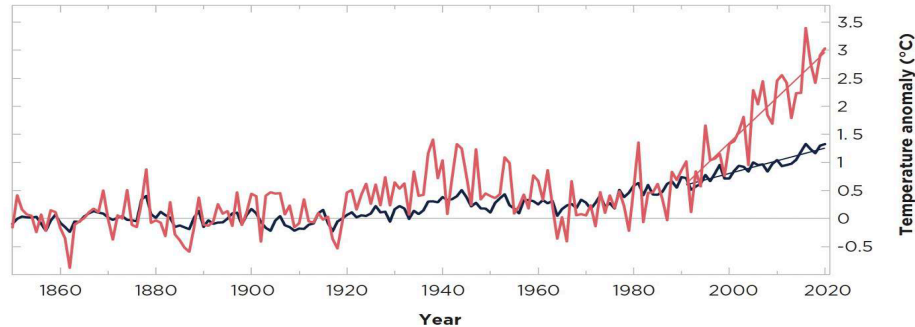


The nr 1 imperative: to keep the Arctic (ice) in the Arctic. Thus avoiding flooding of Mega Cities

Amplification of Temperature Change in the Arctic

ANNUAL ANOMALIES RELATIVE TO 1850-1900 AVERAGE



— Arctic (60°N-90°N) temperature change — Global temperature change

Climate warming in the Arctic goes **3x faster** than average

Buying time to avoid flooding as **irreversible** consequence



Global warming in the Arctic is happening 3x faster than global average and has reached 3,0°C already versus 1,2°C for global average. As a result, melting of both floating sea ice & land ice during the Arctic summers has significantly increased and is no longer in balance with the growing of ice during the Arctic winters. This leads to net loss of ice, and hence sea-level rise, as well as loss of Albedo to reflect back incoming solar radiation. When sea ice disappears, the darker water will absorb more heat, further accelerating the loss of Arctic ice & sea-level rise.

Anthropogenic GHG emissions have increased CO2 concentrations as the Keeling curve shows. Tackling the cause both by **Reduction** of current emissions (NetZero) and by **Removal** of past emissions from the atmosphere (NetNegative) is indispensable. However, effects have been set in motion by cumulative emissions that must be tackled by Climate **Repair** & Arctic **Refreeze** to avoid Climate Disaster in the form of sea-level rise & flooding of coastal Mega Cities.

If not addressed, positive feedback loops - e.g. increasing methane emissions resulting from melting permafrost - will further exacerbate the problem, making the eventual loss of coastal assets *irreversible* and merely leave the questions *when* these will be lost and *how many* citizens will become climate refugees? This is the last decade in which the eventual loss of Mega Cities and coastal areas can still be avoided. This is now humanity's *nr 1 imperative* !

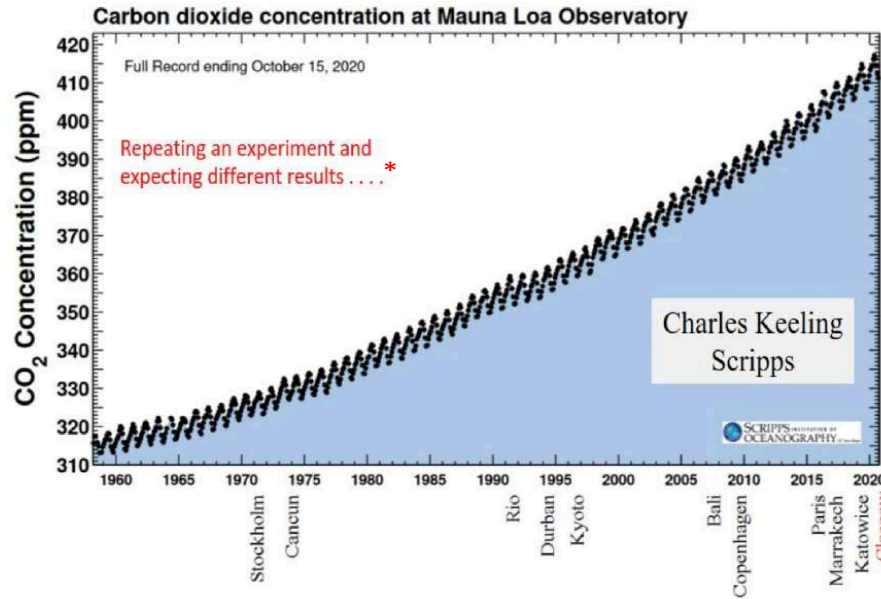
Of the three available technologies, MCB - Marine Cloud Brightening - is the most likely to get societal support & political licence, because it is effective and controllable in location and in time. It involves reducing the droplet size of dark cloud systems moving in the direction of the Arctic by emulating the effect of a storm at sea, by spraying seawater through fine nozzles that will carry sea salt particles as condensation nuclei into the dark clouds. The reduced droplet size has as effect a brighter/whiter cloud of humidity that will stay in the atmosphere and can act as sunshade to protect Arctic ice from melting, as the clouds move over both sea & land ice.

It requires a 'fleet' of 500-700 spray units around the Arctic that will be orchestrated into spray action by satellites using meteorological AI. With the window of opportunity, to avoid climate disaster and the eventual loss of Mega Cities, closing by the end of this decade, the Refreeze Foundation will support the technological development for the proof of concept and will build societal acceptance & political licence for MCB deployment at scale by the end of this decade.

TALKS on Climate WARMING

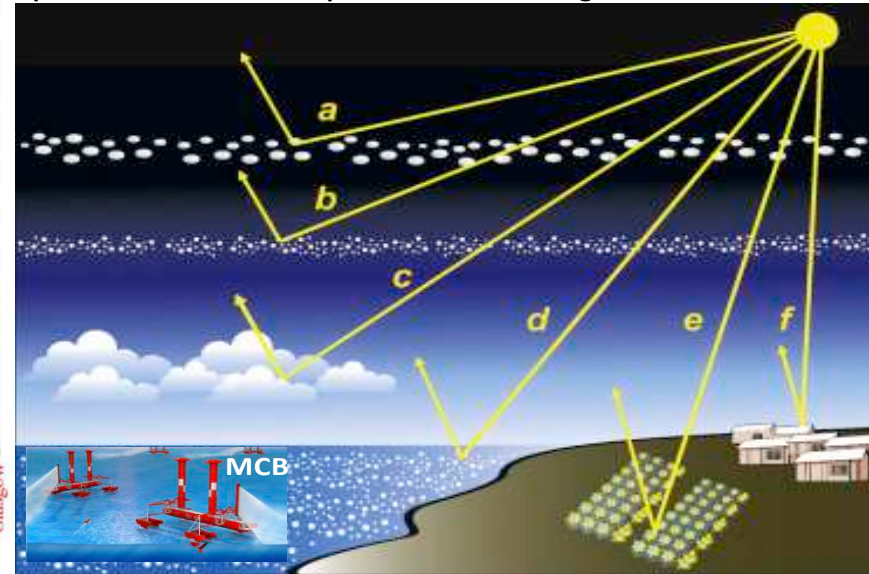
versus

ACTION on Climate COOLING



* Einstein's definition of insanity

Optimum of various techniques to reflect incoming heat at various levels



C : MCB - Marine Cloud Brightening : a Natural Solution against Climate Warming

The Economist names SRM (Solar Radiation Management) as the most prominent of 22 emerging technologies to watch in 2022

<https://www.economist.com/the-world-ahead/2021/11/08/what-next-22-emerging-technologies-to-watch-in-2022>



Effectiveness : **Low**

HGC

MCB

SAI

High

Acceptance : **Low**

SAI

HGC

MCB

High



- SAI = Stratospheric/Sulphate Aerosol Injection Stratospheric level
- MCB = Marine Cloud Brightening Atmospheric level
- HGC = Hollow Glass Cubicles / Silicia Surface level

Committee of Recommendation (optional)

Providing gravitas to the effort. Potential candidates Ólafur Grimson (President of Arctic Circle & former President of Iceland), Sir David King (UK Chief Scientist & Climate Envoy), Robbert Dijkgraaf, Nobel laureate, etc

Charity The Refreeze Foundation

Charity (ANBI) registered in The Netherlands to enable tax exempt donations to the cause

The Refreeze Not for Profit Company Ltd/B.V.

Decides budget allocation for Technology Development & Public Engagement Activities

Technology Development Activities :

Goal Proof of Concept for MCB

To be based in Cambridge working with associate Universities (Delft, Edinburgh, Harvard, a.o.)
Lab & field testing technology on critical parameters.
Receives budget from Refreeze Cy
Reports results to Refreeze Cy
Supports Public Engagement Activities

Public Engagement Activities :

Goal Societal Support & Political Licence for MCB

To be based in Brussels, briefing & engaging EU & international stakeholders present there.
Also participating in Arctic Circle & Arctic Council and relevant international climate policy shaping activities.
Receives budget from Refreeze Cy.
Reports activity & results to Refreeze Cy