



Lomonosov Moscow State University
Business School

Global Limits of Economic Growth

*Lomonosov Moscow State University,
Inter-Departmental Course, 2023-2024, Spring Fall*

Course Reader:

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Requirements to Pass the Course

- 1) At least 50% of sessions are attended (6 sessions)
- 2) At least 60% points for the final course test
- 3) Individual Project (Presentation) is done properly and delivered in time

General Scheme for Resource Limitations Analysis



Scheme for the Individual Project (1-2 students per 1 project)

Resources	Steps of Analysis					
	Step 1	Step 2			Step 3	Step 4
	Role/ Importance	Limitations produced for			Ways used to overcome existing limitations	Suggestions how to improve these ways of coping with limitations
		World economy	National economy	Industries/ Business		
Unique Resource or Problem selected by you Scale: world or a country or an industry

Learning Schedule

- Our classes will take place on Wednesdays at 15:00 during 3 months (12 weeks)
- Communication with the course reader:
 - During classes
 - Via e-mail
 - All administrative issues should be addressed via **your Personal Account** (личный кабинет)
- Before each session you will receive **Pre-Reading and Food-for-Thought Assignment** through your Personal Account

Pre-Reading and Food-for-Thought Assignment

Pre-Reading and Food-for-Thought Assignment before Session 3 (Febr., 21st)

CLIMATE CHANGE THEORY

1. Familiarize yourself with the **IPCC Special Report: Global Warming of 1.5C:**

<https://www.ipcc.ch/sr15/chapter/spm/>

Think about:

What this document is about?

INTERNATIONAL CLIMATE DOCUMENTS

1. **Paris Agreement:** <https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement>

2. Explore **UN Sustainable Development Goals** related to climate (SDG13 and SGD7):

<https://sdgs.un.org/goals>

Think about:

How do the SDGs correlate between one another?

How do ideas of Paris Agreement correlate with SDGs on climate?

Pre-Reading and Food-for-Thought Assignment

Climate Change in the European Alps: Adapting Winter Tourism and Natural Hazards Management. OECD (2007), Executive Summary, p.1-4.

Executive Summary

This report provides an assessment of the impacts of, and adaptation to, climate change in the areas of winter tourism and natural hazards management for the European Alps.¹ The implications of this assessment however extend beyond the European Alps. Insights into the costs of adaptation, the roles of the private sector and government agencies, and broader lessons on the synergies and trade-offs between climate change adaptation and other sectoral and development priorities are also likely to be relevant for other mountain systems which face similar climatic and contextual challenges, for example in North America, Australia and New Zealand. More generally, examining the case of the European Alps – where there is high adaptive capacity – can highlight examples of good adaptation practices and the role of financial mechanisms, as well as identify constraints and limits to adaptation. Such insights would be valuable not only for other developed country contexts, but for developing countries as well.

Pre-Reading and Food-for-Thought Assignment

CLIMATE CHANGE_HOW INDUSTRIES ARE ADAPTING TO IT

Read the executive summary “**Climate Change in the European Alps**”, OECD. (see the file)
Be ready for the situation analysis in class basing on a following table “Adaptation measures of winter tourism industry to climate change”. There up to 6 different adaptation measures in the text.

#	Adaptation measures (technological and behavioral)	Positive effects (what problem is resolved)	Existing limits (limits of using this measure, external limits)
...			

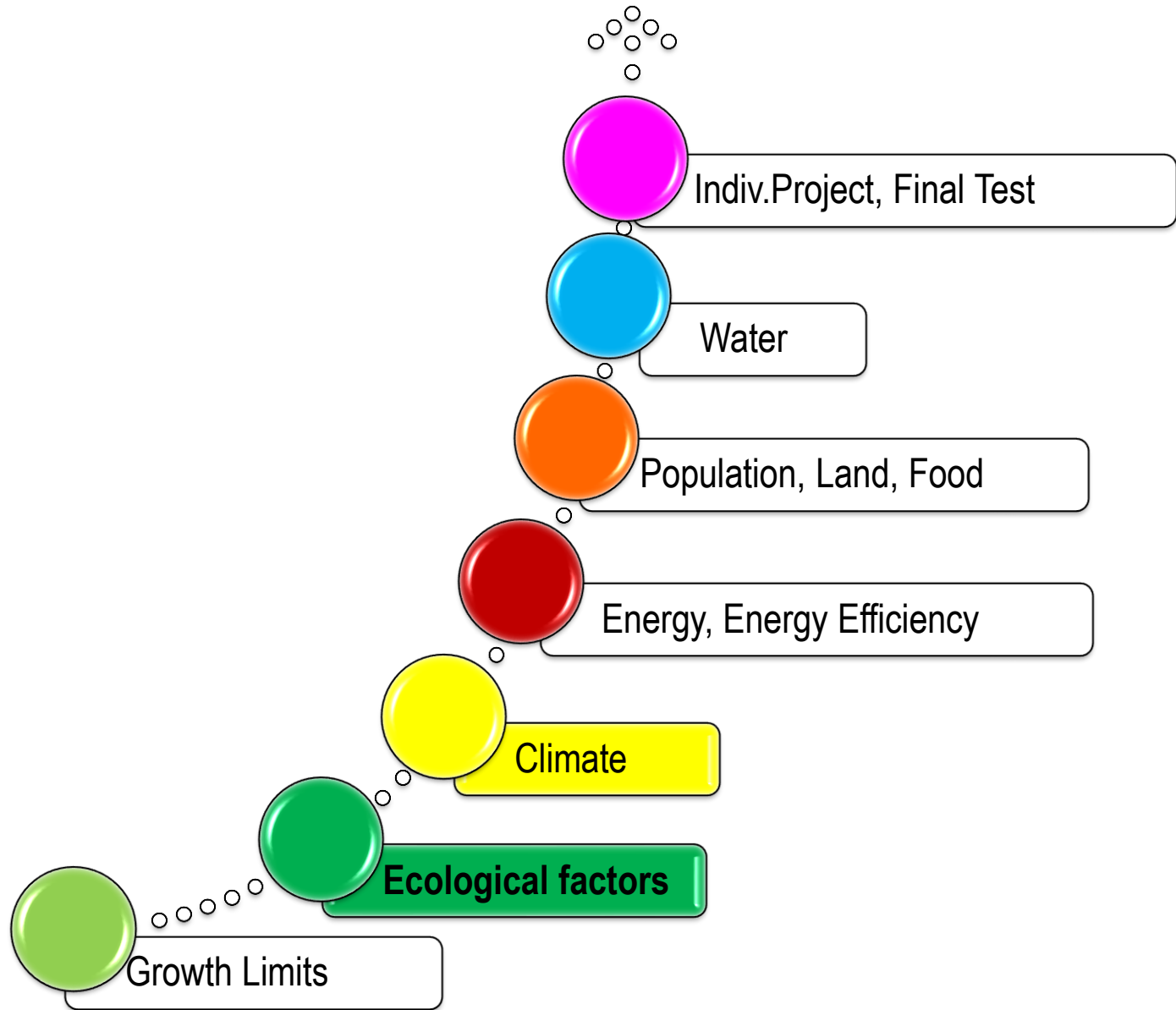
Think about:

Imagine you are to take decision on the adaptation & mitigation measures for the winter resorts described.

What measures would you select and why? Suggest criteria to rate them.

Do you feel lack of some kind of information in order to compare the measures and take the final decision?

Course Route



Session 3

3.1. Global Ecological Problems

3.2. Global Climate Changes

21.02.2024

Session 3.1

Global Ecological Problems

Aim of Session 3.1. *Global Ecological Problems*

1. To know specifics among different instruments of Business Environmental Responsibility (ecoratings, environmental standards, ESG ratings, etc.)

Session 3.1. Global Ecological Problems

1. Public Environmental Policy
2. International Environment Management Standards
3. Business Environmental Responsibility (Ecoratings, ESG-ratings)
4. Environment Risk Management



- Kyoto Protocol
 - the 1st international legislation on emissions cut
- EU
 - environment legislation has a strong public participation component
- UK
 - the Climate Change Act 2008 makes it the first country in the world to have a legally binding long-term framework to cut carbon emissions.
- Russia
 - Climate Doctrine, Dec.2009 – 1st ed., Oct.2023 – 2^d ed.



GENERAL INSTRUMENTS

- **Market reforms:** market liberalization, energy efficiency programs, trade and price liberalization

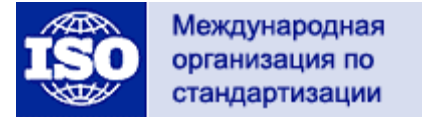
SPECIFIC INSTRUMENTS

- **Strategic policy:** national strategic plans and programs, doctrines
- **Tax policy:** immunity from taxation, emission taxes, subsidies
- **Emission trade,** green certificates
- **Adjusting mechanisms:** **obligatory standards**, systems of certification, verification and monitoring
- **Voluntary agreements:** “strong” and “soft”
- **Research:** research programs with demonstrational effect
- **Informational instruments:** marking programs, informational campaigns



- **Environmental management system**

- Environmental management standards (ISO* 14001:2015)



- Ecoratings (voluntary)
- ESG-ratings (voluntary)



Международная
организация по
стандартизации

- **ISO* 14001:2015** is a universal **environmental management standard (EMS)**.
 - specifies a set of environmental management requirements (systemic, policy, planning, operational, checking) that the organization identifies as those **which it can control and those which it can influence**
 - is **applicable to any organization** that wishes to implement and improve an EMS
 - **does not itself state specific environmental performance criteria**

<https://youtu.be/hCAa7OWdjfo>

- **EMAS (Environmental Management Audit System)** is a specialized environmental standard
 - **Is obligatory for certain types of industries** such as processing industries, electricity, gas and water supply, waste disposal



- **Business Environmental Responsibility (ER)**
 - doesn't depend on the size of environmental issues relevant to its operation
 - represents new conditions for global competition
 - ✓ ER of commodity producers
 - ✓ Ecological and energy efficiency of products
 - ✓ Formation of environmentally sensitive markets
 - ✓ International environmental standards
 - ✓ Best available technologies
- Environmental policy is the way to improve the competitiveness of the national economy as well as of the separate company



Green Economy Mechanisms in Business

- Incorporating indicators of environmental responsibility into the **ratings of investment attractiveness**

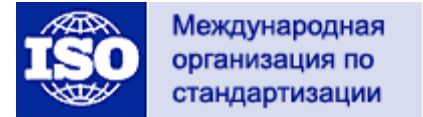


- Development of voluntary reporting in the field of sustainable development
- Development of voluntary environmental certification systems
- Adopting of public policies and standards of environmental responsibility of international financial institutions and investors



- **Environmental management system**

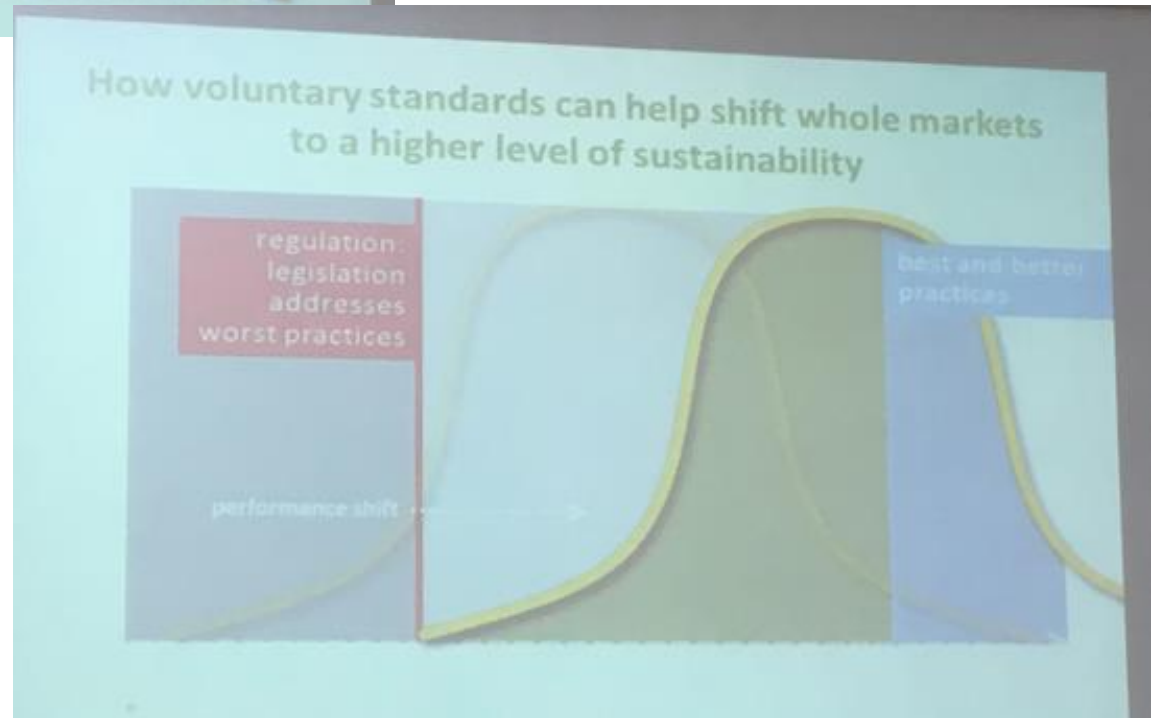
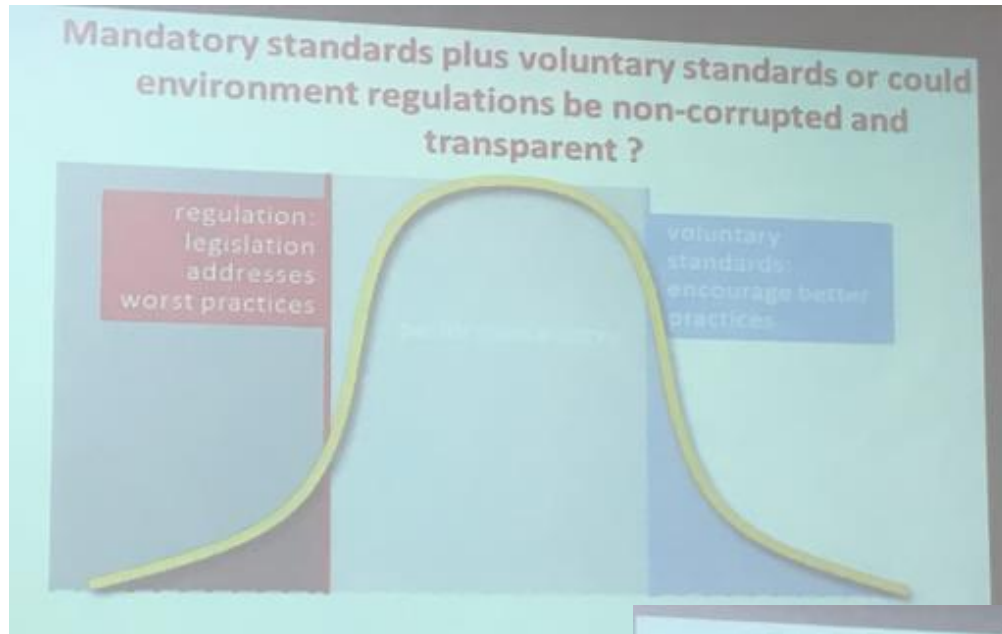
- Environmental management standards (ISO* 14001:2015)



- Ecoratings (voluntary)

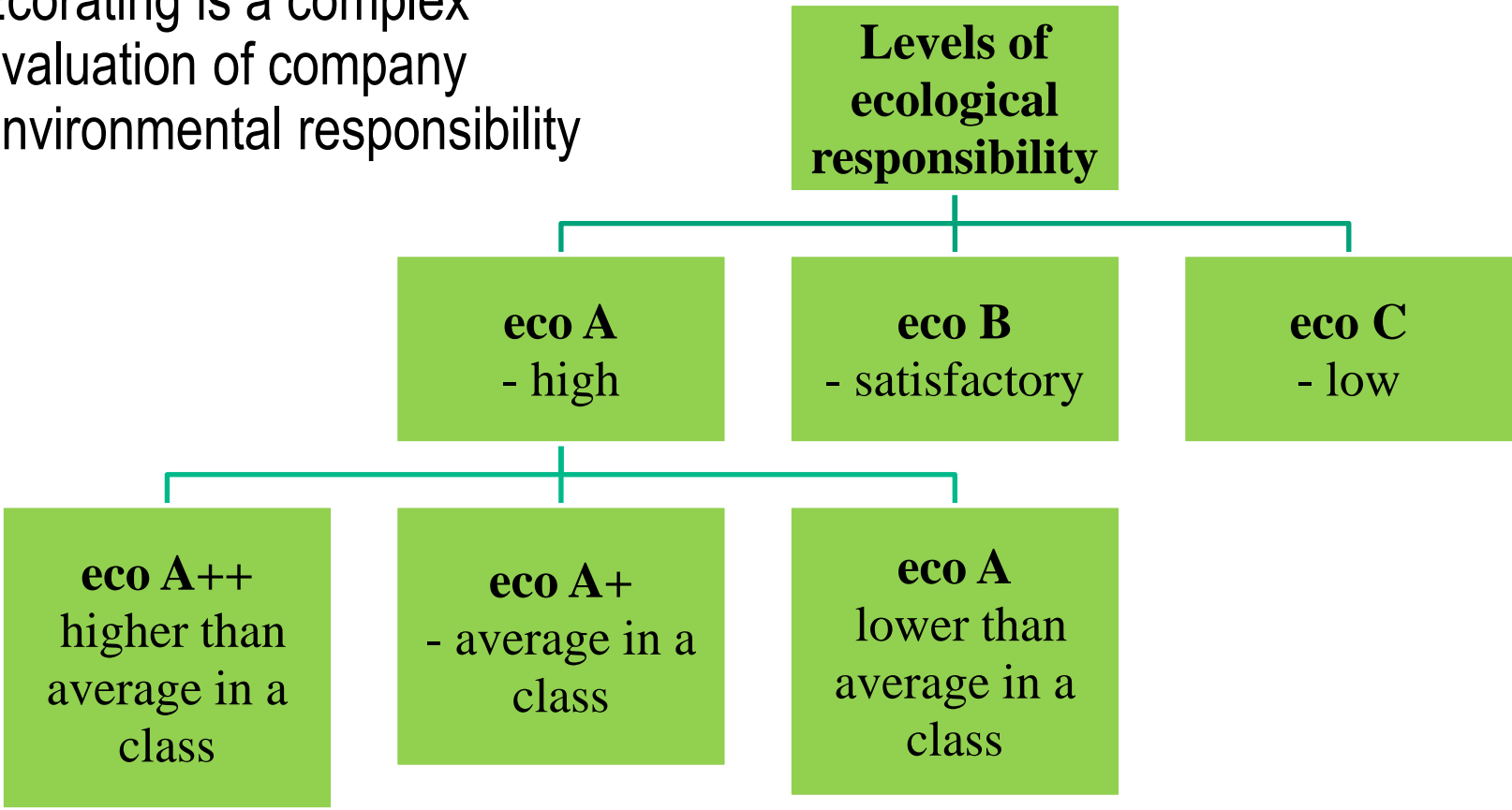
- ESG-ratings (voluntary)

Mandatory Standards + Voluntary Standards



Ecoratings: Levels of Ecological Responsibility

Ecorating is a complex evaluation of company environmental responsibility





- Ecorating should be:
 - Complex & Full covering
 - Independent & Objective
 - Voluntary

- Are ecoratings important for companies?



- Why ecoratings are important for companies?
 - Independent source of a company current environmental status
 - Objective comparison of companies by a set of ecological indicators
 - Monitoring dynamics of companies' indicators
 - Acknowledgement of serious environment initiatives for business partners

 - Effective way to attract product consumers
 - New mechanism of information and feedback between industry and the society
 - Reducing environmental impacts through improved policies and practices and increasing transparency

“Smart companies seize competitive advantage through strategic management of environmental challenges.”
Andrew Winston and Daniel Esty “Green to Gold”.

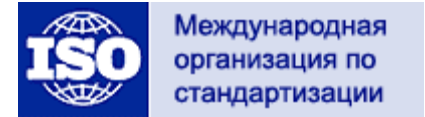
Basic Principles of WWF Ecoratings

- Methodology is discussed with all the participants and is updated every year
- Calculations are made by independent rating agency using only the officially published data
- After preliminary results are obtained companies can reveal missing information
- All major industry players are covered by their industry ecorating each year
- Ecorating assessment goes through all the stages of industrial process (*sustainable production chain*)



- **Environmental management system**

- Environmental management standards (ISO* 14001:2015)



- Ecoratings (voluntary)

- **ESG-ratings (voluntary)**

Most popular ESG standards, rankings and ratings

The 8 ratings included in this brief are used by many leading investors, asset managers, analysts, and other financial experts



1

- **ESG performance is not synonymous with performance on ratings and rankings**
- But stakeholders and investors continue to incorporate these third-party comparisons and “stamps of approval” into their analyses and assessments
- Significant capital is influenced by ESG ratings
- **What could be potential problems with ratings and rankings?**
 1. Too many ratings, correlation (!)
 2. Is it an expensive story?
 3. Depend more on statistics and data?
 4. Ecological projects are usually LR
 5. Too subjective

ESG problems of Russian companies

- Since 2022 there is a detachment from international rankings
- The demand from investors remains
- The Bank of Russia's Methodology has been launched: a unified rating scale, ensuring the reliability of data
- There are complex communications with foreign agencies
- This is useful benchmarking with other companies
- There is a Gradual Movement to Industry-Specific Methodologies

Why companies should manage risks when it comes to environmental responsibility?

- Risk of losing customers
- Risk of losing access to capital, loans and insurance

Functional framework

1. Risk assessment

2. Monitoring

3. Option assessment

4. Goal and strategy formulation

5. Implementation

6. Evaluation

Session 3.2

Global Climate Changes

Our Ocean | Timelapse in Google Earth



Our Forests | Timelapse in Google Earth: <https://www.youtube.com/watch?v=b4eLTYUcj7k>

Our Cities | Timelapse in Google Earth: https://www.youtube.com/watch?v=v74_mf2usc0

Aims of Session 3.2. *Global Climate Changes*

- 1. To understand and interpret correctly **climate change manifestations****
- 2. To understand **world climate policy and potential of carbon taxing****
- 3. To calculate gaining from **CO2 trade****
- 4. ...**

Plan of Session 3.2

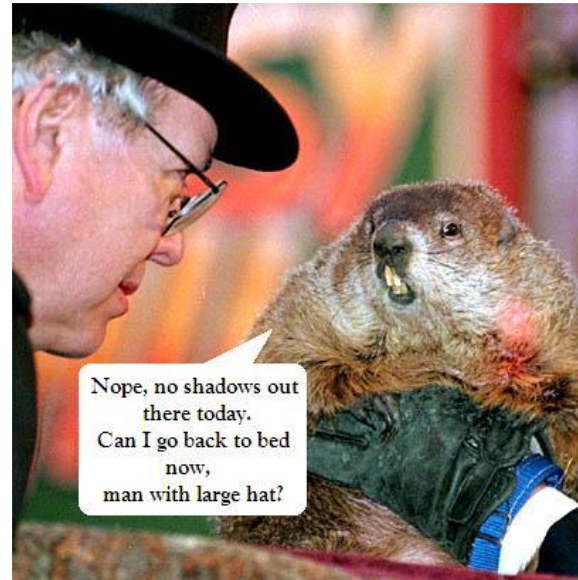
SESSION 3.2

1. Climate Change Manifestations
2. ... (*next time*)

We are living in a Different Climate Era

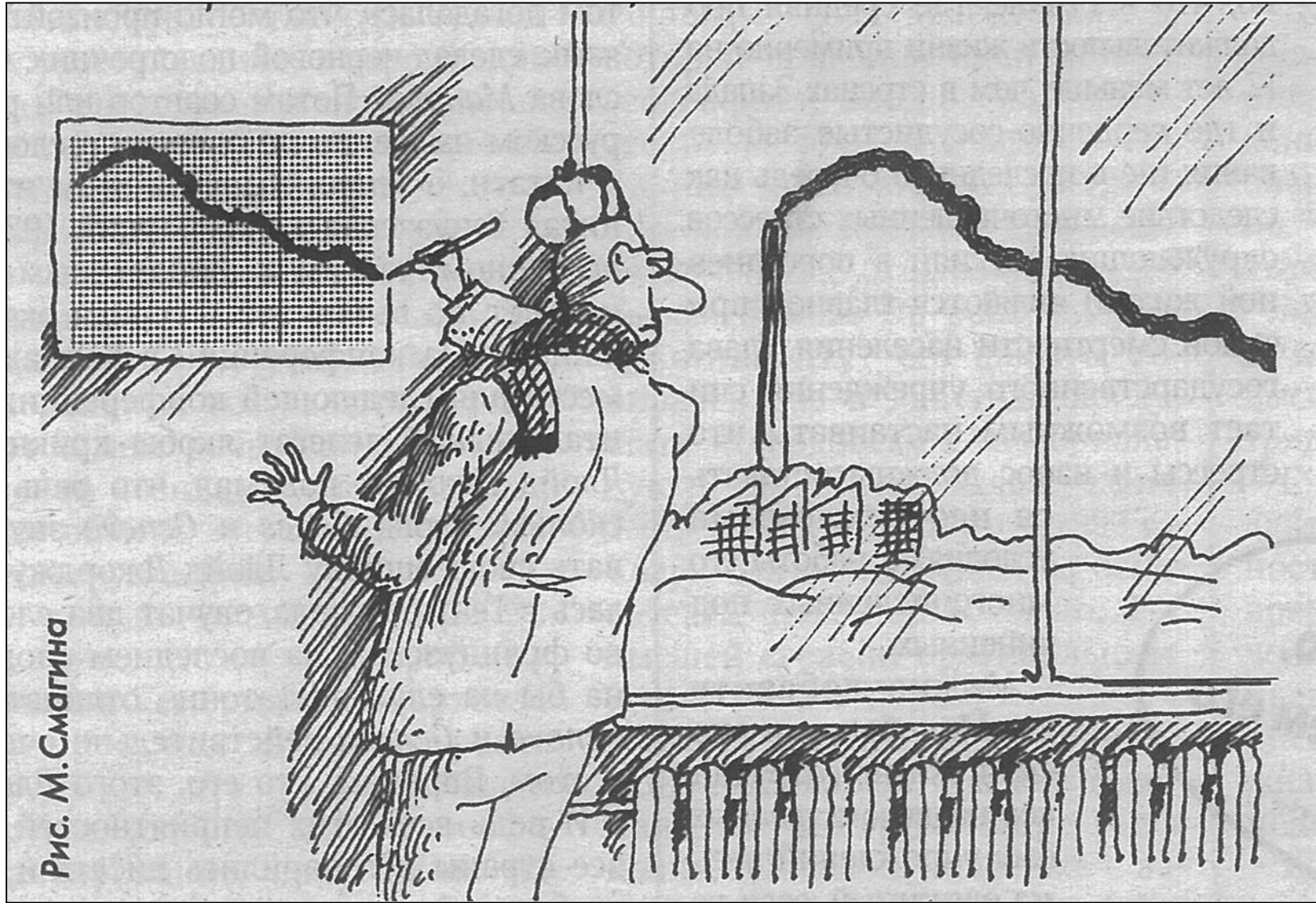


- Actual climate and weather can not be precisely described by traditional folklore, because they were formulated for a climate of another climatic and ecological eras.



- **Groundhog Day (USA, Canada) is an annual holiday celebrated on February 2.**

Global Warming Predictions



Positive side of the Greenhouse effect

ADVANTAGES OF GREENHOUSE EFFECT

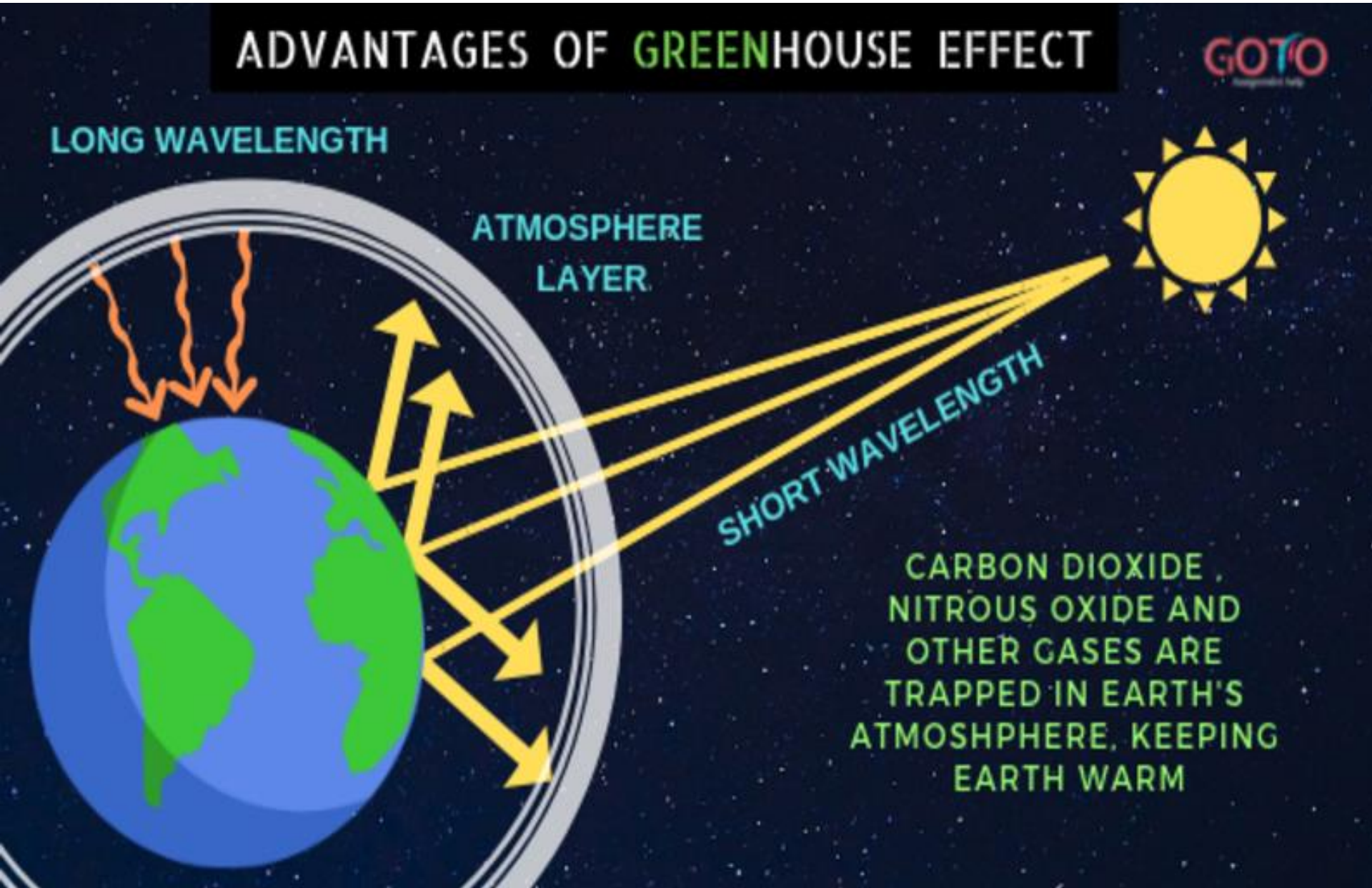


LONG WAVELENGTH

ATMOSPHERE
LAYER

SHORT WAVELENGTH

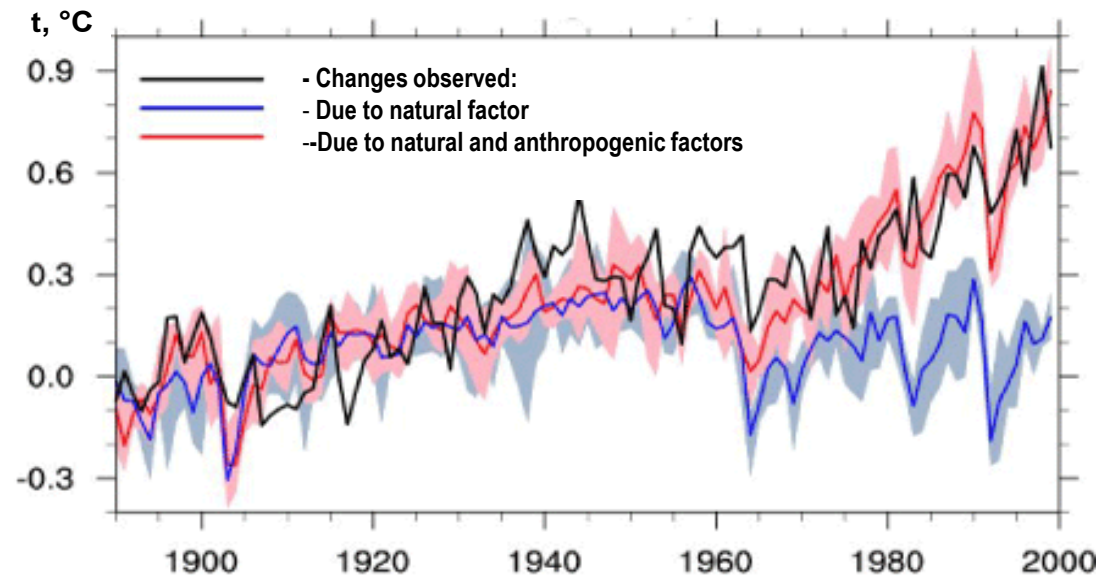
CARBON DIOXIDE,
NITROUS OXIDE AND
OTHER GASES ARE
TRAPPED IN EARTH'S
ATMOSPHERE, KEEPING
EARTH WARM



Climate Change Manifestations

- Discussions have taken place since 1970-s
- From 2005 discussions pass to the level of G8
- The discussion continues about the ambiguous character of the global warming
- **Individual businesses and whole industries face the climate change consequences today**

Observed temperature rise cannot be explained only by natural factors



Source: IPCC

Climate change “deregulation” can cause different climate and natural changes

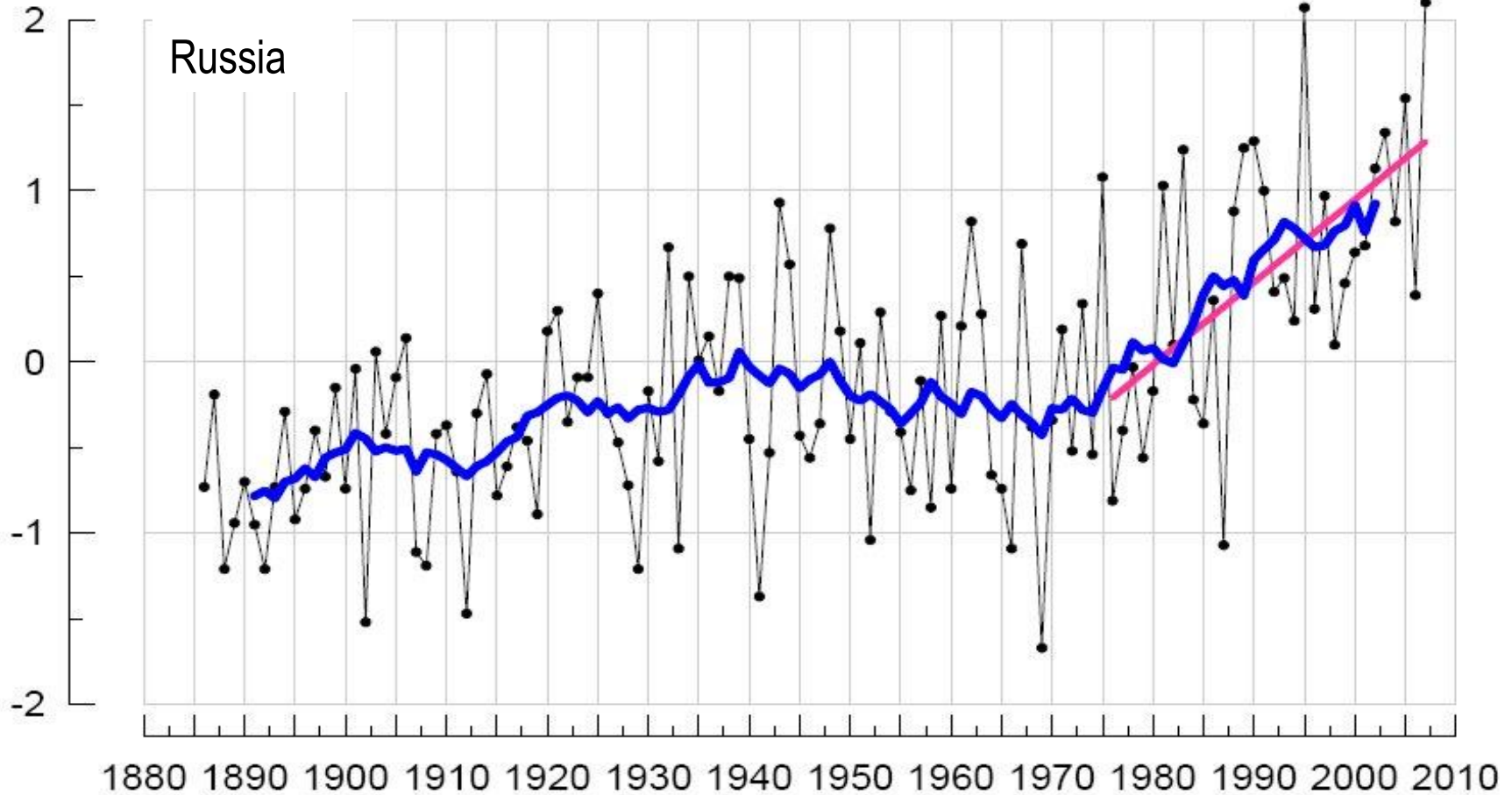
A.1. Human activities are estimated to have caused approximately 1.0°C of global warming ^{FN6} above pre-industrial levels, with a *likely* range of 0.8°C to 1.2°C.

Global warming is *likely* to reach 1.5°C between 2030 and 2052 if it continues to increase at the current rate. (*high confidence*) (Figure SPM.1) {1.2}

- <https://www.ipcc.ch/sr15/chapter/spm/>

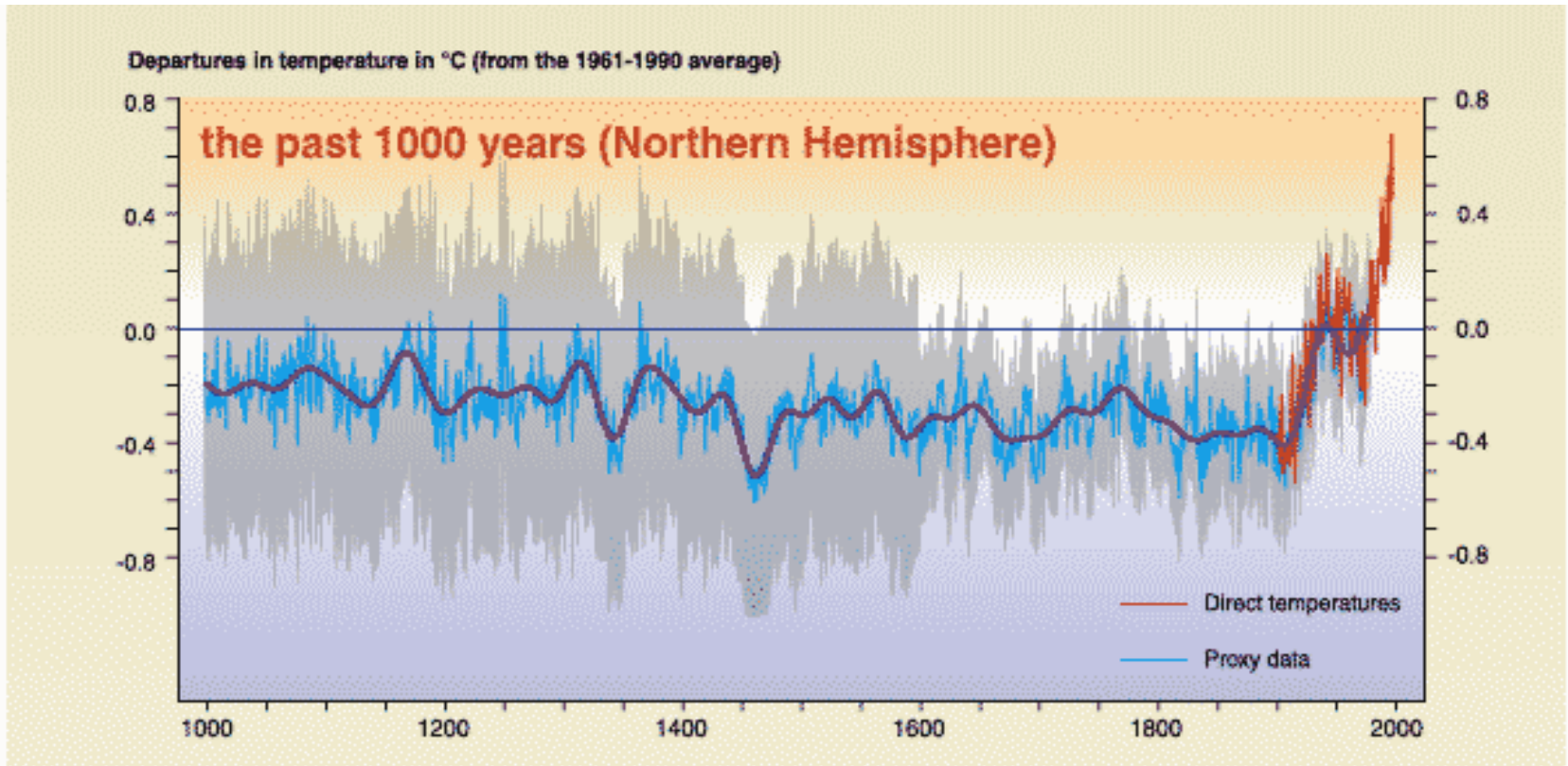
Growth of average annual temperature in Russia, °C

(average levels of 1961-1990 taken as a zero)



Source: WWF

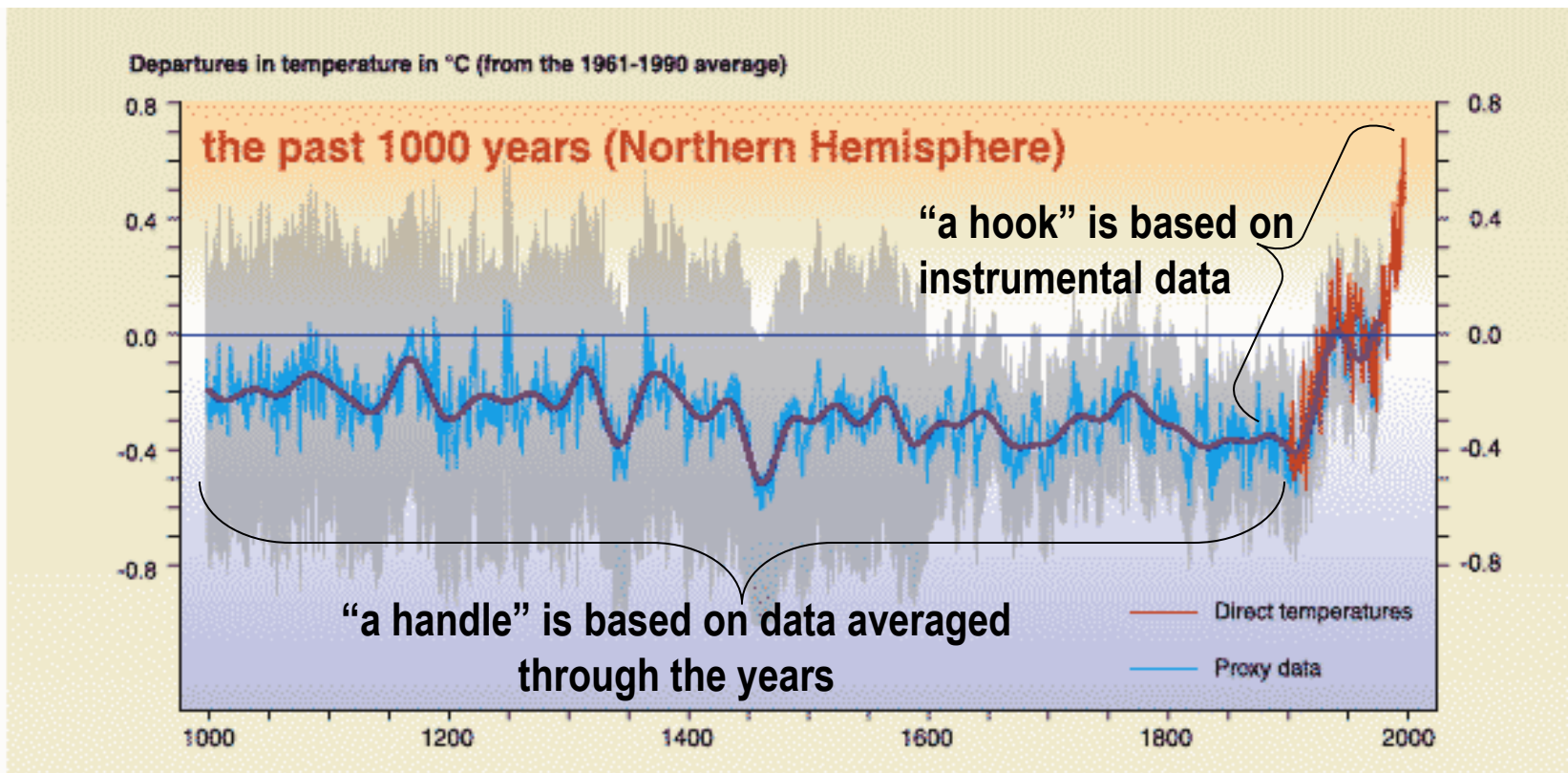
“Hockey-stick” effect



Источник: МГЭИК

The uncertainty of climate change models remains very high

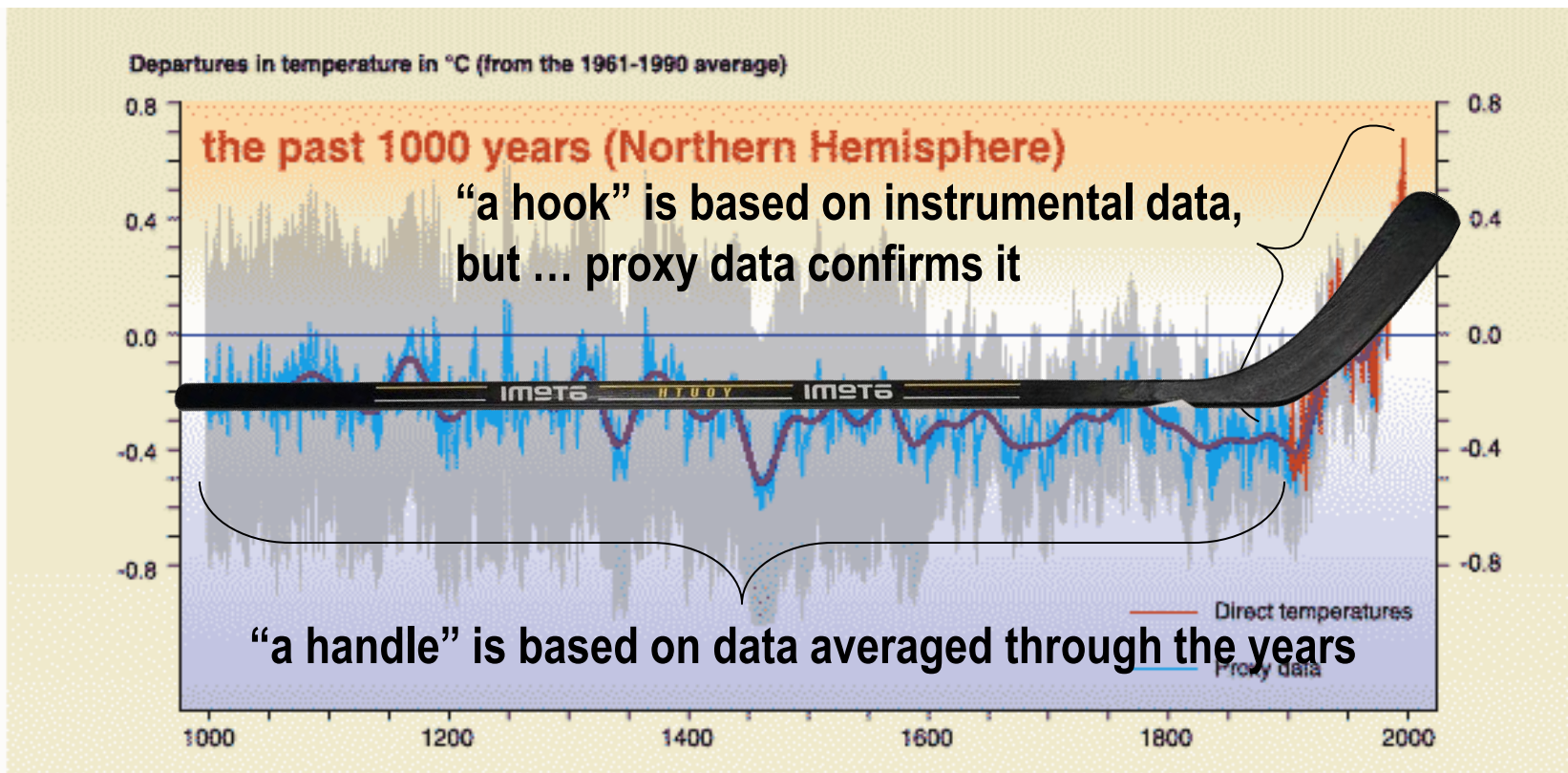
“Hockey-stick” effect



Источник: МГЭИК

The uncertainty of climate change models remains very high

“Hockey-stick” effect



Источник: МГЭИК

The uncertainty of climate change models remains very high.

Different Views on Global Warming Origins

Alarmers and Mainstreamers

- Anthropogenic character is caused by human industrial activity (emissions of GHG)
- Alarmers are more eccentric: World Collaps Model!

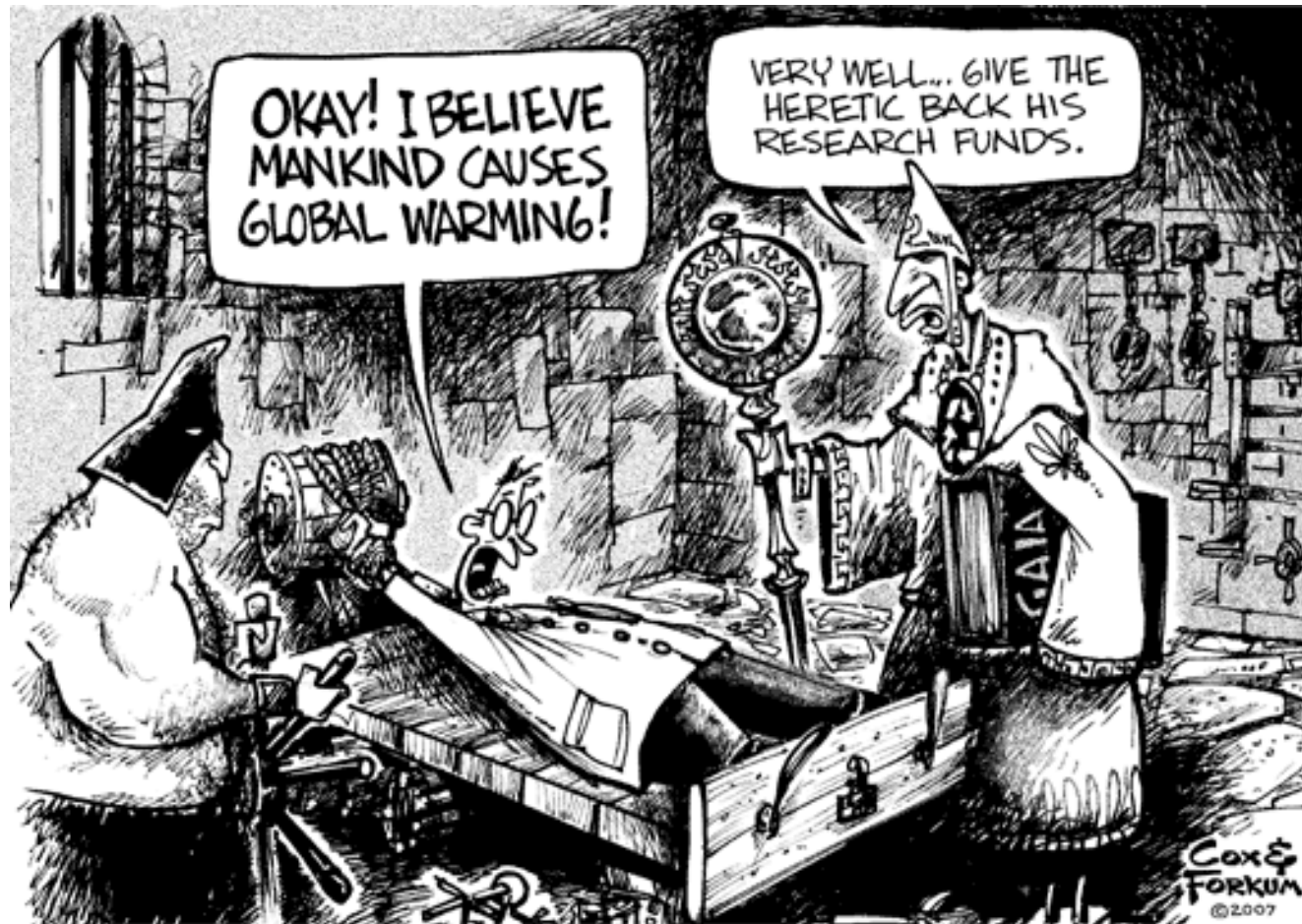
Sceptics

- Do recognize global warming effect, but doubt on the dominant component of humanity in it

Deniers

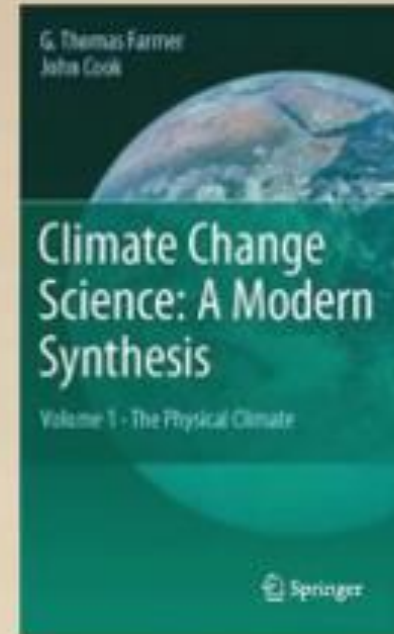
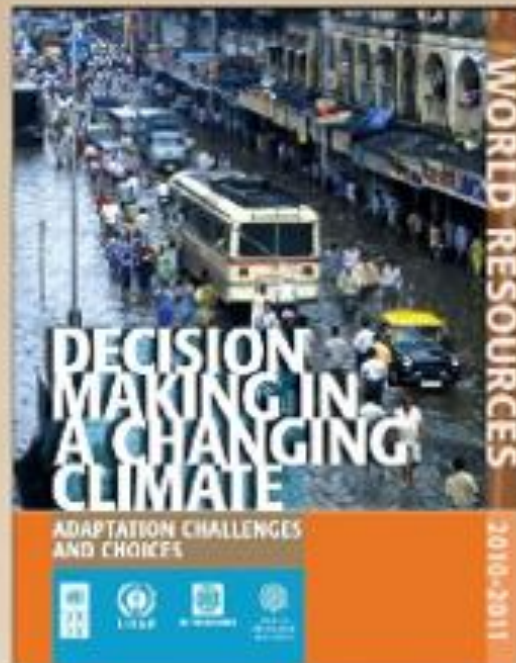
- Do not recognize the fact of global warming itself

Alarmers, Mainstreamers, Sceptics and Deniers



www.CoxAndForkum.com

Who the heretic is: Alarmer, Mainstreamer, Sceptic or Denier?



http://www.skepticalscience.com/docs/Guide_to_Skepticism.pdf

<http://www.skepticalscience.com/translation.php?lang=16>

- <http://www.unep.org/climatechange/mitigation/Default.aspx>
- <http://www.globalissues.org/issue/178/climate-change-and-global-warming>
- <http://climate.nasa.gov/causes>
- <http://www.worldclimateresourcesreport.com>
- <http://www.worldresourcesreport.org/wrr-2010-2011>

Natural & Industrial Contribution to Global Warming

- Around the world there are **28 or so research groups** in more than a dozen countries who have written **61 climate models**. Each takes a slightly different approach to the elements of the climate system, such as ice, oceans, or atmospheric chemistry.
- The computer model that generated the results for this graphic is called "ModelE2," and was created by **NASA's Goddard Institute for Space Studies (GISS)**

<http://www.bloomberg.com/graphics/2015-whats-warming-the-world/>

1880-2005



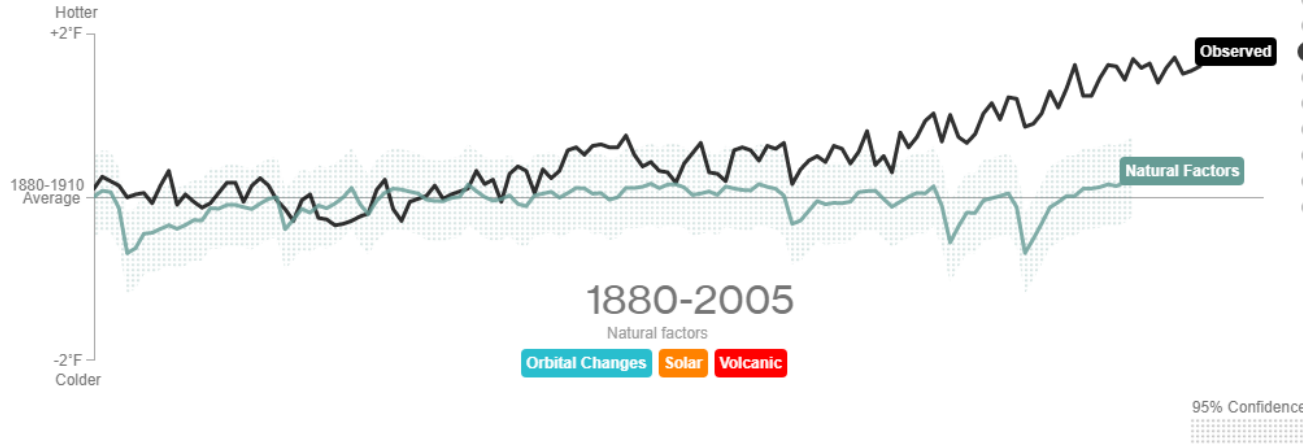
Compare and Contrast

Putting the possible natural and human causes of climate change alongside one another makes the dominant role of greenhouse gases even more plainly visible.

The only real question is: What are we going to do about it?

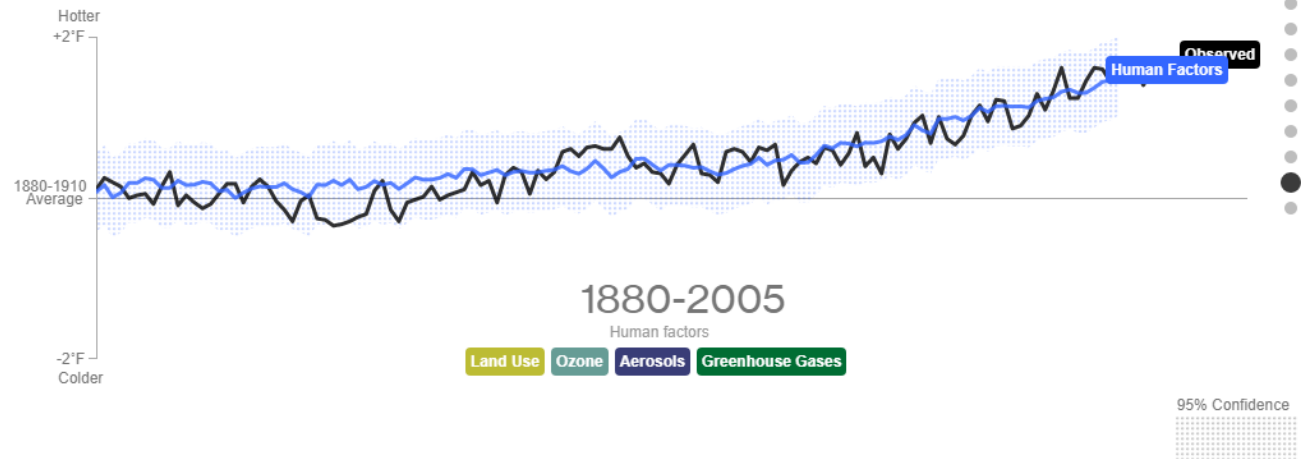
Is it All Three of These Things Combined?

If it were, then the response to natural factors should match the observed temperature. Adding the natural factors together just doesn't add up.



See for Yourself

Greenhouse gases warm the atmosphere. Aerosols cool it a little bit. Ozone and land-use changes add and subtract a little. Together they match the observed temperature, particularly since 1950.



GHG Emissions by sectors

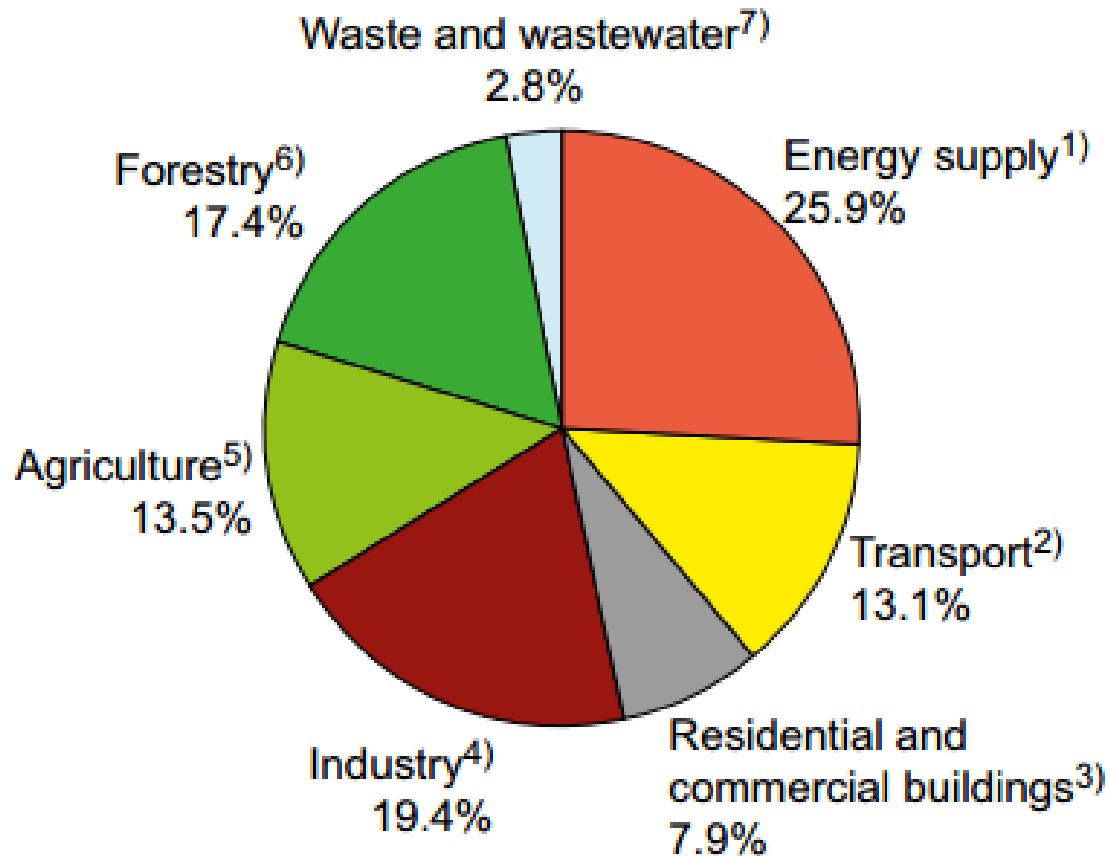
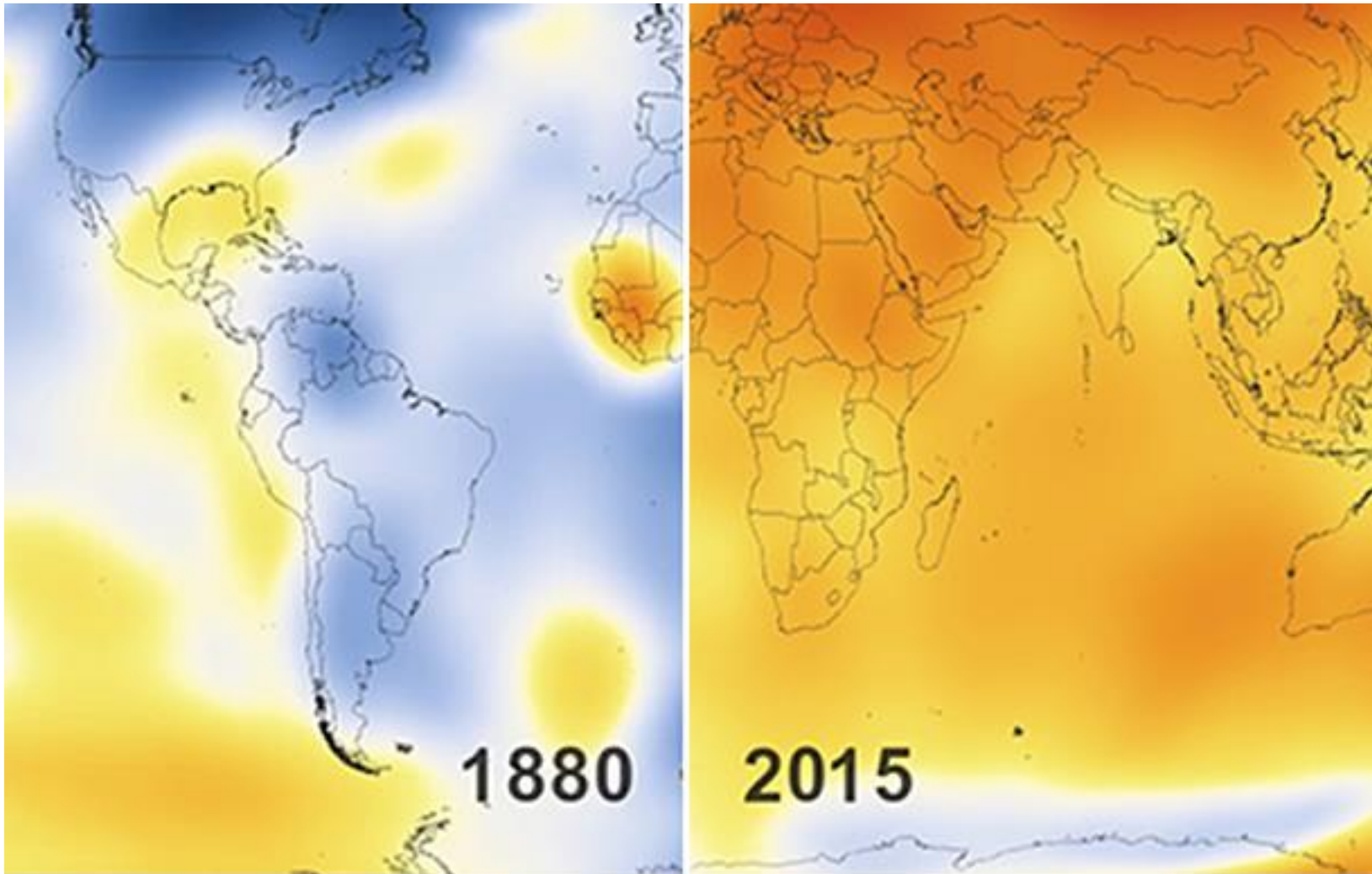


Figure TS.2b: GHG emissions by sector in 2004 [Figure 1.3b].



100 years of global warming in less than a minute

Nasa illustration of Earth's long-term warming trend between 1880 and 2015



It shows the changing temperatures over the last 100 or so years using a rolling five-year average. The blue colours represent temperatures cooler than average, while hues of orange signify temperatures warmer than average.

<http://www.telegraph.co.uk/news/earth/environment/globalwarming/12117449/Animation-100-years-of-global-warming-in-less-than-a-minute.html>

Expected Consequences of Climate Change

CLIMATE DESTABILISATION

The average temperature rise across the globe **4°C**

The arctic rise will be as much as **16°C**

Coastal areas of Britain and New Zealand will see temperatures rise by **2°C**

Affects on the UK

Melting Glaciers

Himalayan glaciers will be significantly reduced by 2050 putting the water source of billions of people at risk. South America and the Alps will also see glaciers retreat.



Countries extremely dependent on Climate Changes

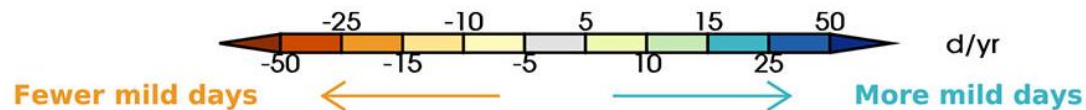
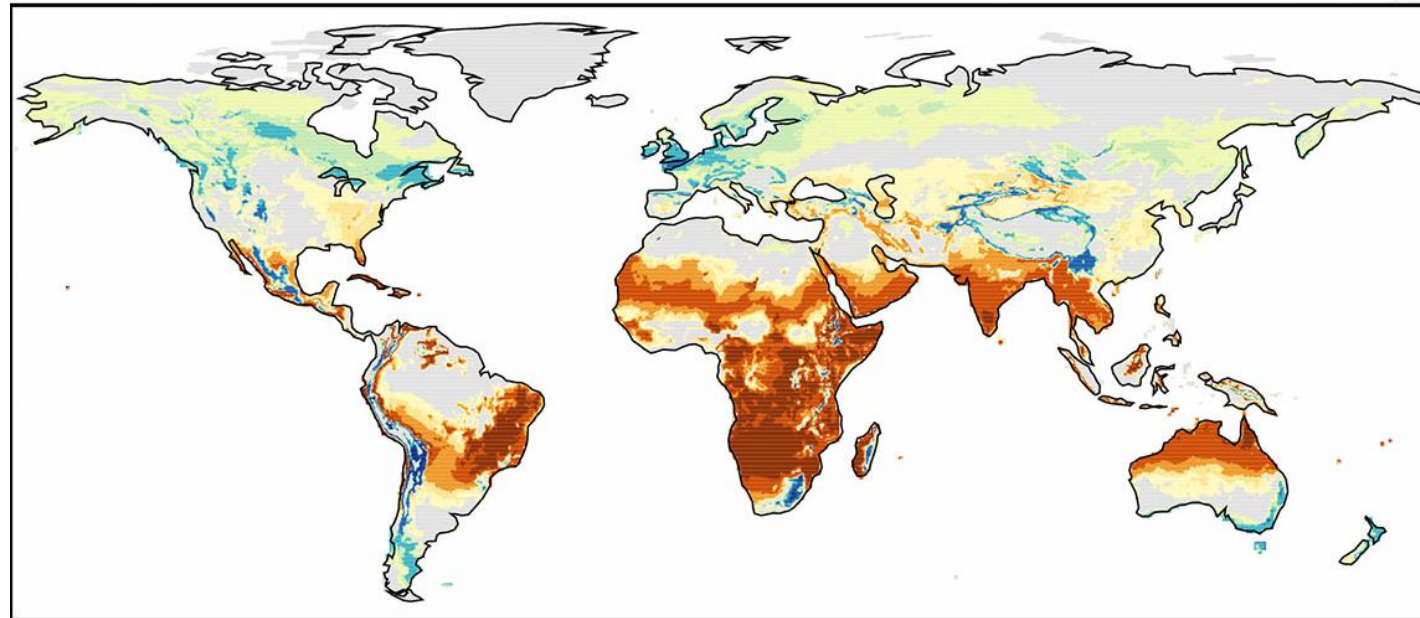
- These are poor countries from the developing world
- Their economy is usually strongly dependent on agriculture
- Their political situation usually is not stable
- Their costal areas suffer from flooding, their internal areas suffer from draught
 - Examples: Bangladesh, Chad, DR of Congo, Guinea-Bissau, CAR, Afghanistan, etc.

Countries that are mostly suitable for living (liveable)

- Princeton University Study
 - air T is around +18... +30 °C
 - dew point temperature is lower than +20°C
 - average daily precipitation less than a millimeter

Change of annual number of mild days

mean: -10 d/yr per km²; -11 d/yr per person

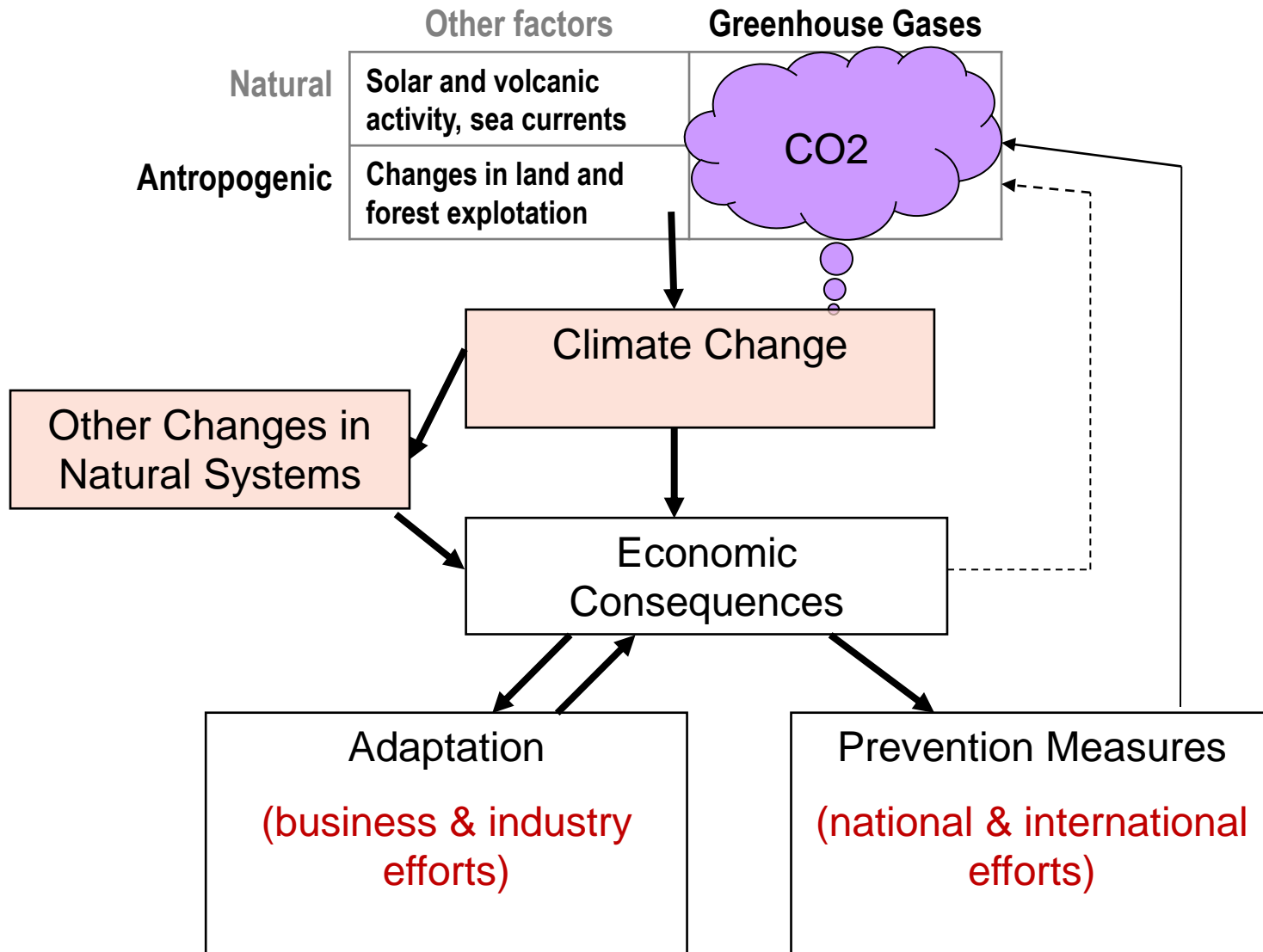


THE RIO DECLARATION ON ENVIRONMENT AND DEVELOPMENT (1992)

PRINCIPLE 15

- In order to protect the environment, **the precautionary approach** shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.

Causes and Consequences of Climate Change



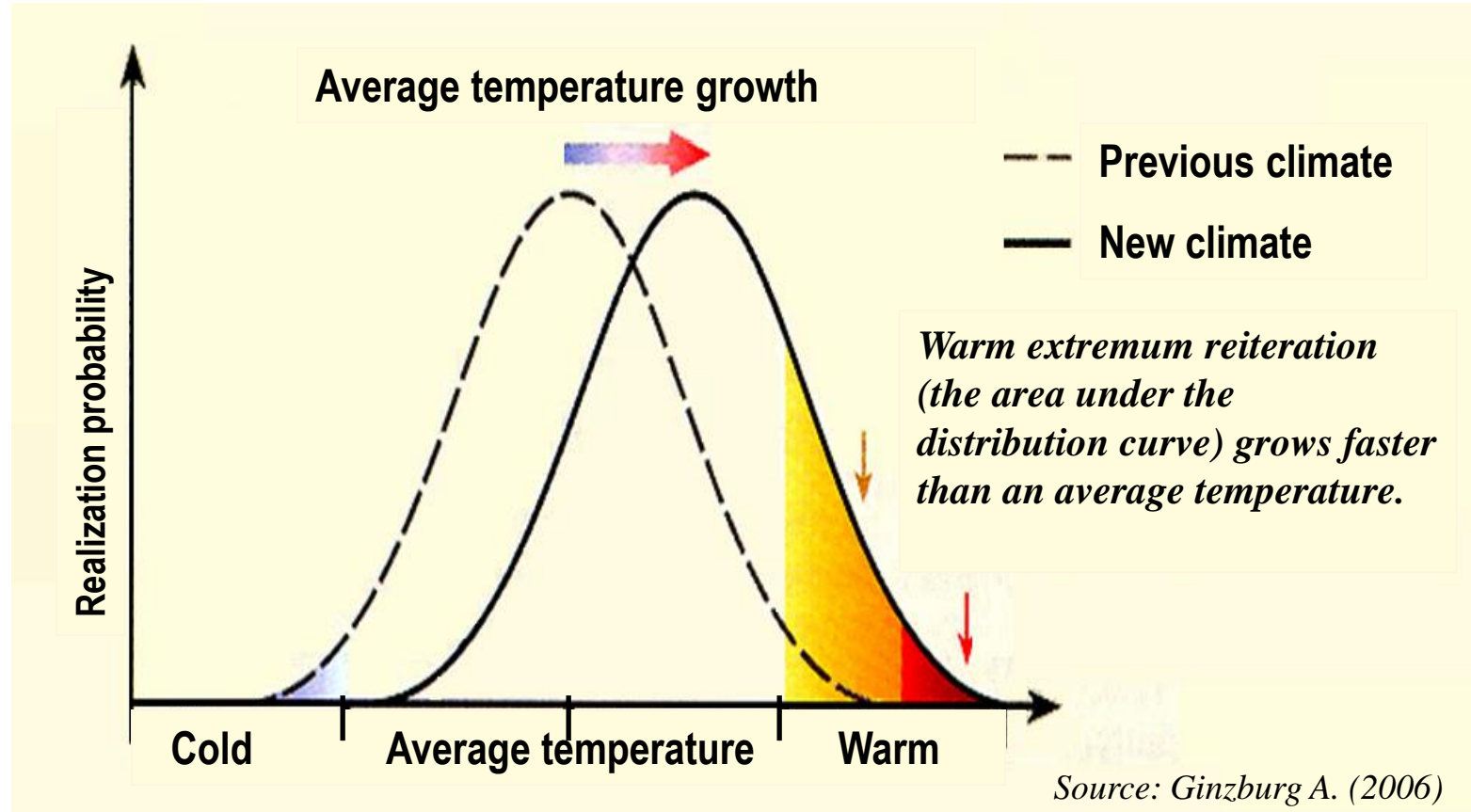


Expected Consequences of Climate Change

Changes	“Gradual” changes	⇒ “Extreme” changes (disasters)
1. Meteorological changes		
■ Temperature	Average temperature growth	Heat waves, cold waves
■ Moisture	Changes in atmospheric precipitation	Thunderstorms, hails, droughts
■ Wind speed	Changes in wind speed	Hurricanes, snowstorms, dust storms
2. Affected geophysical processes		
■ Lithosphere	Soil erosion	Earthquakes, volcanism, landslips
■ Cryosphere	Glacier and permafrost receding	Avalanching
■ Hydrosphere	Sea level rise, change in ocean currents	Floods, tsunami
■ Biosphere	Size, structure, migration of populations	Epidemics

Growth of Extreme Changes

Small changes in average temperature can cause significant changes of extremum reiteration

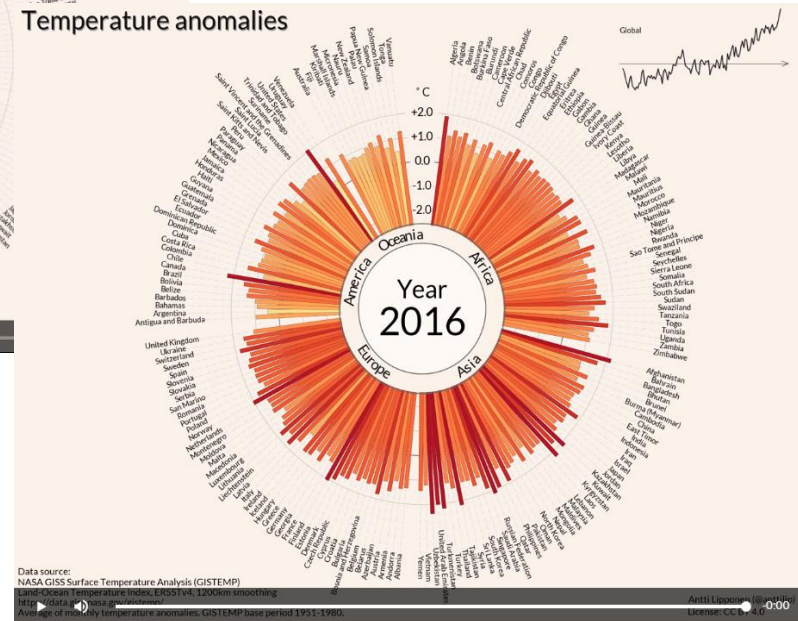
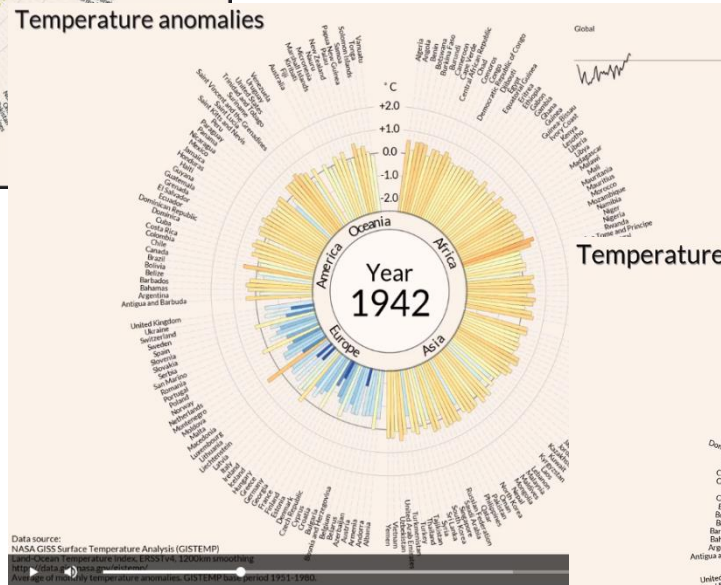
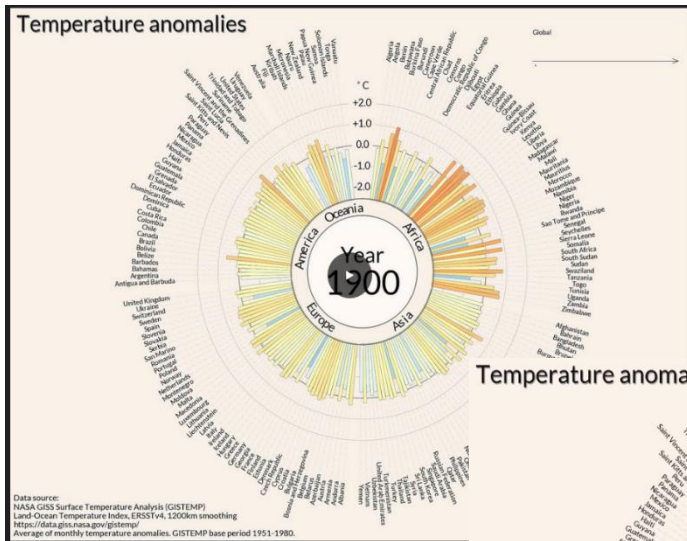


Global Natural-Disaster costs



Why there is a trend of growing costs of disasters?

Temperature anomalies arranged by country 1900 - 2016



<https://www.flickr.com/photos/15041108@N06/35471910724/>

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Executive Summary

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Discussion Topic: Climate Change in the European Alps

Adaptation measures	Positive effect +++ ++ +	Existing limits
1		
2		
3		
4		
5		
6		