

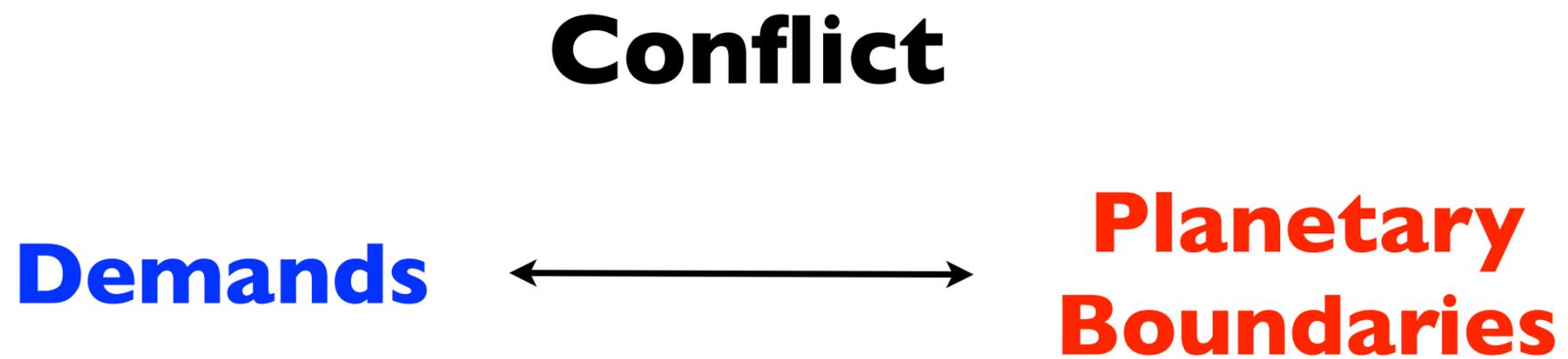


Science Based Environmentalism

Alexander Schatten
www.schatten.info



Humanity on the Edge?



Nature Vol. 461, September 2009:
A safe operating space for humanity

This Nature article is one example of a large number of publications that indicate the same baseline: a growing world population plus increasing standards of living have driven important global systems out of sustainable levels.

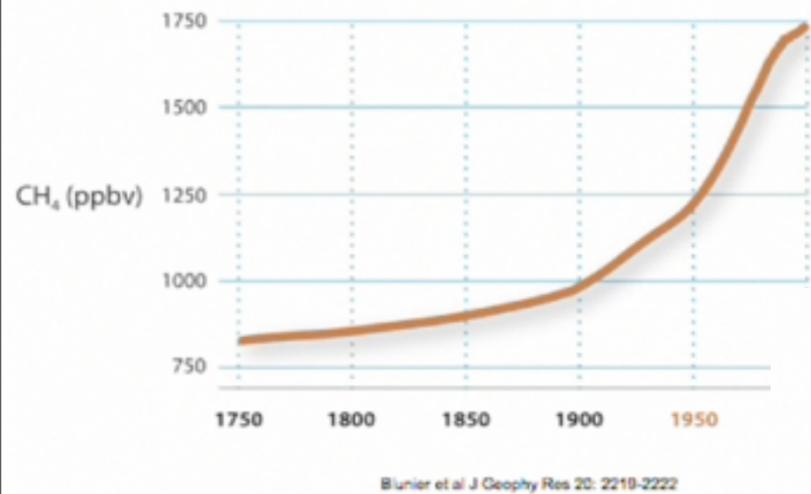
Demands & Constraints



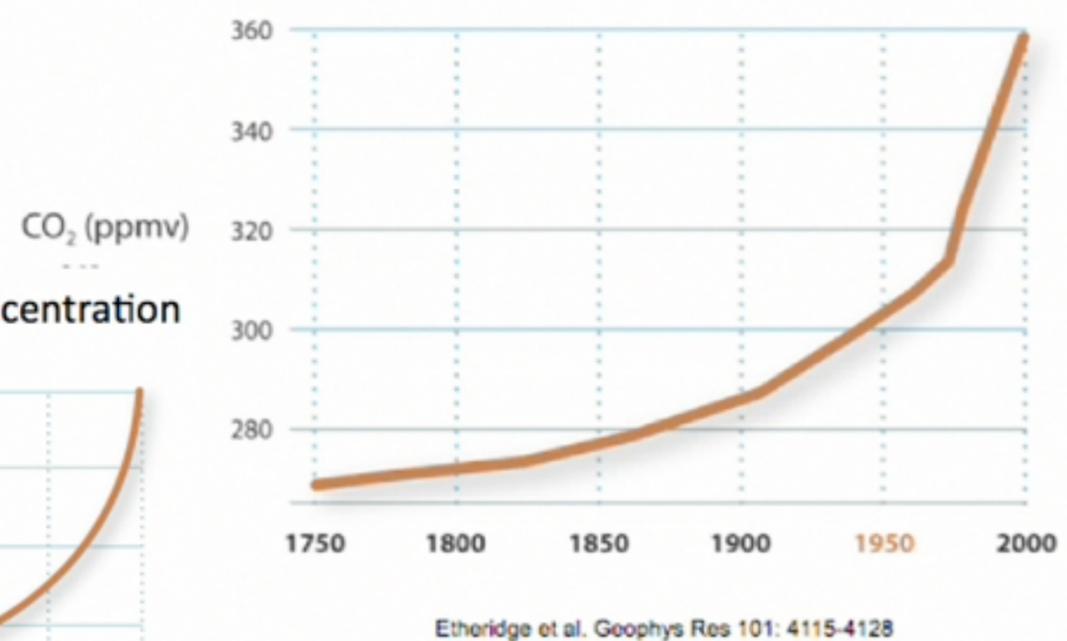
Energy
Material Goods
Food, Water
Space

Growth of population
Growth of consumption
Economic model that builds
on exponential growth

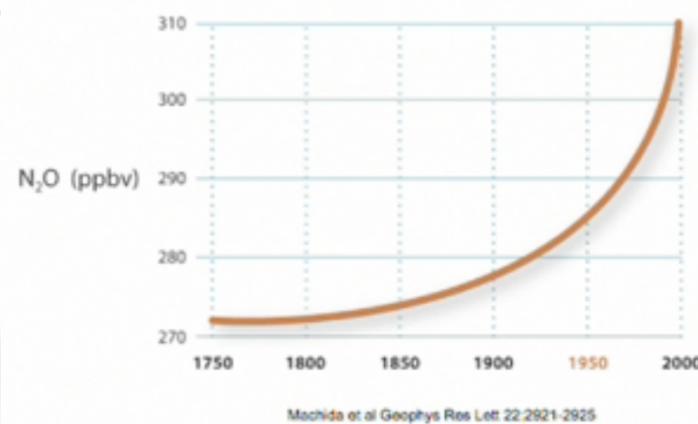
Atmospheric CH₄ concentration



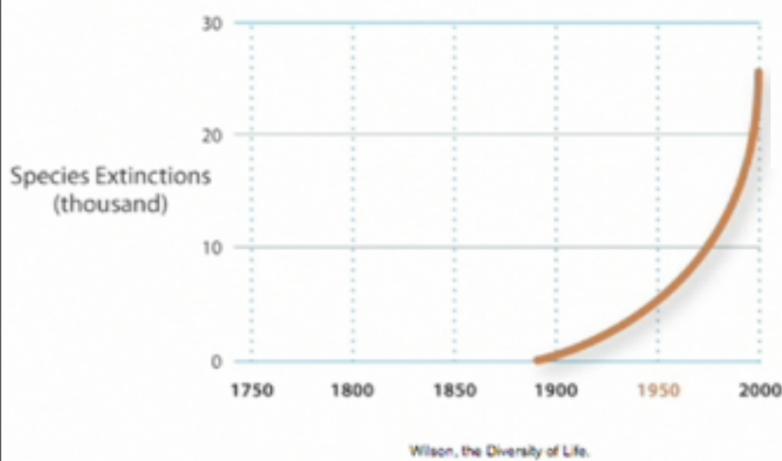
Atmospheric CO₂ concentration



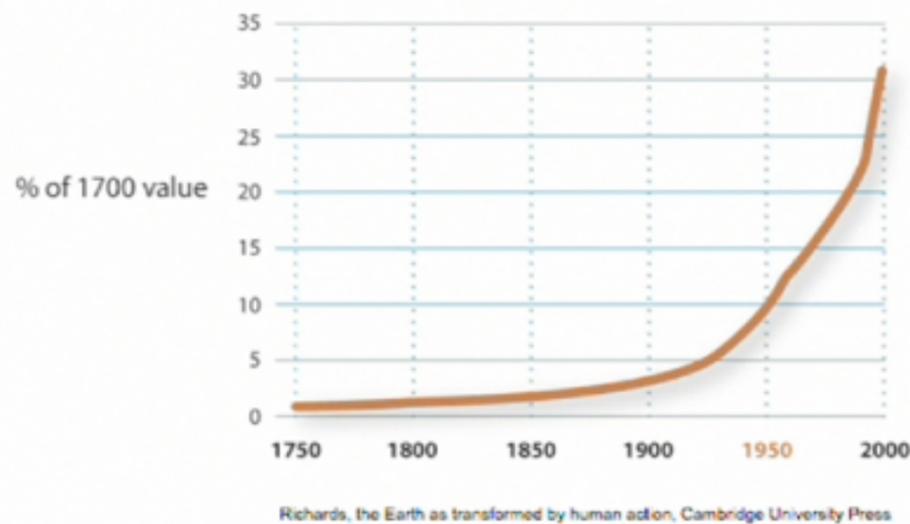
Atmospheric N₂O concentration



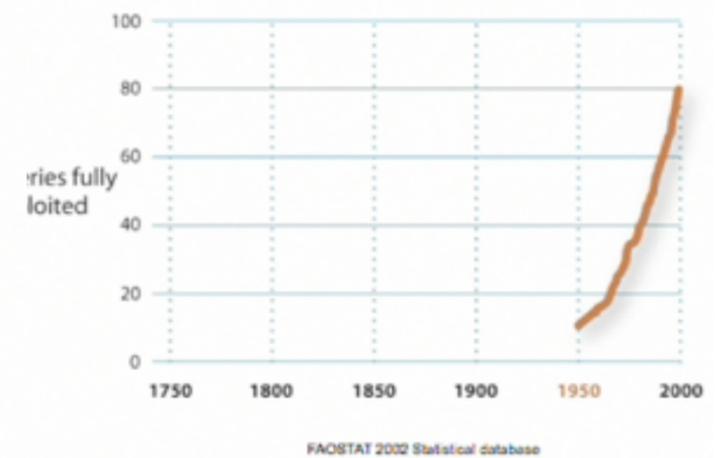
Species extinctions



Tropical rainforest and woodland loss



Ocean ecosystems



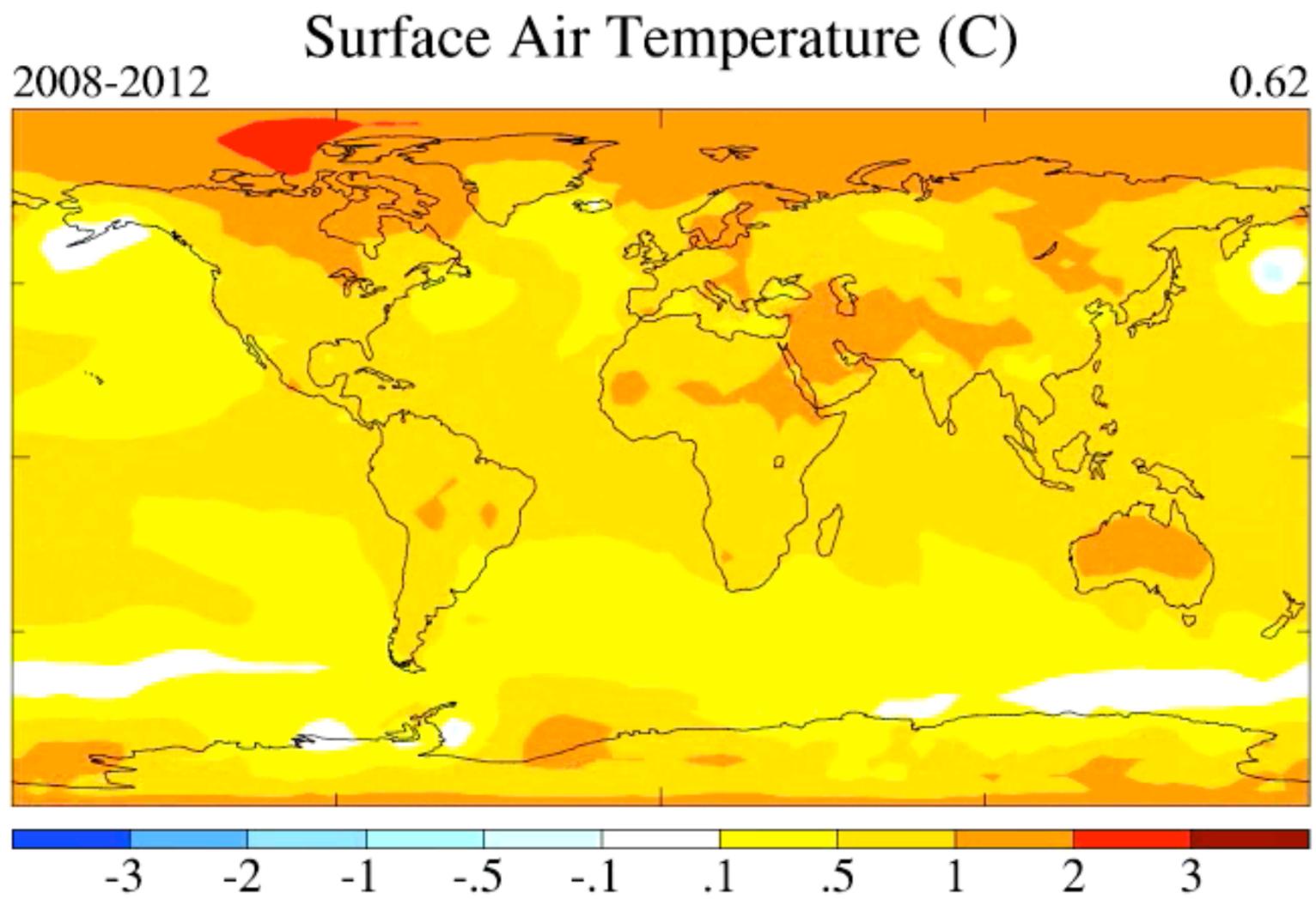
Figures from
J. Rockström
(TED)

Boundaries according to nature article:

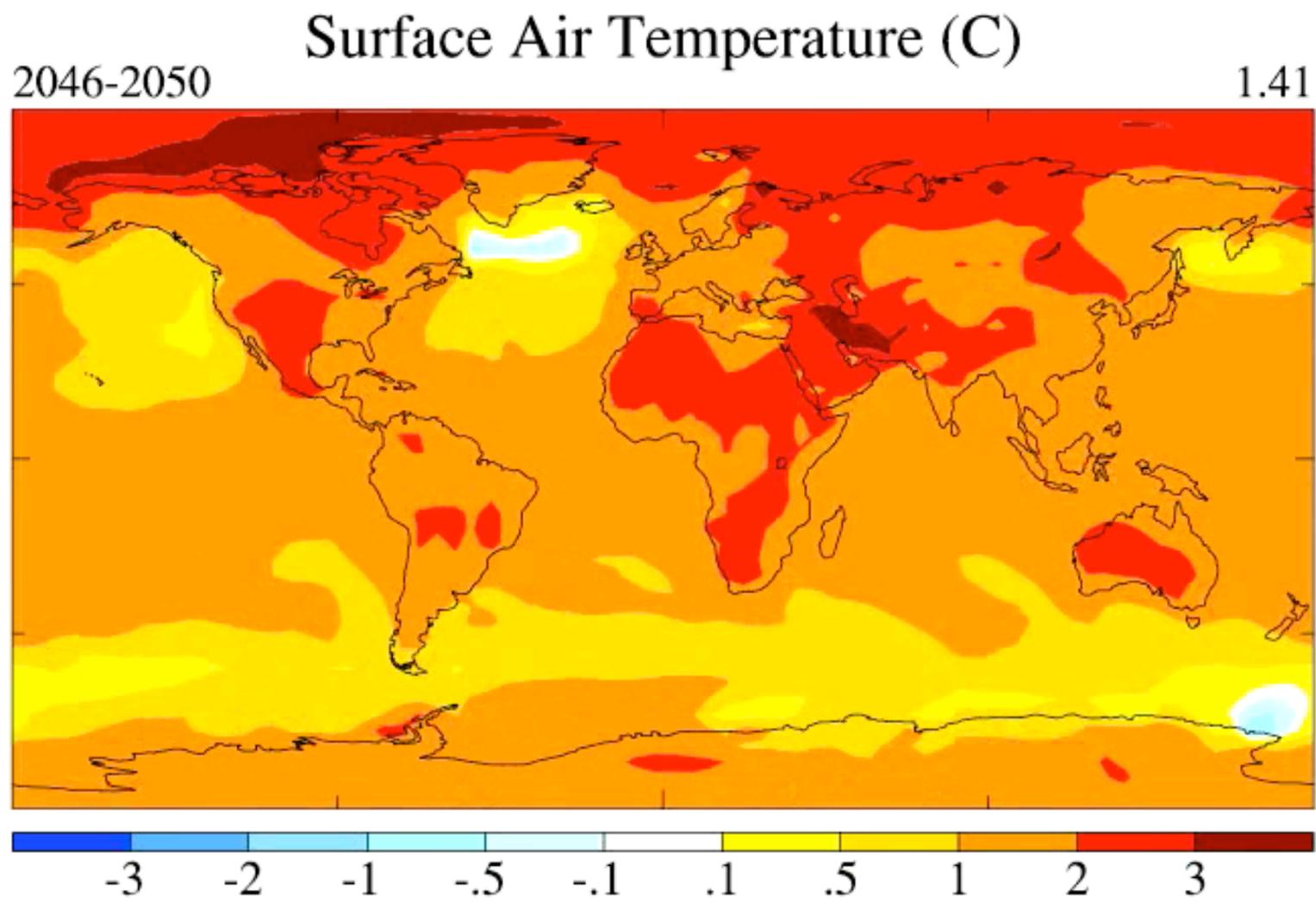
- Climate Change
- Biodiversity Loss
- Nitrogen Cycle

are already now (way) out the safe area, with the others, the situation is more differentiated or unclear:

- Phosphorous Cycle
- Stratospheric Ozone Depletion
- Ocean Acidification
- Global Freshwater Use
- Change in Land Use
- Atmospheric Aerosol Loading
- Chemical Pollution



Video from NASA, Goddard Institute for Space Administration: <http://data.giss.nasa.gov/modelE/sc07/>
Climate simulation animation for SC07 picture shows current situation. Overall temperature increase (average) of approx. 0.6°C, Important though, is the uneven distribution. E.g. in polar region warming is significantly stronger and impacts potentially catastrophic.



Video from NASA, Goddard Institute for Space Administration: <http://data.giss.nasa.gov/modelE/sc07/>
Climate simulation animation for SC07. This picture shows the status according to the model for 2050. This is a relatively moderate model.

“ We are entering **Anthropocene**, where humans are the predominant drivers of change on a planetary level



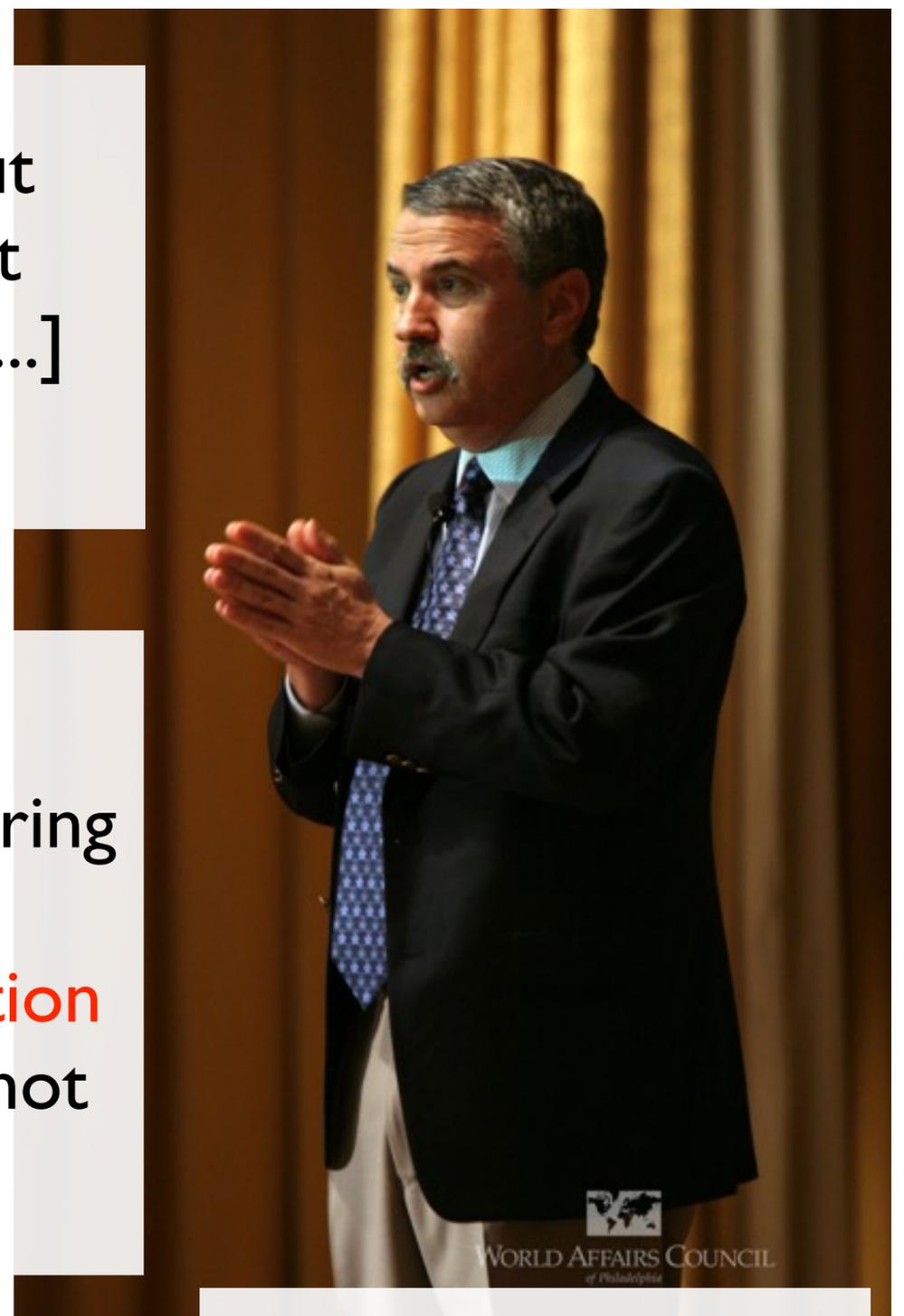
Johan Rockström

“

The **green revolution** is not about the whales anymore. And it is not about “our children’s children,” [...] **This is about us.**

“

Whenever I hear "we're having a green revolution", I can't resist firing back "Really? **Have you ever heard of a revolution where no one got hurt?**" That's not a revolution, that's a party.



Thomas Friedman

Thomas Friedman, Hot flat and crowded, Why the world needs a green revolution, Release 2.0, Penguin (2009)

Currently: “It's all about looking green—and everyone's a winner.” But:
The Situation is clear: fast and massive actions are needed. Change is not going to be fun and easy-going.

Prof. Manfred Grasserbauer (former Director at Joint Research Centre of the European Commission, Institute for Environment & Sustainability, Ispra) talks about the need of a “Third Industrial Revolution”



Good & Evil?

Luckily, we can easily part the world into good and evil!

Can we?



Good ?

LANDWIRTSCHAFTSSPRECHER 28.09.2010 11:51



Wolfgang Pirkhuber

Gentechnikfreiheit mit Zähnen und Klauen verteidigen

"Das von Bundesminister Stöger erwirkte Importverbot einzelne gentechnisch veränderte Konstrukte bei Raps u ein erster richtiger Schritt. Jedoch schwebt das Damokl der gentechnikveränderten Lebensmittel weiterhin über Österreich, denn nach wie vor werden zahlreiche gente veränderte Pflanzen nach Österreich eingeführt und et verfüttert", so unser Landwirtschaftssprecher Wolfgang

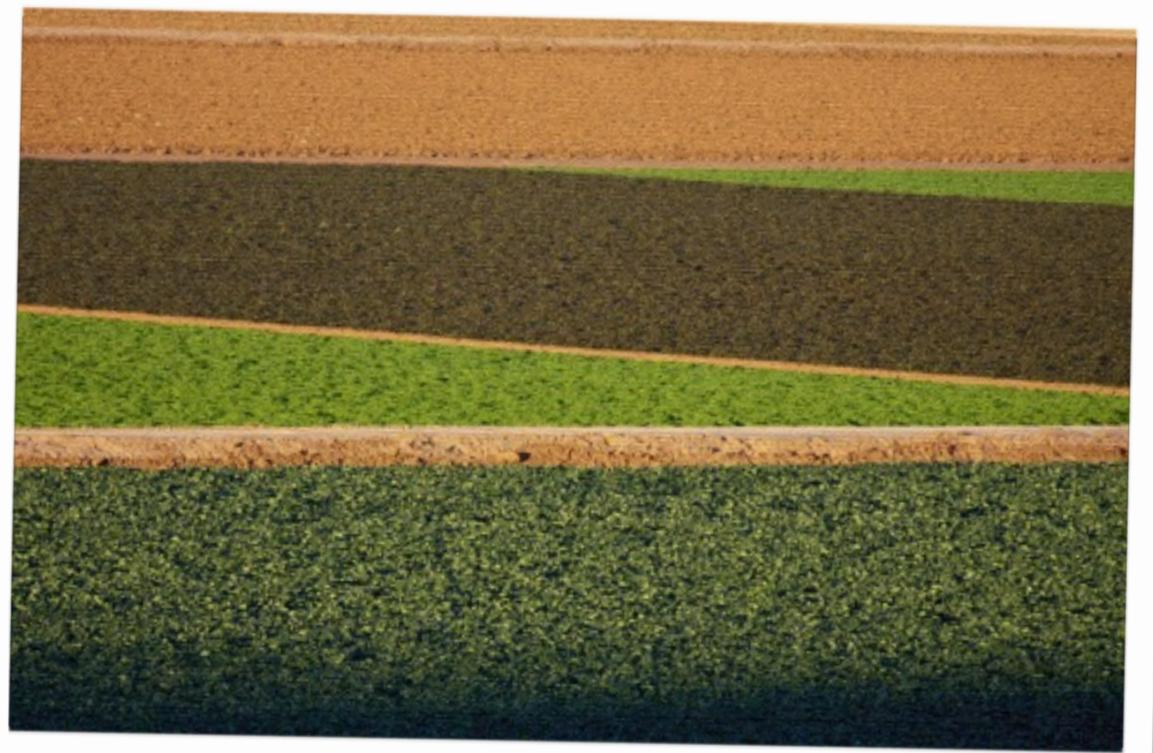
Stöger soll sich gegen Gentechnik einsetzen

Deshalb fordert er Stöger auf, sich vehement gegen den von Gentechnik-Produkten in der EU einzusetzen. "Einen machen weder Pollen noch Bienen an den Grenzen halt, andererseits kann sich Österreich auf Dauer nur schwer Importverbote wehren. schließlich herrscht innerhalb de



Greenpeace Activities like demonstrations against Castor transport, a press-release by the Austrian Green party, headlines from a Global 2000 folder.

Photo by Greenpeace, Grüne Baden Württemberg
 Press Release: Green Party Austria, Cover from Global 2000 Document



Evil ?



Genetic engineering and food technology, large farms,
Atomic powerplant, meat production and non-local food

Photos by
Nestle, cobalt123 (flickr)
Marylise Doctrinal (flickr,



Reality Check !

Is the situation really so simple?

Waste & Recycling

“Silent Spring”

Renewable Energies

Important Contributions by Environmentalists!

Biodiversity & Habitat
Protection

Climate Change

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Environmental organisations and individual activists made significant contributions in the last decades, for instance:

- Rachel Carson starts environmental movement with “Silent Spring”
- Waste disposal
- Climate change
- Biodiversity and protection of endangered species
- important local initiatives
- good example is WWF: actually shows a significantly more rational attitude compared with other environmental organisations
see e.g. Jason Clay, discussions with major companies to reduce footprint
http://www.ted.com/talks/lang/eng/jason_clay_how_big_brands_can_save_biodiversity.html

“Natural” vs. “Artificial”

Nuclear Energy

Organic Food

Problematic Activities?

Regional Planning

Local vs. Global

Genetic Engineering

For instance:

- life in cities usually creates a significantly smaller footprint than life in the countryside. Thus growth of cities is most likely not a bad thing, but an opportunity.
- Opposition against nuclear energy made the topic so unpopular, that even very promising new reactor types come to the market with decades delay.
- risk assessment is often driven by “spectacular” headlines, not by reason
- Organic food is partly ideology, and hardly a model to supply the world at 9 Billion
- See also different assessment of green revolution (Norman Borlaugh): for one group he saved the life of a billion people, for others he is the father of terrible destruction due to industrial farming



Fallacies & Ideologies:

The Need for a Cool, Rational Approach

Many Environmental Movements are driven more by ideology than by rationality and facts

Risk Assessment

Would we enter an airplane if risk of serious accident is 99% ?

even if the risk would be 1% ?

(most people have insurances to cover for even smaller risks)

Risk for catastrophic climate change is in the >95% range!

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Similar issues with other risks:

Individual traffic (WHO: 1,2 Million Death per year) vs. terror, and so on

Neil deGrasse Tyson: "Deaths from Coal mining accidents are dominated by deaths in China, which has been averaging several thousand per year for the last fifty years. Deaths from Nuclear power plant accidents are 100% from Chernobyl. No deaths resulted from Pennsylvania's 3-Mile Island accident. These are the only two meaningful accidents in the industry."

Factoring in amount of Energy production: 6000:60 death = Coal:Nuclear (100:1)

"In fact, the fly ash emitted by a power plant—a by-product from burning coal for electricity—carries into the surrounding environment 100 times more radiation than a nuclear power plant producing the same amount of energy."

(<http://www.scientificamerican.com/article.cfm?id=coal-ash-is-more-radioactive-than-nuclear-waste>)

The Economist, April 10-16, 2010, pp74-75: Chinese National Nuclear Corporation regains Uranium from coal ashes (powerplants)



The “Natural Law” Fallacy (Appeal to Nature)



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- What exactly is natural around us?
- Wheat? Rice?
- Cows, Pigs, Chicken?
- Genetic Engineering is done since thousands of years, are actually one of the most successful human inventions, but called: selective breeding
- local, grown, traditional stuff is good, synthetical, artificial is bad

Difference between “genetic manipulation” vs. “genetic technology”, the first we do since we are humans, partly with very crude mechanisms to increase mutation rates (radioactivity, ...)

We do not have to stick to food: our apartments? our clothes? our transportation? our... whole life?

The “Big Enterprise” Fallacy

Activity by (Large) Company



“Reflex”

Bad, Questionable...

When a large company does it, it is questionable?!
Really?
Always?

Both: Most modern scientific discoveries and technologies offer significant chances & pose threats.



Chance or Threat ?

Proper Assessment of risk and following from that analysis a realistic discussion of chances and threats. Some risks are more obvious than others, some are misleading.

- Genetic Engineering
- Nuclear Energy vs. Coal
- Geo-Engineering
- Concrete Examples
 - WWF – Mondri: "Nuclear Power"
 - "Gen-Mais" Afrika

However, considering the demands and threats mentioned before, we will need all options available to survive the 21st century. Also there are opportunity costs that are easily forgotten in not-choosing a technology. E.g. a therapy may have side effects (risks), not taking a therapy can have much more severe effects however.

Economic Ideologies

NGOs

Governments

Denialism

Individual Opinion



Scientific Consensus

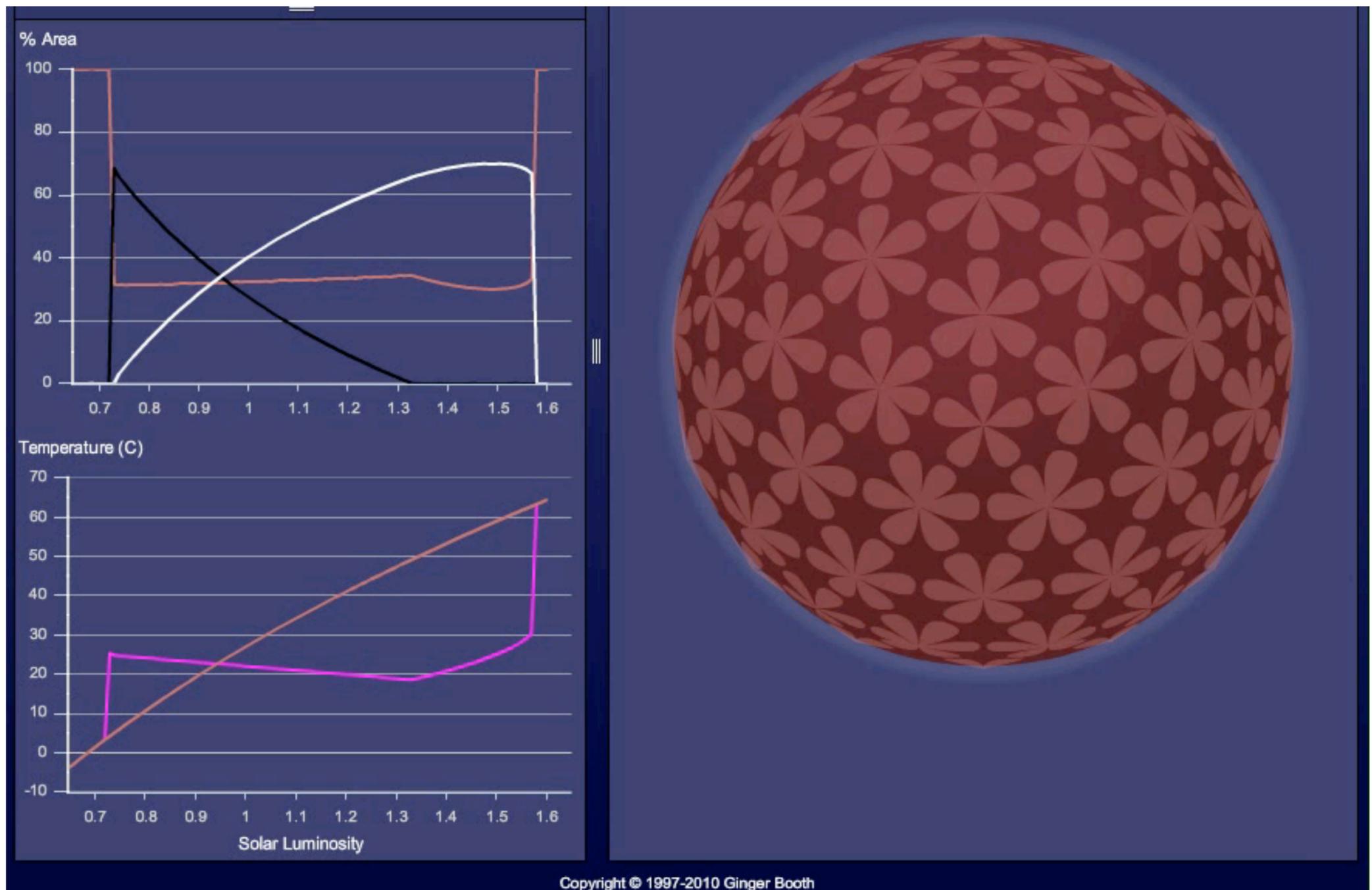
- NGOs
 - NGOs made a lot of important contributions in the last decades
 - NGOs also introduced a large amount of nonsense into the public discussion
- Governments (e.g. US Senate)
 - Climate change denialism
 - Believe in economic ideologies
 - Goal should go into the direction to define economy as a sub-discipline of ecology
- Public does not differentiate between opinion of
 - scientific community
 - individual scientist
 - Example
 - Jörg Lomborg



Science-Based Environmentalism

Discussion without ideological bias is needed

Complex, non-linear Systems



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Complex Systems

- Linear vs. Exponential
- Tipping Points

Example Video: Daisyworld: simulated planet with two types of flowers (white/black) with different albedo and rising temperature. Illustrates on a very simple model the complex interplay of factors, and the resilience a system has (temperature) for a long time. When the tipping point is reached, the system "flips".

- The obvious is often not the correct idea
- Examples
 - Working
 - Office vs. at Home
 - Local food vs. imported food
 - Tomatoes: Vienna/Spain
 - Climate Change
 - Overfishing
 - Tomatoes Vienna/Spain

Complex Systems demand careful analysis not decisions based on ad hoc "plausibility"

Assessment of
Situation

Measure

Monitor

Manage

The Role of Science

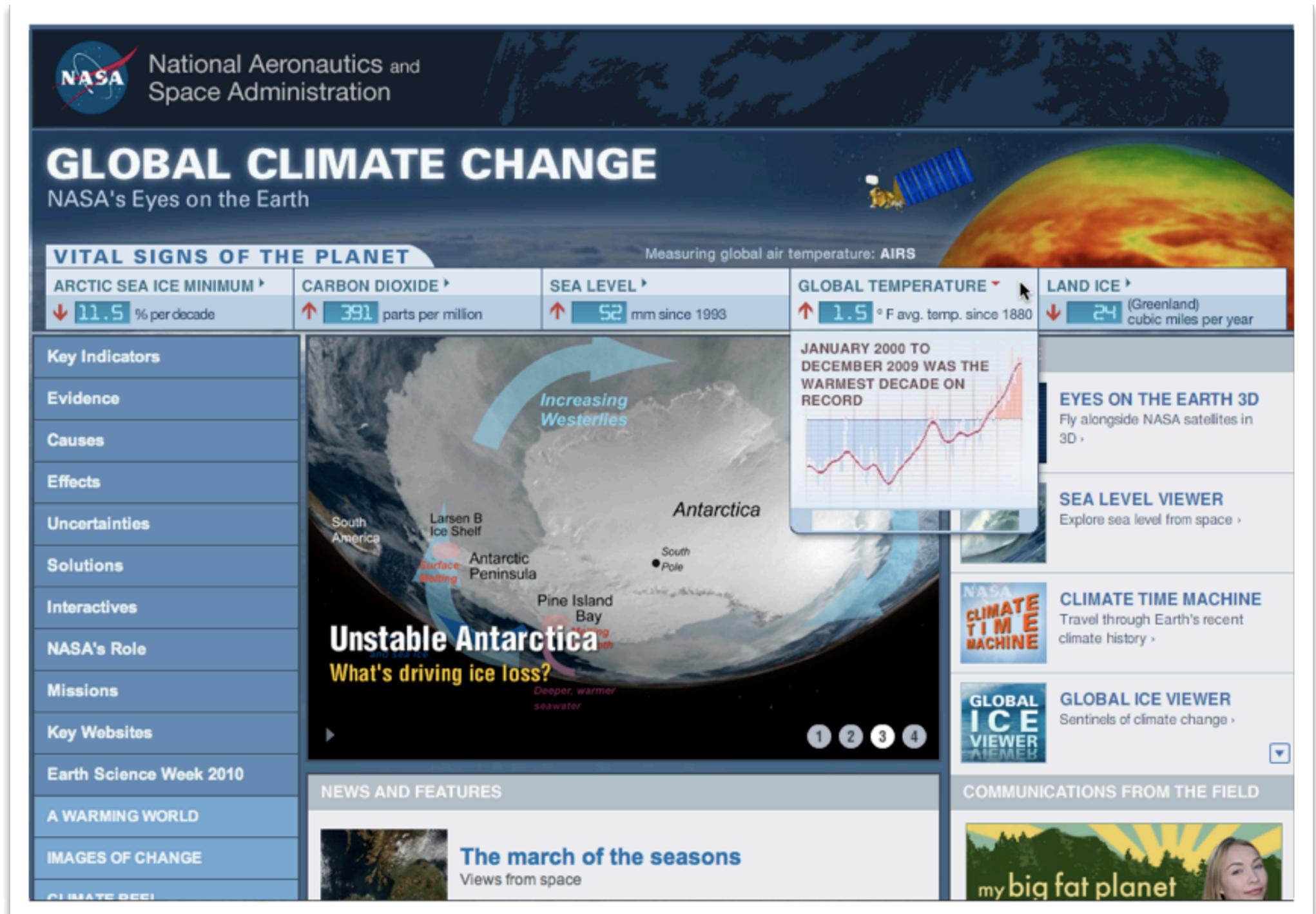
Major Scientific
Programs

Funding

Communication
with Society

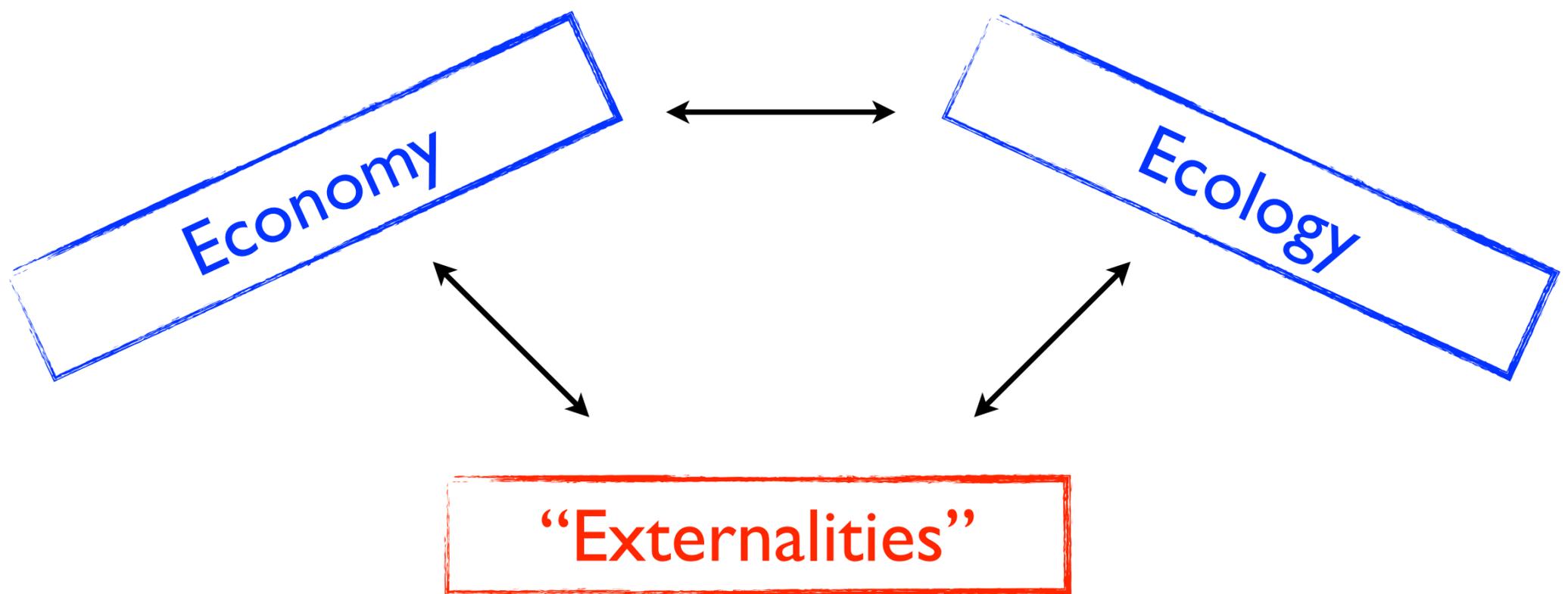
- Good assessment of the current situation foundation for action
- Major scientific undertakings
 - Climate Modeling
 - Biodiversity Assessment
 - Energy Research
- Funding
- Communication of Results

Interdisciplinary Approach



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- Sciences
 - Assess Threats
 - Assess Risks
 - Develop new technologies
- Psychology
 - Usage patterns
 - Influence of behaviour
 - * Example: Dan Ariely
 - "If you wanted to design a problem that people would not care about it would basically look like global warming"
- Sociology and Political studies
- Economics
 - New economic and financial systems for the 21. century
- Computer Science
 - Software
 - Complex Models
 - Visualisation
 - Presentation
 - climate.nasa.gov <<http://climate.nasa.gov>>



Economic System that Reflects the Problem *(and is scientific)*

- Currently at least parts of influential economics is “virtual” discipline, a parascience having a very narrow picture of an imaginary world
- "Economy as a subdiscipline of Ecology": one core problem is, that economic systems and politics behave as if we would leave on a planet without borders and limits
- so called “externalities” have to be avoided



Appropriate Risk Assessment

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Appropriate Risk assessment between over-hyping new ideas and over-optimistic assumptions, ignoring “black swans”, and ideology-based pessimism.

Also opportunity costs on non-action has to be taken properly into consideration.



One More Thing...

... and the Sceptical Community?

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- Sceptical Community has important Role in
- debunking nonsensical green ideologies (“organic”...)
 - but also: criticising companies, scientists, politicians

Scepticism is not denying what's uncomfortable and accepting what's fitting one's worldview

The Blind Spots

10:10



1:1

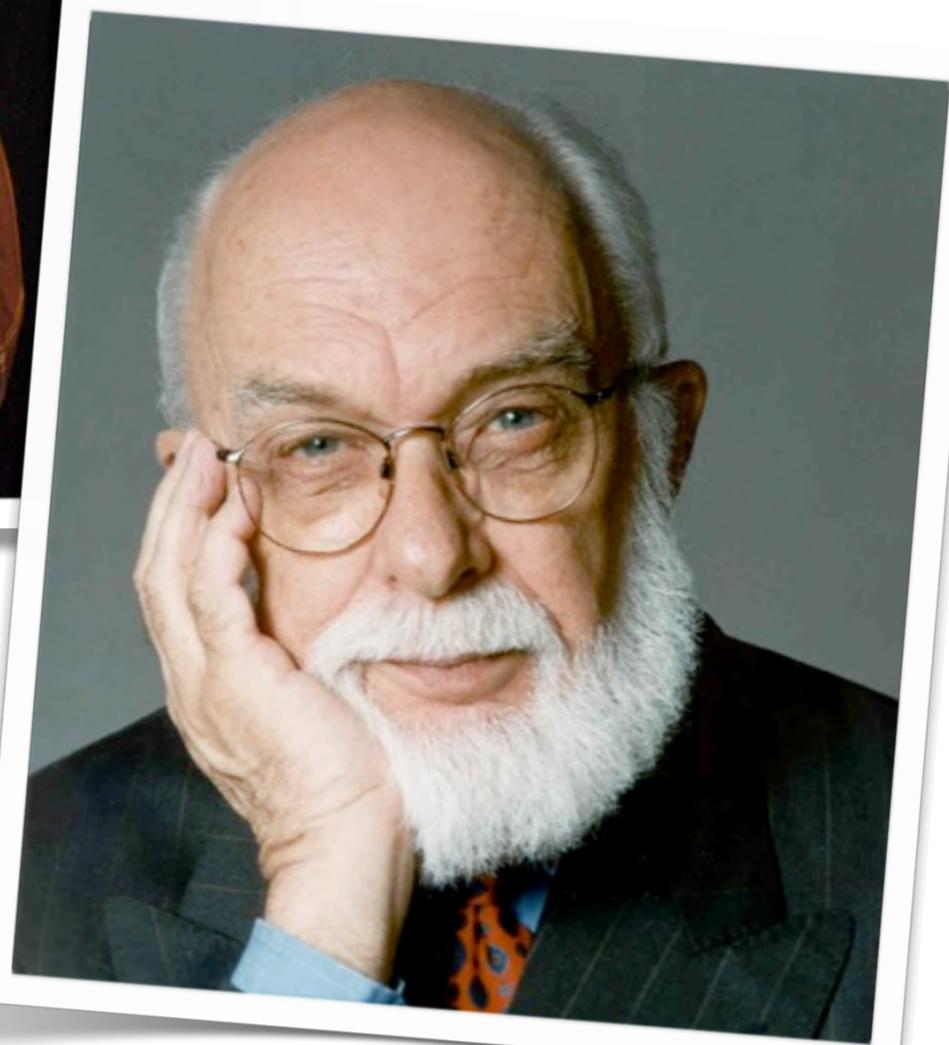
10:20

- Sceptics tend to be technocratic
- Sceptics tend to be over-optimistic about the potential of future science and research
- Sceptics tend to assume continuous improvement and technological success
- popular mistake: over-estimation of speed of technological development
 - 10/10 rule
 - probably replaced by 10/20 rule due to irrational objections in some places (GenTech, ...)
 - replaced by 1/1 rule, but only in certain fields, e.g. Internet products

Two Examples



Penn & Teller



James Randi

Penn and Teller and James Randi are important figures in the sceptical movement and similar to the environmental movement they have contributed a lot to rational thinking and debunking questionable ideas.

However, scepticism is not a one way street, where own ideas are leading the way. Overwhelming scientific evidence has to be accepted even if it does not fit into one's own world view, in this case: denial of climate change without any noteworthy reasoning, except arguments from ignorance.

“ Die Selektion hat uns Anschauungsformen gemäß den Aufgaben in noch höchst einfachen Lebensbereichen eingebaut. Und mit Anschauungen von gestern unterwerfen wir uns eine Welt von morgen.

Rupert Riedl, Evolution und Erkenntnis, Piper (1985)

www.schatten.info

Twitter: alex_buzz



Dr. Alexander Schatten

Thank's for the attention, please contact me in case of questions.
Looking forward to communicate with you via Twitter too!