

**DIW** Berlin

Deutsches Institut  
für Wirtschaftsforschung

[www.diw.de](http://www.diw.de)

# Was kosten uns Klimawandel und Wetterextreme?

**Prof. Dr. Claudia Kemfert**

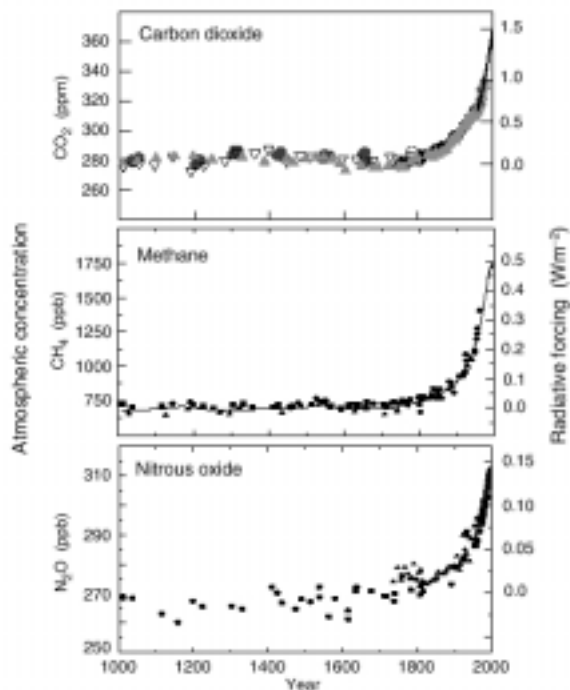
**Deutsches Institut für  
Wirtschaftsforschung  
Humboldt Universität Berlin**

**München 16. Februar 2005**

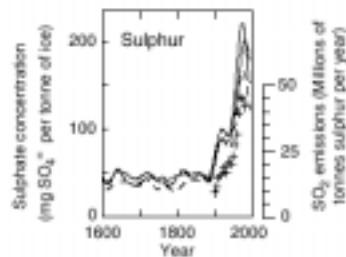
# **Der Klimawandel- Gründe zur Besorgnis**

Indicators of the human influence on the atmosphere during the Industrial Era

(a) Global atmospheric concentrations of three well mixed greenhouse gases

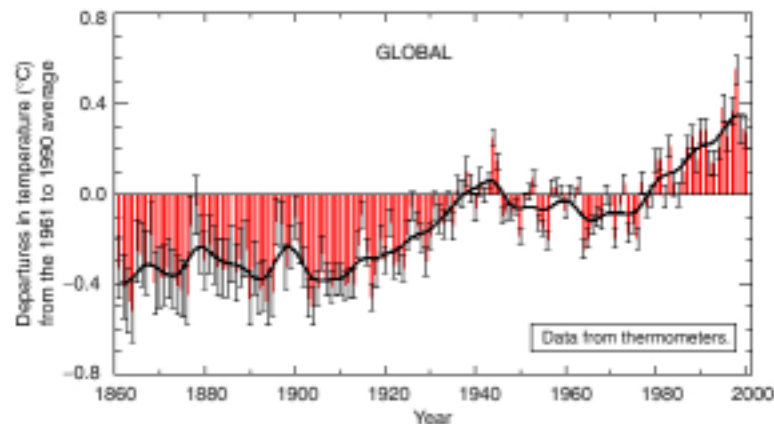


(b) Sulphate aerosols deposited in Greenland ice

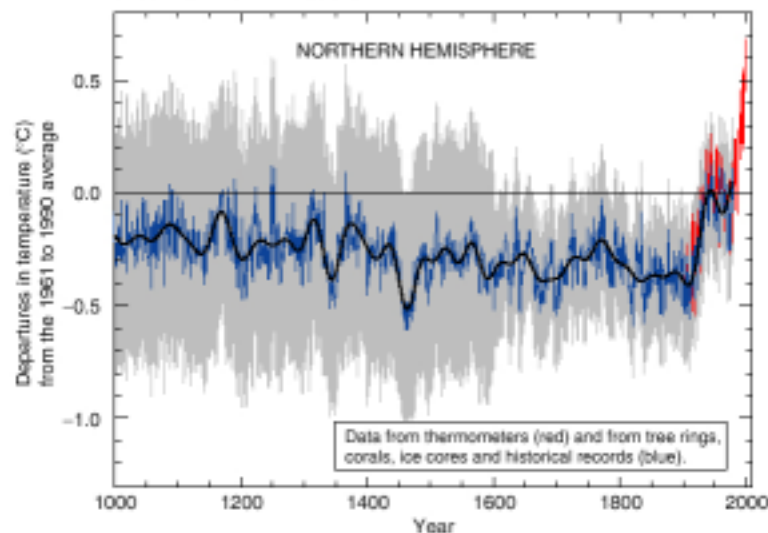


Variations of the Earth's surface temperature for:

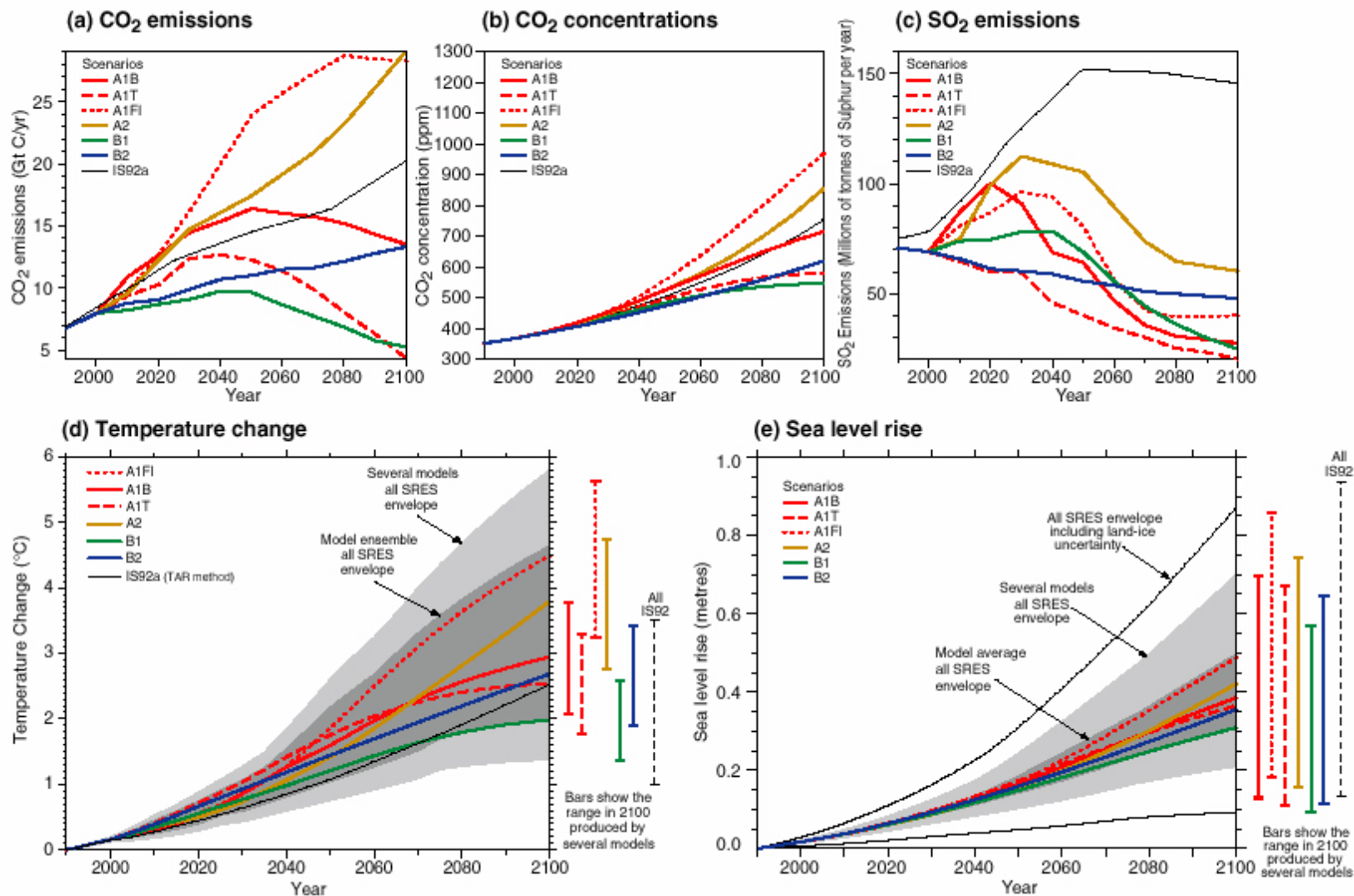
(a) the past 140 years



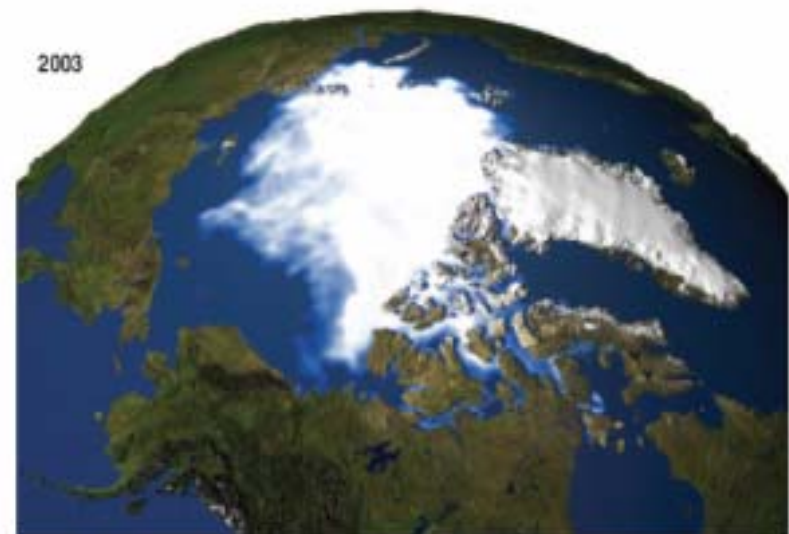
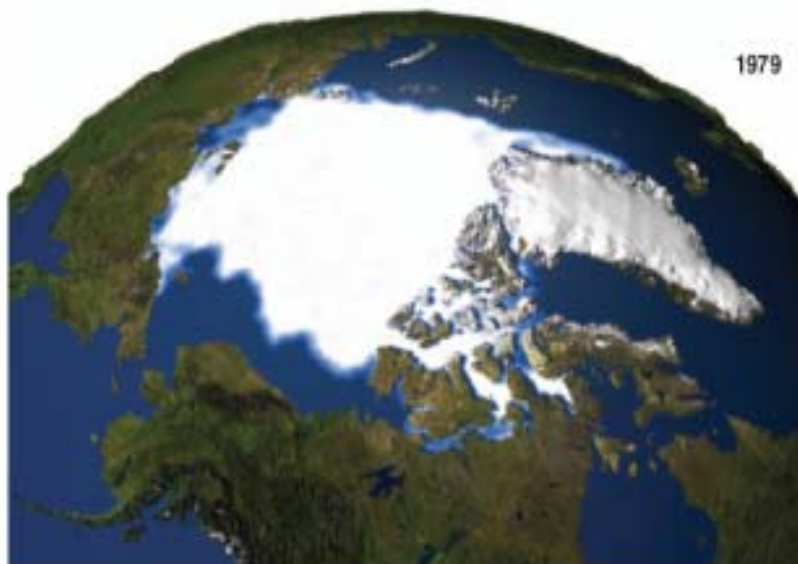
(b) the past 1,000 years



# The global climate of the 21st century

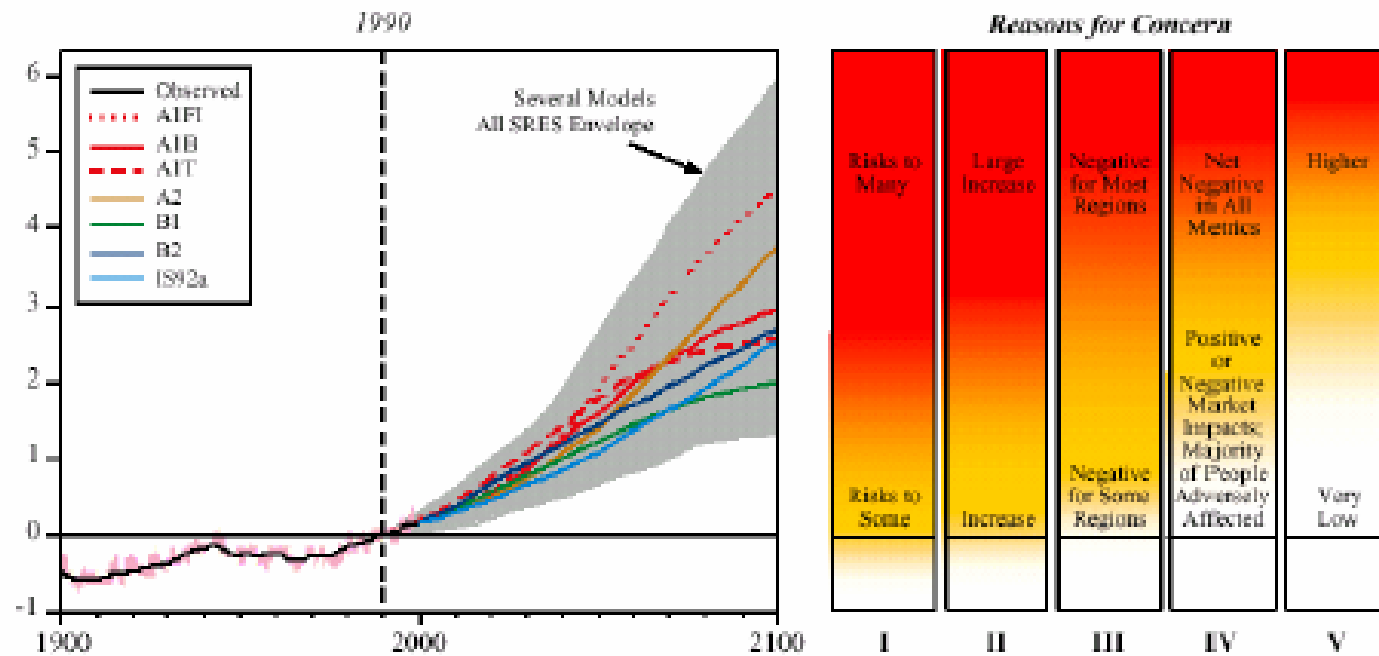


## Veränderung arktisches Eis- 1979 - 2003



Quelle: DMSP

Figure 1. Reasons for concern about climate change



- I Risks to Unique and Threatened Systems
- II Risks from Extreme Climate Events
- III Distribution of Impacts
- IV Aggregate Impacts
- V Risks from Future Large-Scale Discontinuities

Source: taken from IPCC (2001).

## From Emissions to Impacts

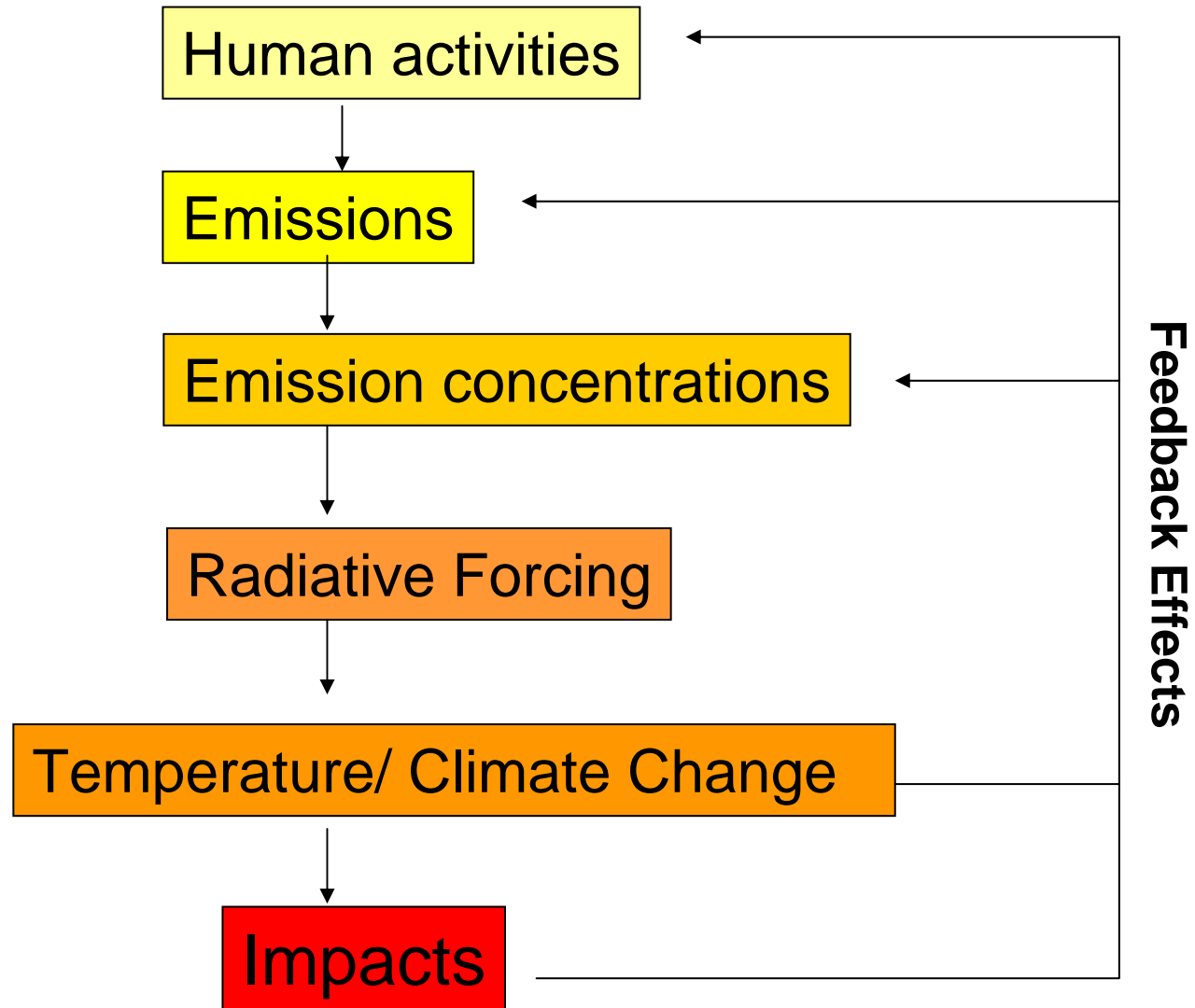


Figure 4. Sector damage relationships with increasing global mean temperature<sup>7</sup>

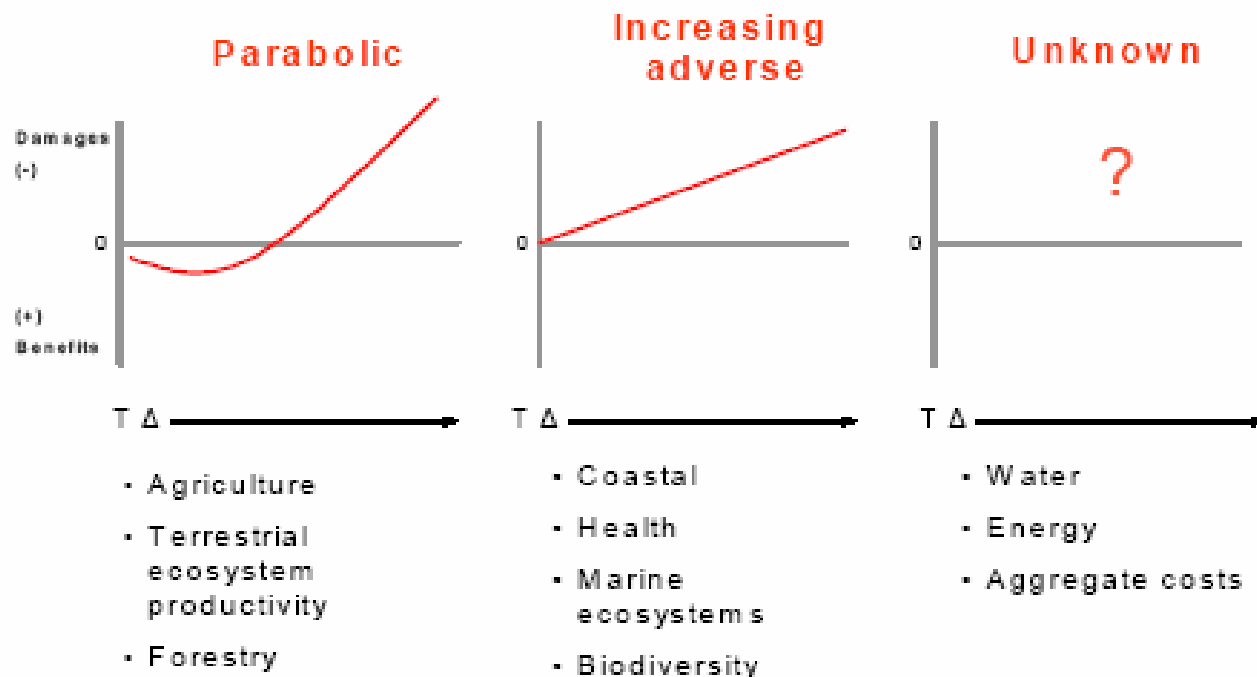
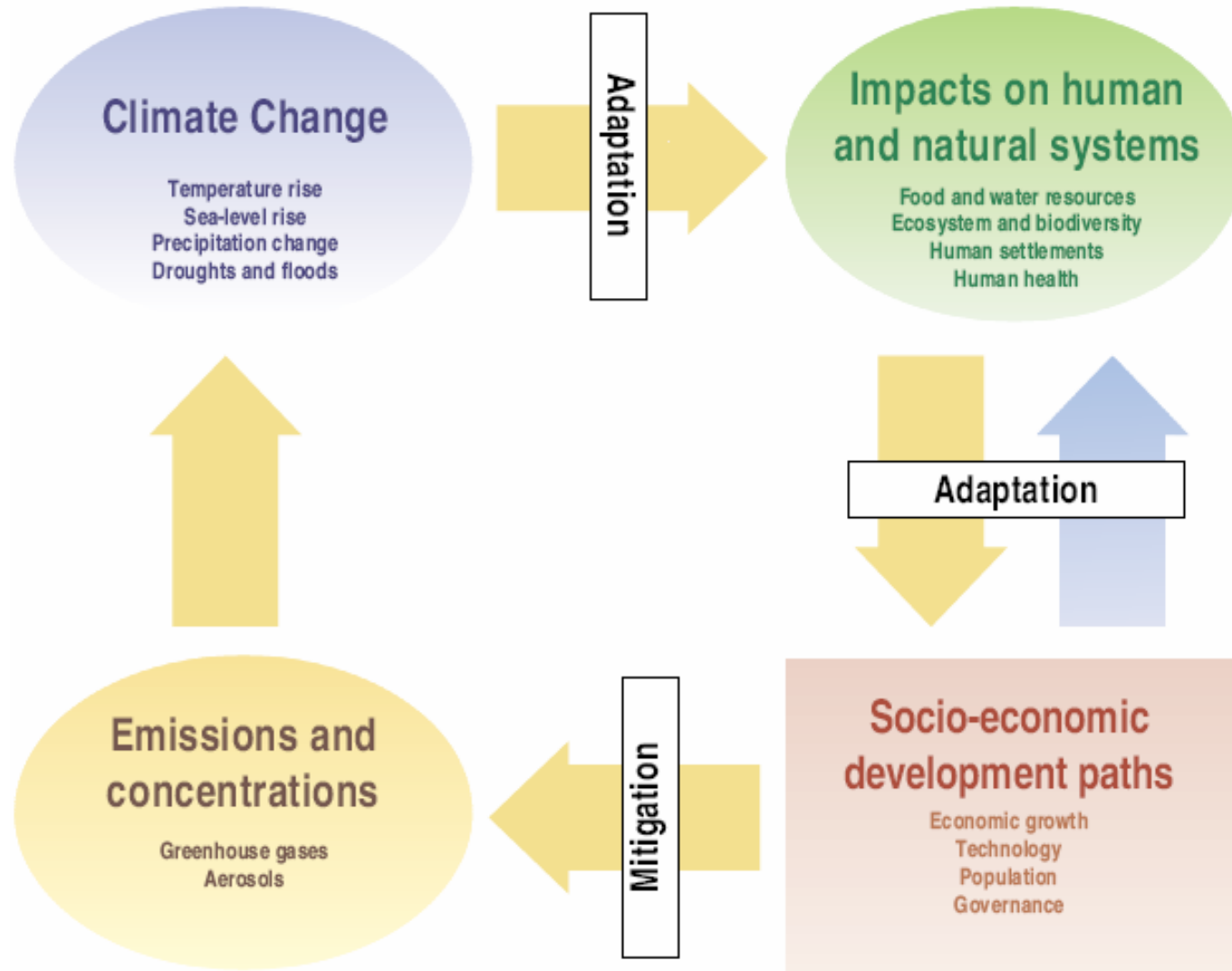


Figure 5. Risk to regional and global ecosystems by global mean temperature increase



Source: OECD 2004





## Global costs of extreme weather events (inflation-adjusted)

Annual losses, in thousand million U.S. dollars

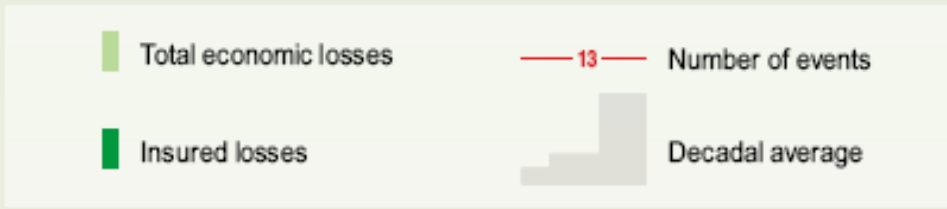
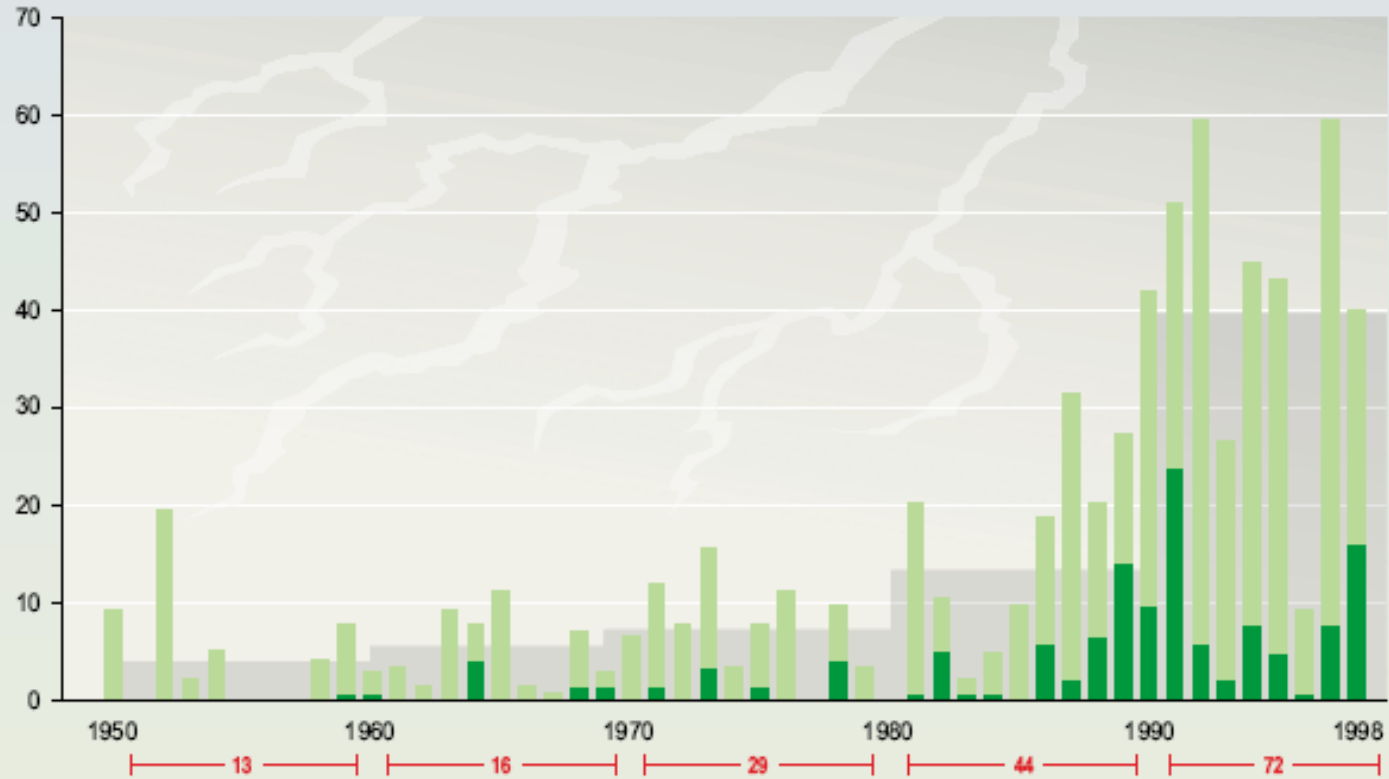
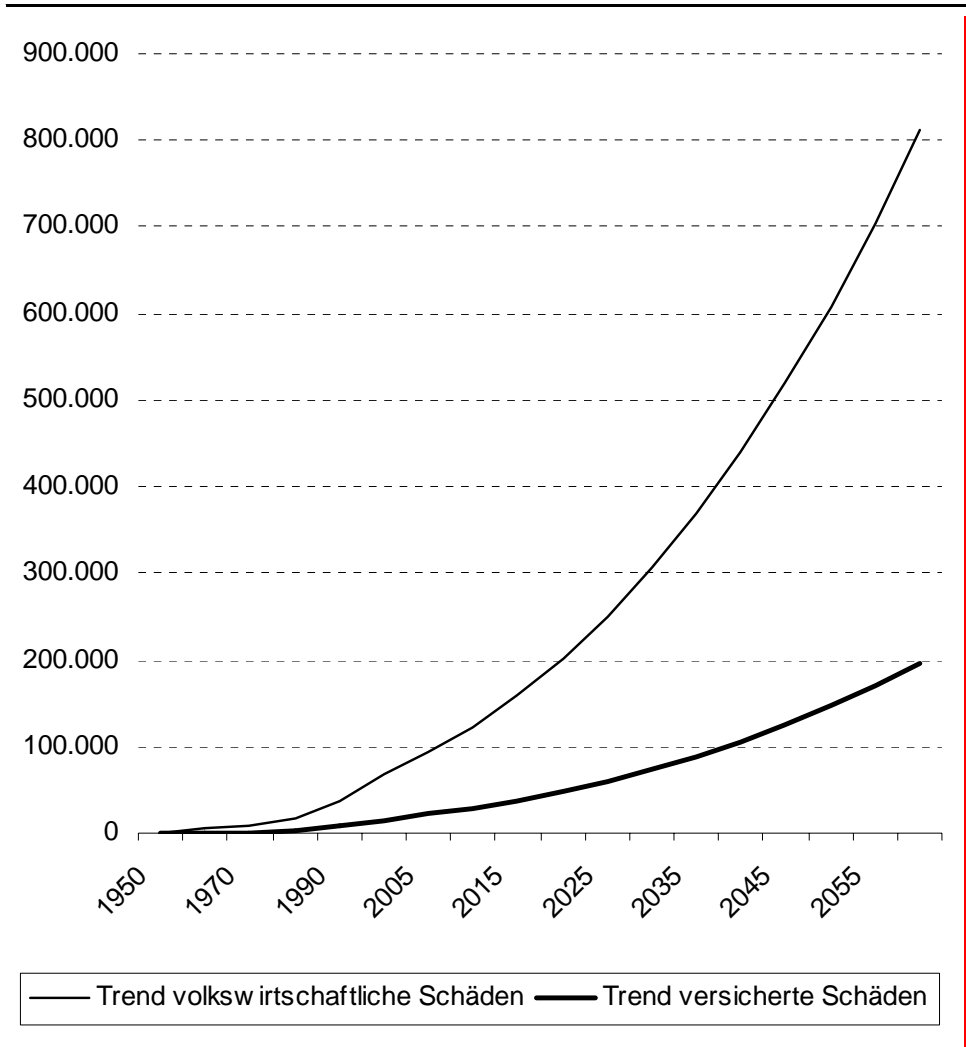


Abbildung 5  
 Extrapolation der globalen volkswirtschaftlichen Schäden  
 bis zum Jahre 2060  
 In Mill. US Dollar (real 2002)

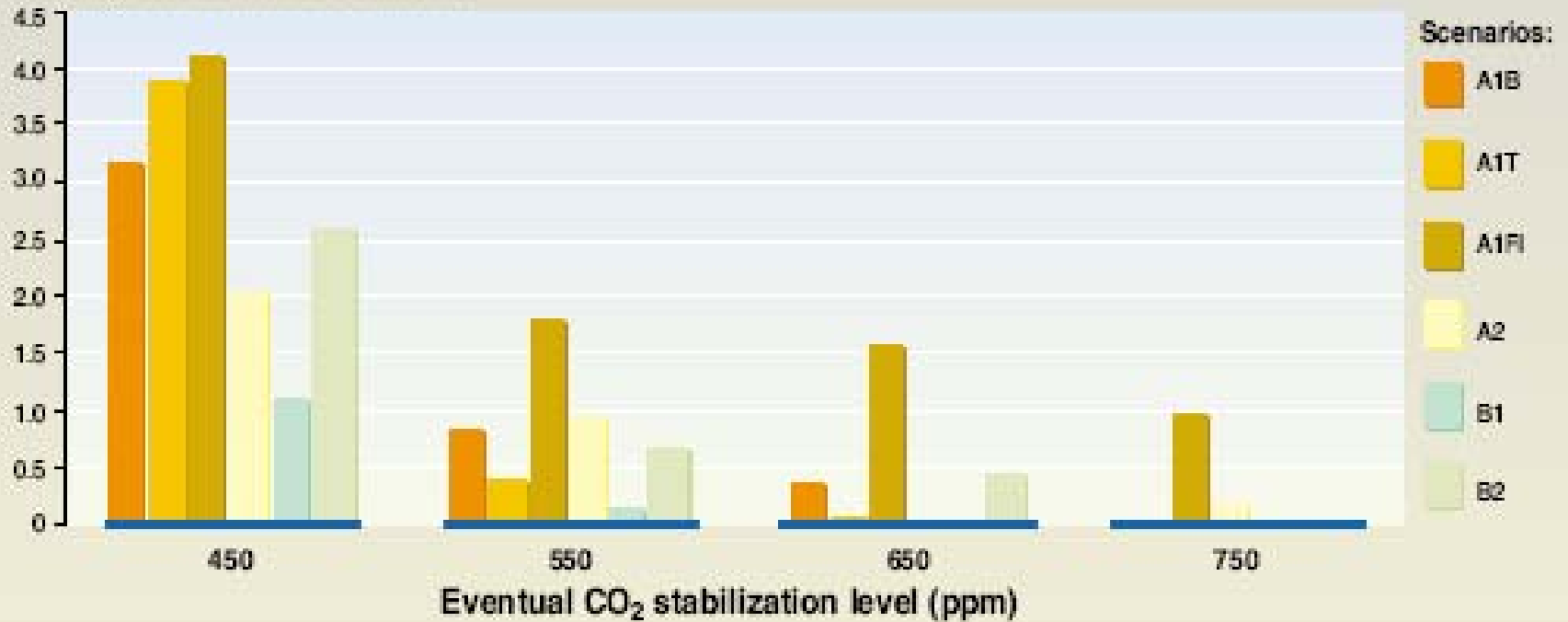


Quelle: Berechnungen des DIW Berlin auf Basis der Daten Münchner Rück DIW Berlin 2004

# **Simulation der volkswirtschaftlichen Kosten des Klimawandels**

### Global average GDP reduction in the year 2050

Percentage reduction relative to baseline



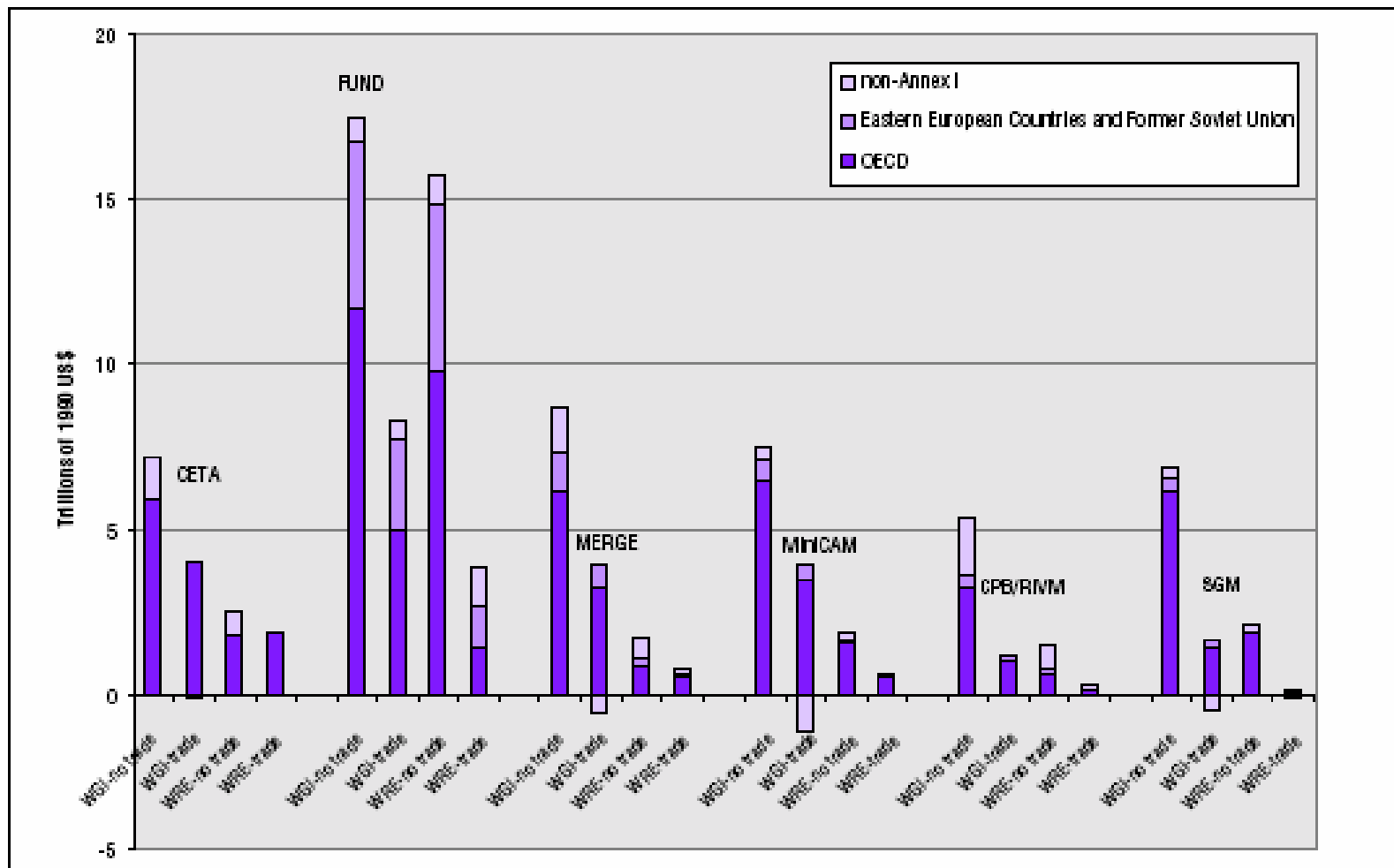


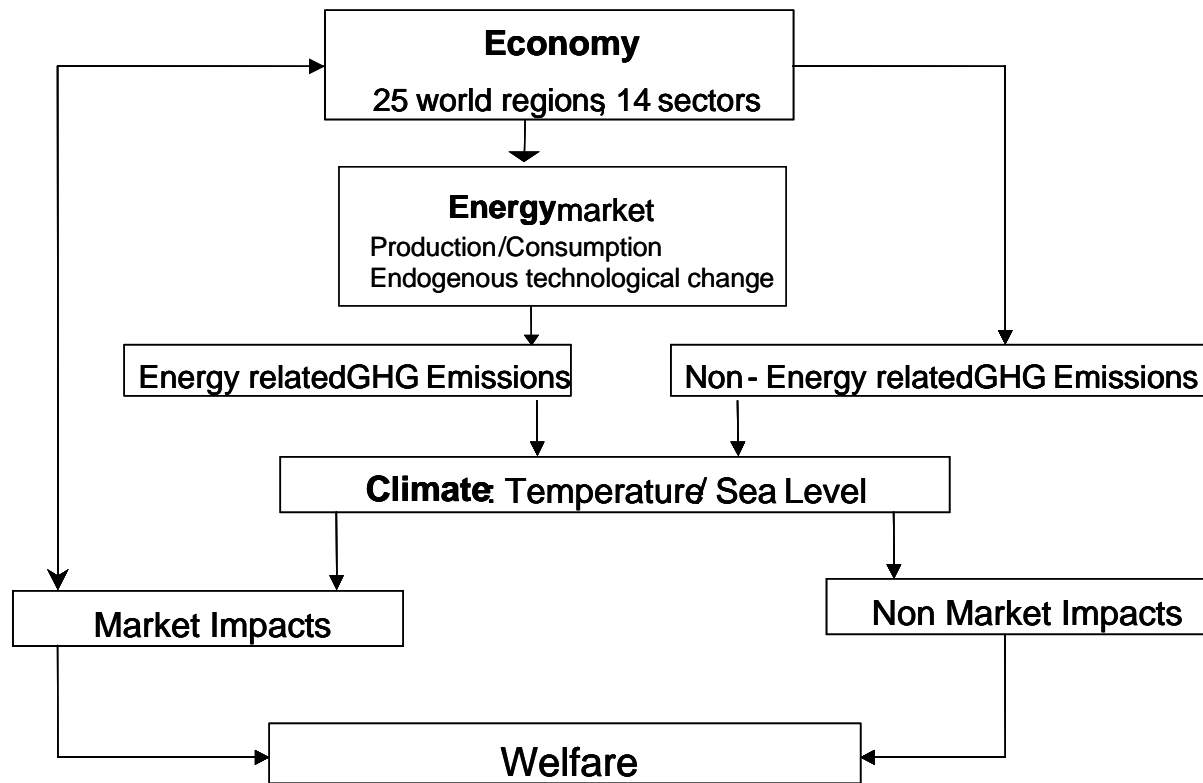
Figure 8.13: Costs of stabilizing concentrations at 550ppm; discounted to 1990 at 5%

# The Model WIAGEM -ICM

Economic Impact assessment by World General equilibrium model WIAGEM: climate integration

- Recursive dynamic MRT model
- 25 world regions aggregated to 14 trading regions, 14 sectors
- Induced technological change: energy efficiency increases due to R&D expenditures
- 50 –100 years time period, solving in 5 years time steps, 2100 Model version
- five energy sectors: coal, natural gas, crude oil, petroleum and coal products and electricity
- ICM:simplified climate module (MPI,PIK)

# Model Characteristics

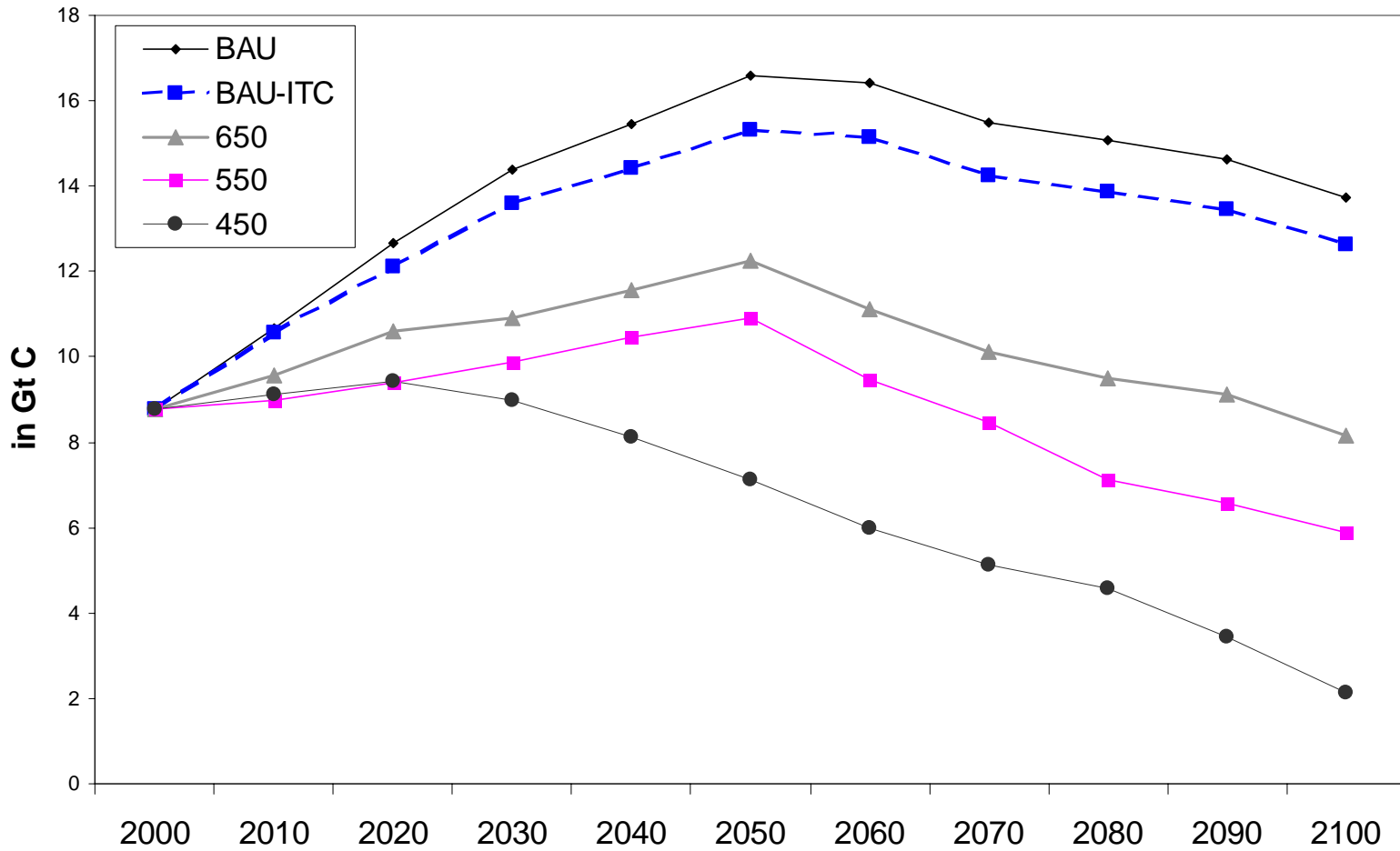


## Damages:

- Agriculture
- Terrestrial Ecosystems
- Forestry
- Coastal
- Health
- Marine Ecosystems
- Biodiversity
- Water
- Energy
- Aggregate Costs

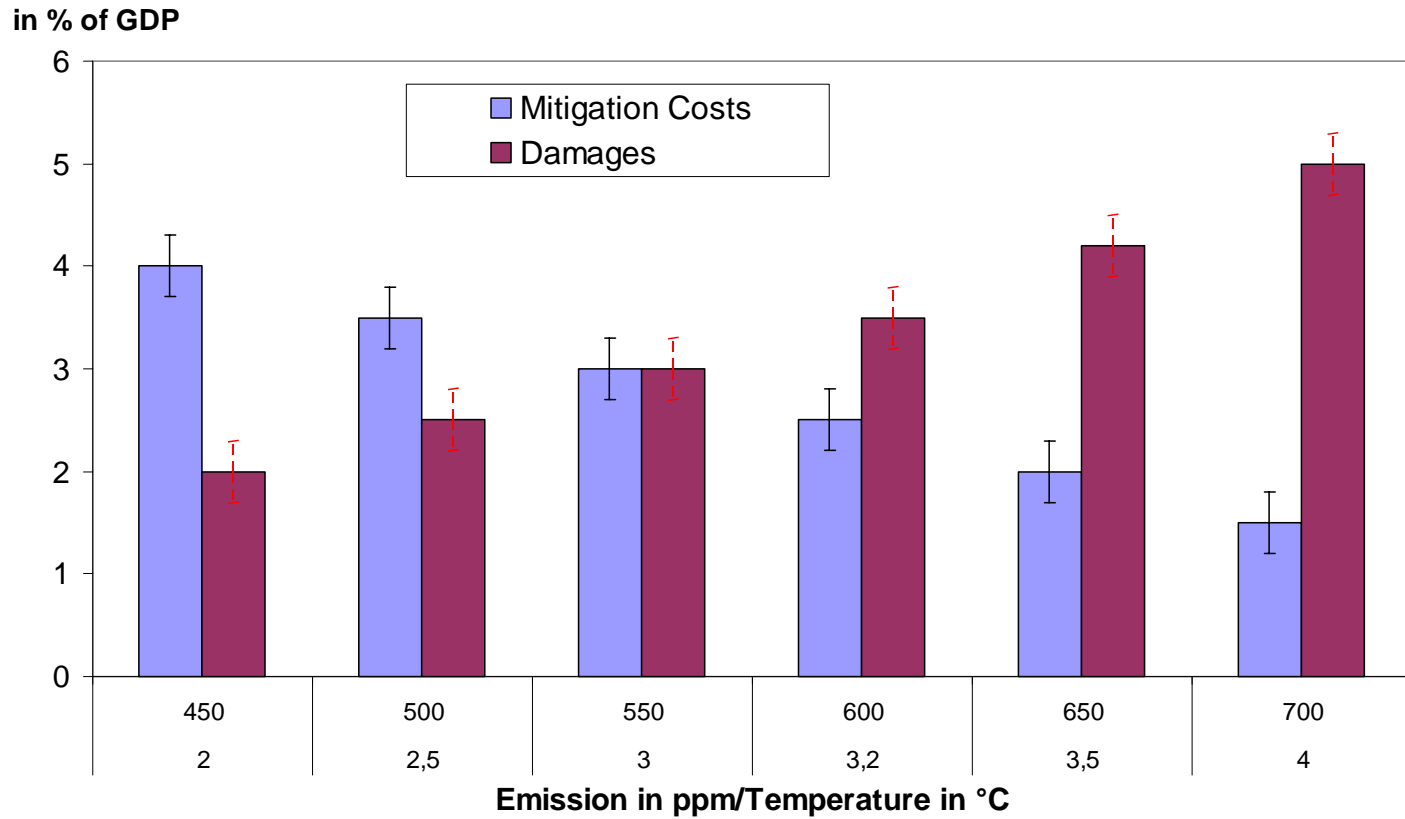


# Emission Stabilisation Scenarios

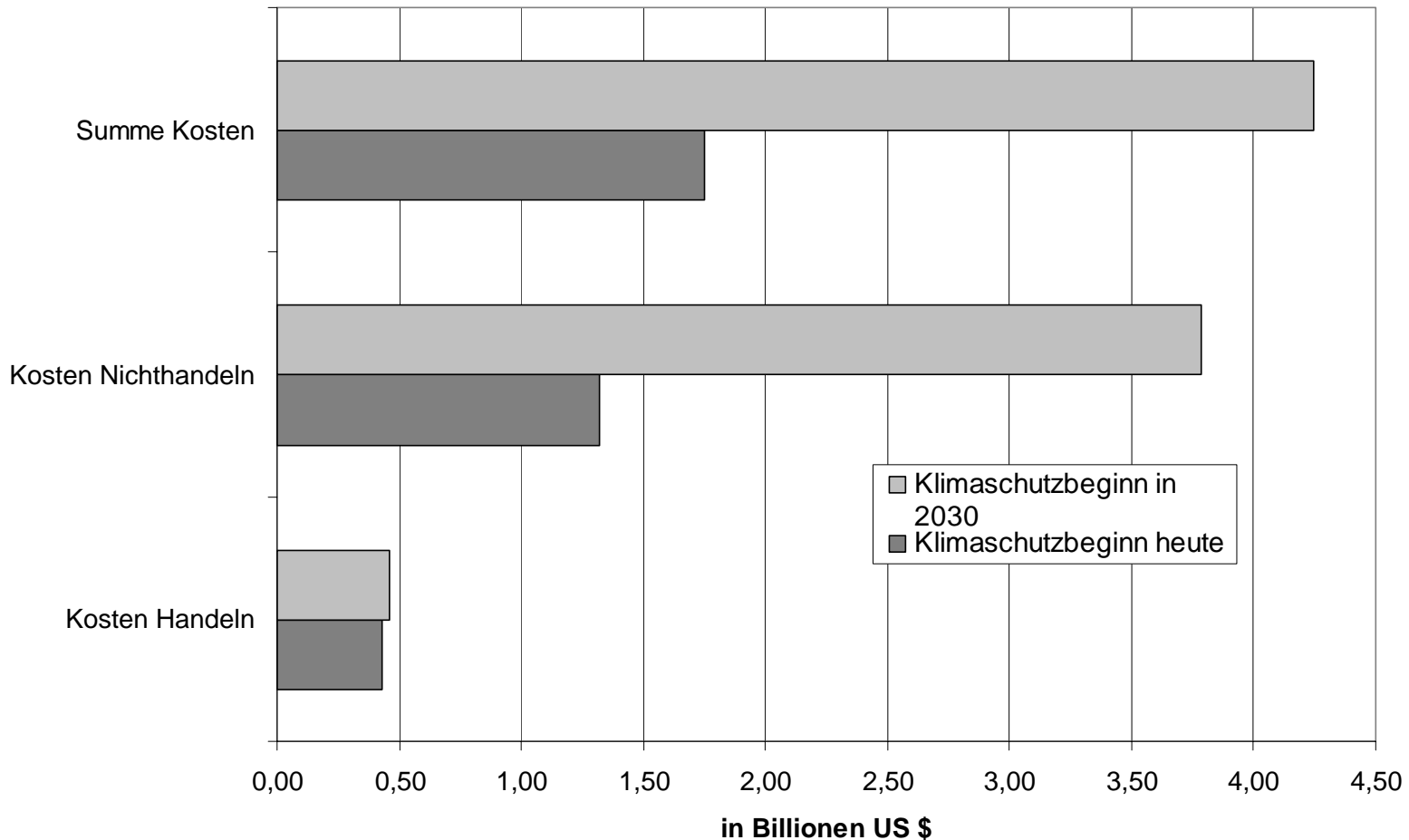


Source: Kemfert-WIAGEM

# Mitigation /Damage Costs



# Kosten des Handelns und Nichthandelns im Jahre 2050



## Fazit:

- **Der Klimawandel wird volkswirtschaftliche Schäden global bis zu 2 Billionen US Dollar im Jahre 2050 verursachen**
- **Die Kosten des heutigen Handelns sind niedriger als die Schäden**
- **Wenn erst im Jahre 2030 mit Klimaschutz begonnen wird, wird das Temperaturziel von 2 °C nicht erreicht- die Schäden sind weitaus größer als die Kosten**