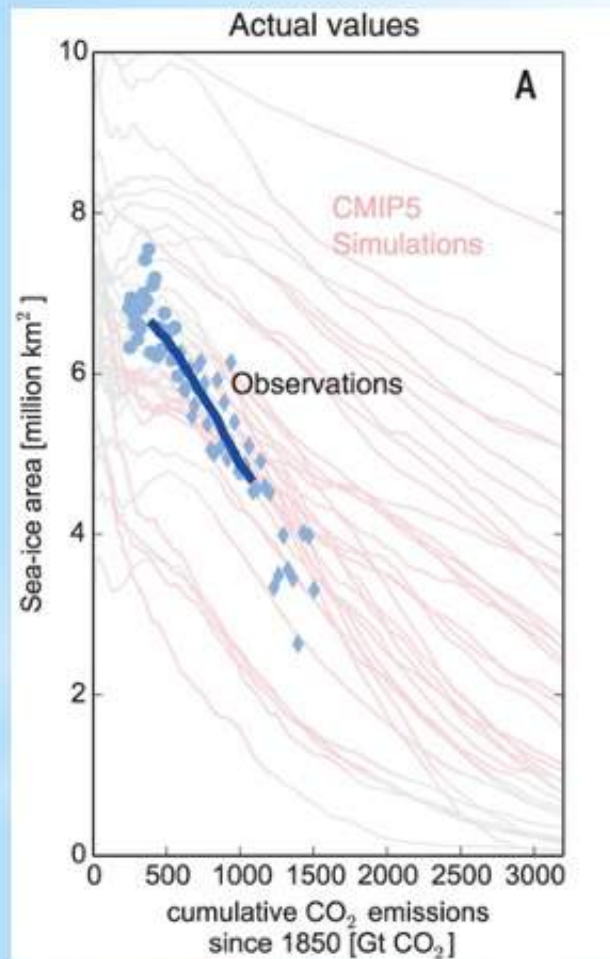
Area of soccer field: $105 \cdot 68 \text{ m} = 7140 \text{ m}^2$

(Assuming sea ice is 1 m thick).

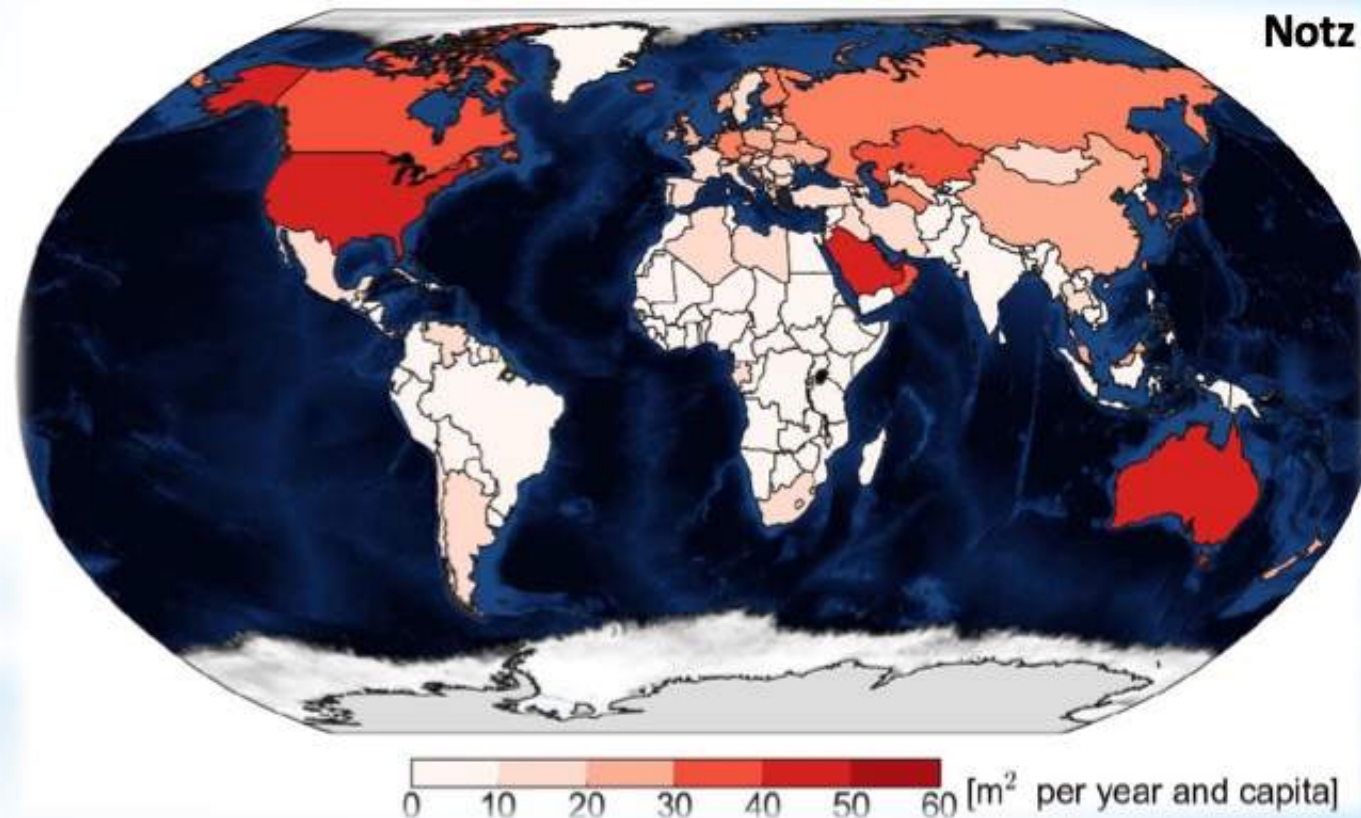
Alternatively :
1 soccer field lost every 0.8 s.



Arctic sea ice decline is linear and caused by me and you...



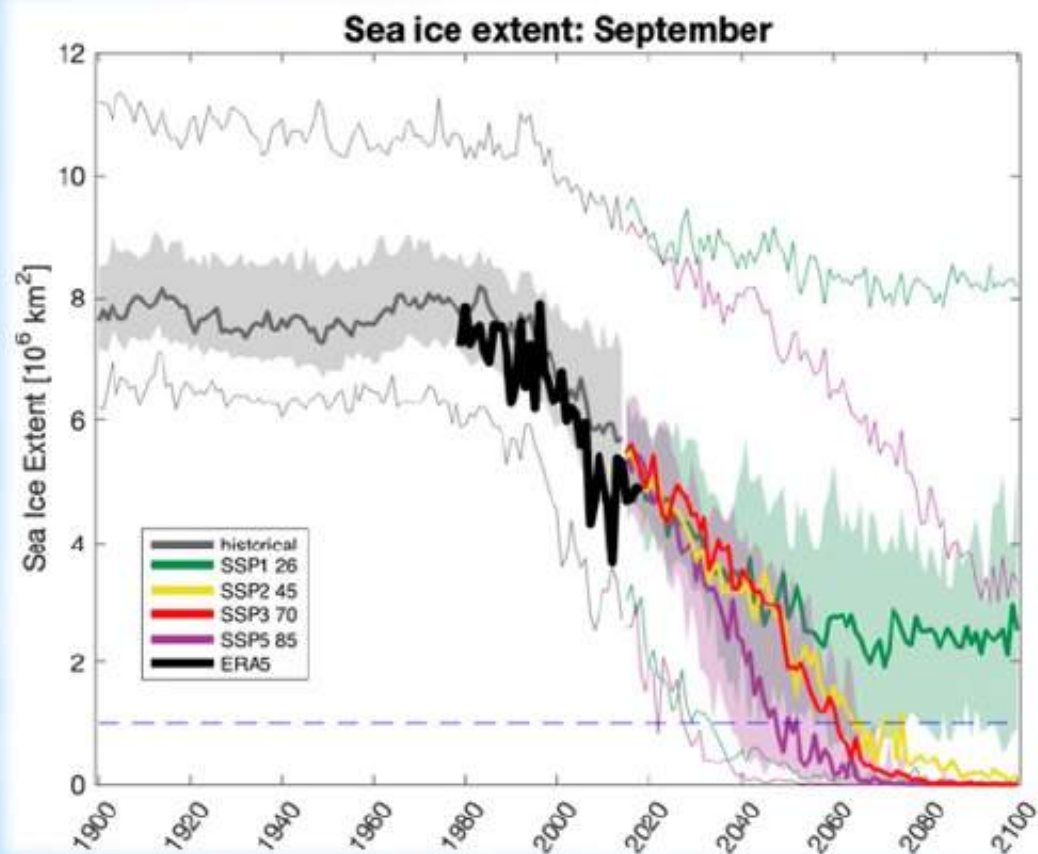
Annual mean loss of Arctic September sea-ice area caused by average emissions of each citizen



3 m² Arctic September sea ice loss = 1 ton anthropogenic CO₂ emission

Bergen – Brussels = 0.75 ton CO₂ => 2.25 m² is saved because I am not attending this meeting

Can we still «save» the Arctic Sea ice?



In some way Yes!

Fossil-fueled Development - The Highway

Regional Rivalry - The Rocky Road

Middle of the Road

“Paris Agreement” – The green road

Arctic sea ice loss is mostly caused by human use of fossil fuel – cased closed

Why is continued Arctic Climate research needed?

- **We do not know the circulation response to Arctic sea ice loss**
- **We are not able to forecast Arctic climate well**
- **We do not know the ecological consequences**
- **We are not able to explain natural climate variability**

Key Arctic topics for the future:

- *How rapidly will Arctic sea ice decline in the future?*
- *What long-term observations are essential for future predictions?*
- *What are the impacts of Arctic climate change – both locally and globally?*
- *How can we best advance environmental prediction capabilities?*

Our strengths...

- Breadth of expertise including observations, modelling, theory and logistics
- Leading role in various national and international committees
- Flexible and responsive to new ideas
- Access to large-scale infrastructures (research icebreaker, polar stations, aircraft, HPC facilities ...)
- Availability of some of the most advanced regional and global earth system models

Our mission...

Mission statement:

Advancing Arctic climate research in Europe for the benefit of society...

... through

- international cooperation (e.g. shared infrastructure),
- Identification of key topics (research priorities), and
- providing advice (policy makers, funding agencies...)

Who we are...

25 participating institutions from 10 European countries

Denmark	 	Finland	
France	    		
Germany	 	Italy	 
Norway	    		
Sweden		The Netherlands	 
United Kingdom	   		