Our Common Present 2016

Great expectations, projects and mistakes – efforts to understand and control nature in the past and the present

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Environment Center
Charles University
in Prague

ÚSD

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UNIVERZITY KARLOVY
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Ekonomická fakulta
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Jihočeská univerzita
v Českých Budějovicích
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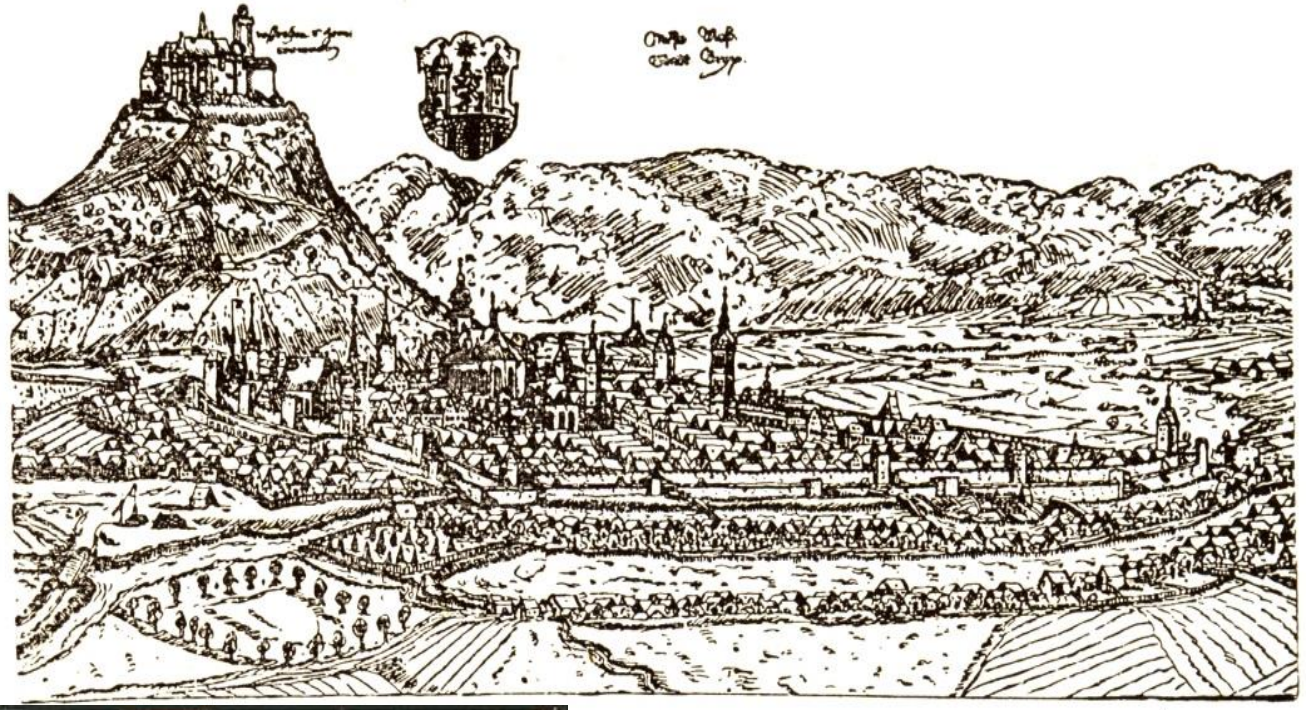
Sustainable development discourse

- 1987: **Our Common Future** (Brundtland Report) - United Nations WCED
- 1992: Agenda 21 - UN on Earth Summit
- 2012: The Future We Want (Rio+20 UNCSD)
- 2015: Sustainable development goals = Agenda 2030
- … in Czech Republic → Agenda 2050
  - 2011 – **Our Common Present** conferences
  - 2016 – **Past**, present, future

What we have heard yeasterday…

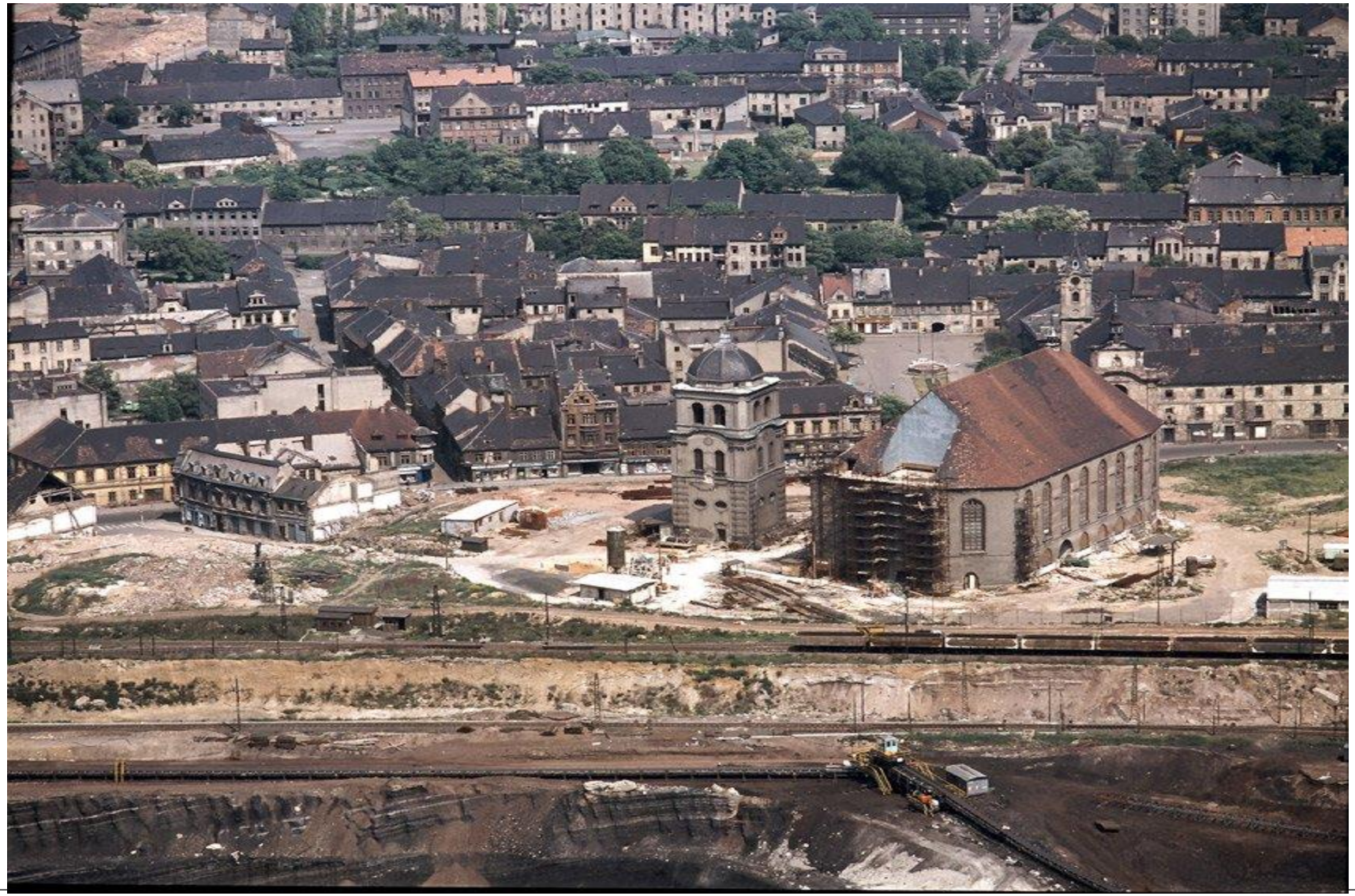
Most - 1602



n 1602, v. J. Willenberger

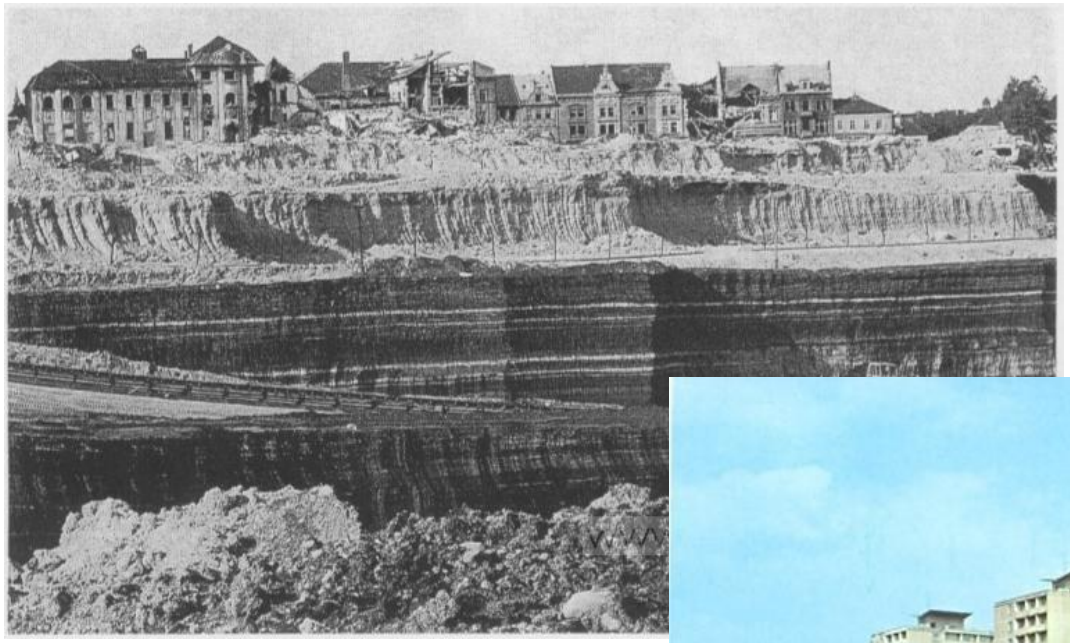
Most 1900

Mining encroaching on Old Most



Mining around Old Most… and new city

Jaroslav David,
OCP 2016

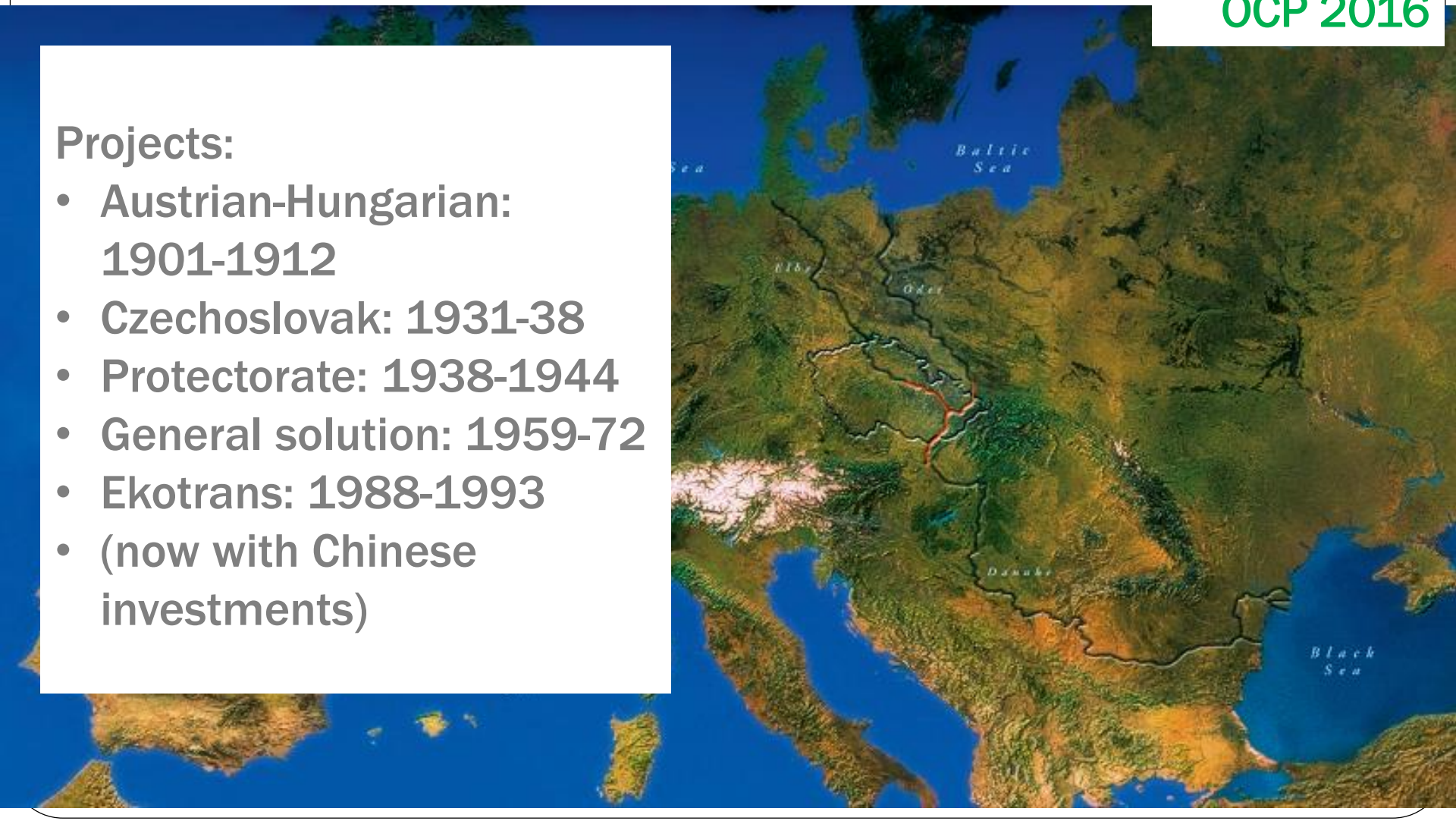


Danube – Oder – Elbe canal

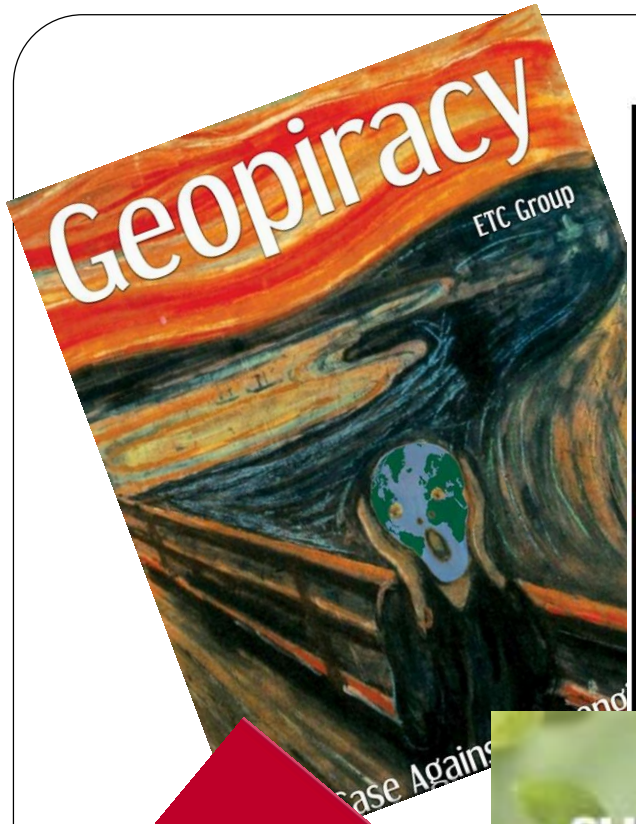
Jíra Janáč,
OCP 2016

Projects:

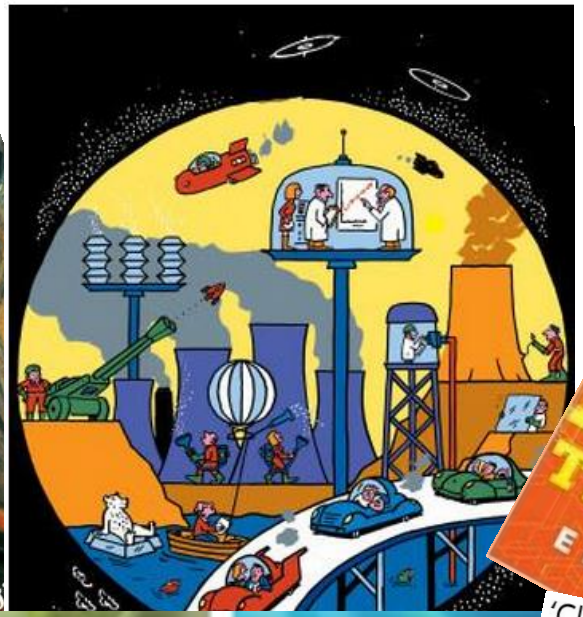
- Austrian-Hungarian: 1901-1912
- Czechoslovak: 1931-38
- Protectorate: 1938-1944
- General solution: 1959-72
- Ekotrans: 1988-1993
- (now with Chinese investments)



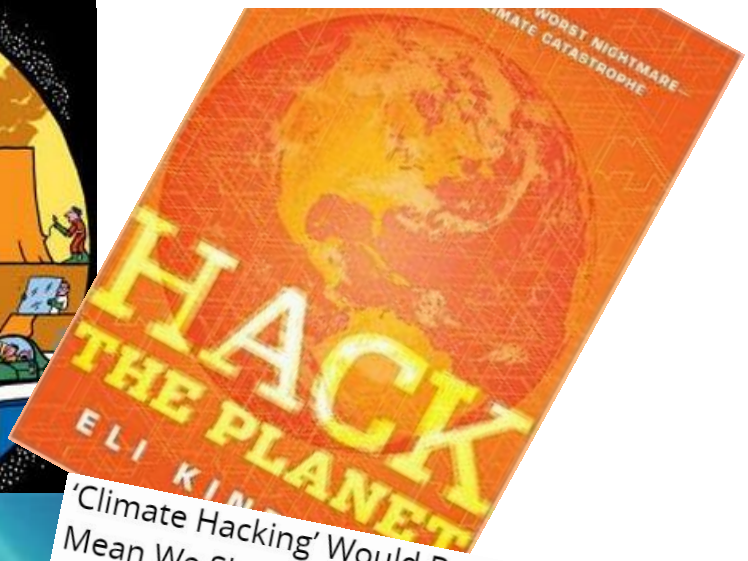
Are mistakes are our destiny ?



The Climate Fixers

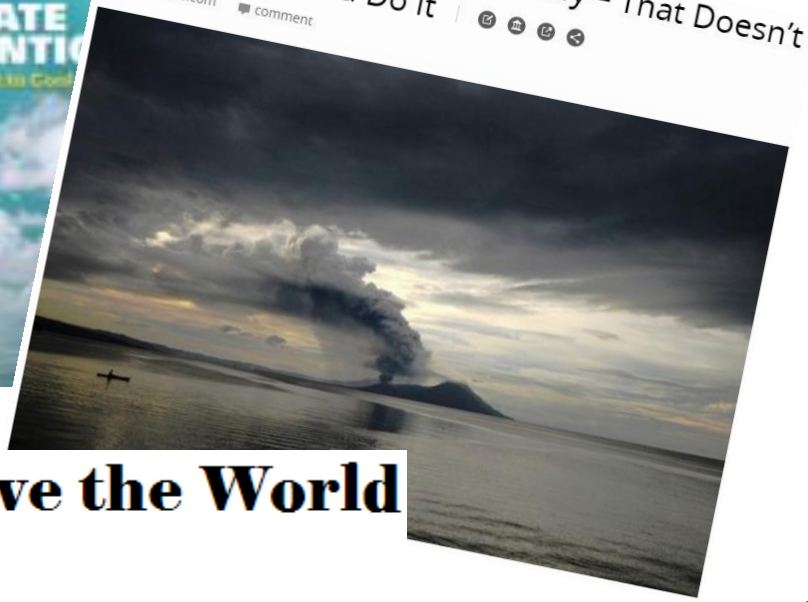


Miroslav Havránek,
OCP 2016



'Climate Hacking' Would Be Easy – That Doesn't Mean We Should Do It

iflscience.com comment



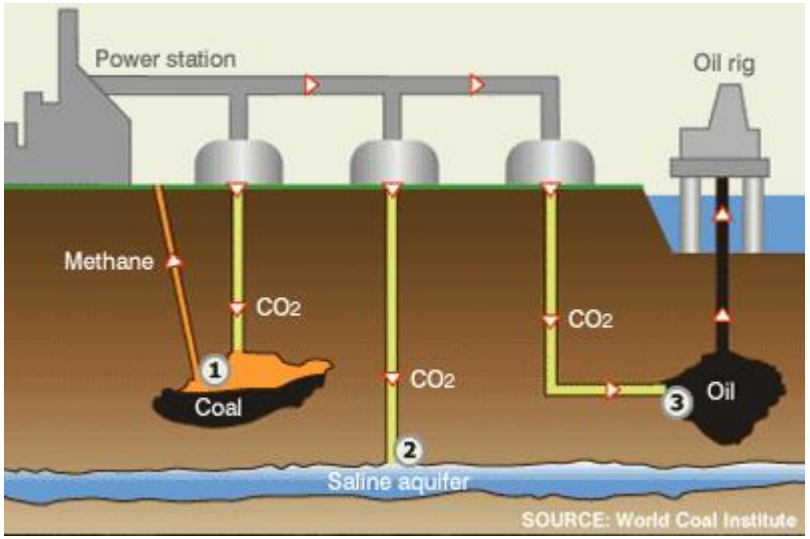
Can Geoengineering Save the World from Global Warming?

Possibilites to combat climate change

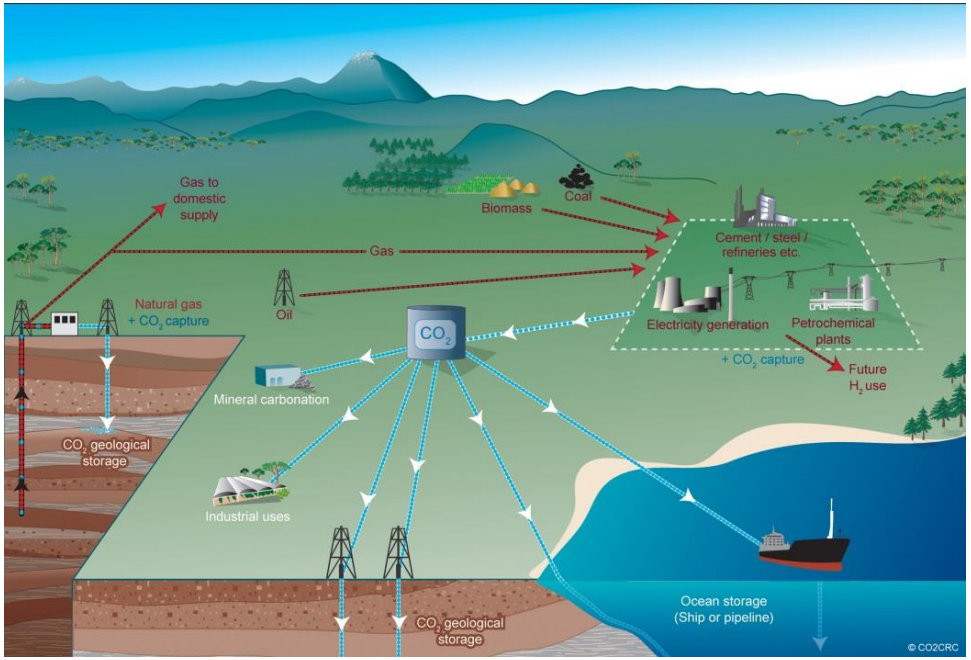
- CO_2 sequestration (CCS)
  - process of capturing waste carbon dioxide (CO_2) from large point sources, such as fossil fuel power plants, transporting it to a storage site, and depositing it where it will not enter the atmosphere, normally an underground geological formation
- Albedo modification (SRM)
  - type of climate engineering which seek to reflect sunlight and thus reduce global warming through creation of stratospheric sulfate aerosols
- *Large scale change of Earth circulation (fringe)*
  - *E.g. Barents sea, Bering strait*

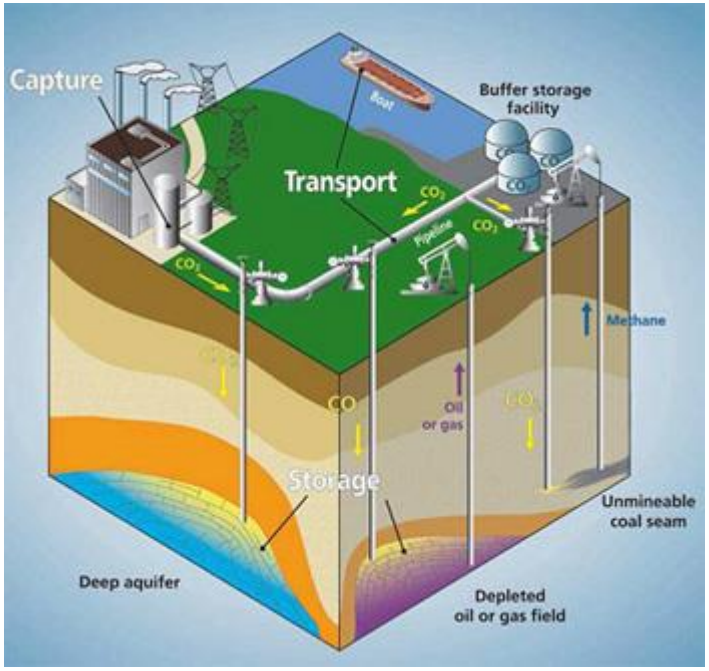
The Geoengineering Gambit – MIT Technology review, 2009

„Classical“ CCS



www.CO2remove.eu



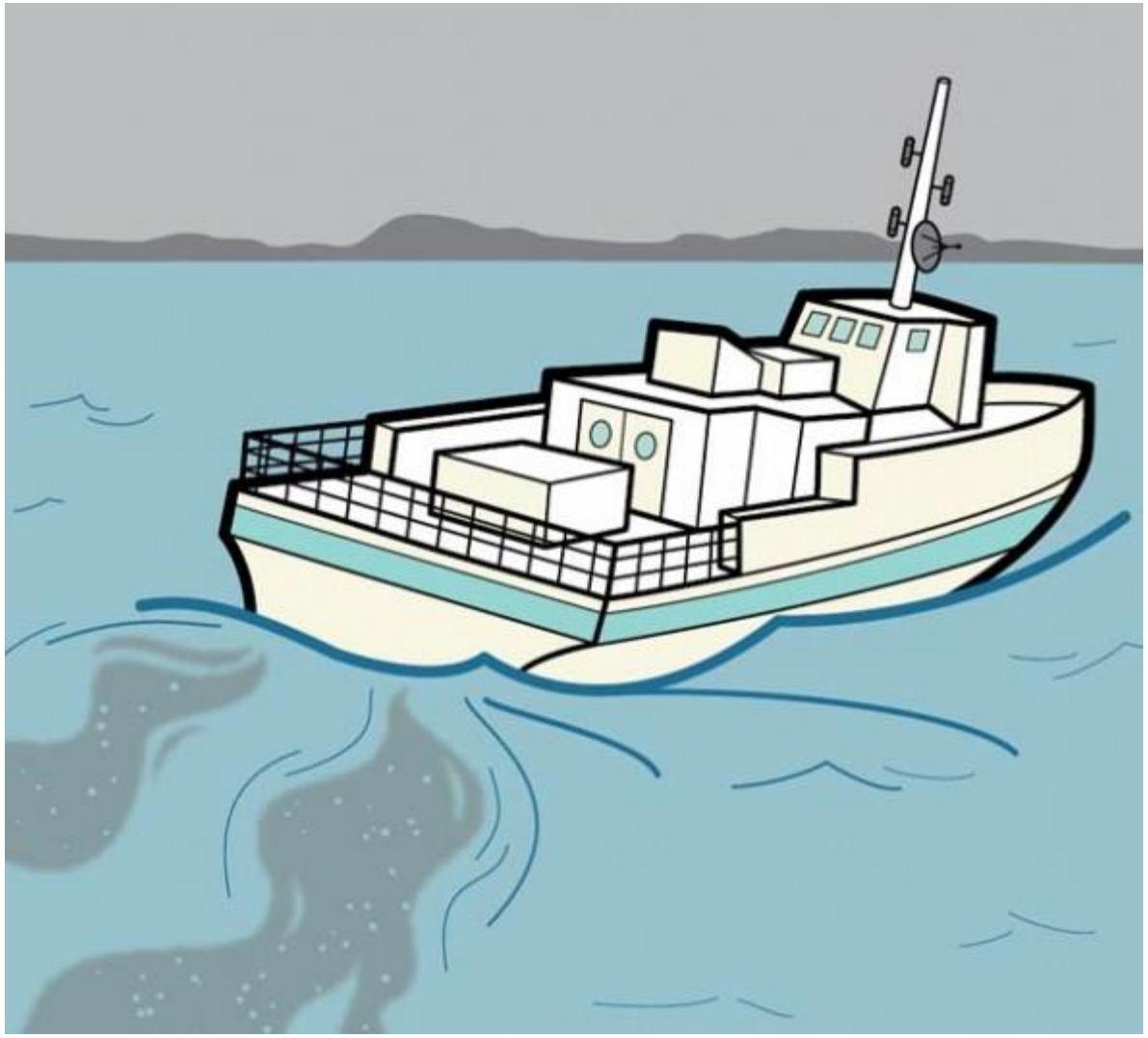


CO_2 Atmosphering scrubbing

Geoffrey Holmes et al. / Energy Procedia 37 (2013) 6079– 6095

Geoffrey Holmes et al. / Energy Procedia 37 (2013) 6079– 6095

About 1Mt CO_2/year,
versus energy required



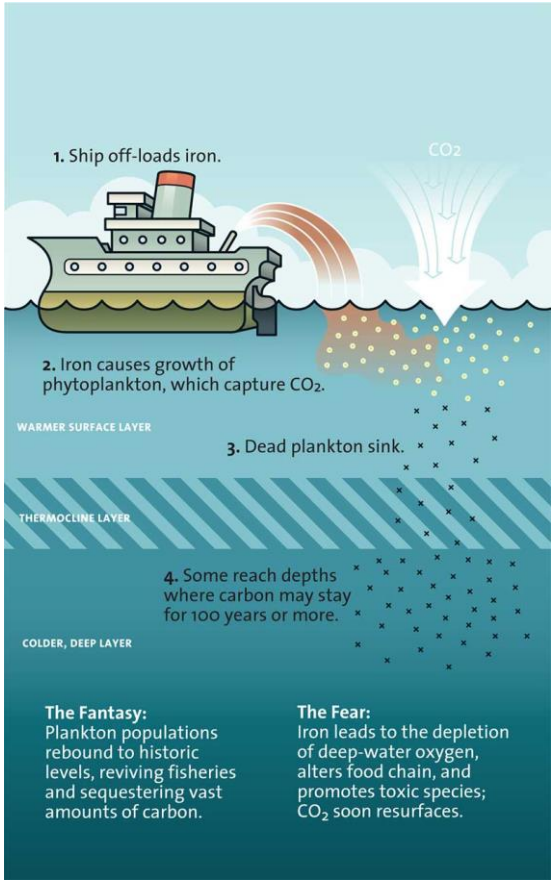
Source: Bullis, K., 2009. The Geoengineering Gambit

Ocean Fertilization:

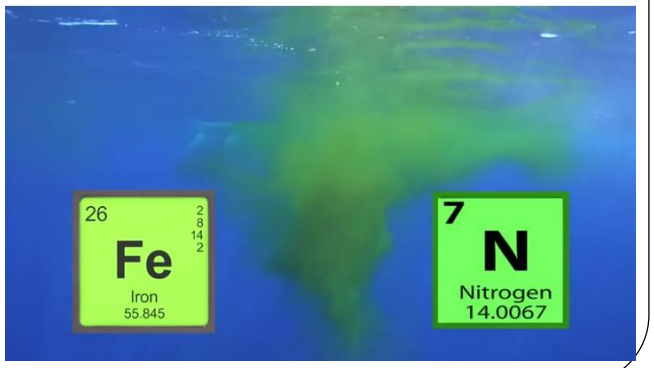
Adding iron or other nutrients to the ocean could promote algae blooms, which would capture carbon dioxide and store some of it deep in the ocean. Pros: It would directly address the root of climate change: carbon dioxide in the atmosphere. Cons: At best, it could offset an eighth of the greenhouse-gas emissions attributed to humans, and it could harm ecosystems.

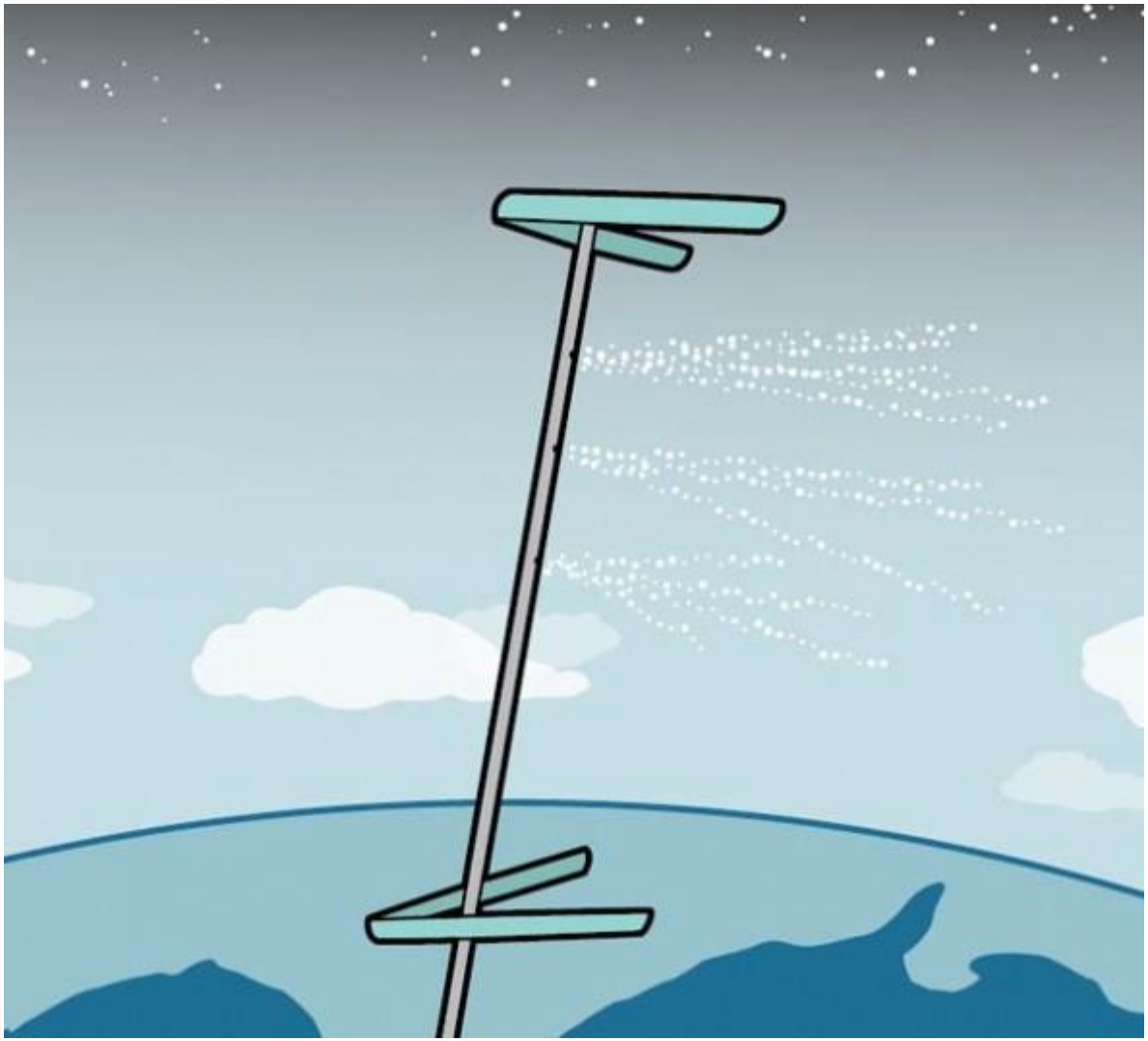
Ocean fertilization

A massive phytoplankton bloom induced by an ecosystem-scale iron fertilization experiment in the equatorial Pacific Ocean, KENNETH H. COALE et al, Nature, 1996



Nicol, S., Bowie, A., Jarman, S., Lannuzel, D., Meiners, K. M. and Van Der Merwe, P. (2010), Southern Ocean iron fertilization by baleen whales and Antarctic krill. Fish and Fisheries, 11: 203–209. doi: 10.1111/j.1467-2979.2010.00356.x



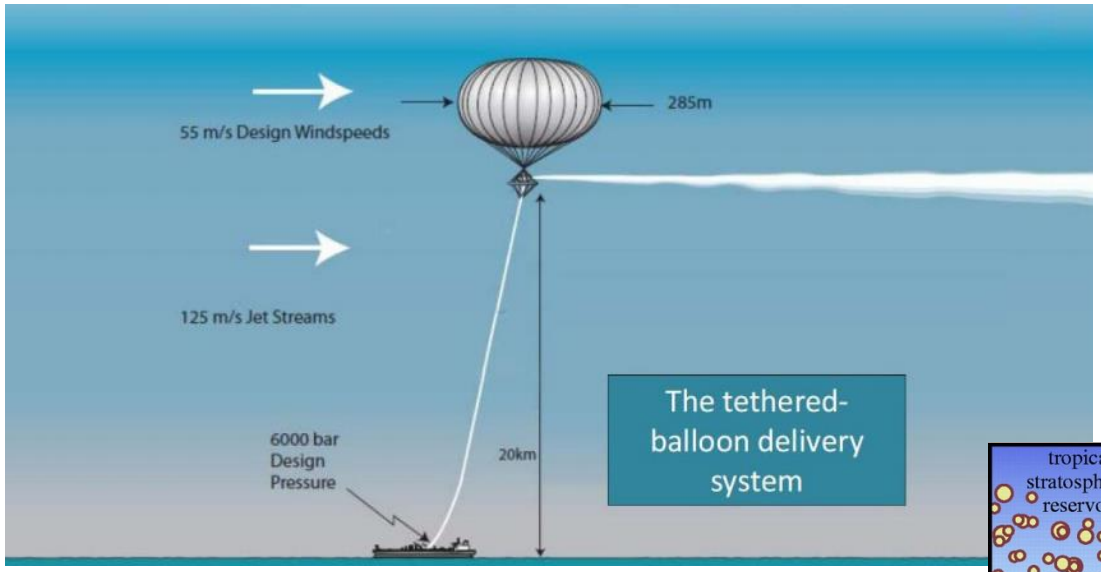


Source: Bullis, K., 2009. The Geoengineering Gambit

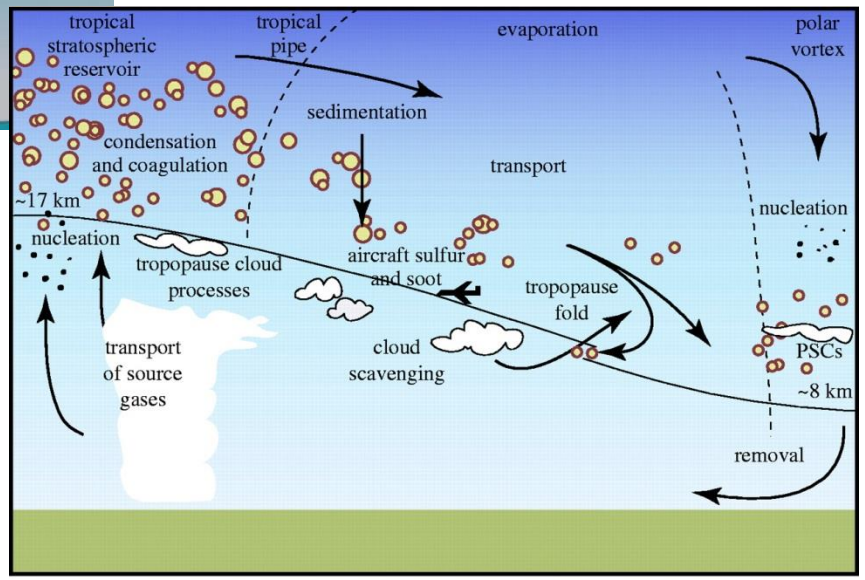
Sulfate Injection:

Aircraft, or a hose suspended by hundreds of wing-shaped balloons, could inject aerosols into the upper atmosphere. The particles would reflect light and shade the earth.
Pros: It could be cheap and fast-acting, cooling the earth in months.
Cons: It could cause droughts. Injections might need to continue for hundreds of years.

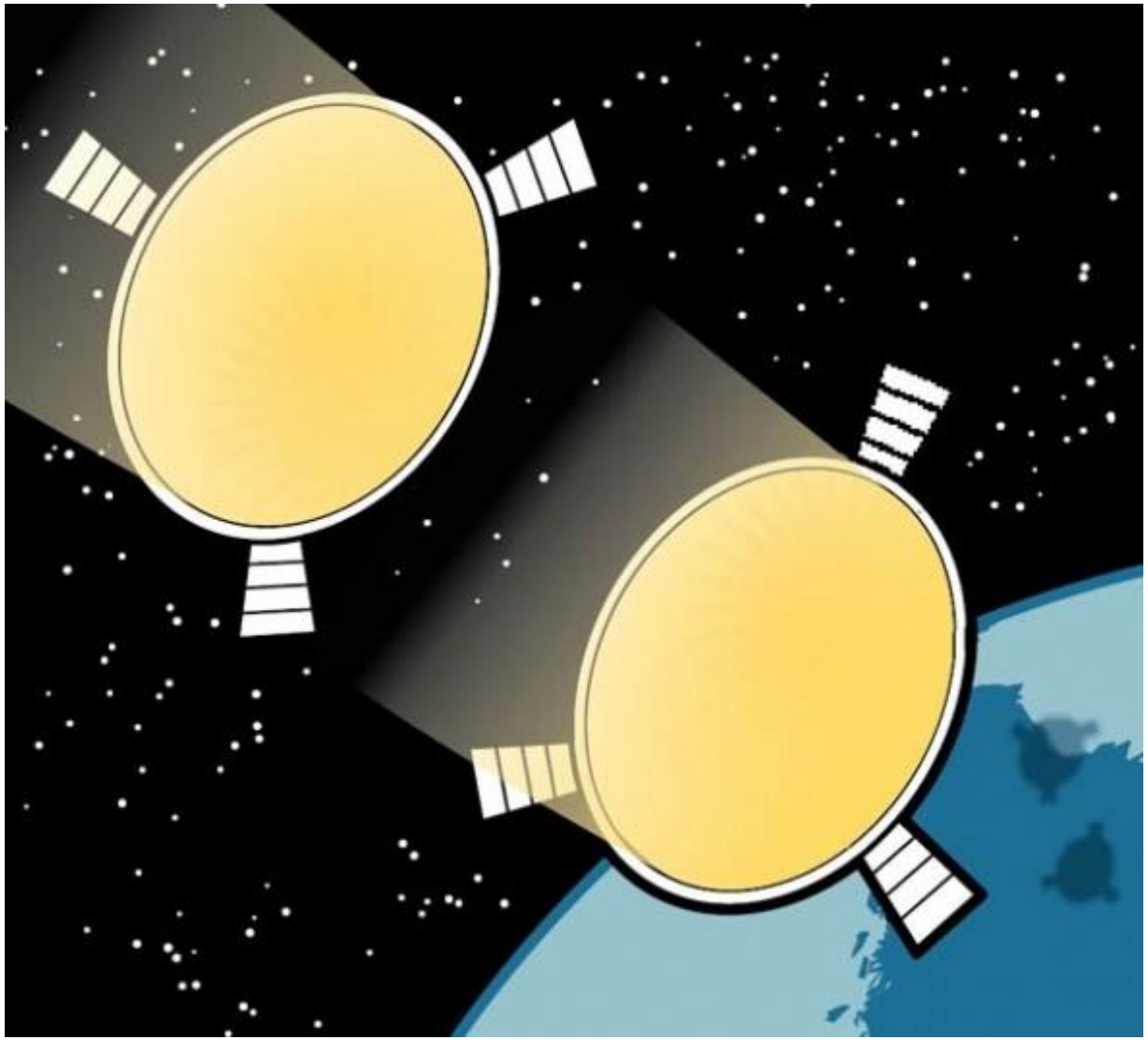
Aerosol injection



Eli Kintisch, FOE, 2012



An overview of geoengineering of climate using stratospheric sulphate aerosols
Philip J Rasch, Simone Tilmes, Richard P Turco, Alan Robock, Luke Oman, Chih-Chieh (Jack) Chen, Georgiy L Stenchikov, Rolando R Garcia
Phil. Trans. R. Soc. A 2008 366 4007-4037; DOI: 10.1098/rsta.2008.0131. Published 13 November 2008



Source: Bullis, K., 2009. The Geoengineering Gambit

Space Shades:

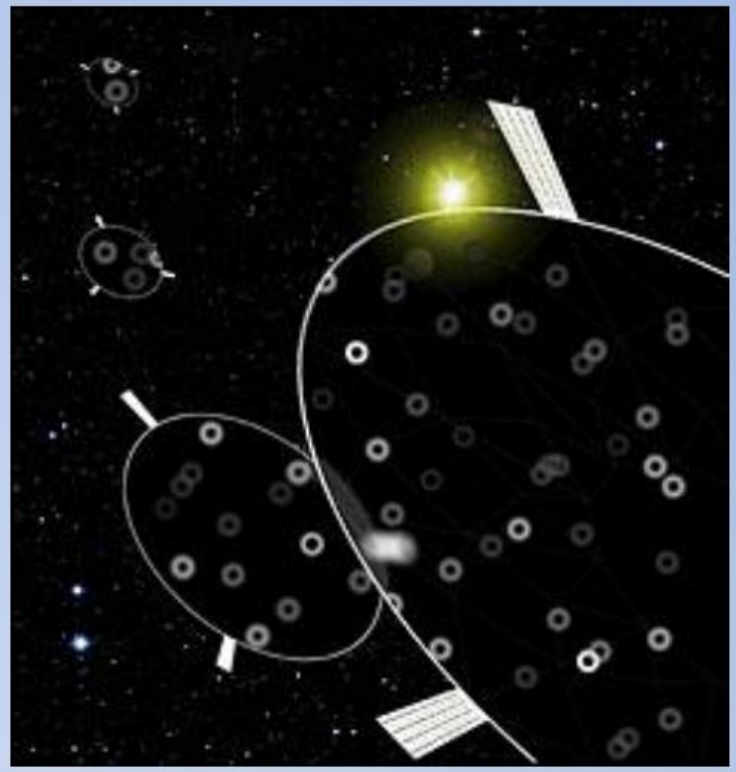
Trillions of disks launched into space could reflect incoming sunlight. Pros: Space-based systems don't pollute the atmosphere. Once in place, they would cool the earth quickly. Cons: The technology could take decades to develop. And launching trillions of disks is fantastically expensive.

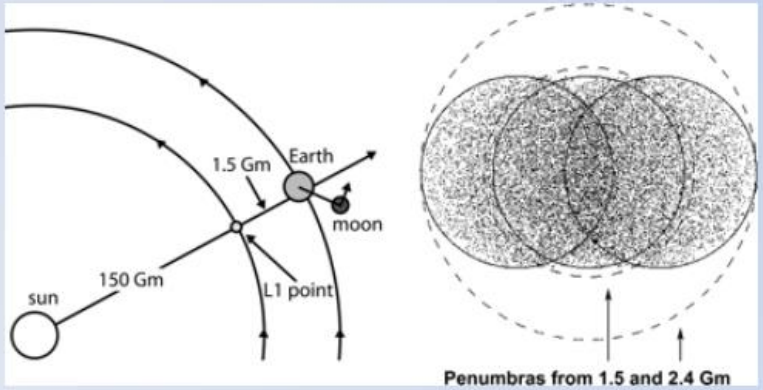
Global shade

Blocking Sunlight:

- A 100,000 km cloud
- comprised of 16 trillion manhole-cover sized discs,
- ~3 million miles from earth,
- blocking 2% of the sun's rays.

$1 -$5 trillion depending on launch technology.





Eli Kintisch, FOE, 2012

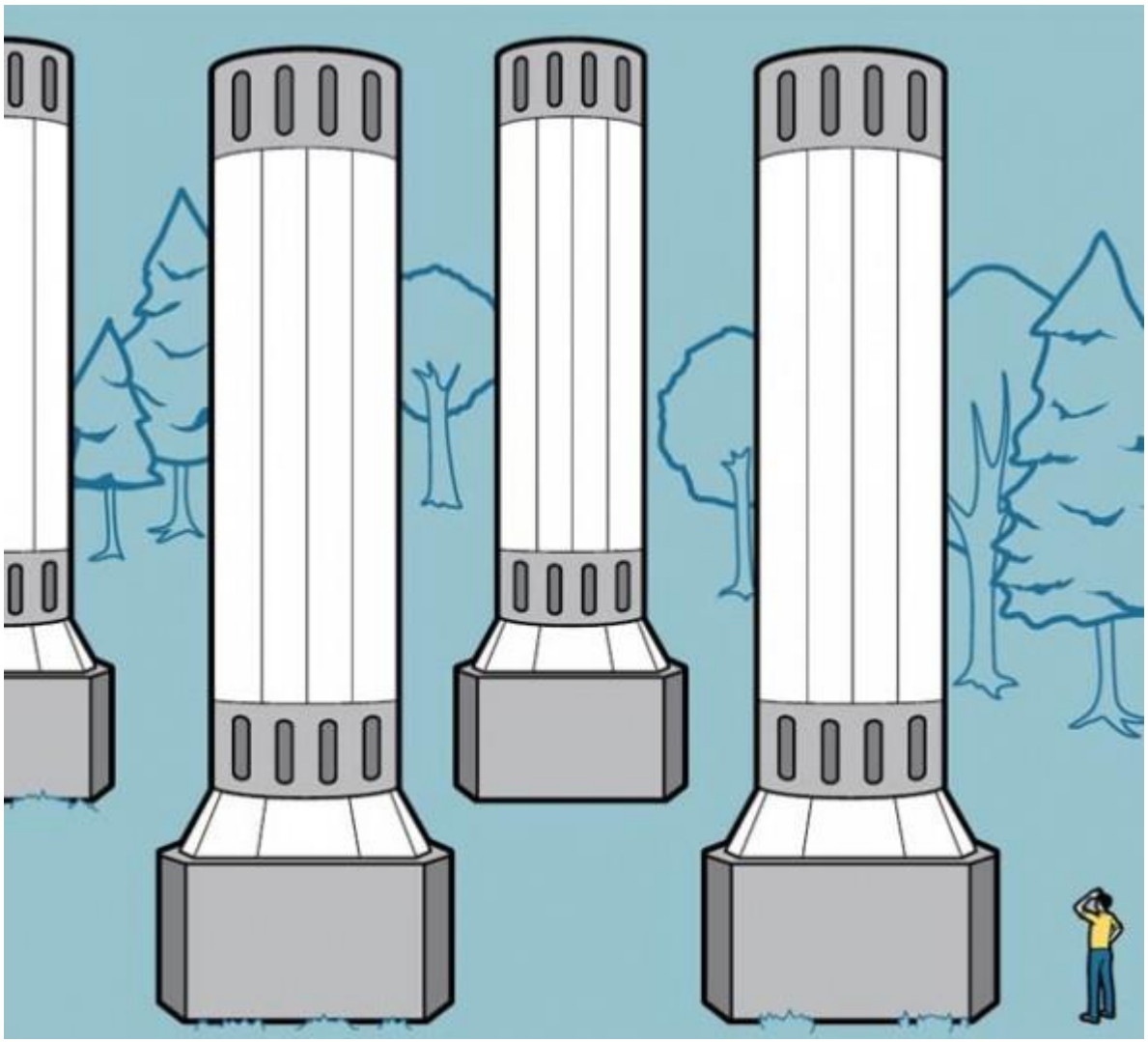
Source: Bullis, K., 2009. The Geoengineering Gambit

Cloud Brightening:

Tiny droplets made by spraying an extremely fine mist of seawater into low-lying clouds could make them reflect more sunlight than ordinary clouds. Pros: Shading could be targeted—to stop the melting of Arctic Sea ice, for example. Cons: Scientists don't know how it would affect precipitation and temperatures over land, where it would matter most.

R/V *Point Sur* Smoke Operations

Lynn M. Russel, FOE 2012



Source: Bullis, K., 2009. The Geoengineering Gambit

Artificial Trees:

Various chemical reactions can be used to capture carbon dioxide from the atmosphere for permanent storage.
Pros: In the long run, this could reduce atmospheric concentrations of carbon dioxide. There is no obvious limit to how much of the greenhouse gas could be stored.
Cons: It could be very expensive and energy intensive, and it would take a long time to reduce temperatures.

Or simply reforestation…

NASA photo of deforestation in Tierras Bajas project, Bolivia, from ISS on April 16, 2001.

Aerial Reforestation?

photo: Discovery Channel

Questions?

more on

czp.cuni.cz

envigogika.cuni.cz

www.copernicus-alliance.org