Trends of Natural Disasters – the Role of Global Warming

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Communication on Climate Change as a relevant risk in insurance industry for many years

Trends of Natural Disasters

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The last years have brought records in natural disasters in respect to:

- Intensities
- Frequencies
- Damages and losses

Heat wave of 2003, the largest humanitarian natural catastrophe in Europe for centuries

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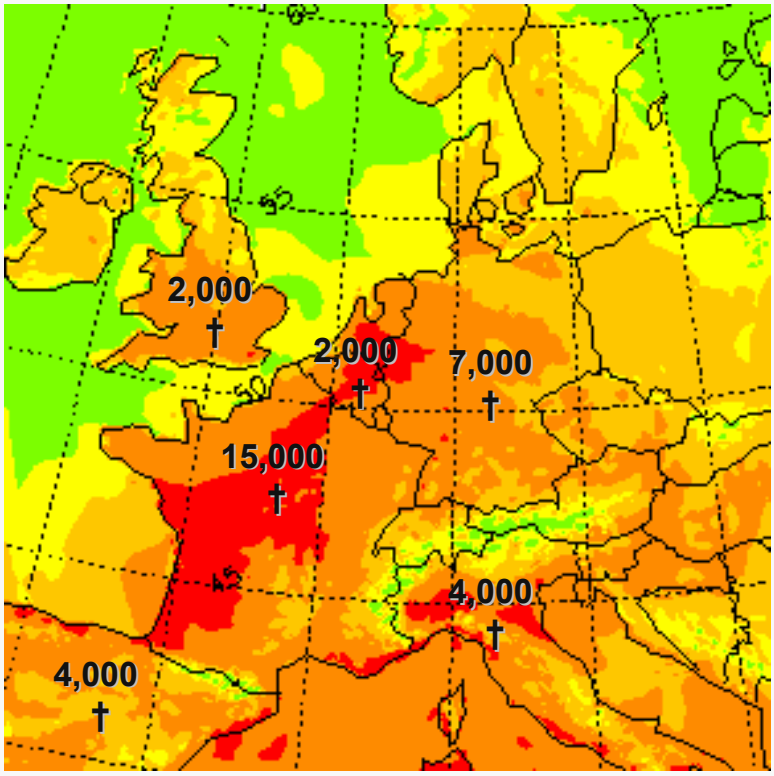
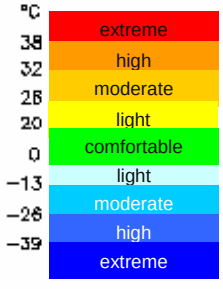
Perceived Temperature on 8 August 2003 and excess mortality



Source: German Weather Service, 2004

Heat stress



Cold stress

UTC
13:00

2004: 1st Hurricane in South Atlantic

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Hurricane Catarina off the Coast of Brasil, March 2004

Source: Image courtesy of Earth Sciences and Image Analysis Laboratory, NASA Johnson Space Center, Bild-Nummer ISS008-E-19646. http://eol.jsc.nasa.gov

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July/August 2005 – Flooding in India

944 mm rain within 24 hours, highest ever in India

24.7- 5.8 Flooding in India (1.150 fatalities)

Economic losses (US$ m):	5.000
Insured losses (US$ m):	770

August 2005 – Hurricane Katrina
6th strongest hurricane, largest losses of a single event

25.-30.8 Hurricane Katrina, USA (1.322 fatalities)

Economic losses (US$ m):	125.000
Insured losses (US$ m):	61.000 (NFIP included)

source: Reuters

2005, a Year of Weather Extremes

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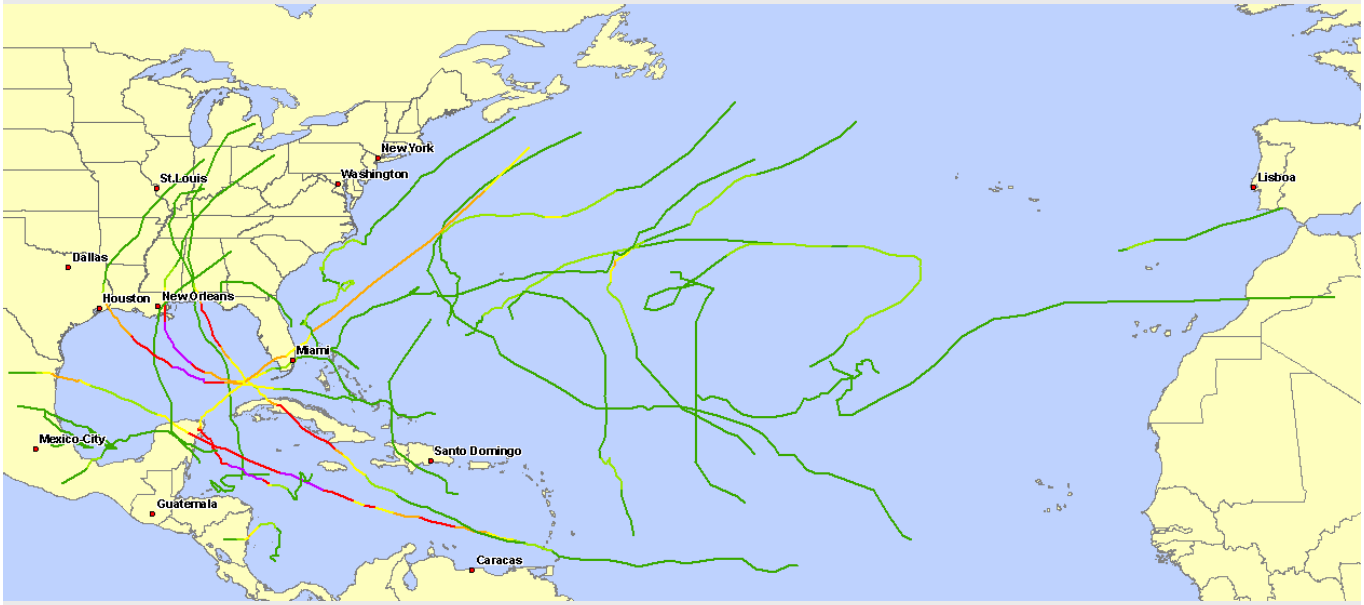
Never before since the beginning of records (1850) have so many named tropical storms occurred in the North Atlantic basin in one season:
28, of which 15 with hurricane strength
(old absolute record 21 in 1933, resp. 12 in 1969)



Hurricane Vince (9 October 2005)

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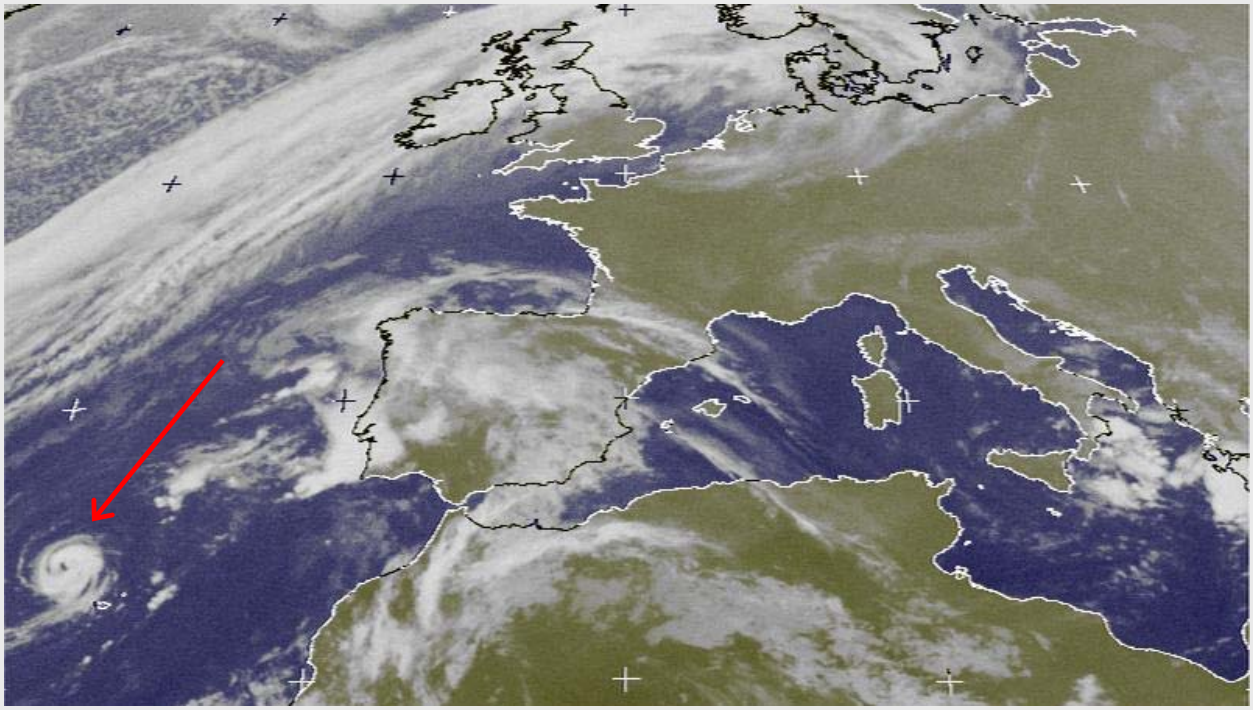
Vince, a hurricane in a region without hurricane risk
(easterly North Atlantic, Madeira)



MR NatCatSERVICE®

One of the world's largest databases on natural catastrophes

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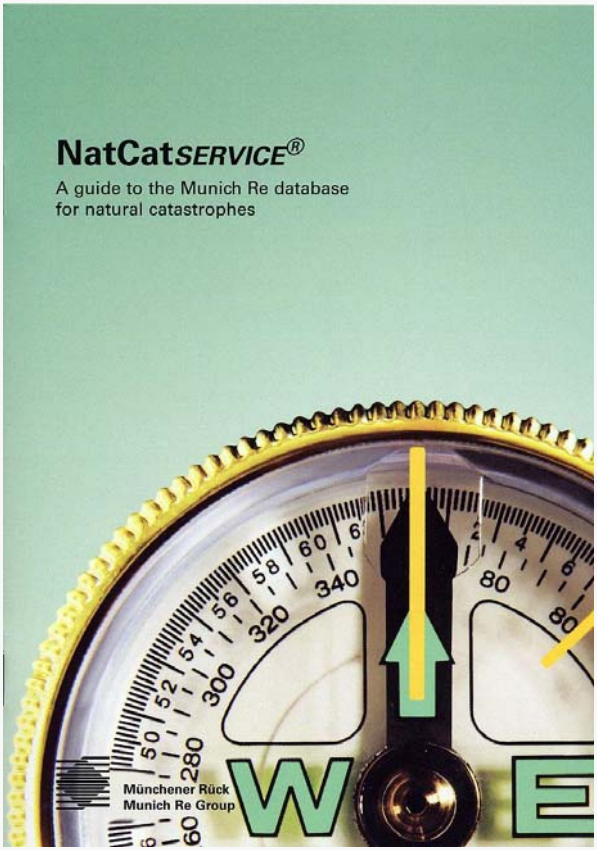

The database today:

- From 1980 until today all loss events have been analysed and entered (19,000 data sets)
- For USA and selected countries in Europe all loss events between 1970 and 1980 - other countries will follow consecutively (1,000 data sets)
- Retrospectively all Great Disasters since 1950 have been analysed and entered (276 data sets)
- In addition all major historical events starting from 79 AD – eruption of Mt. Vesuvio (3,000 historical data sets)

more than 23,000 events

Great Natural Disasters 1950 – 2006

Number of events

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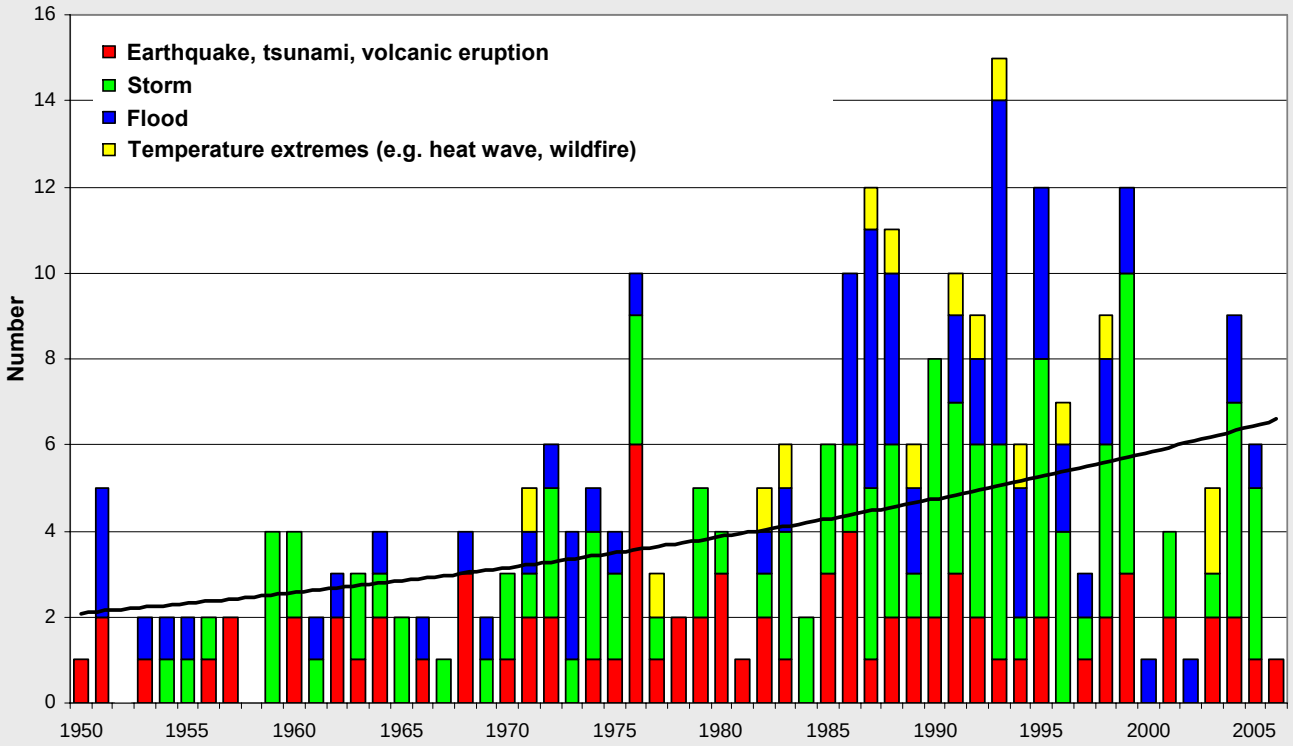

Great Weather Disasters 1950 – 2006

Overall and insured losses

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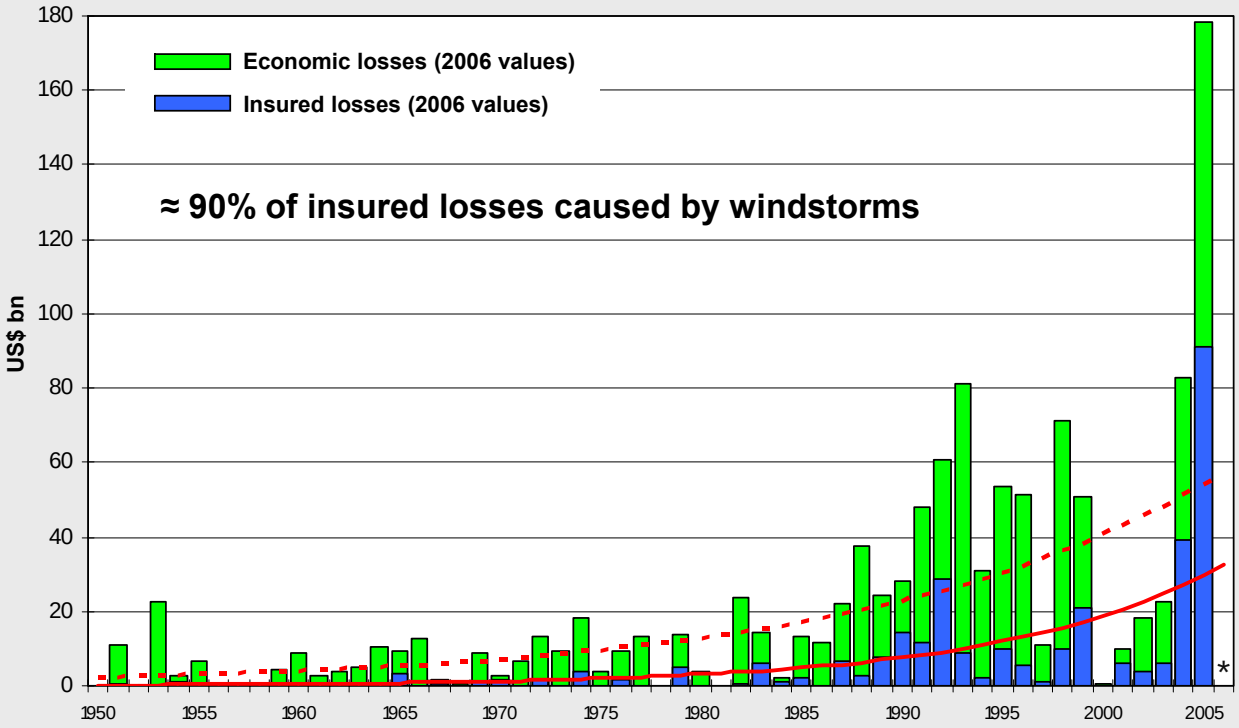

* According to the definition criteria there was no Great Weather Disaster in 2006.

India: Weather disasters 1980 – 2006

Number of events, with trend

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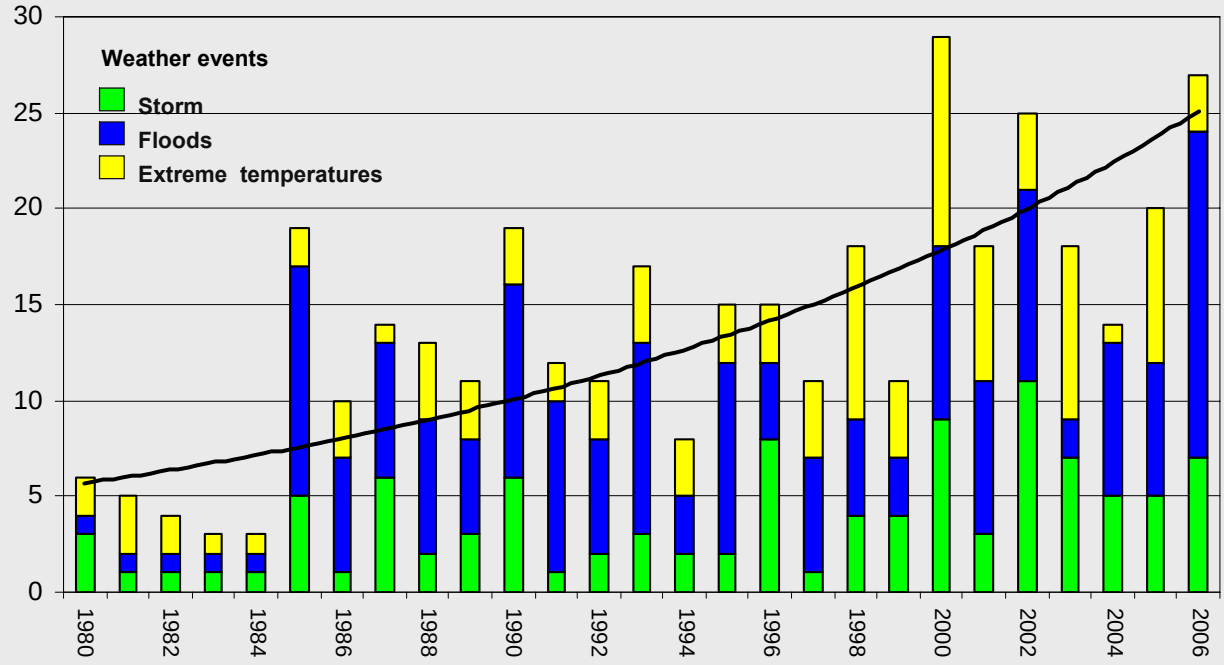

Thunderstorms* USA 1980 – 2006

Number of events with trend

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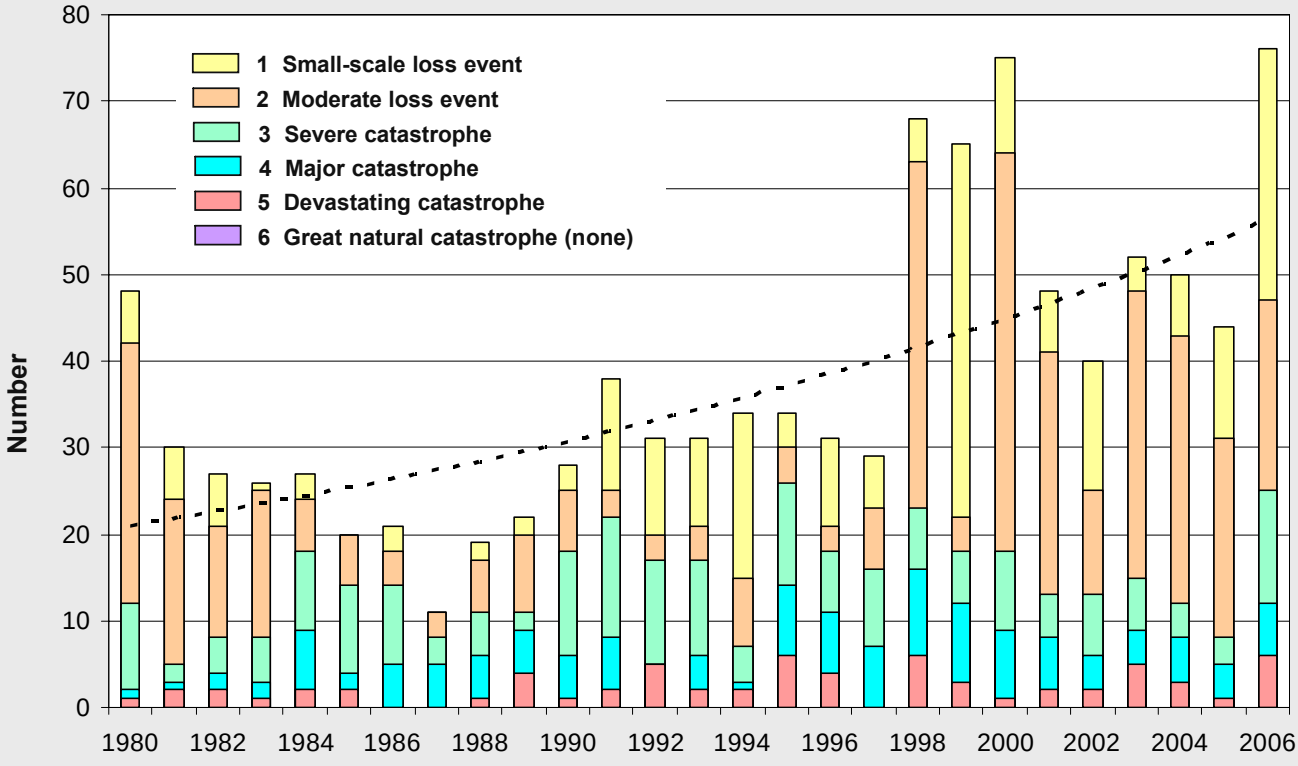

* Thunderstorms including tornado outbreaks and hailstorms

Natural catastrophes in economies at different stages of development between 1980 and 2005

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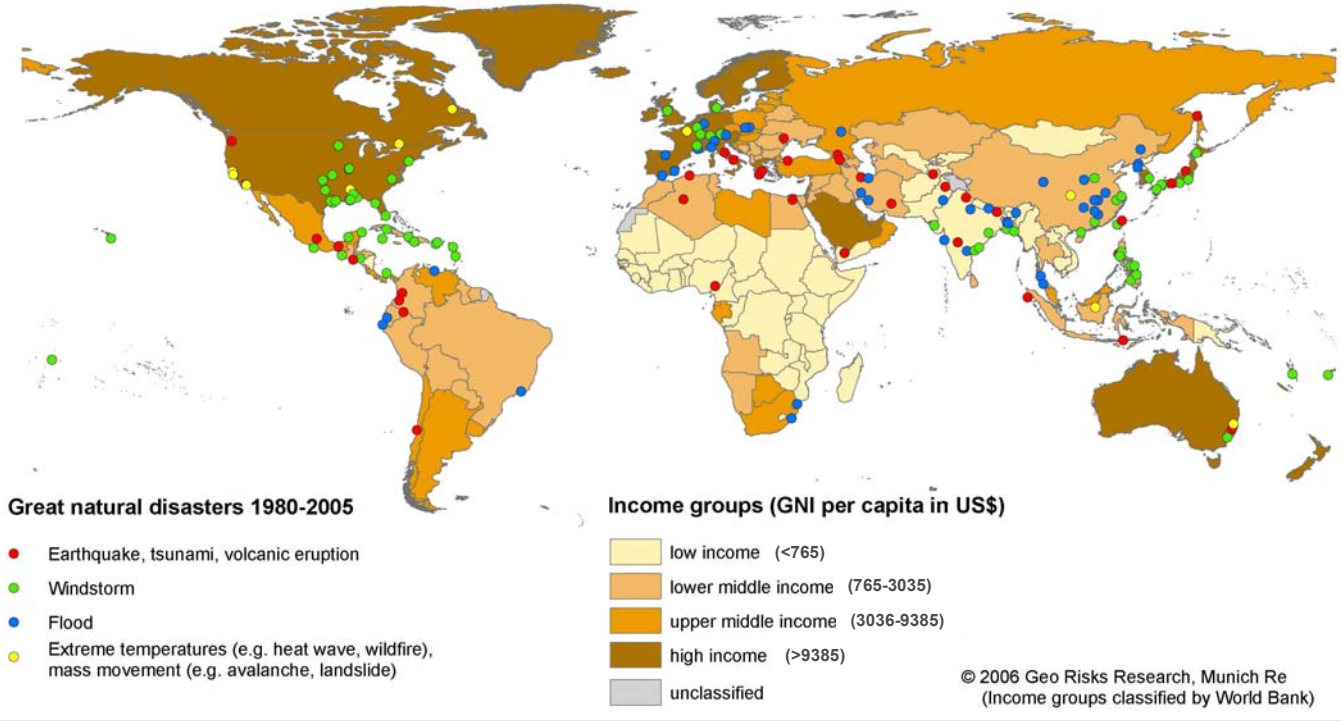

Global distribution of insurance premiums per capita

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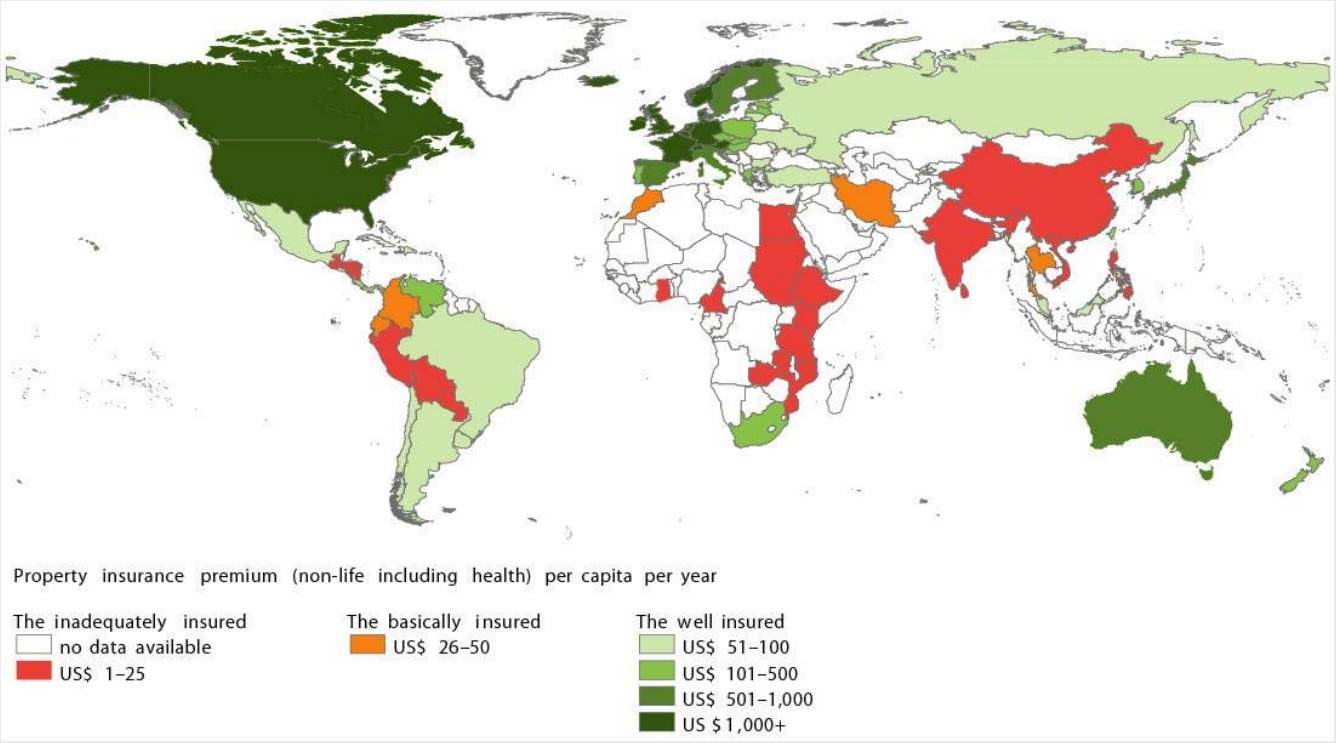

Hurricane losses in the selected Caribbean States in 2004 (GDP%)

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Losses compared to annual GDP	
• Dom. Republik:	1.9%
• Bahamas:	10.5%
• Jamaica:	8.0%
• Grenada:	212.0%
• Cayman Islands:	183.0%

Reasons for globally increasing losses due to natural disasters

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Less problematic

- Rise in population
- Better standard of living
- Increasing insurance density

Problematic

- Concentration of people and values in large conurbations
- Settlement in and industrialization of extremely exposed regions
- Change in environmental conditions - Climate Change

Global mean temperature, 1856 - 2006

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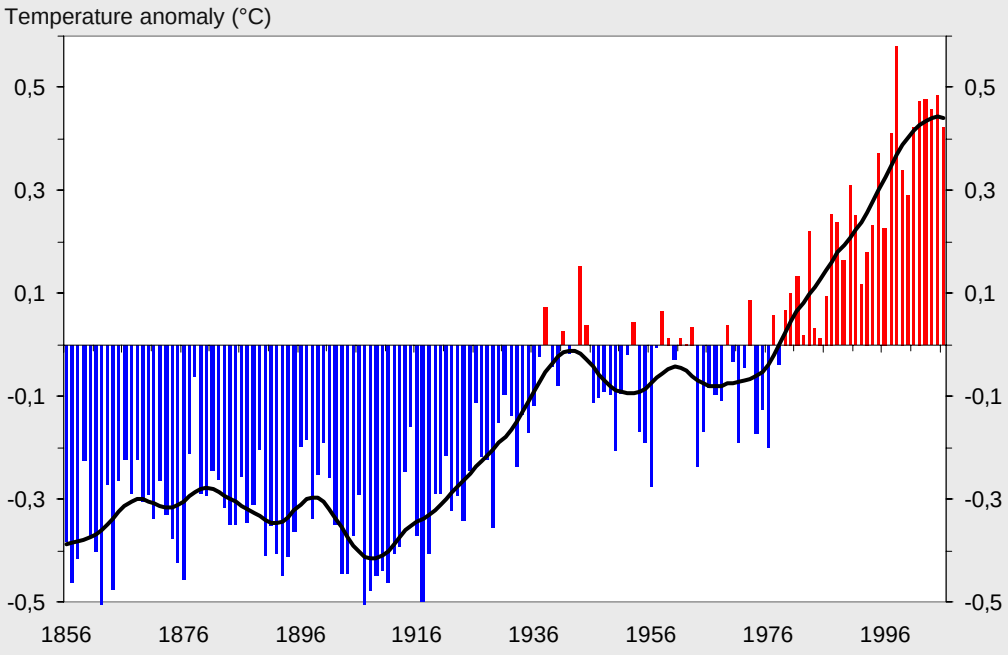
Departures in temperature from the 1961-1990 average



2006: +0.42°C above the 1961-1990 annual average (14°C).

All the 10 warmest years were in the last 12 years.

The five warmest years in decreasing order are:

1998, 2005, 2002, 2003 and 2004.

Source: CRU, UK (2007), compilation acc. to WMO

Global and Regional Temperature trends in the 20th century: modeled and observed

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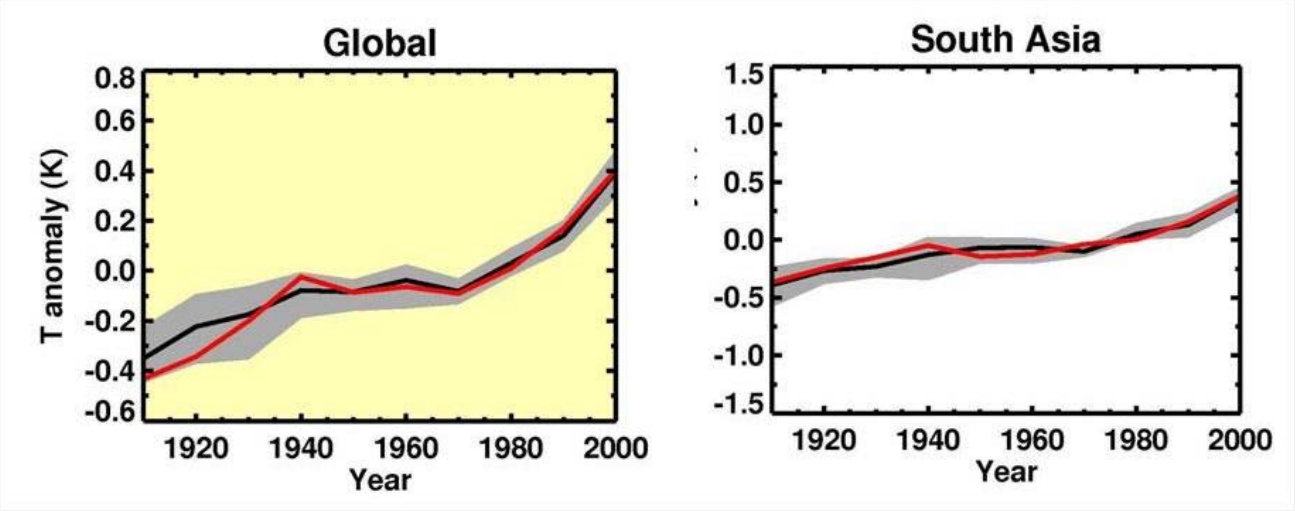

+ 0.8 °C **+ 0.7 °C**

Source: climateprediction.net, Oxford University

CO_2 concentration in the atmosphere

of the past 650,000 years from the Vostok ice core, Antarctica

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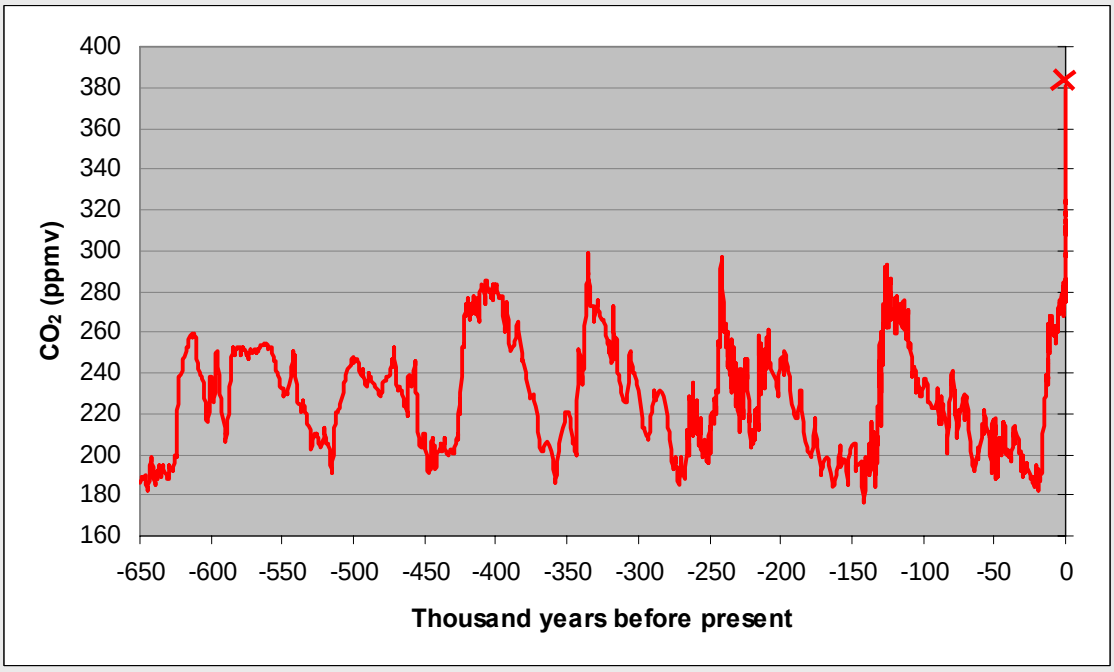

2006:
383 ppmv CO_2

Sources: Siegenthaler et al. (2005), Spahni et al. (2005), Röthlisberger et al. (2004)

Scientific evidence of a link between global warming and tropical storm intensification

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- Global warming will intensify the maximum wind speed by 0.5 on the Saffir Simpson scale and precipitation by 18% in hurricanes until 2050 (Knutson et al., J of Climate 2004).
- Major tropical storms both in the Atlantic and the Pacific region have already increased since the 1970s in duration and intensity by about 50 percent (Emanuel, Nature 2005; Webster, Science 2005)
- Due to climate change the sea surface temperatures have increased already by 0.5°C (Barnett, Pierce, 2005, Science; Santer et al., PNAS, Sept. 2006)
- Of all the factors that drive a major storm only the steady increase in sea surface temperatures over the last 35 years can account for the rising strength of storms in six ocean basins around the world (Hoyos et al., Science 2006)

Projections of air temperature changes relative to 1980-1999 (IPCC, 2007)

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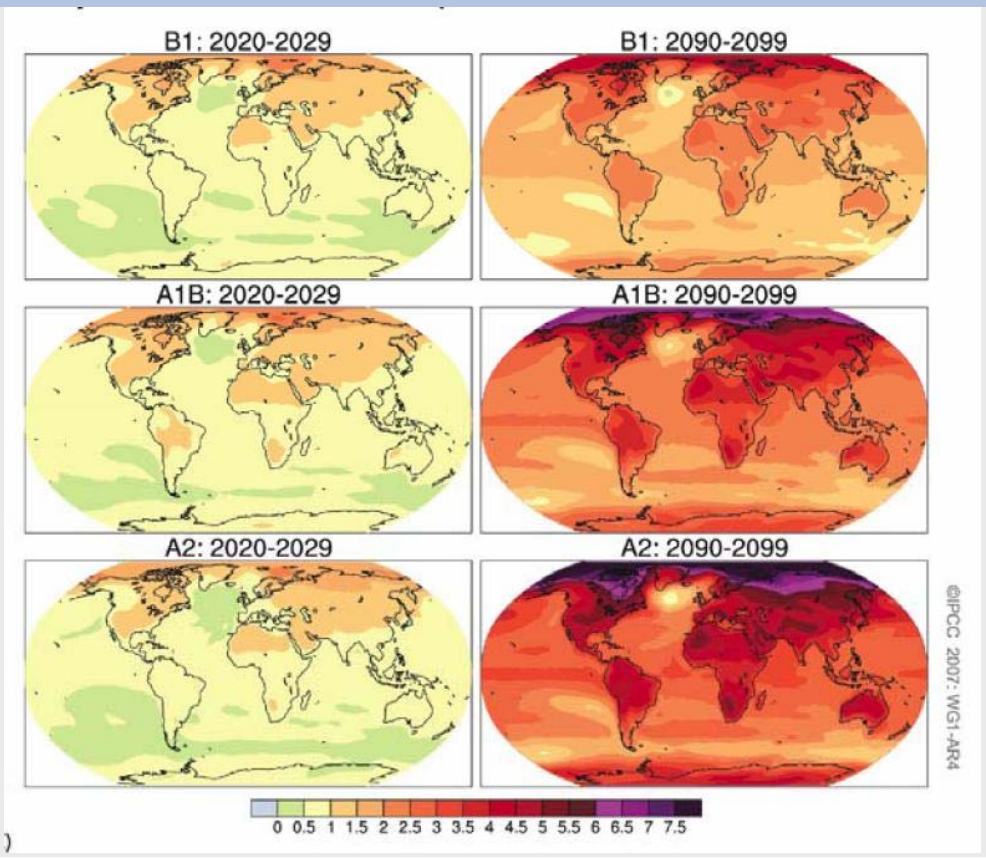

Changes in sea level since 1850

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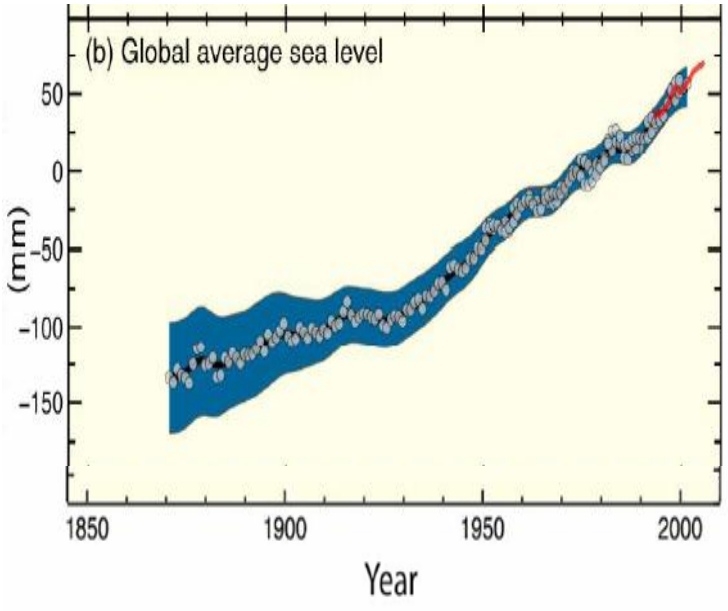

Projected sea level rise in the 21st century:

18 – 59 cm with no increase in ice flow rates in Greenland and Antarctica included

Source: IPCC 4thAR, WGI, Paris, 5.2.2007

IPCC assessment climate change and extreme weather events (2 February, 2007)

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Phenomenon[a] and direction of trend	Likelihood that trend occurred in late 20th century (typically post 1960)	Likelihood of a human contribution to observed trend[b]	Likelihood of future trends based on projections for 21st century using SRES scenarios
Warmer and fewer cold days and nights over most land areas	*Very likely*[c]	*Likely*[e]	*Virtually certain*[e]
Warmer and more frequent hot days and nights over most land areas	*Very likely*[d]	*Likely (nights)*[e]	*Virtually certain*[e]
Warm spells / heat waves. Frequency increases over most land areas	*Likely*	*More likely than not*[f]	*Very likely*
Heavy precipitation events. Frequency (or proportion of total rainfall from heavy falls) increases over most areas	*Likely*	*More likely than not*[f]	*Very likely*
Area affected by droughts increases	*Likely* in many regions since 1970s	*More likely than not*	*Likely*
Intense tropical cyclone activity increases	*Likely* in some regions since 1970	*More likely than not*[f]	*Likely*
Increased incidence of extreme high sea level (excludes tsunamis)[g]	*Likely*	*More likely than not*[f,h]	*Likely*[i]

Policies to Cope with Climate Change Effects

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- Regional, at least country specific prospective risk assessment and mapping necessary

Risk mapping with Munich Re NATHAN

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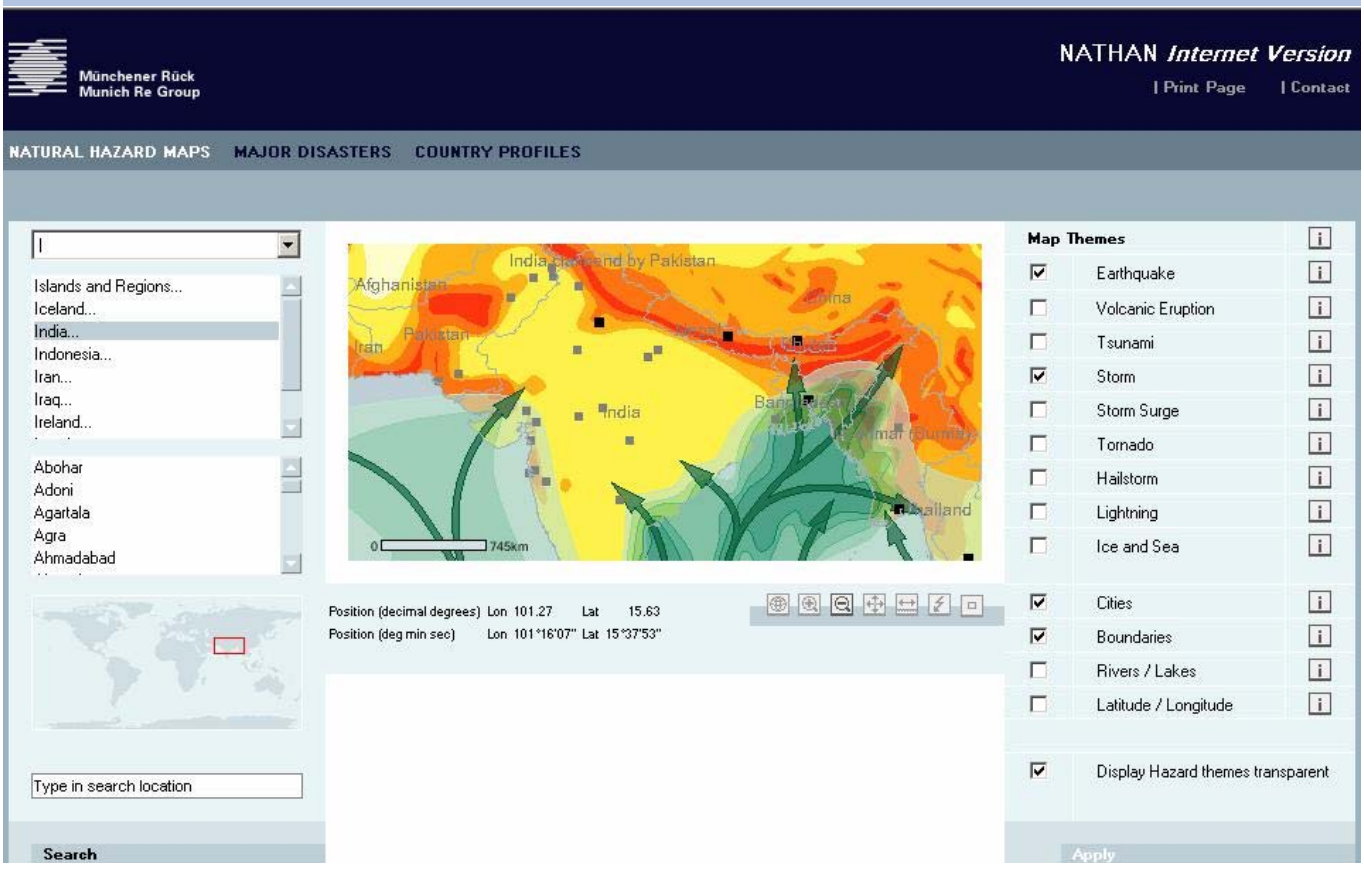

Policies to Cope with Climate Change Effects

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- Regional, at least country specific prospective risk assessment and mapping necessary
- Region specific prevention and adaptation measures
- Regional strategies to cope with losses from disasters induced by global warming
  In developed countries: traditional insurance schemes
  In developing countries: micro insurance, donor based insurance mechanisms
- Mitigation of causes of global warming

The Munich Climate Insurance Initiative (MCII)

The MCII was founded by representatives of Germanwatch, IIASA, Munich Re, the Potsdam Institute for Climate Impact Research (PIK), the Swiss Federal Institute of Technology (SLF), the Tyndall Centre, the World Bank, and independent experts.

MCII

Objectives

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- Wealthy countries will be able to cope with financial losses from increasing disasters by means of insurance solutions and state funding, the poorest countries will suffer most
- The increasing natural catastrophe damages in poor countries will consume increasing ratios of the donor money of development funding, delaying their further development
- New insurance related systems are necessary to get these countries, where currently almost no insurance is available, out of the global warming trap
- MCII is working on solutions to provide expertise on insurance related mechanisms to cover losses due to climate change, especially in developing countries

Insurance of Natural Hazards

Carrier of the burden/liabilities

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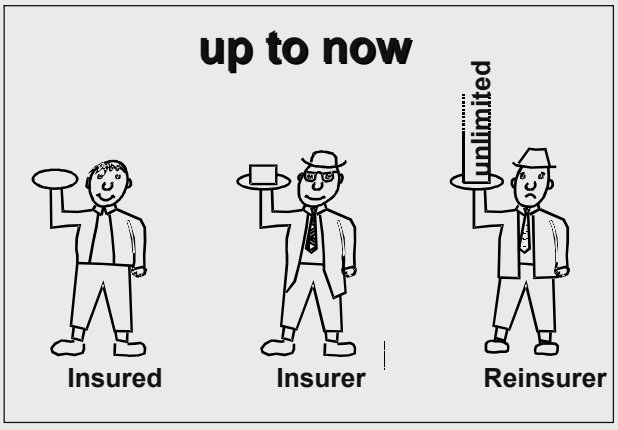

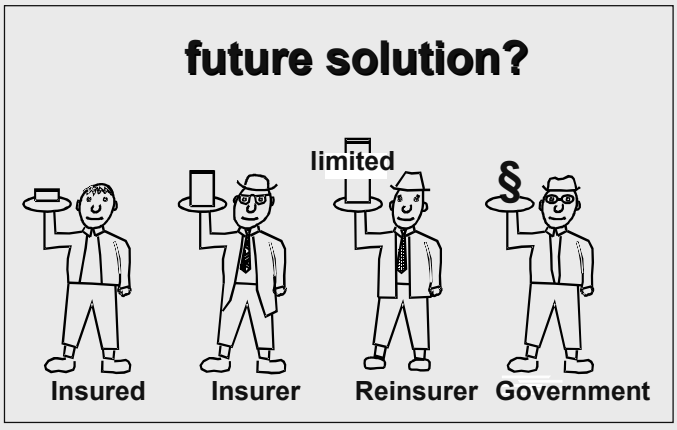

Munich Re: many activities to promote climate protection

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- Member of The Climate Group
- Member of the Global Roundtable on Climate Change (Jeff Sachs)
- Board member of the European Climate Forum
- Hosting side events at the annual global climate summits of the UNFCCC (COP)
- UNEP-Financial Initiative
- Carbon Disclosure Project

Increase of corporate responsibility activities in the field of climate change

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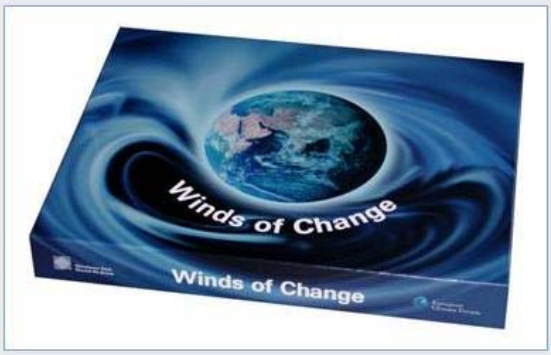
Publications and strategic board game



Conclusions

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- Natural catastrophes, especially weather related events, are increasing dramatically in number and magnitude. Loss potentials have reached new dimensions
- Climate change is happening already, it cannot be stopped anymore, just attenuated
- There is more and more scientific evidence for causal links between global warming and increasing frequencies and intensities of natural catastrophes
- We have to mitigate global warming and adapt to the changing risks in respect to the regionally specific risk patterns
- Insurance mechanisms are part of the adaptation process (UNFCCC) – they have to be designed in regard to the regional characteristics