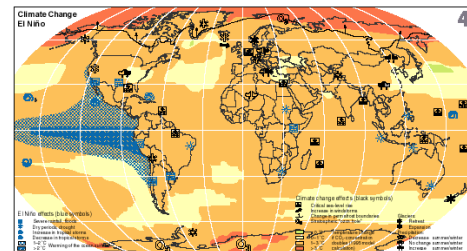
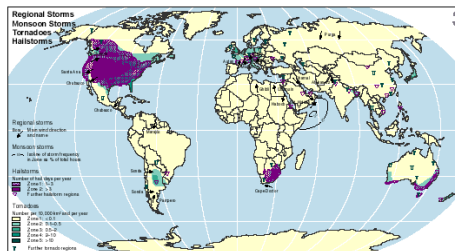
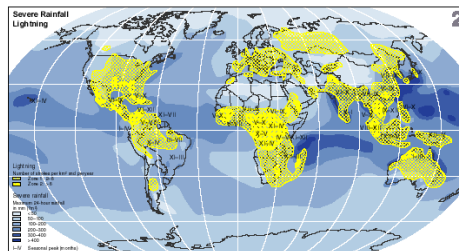


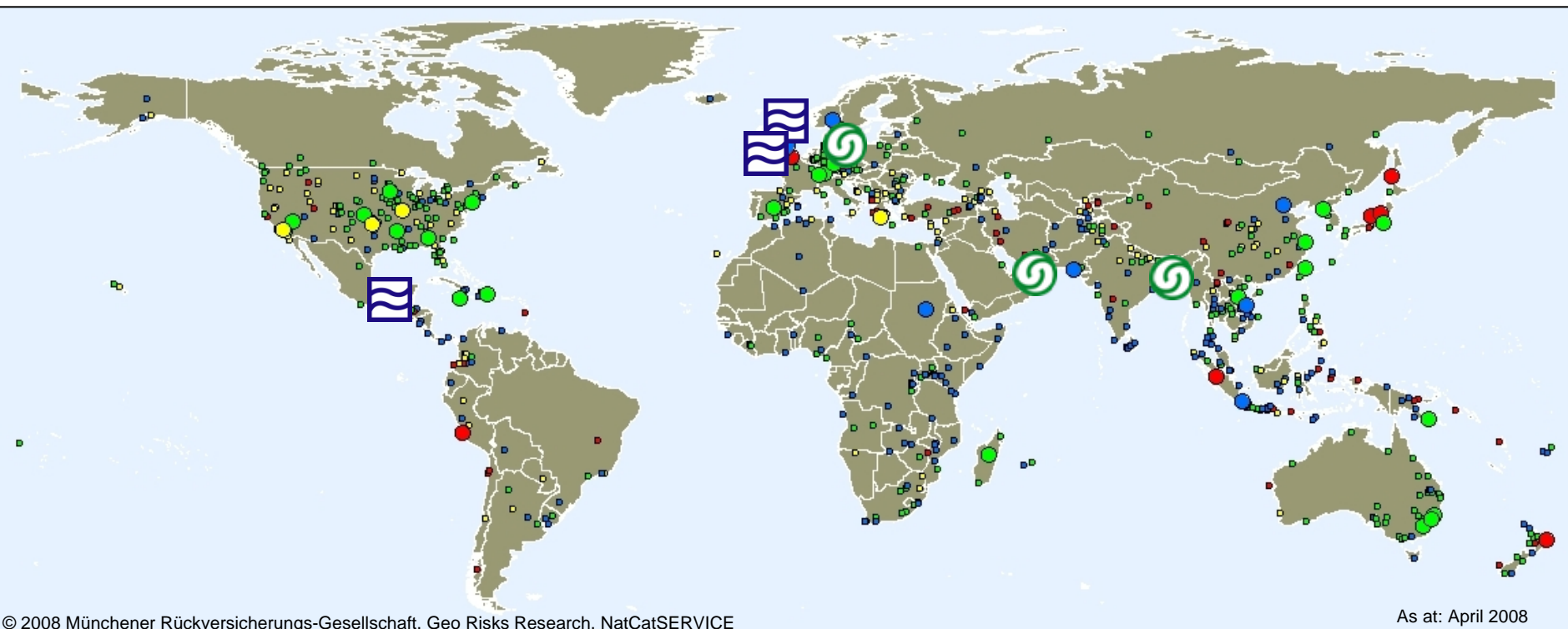
Catastrophes and Climate Change

***Causes, Costs and Counter-Measures –
(Re-)Insurance Perspectives***

***Prof. Dr. Gerhard Berz, Munich University,
formerly Geo Risks Research, Munich Re***

Münchener Rück
Munich Re

Natural disasters 2007



2007: 960 natural disasters

○ Significant loss events

Great natural catastrophes (6)



Floods (25-30.6 & 20-23.7) United Kingdom

Floods, landslide (28.10-6.11) Mexico

Winter storm Kyrill (18-20.1), Europe



Tropical cyclone Gonu (4-8.6) Oman, Iran

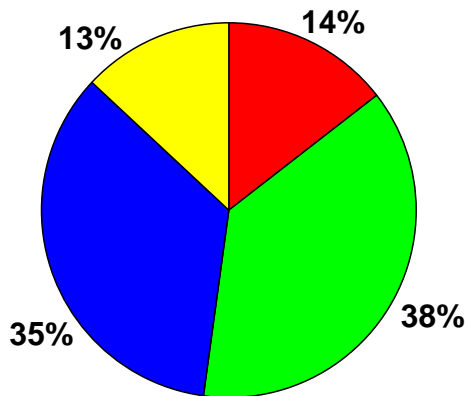
Cyclone Sidr (15-17.11) Bangladesh, India

- Geophysical
(earthquake, tsunami, volcanic activity)
- Meteorological (storm)
- Hydrological
(flood, mass movement)
- Climatological
(extreme temperature, drought, wildfire)

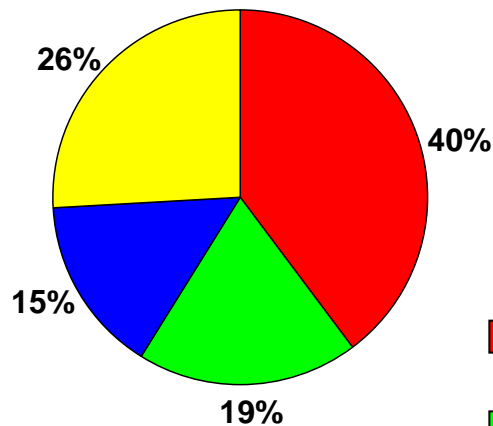
Natural disasters 1980 - 2007

Percentage distribution worldwide

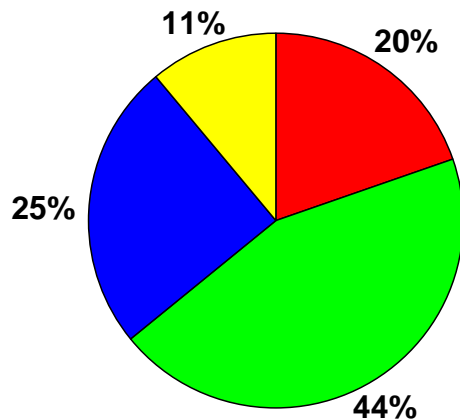
17,000 loss events



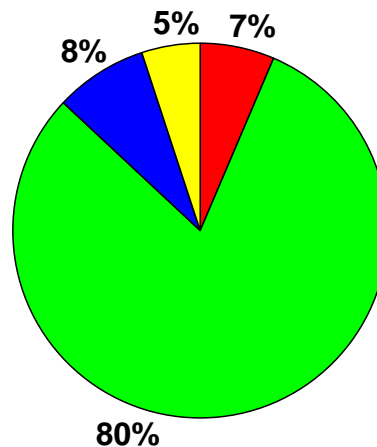
1,500,000 fatalities



**Overall losses:
US\$ 1,800bn***



**Insured losses:
US\$ 450bn***



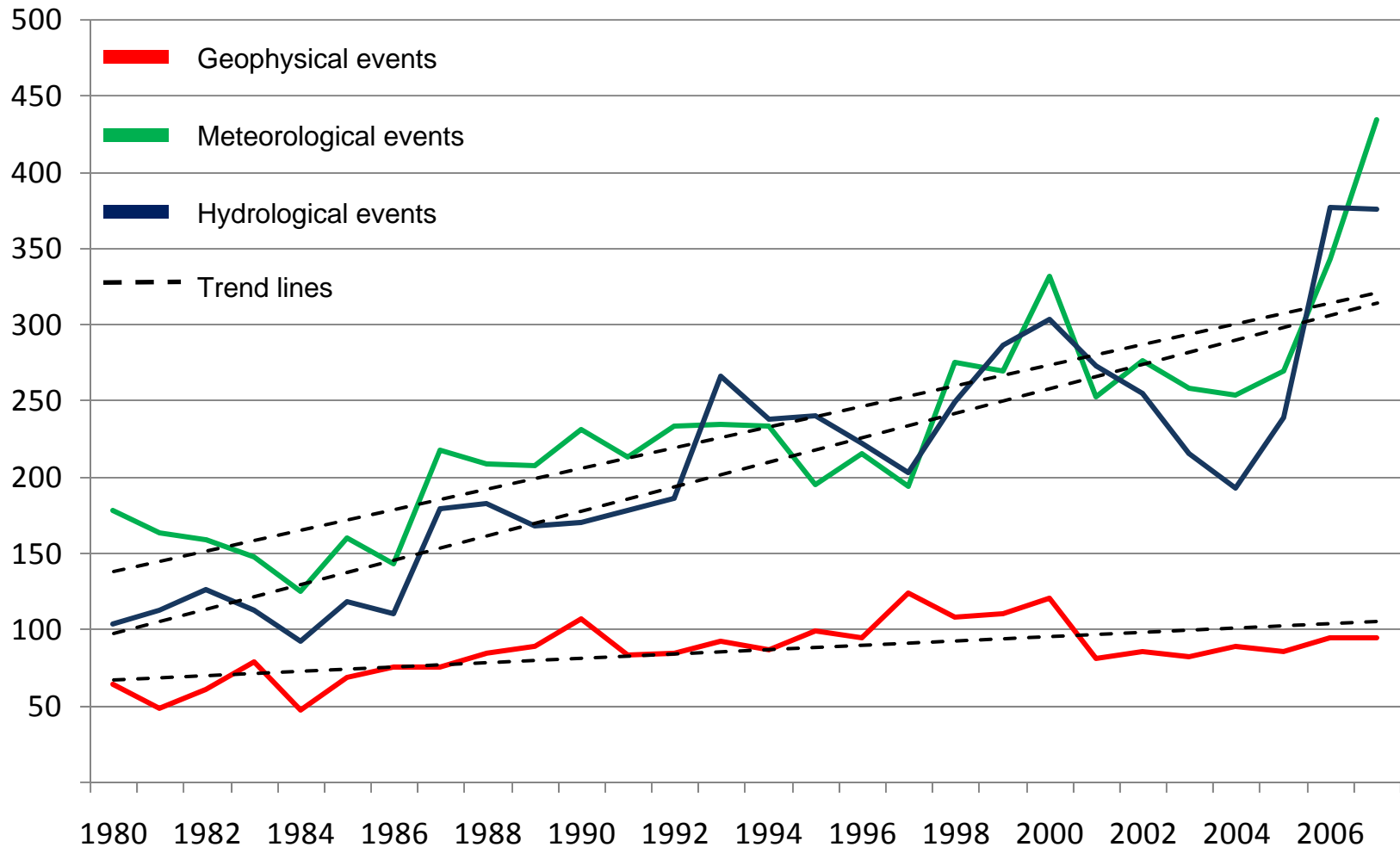
- **Geophysical**
(earthquake, tsunami, volcanic activity)
- **Meteorological (storm)**
- **Hydrological**
(flood, mass movement)
- **Climatological**
(temperature extremes, drought, wildfire)

* original values

Natural disasters 1980 - 2007

(Geophysical, meteorological, hydrological events)

Number of events, worldwide



Great weather disasters 1950 - 2007

Decadal comparison, worldwide

	Decade 1950-1959	Decade 1960-1969	Decade 1970-1979	Decade 1980-1989	Decade 1990-1999	last 10 1998-2007
Number	15	16	29	44	74	41
Overall losses	52.0	67.1	94.4	150.7	507.3	482.1
Insured losses	1.6	7.2	14.5	28.1	120.4	195.7

The comparison
of the last ten
years with the
1960s shows a
dramatic
increase

Factor
last 10:60s

2.6

7.2

27.2

Losses in US\$ bn – 2007 values

The **frequency** and **size** of losses due to natural disasters are **increasing** dramatically all over the world

The reasons

- Rise in population
- Better standard of living
- Concentration of people and values in large conurbations
- Settlement in and industrialization of high-risk zones
- Rising susceptibility of modern societies and technologies
- Increasing insurance density
- **Environmental / climatic changes**

Climate change: trends and effects

Change (increase) in

- Concentration of greenhouse gases
- Air/sea temperature
- Humidity
- Sea level
- Atmospheric circulation



- Windstorms/storm surges
- Thunderstorms/hailstorms
- Torrential rainstorms/floods
- Droughts/heat waves/wild fires

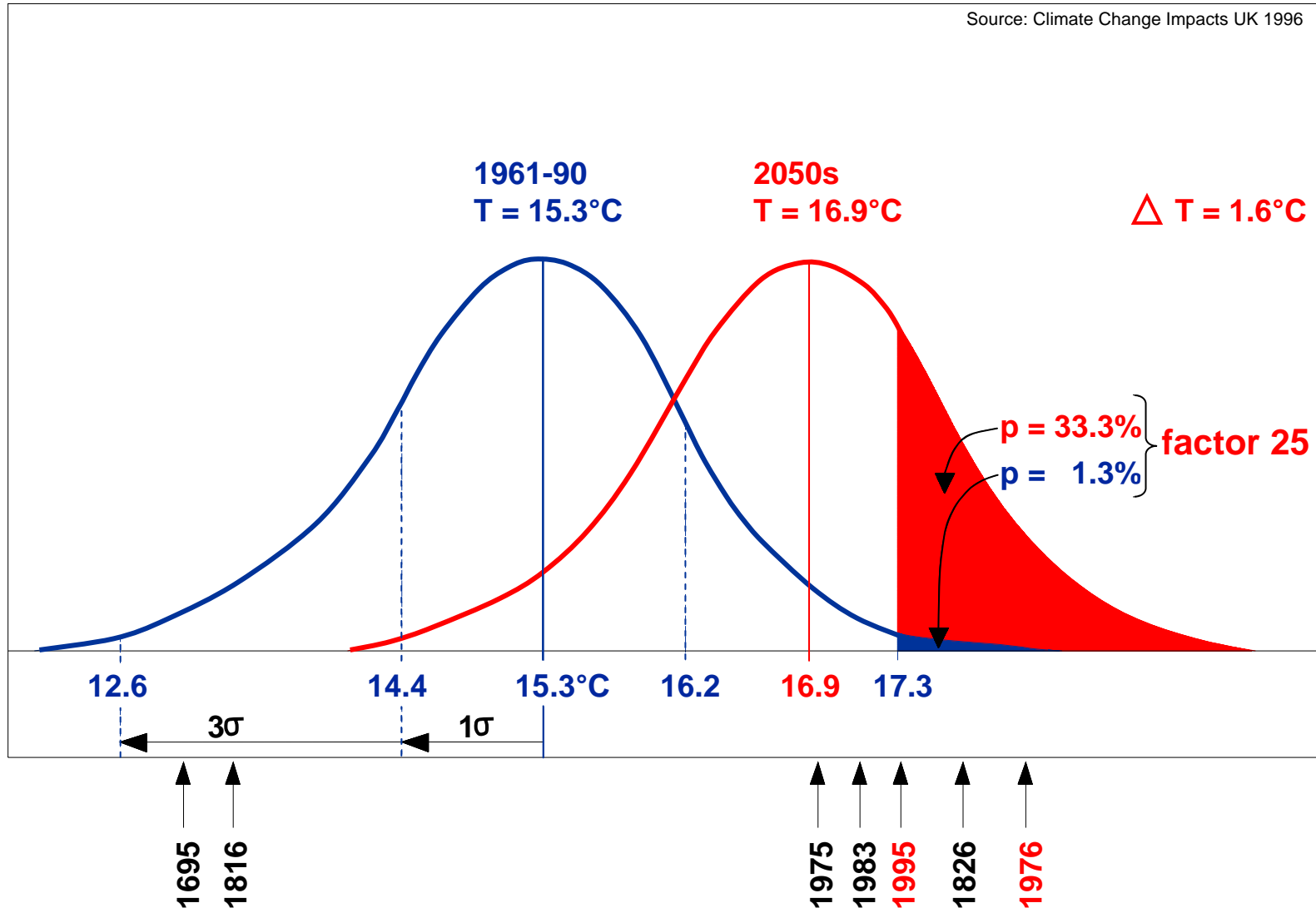
● General: Changing probability distributions



● Changing extremes

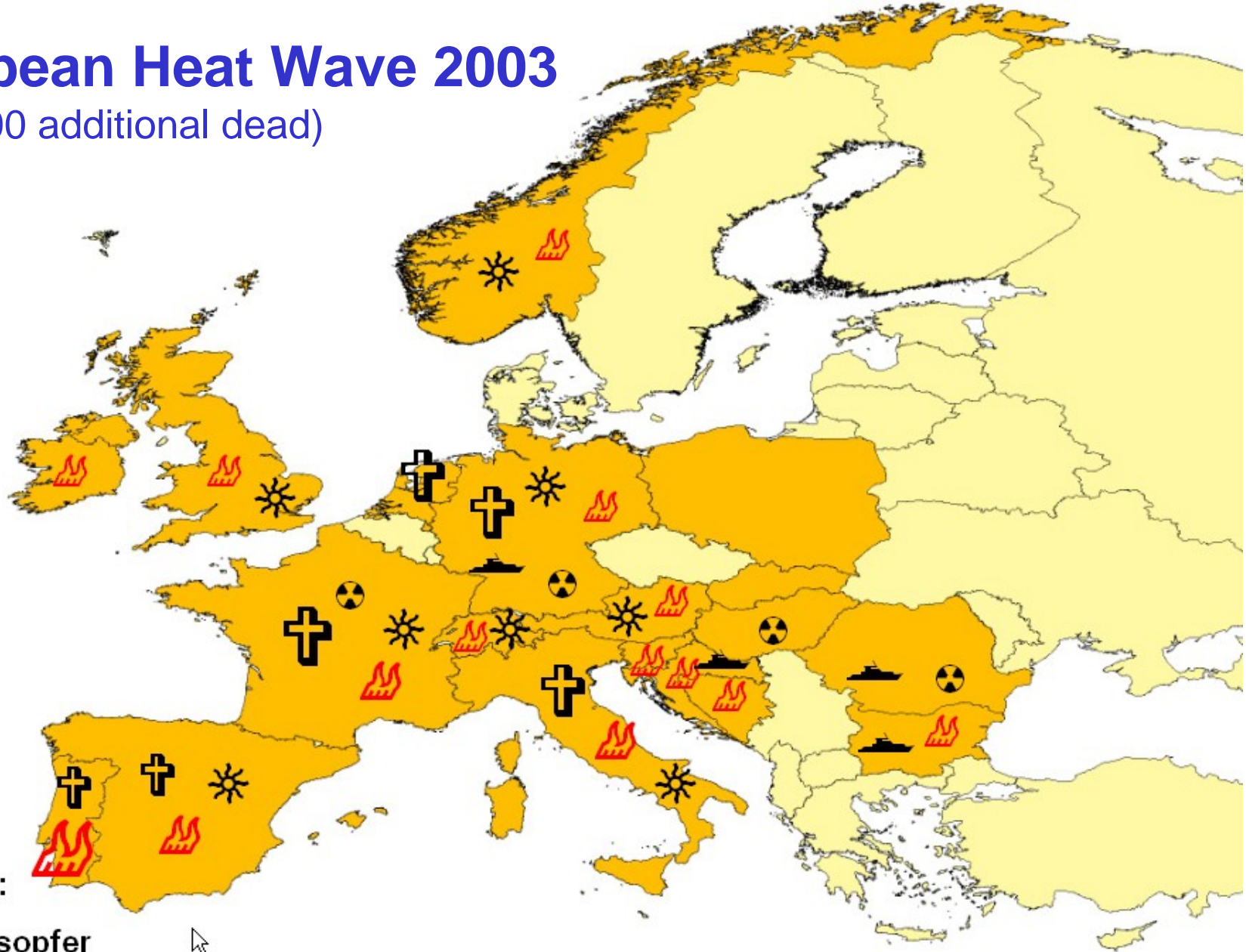
Increasing probabilities of extremes

Example: Summer temperatures in central England



European Heat Wave 2003

(>70 .000 additional dead)



Legende:

✚ Todesopfer

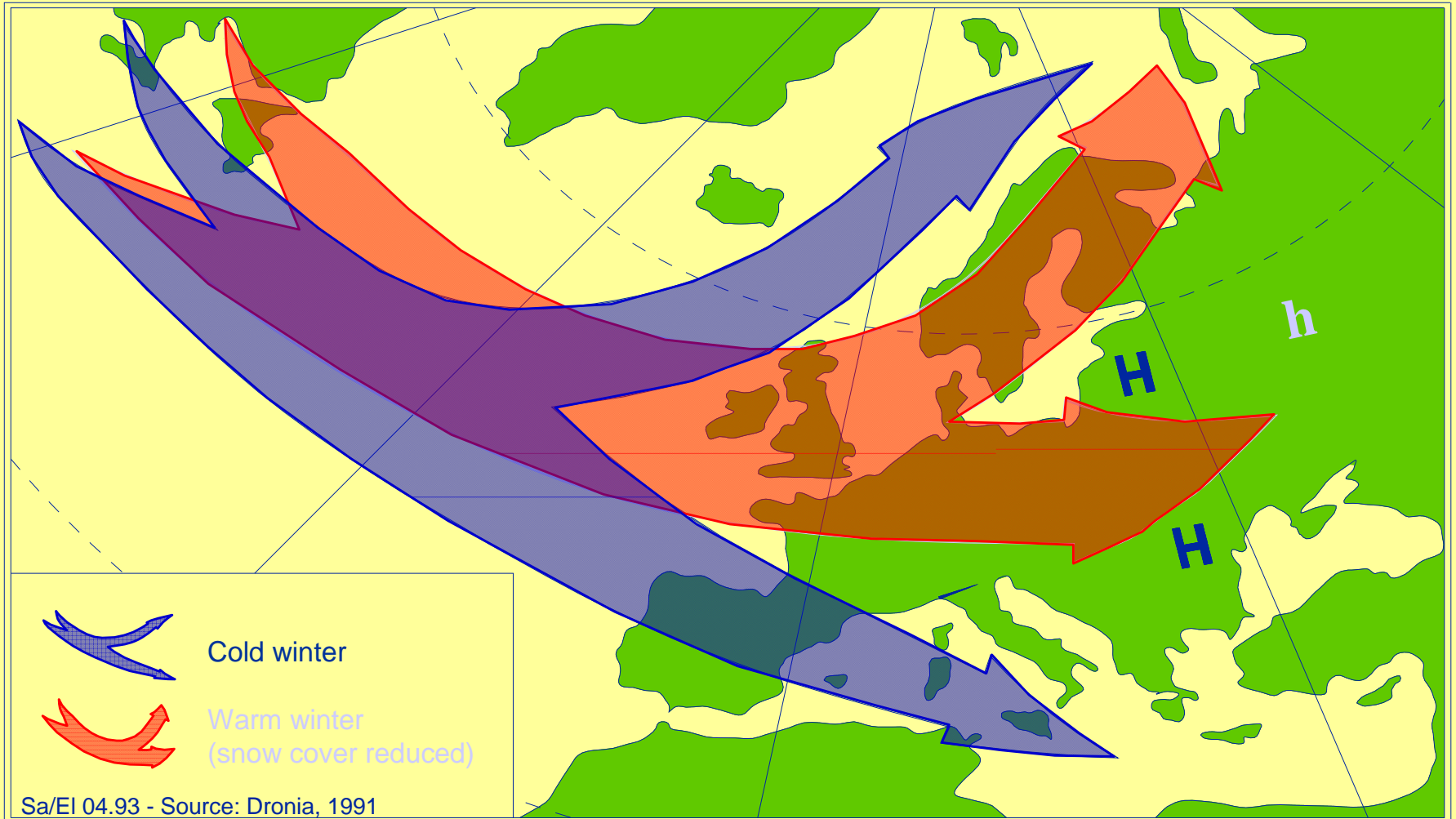
🔥 Waldbrände

☀ Hitzerekorde

☢ Beeinträchtigung von Kraftwerken

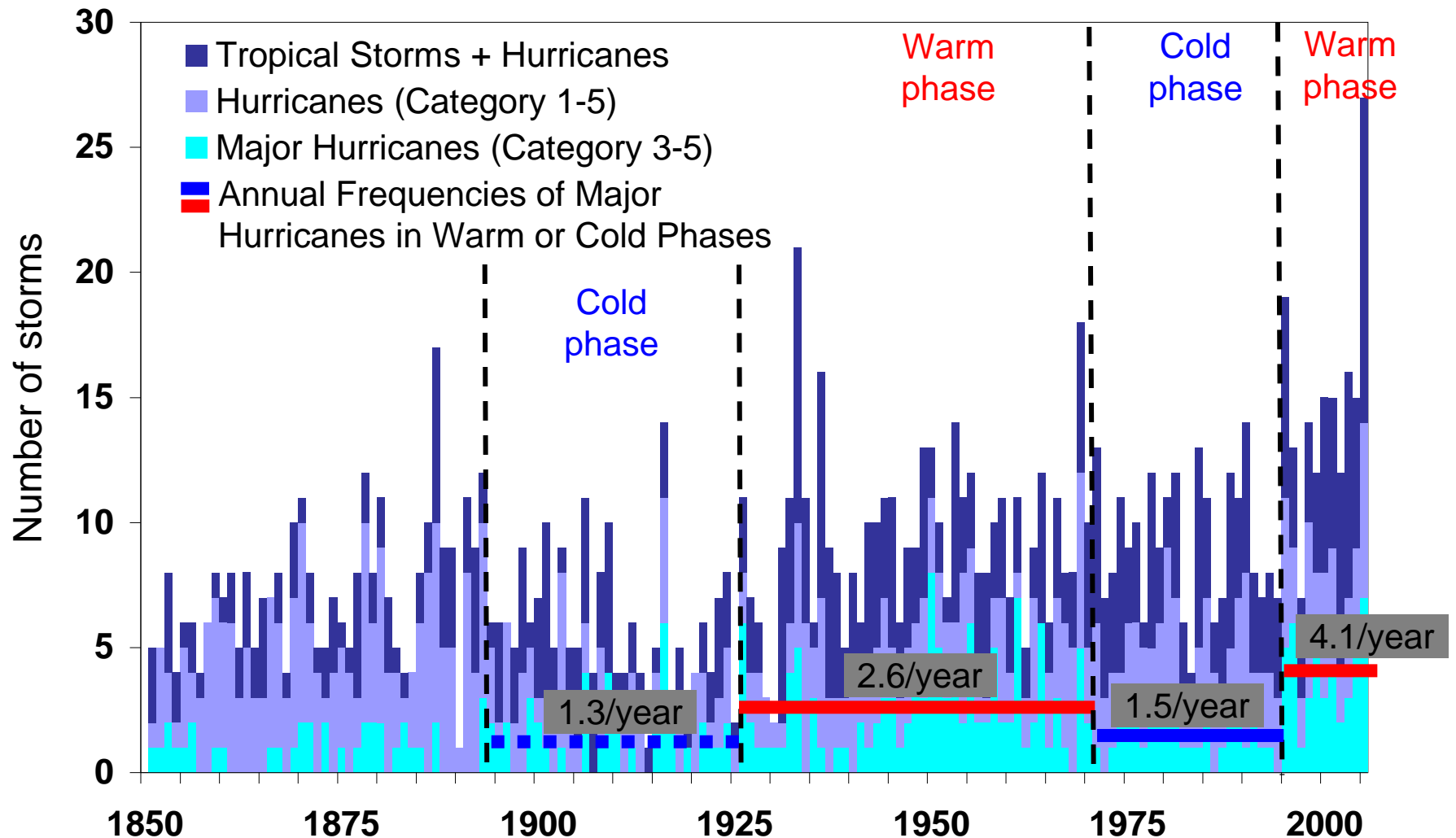
🚢 Einschränkung der Schifffahrt

European winter storm tracks



Annual frequencies of tropical cyclones of various categories

Date source: NOAA, Unisys; work Munich Re 2006

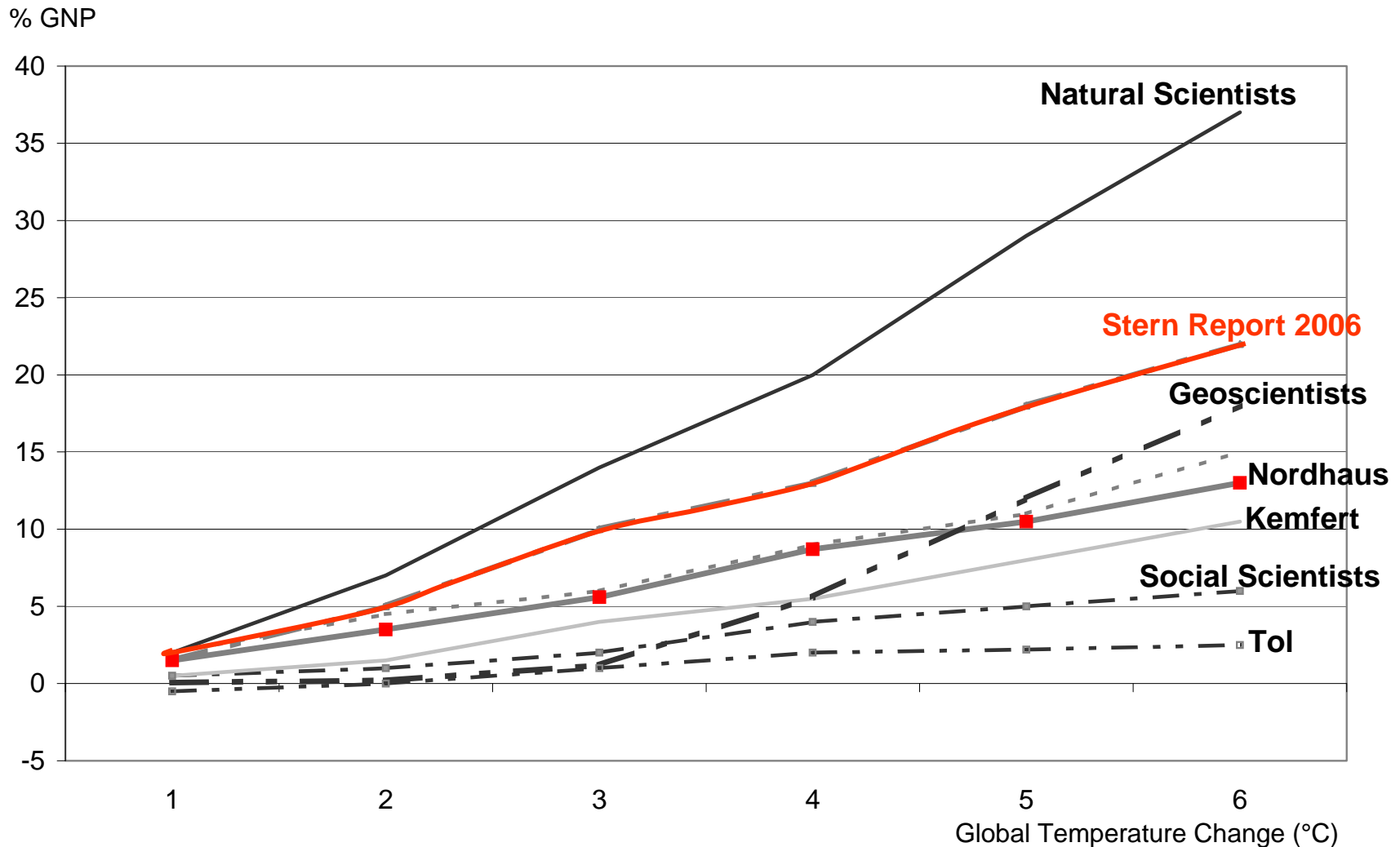


Some impacts of climate change on the insurance industry:

- **Increase in weather variability**
- **New extreme values**
- **New exposures**
- **More frequent and larger natural disasters**
- **Greater loss potentials**
- **Lagging premium adjustment**
- **Rising demand for cover of natural hazards**

Economic Losses due to Climate Change

(some differing models)



Source: OECD (2003), Stern (2006) and Kemfert (2004)

Insurance and the protection of climate

Some areas of possible action:

- Information and **(financial) motivation** of clients and authorities (e.g. restricted cover in high-risk areas)
- Climate-“friendly” **insurance products**
- Eco-audits in environmental liability insurance
- **Including environmental aspects** (e.g. sustainability) in **investment decisions**
- Climate protection: **sponsoring of projects**
- **Eco-balance** of insurance business and real estate
- Insuring **emission trading risks**

Conclusions

- *Disaster risks will continue to rise drastically in dimension and frequency.*
- *Climate change will further increase disaster risks in many regions.*
- *The insurance industry has a number of instruments at its disposal for adapting to changing risks and for actively promoting climate protection.*

**"We need to avoid the
unmanageable
and to manage the
unavoidable"**