

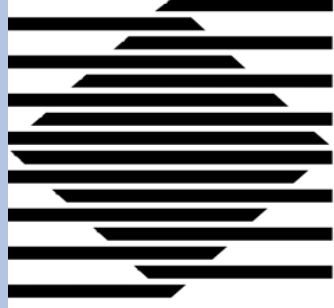
Scientific and Economic Rationale for Weather Risk Insurance for Agriculture

Prof. Dr. Peter Hoeppe

**Geo Risks Research
Munich Re**

New Delhi, India, 27 October 2006





Münchener Rück Munich Re Group

Munich Re

- Insurer of Insurances
- Founded 1880
- One of the world's largest re-insurers
- Premium income ca. bn 20 €
- Leading role in insurance of natural catastrophes and agro



Geo Risks Research Department of Munich Re -
analyses of natural disasters since 1974,
agro experts and special underwriting unit since 1980

Underwriting of agricultural business

For all insurance companies throughout the world

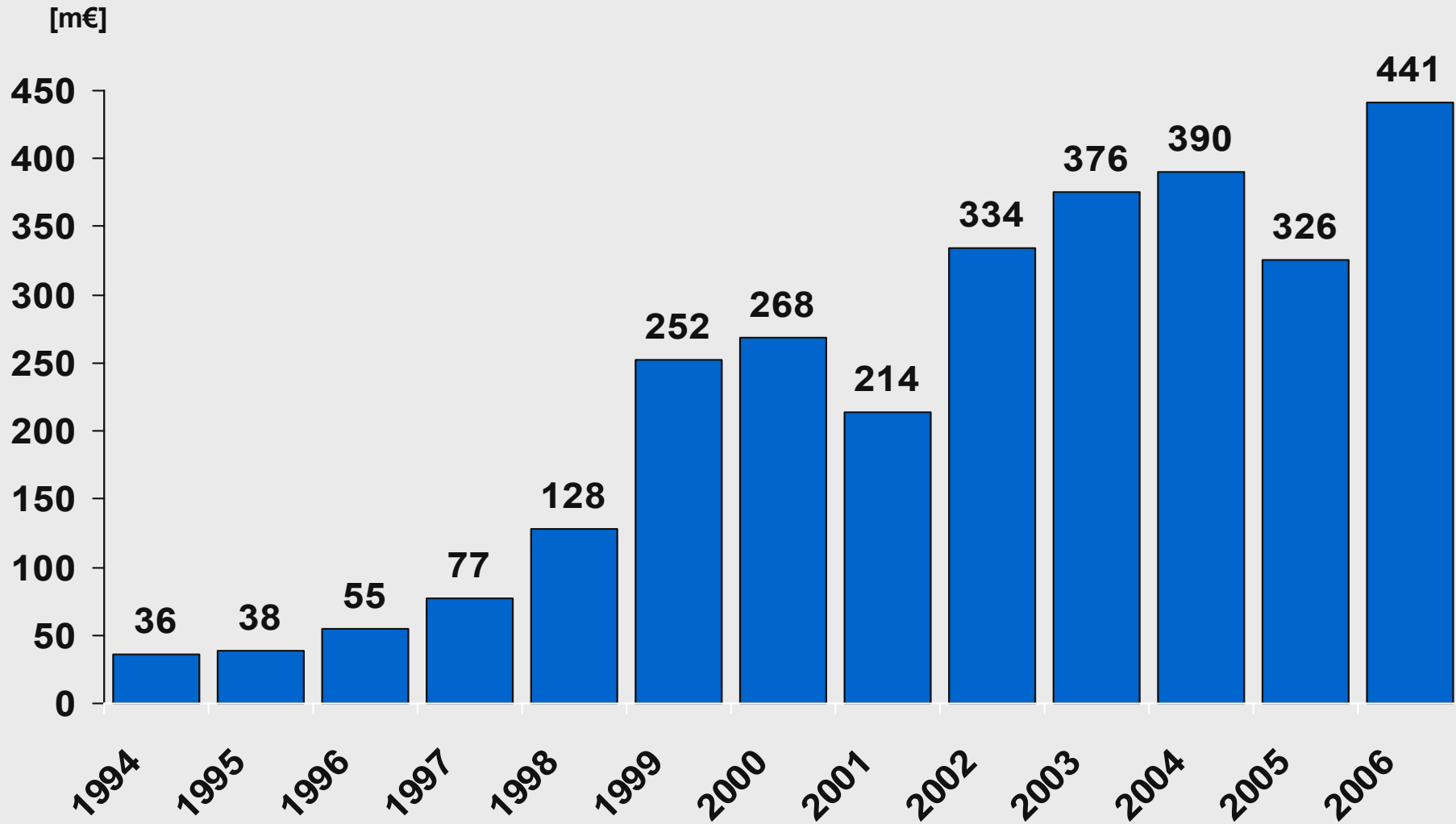
Center of Competence

Development of Munich Re's strategy and underwriting guidelines for agricultural insurance lines

A wide range of segments

- Crops
 - Crop hail
 - Multi-peril and named perils
- Livestock (incl. aquaculture)
- Greenhouses

Premium development in Agro (Munich Re)

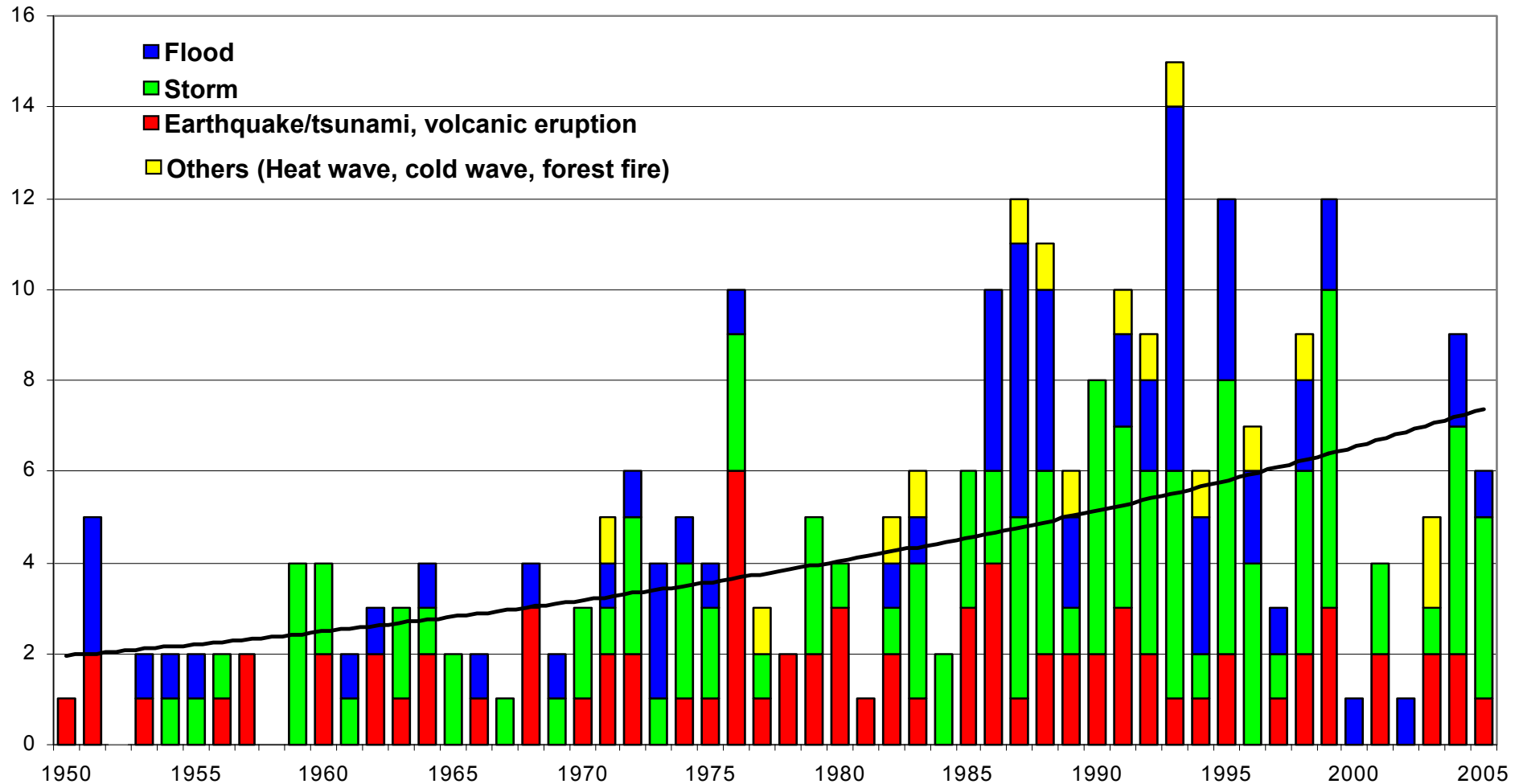


Great Natural Disasters 1950 – 2005

Number of events



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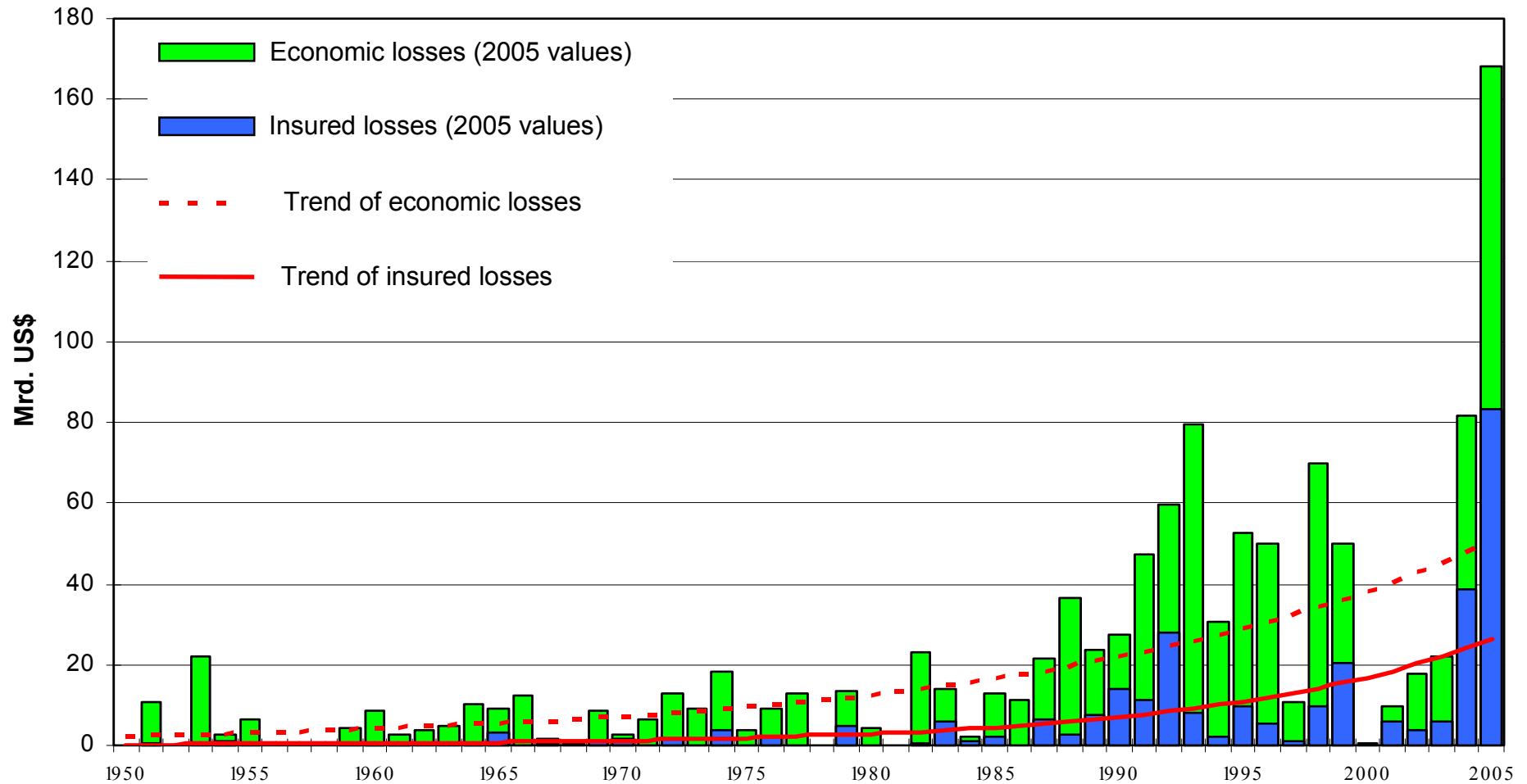
Great Weather Disasters 1950 – 2005

Economic and insured losses

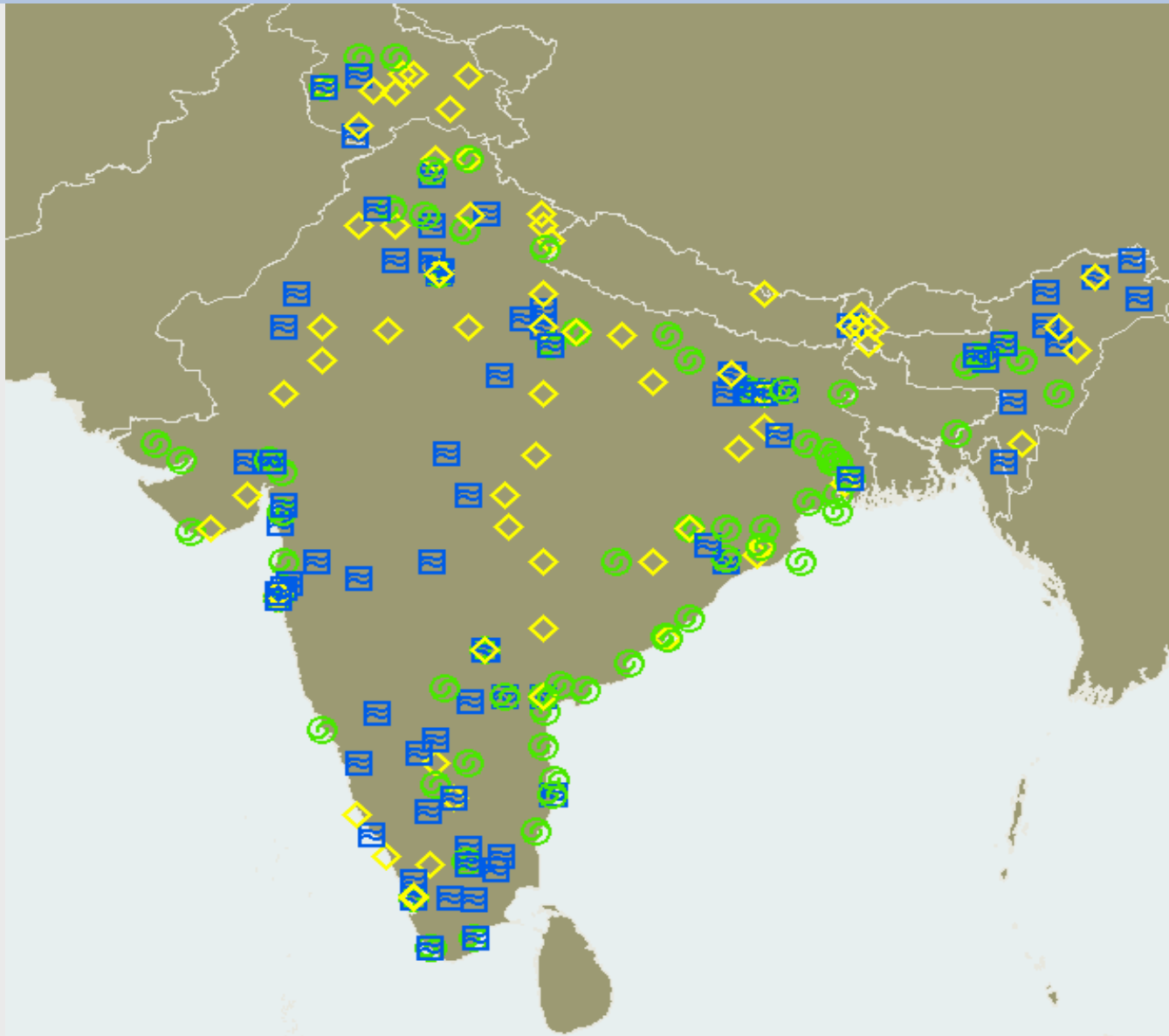
(as at March 28, 2006)




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India: Natural disasters 1980 – 2005



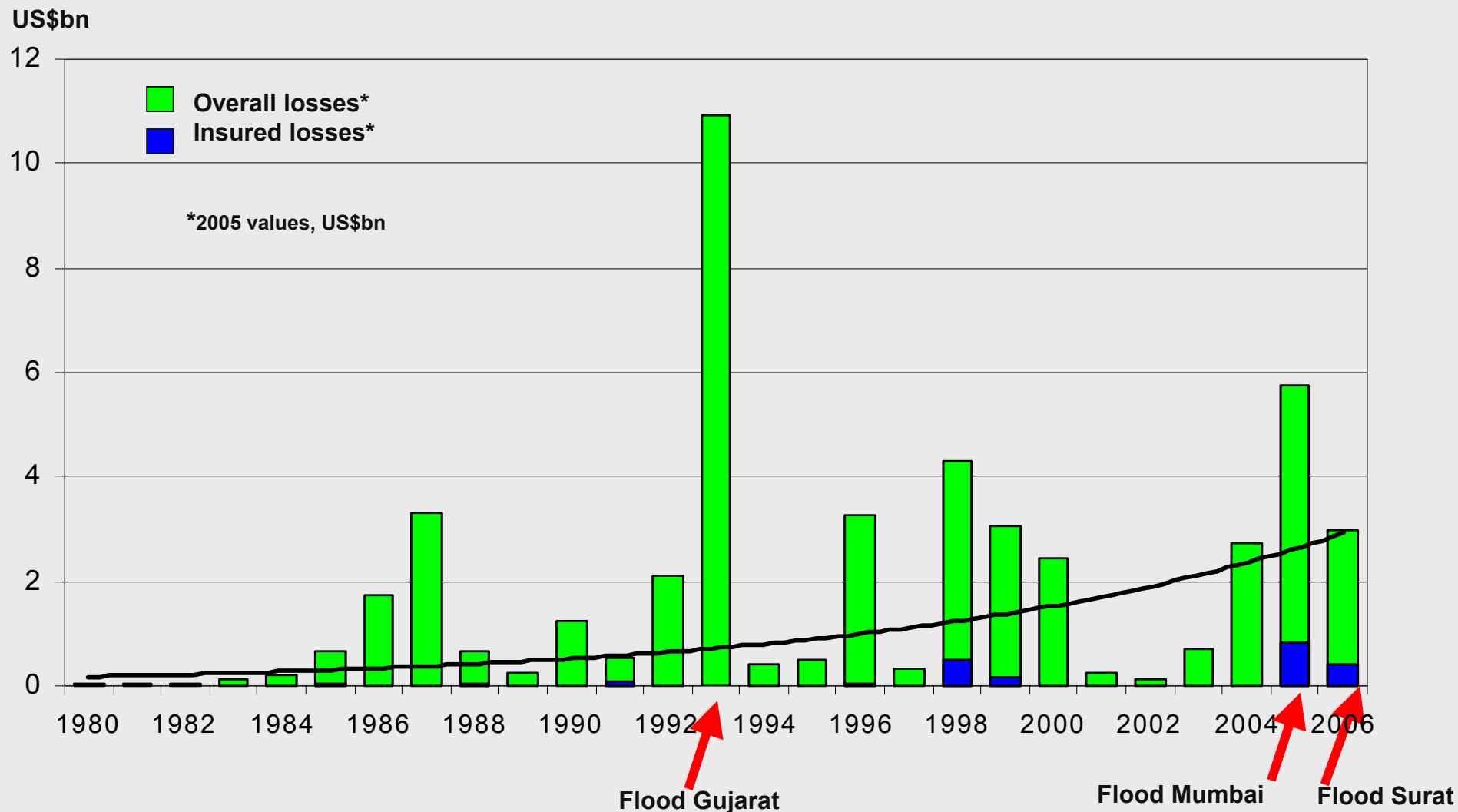
-  Storm
-  Flood
-  Extreme temperature,
Mass movements

India: Natural disasters 1980 – Sept 2006

Overall losses and insured losses



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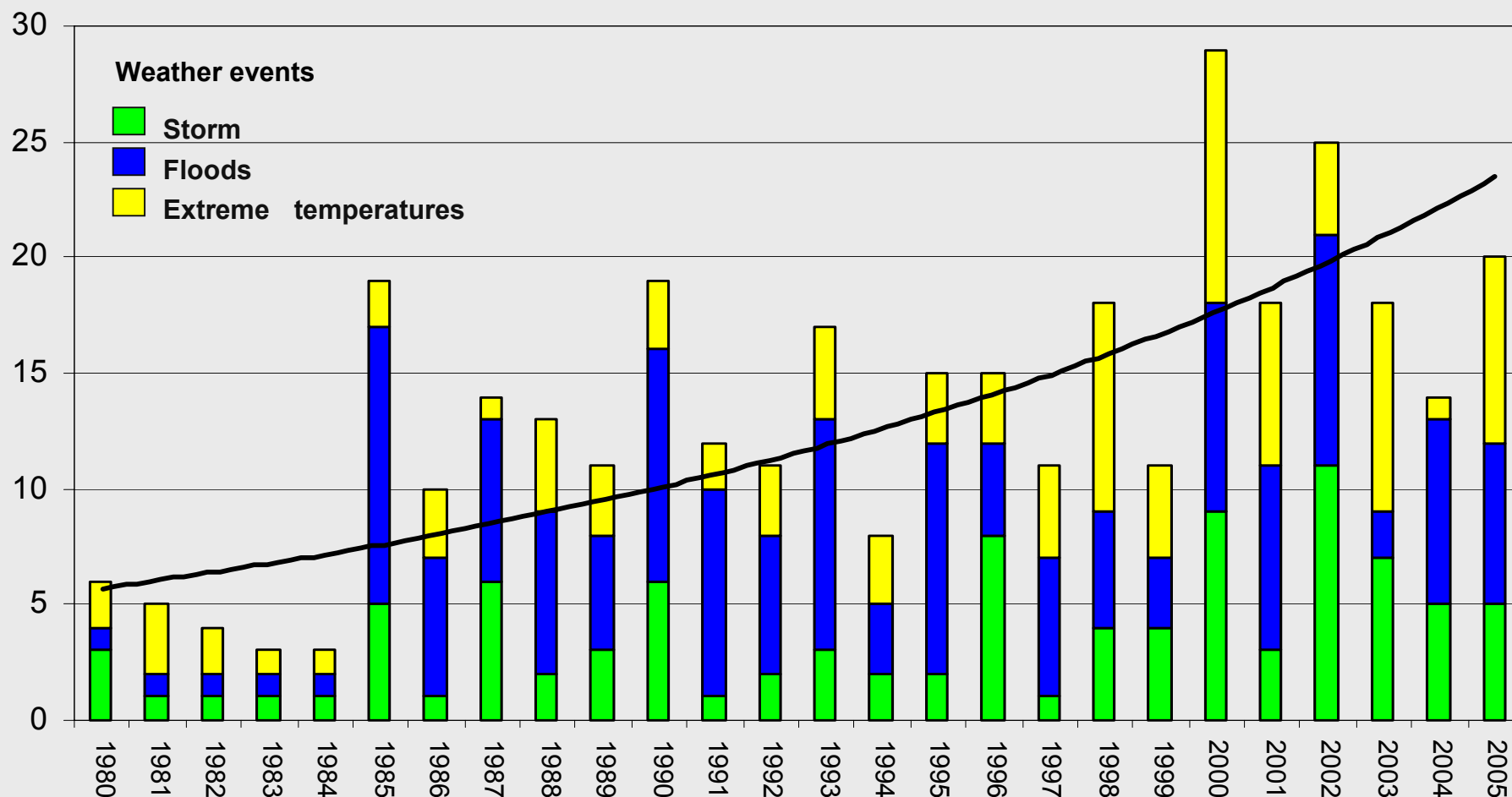


India: Weather disasters 1980 – 2005

Number of events, with trend



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Significant weather disasters in India

Year	Event	Main affected region	Fatalities	Economic losses* (in US\$m)	Insured
1992	Floods	Punjab	1,500	1,000	
1993	Floods	Gujarat	1,000	7,000	
1996	Tropical cyclone	Andhra Pradesh	971	1,500	
1998	Tropical cyclone 03A	Gujarat (Kandla)	10,000	1,700	400
1998	Heat wave	Rajasthan, Orissa	3,200		
1999	Tropical cyclone 05B	Orissa	10-30,000	2,500	120
2000	Flood	Assam	1,500	1,200	
2003	Heat wave	Andhra Pradesh	1,900	400	
2004	Floods	Assam	900	2,500	
2005	Flood	Maharashtra (Mumbai)	1,150	5,000	770
2006	Floods	Gujarat	>600	>2,000	400

*original values

Floods India

July/August 2006

- 1) 4.-7.7.
- 2) 4.-6.7.
- 3) 8.-16.7.
- 4) 29.-31.7.
- 5) 1.-6.8.
- 6) 4.-6.8.
- 7) 7.-12.8.
- 8) 11.-17.8.
- 9) 18.-23.8.
- 10) 21.-23.8.



as at Aug.31, 2006

Flood Gujarat, August 2006



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Flood Gujarat, Rajasthan (Kawas), August 2006



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July/August 2005 – Flooding in Mumbai

Largest 24 h precipitation (944mm) for India



source: Reuters

24.7- 5.8

1.150 fatalities

Economic losses (US\$ m):

5.000

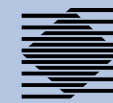
Insured losses (US\$ m):

770

Heat wave / drought 2003



Heat wave / drought 2003



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Heat wave / drought 2003



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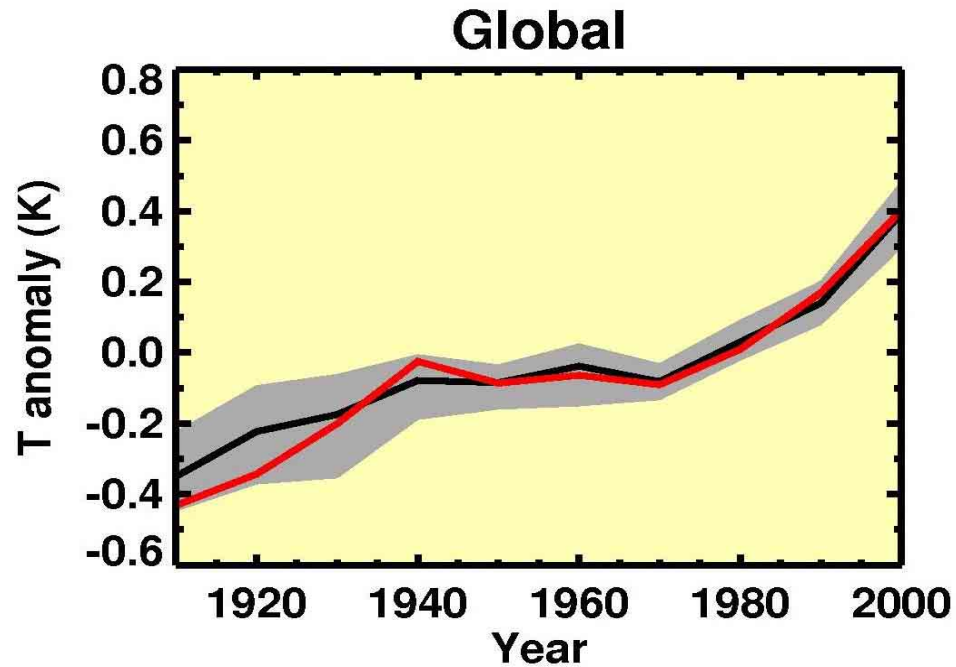
Tropical cyclone 1999 (road repair)



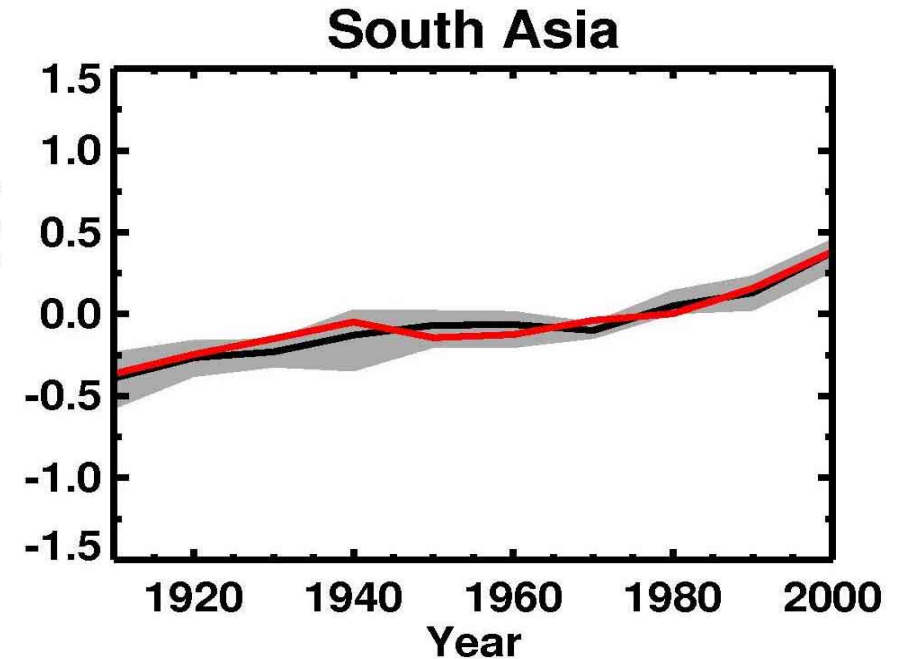
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Global and Regional Temperature trends in the 20th century: modeled and **observed**



+ 0.8 °C

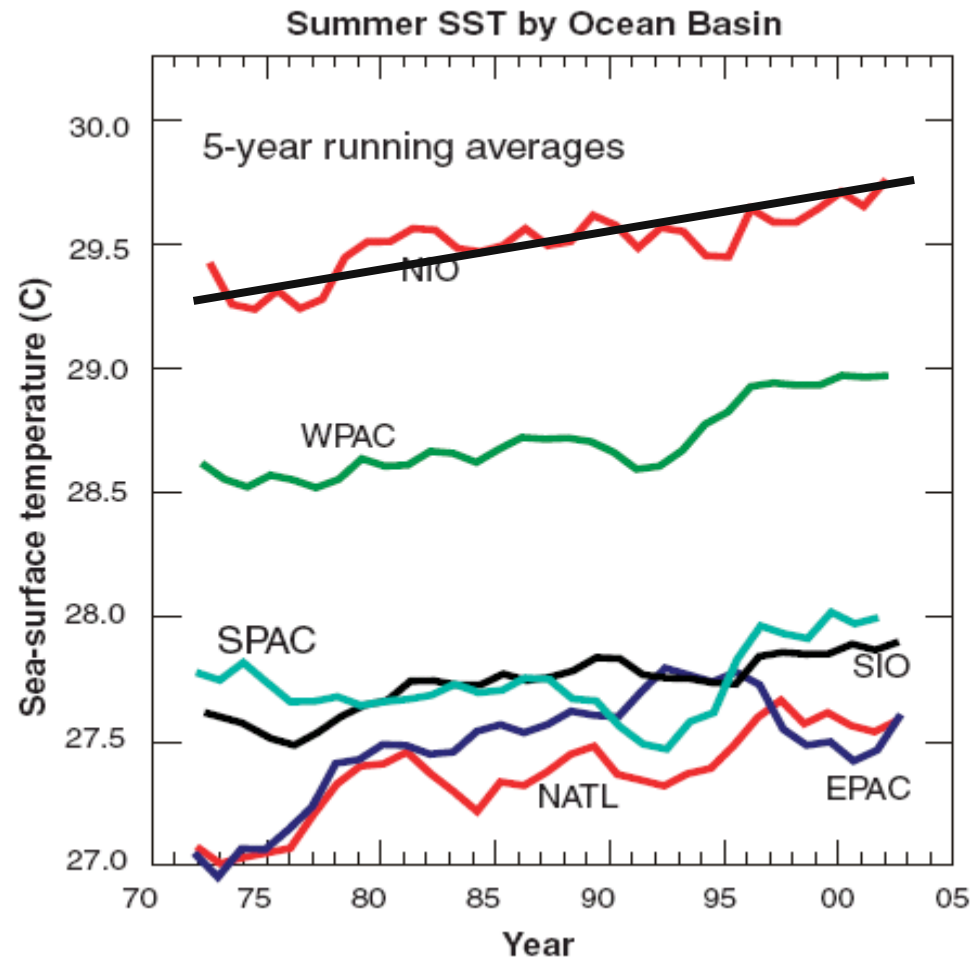


+ 0.7 °C

Changes in Sea Surface Temperatures



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NATL = North Atlantic

WPAC = West Pacific

SPAC = South Pacific

EPAC = East Pacific

NIO = Northern Indic

SIO = Southern Indic

SH = Oceans of the
Southern Hemisphere

Source: Webster et al. (2005),
Science Vol. 309.

Scientific evidence of a link between global warming and tropical storms

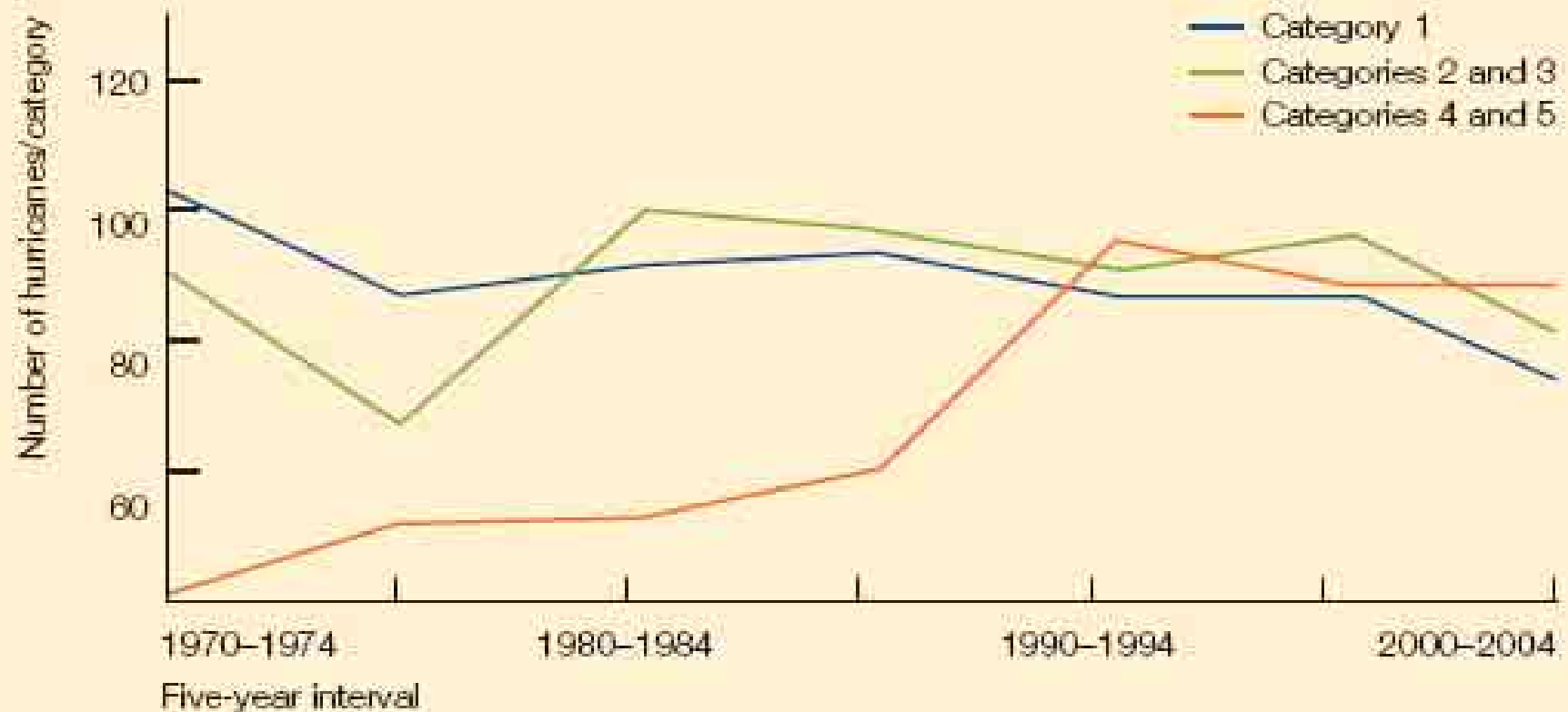
Climate change will intensify the maximum wind speed by 0.5 on the Saffir Simpson scale and precipitation by 18% in hurricanes until 2050 (Knutson et al., J of Climate 2004).

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)

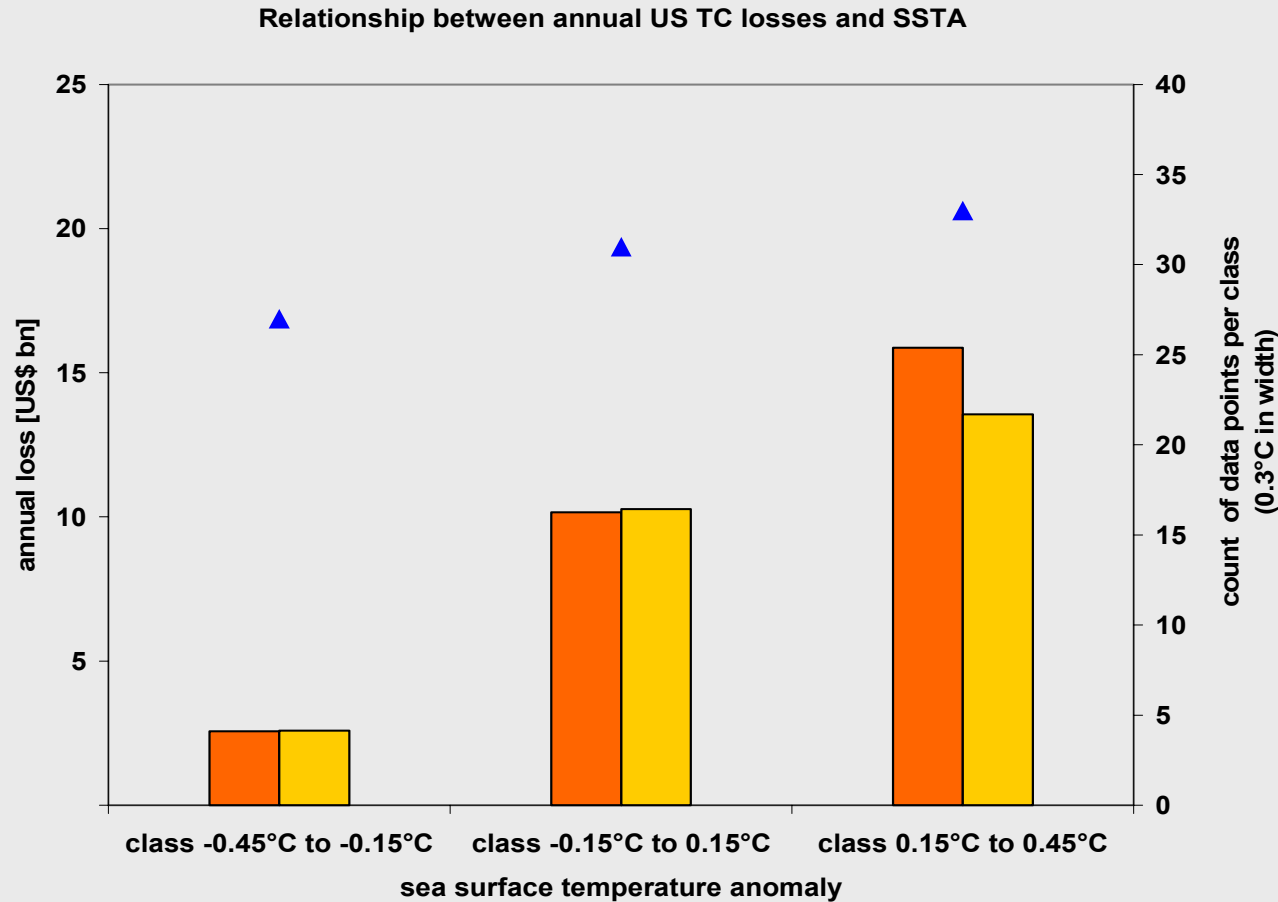
Due to climate change the sea surface temperatures have increased already by 0.5°C (Barnett, Pierce, 2005, Science; Santer et al., PNAS, Sept. 2006)

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)

The global frequency of most destructive tropical storms has increased since the 1970s



Mean annual normalized US hurricane losses in dependence on SST-anomalies



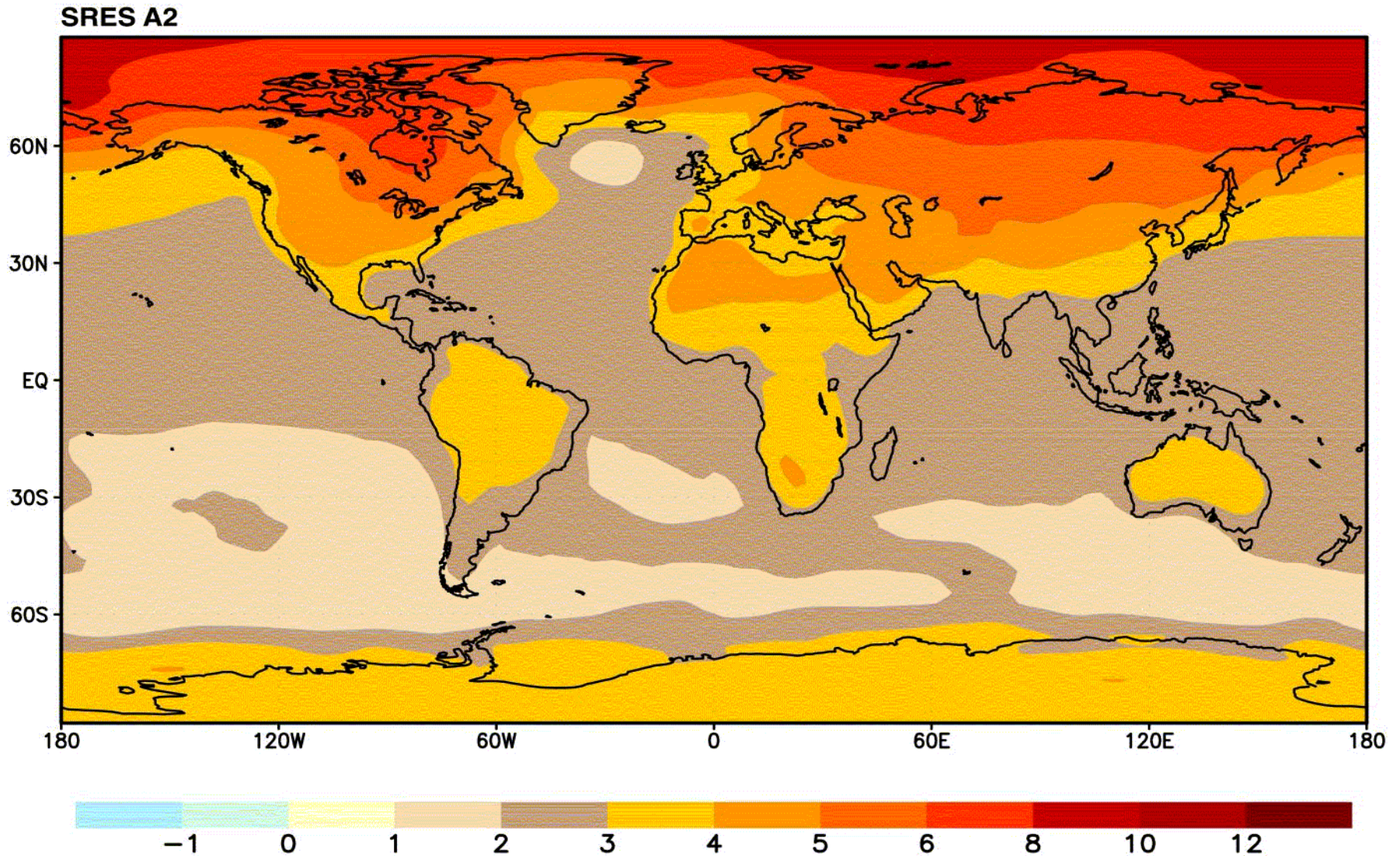
Light orange bars indicate mean annual losses according to R. Pielke's loss figures;
dark orange bars indicate the same with the difference that since 1954 Munich Re's annual loss figures were used (left-hand axis).

Blue triangles indicate number of data points per class (right-hand axis).

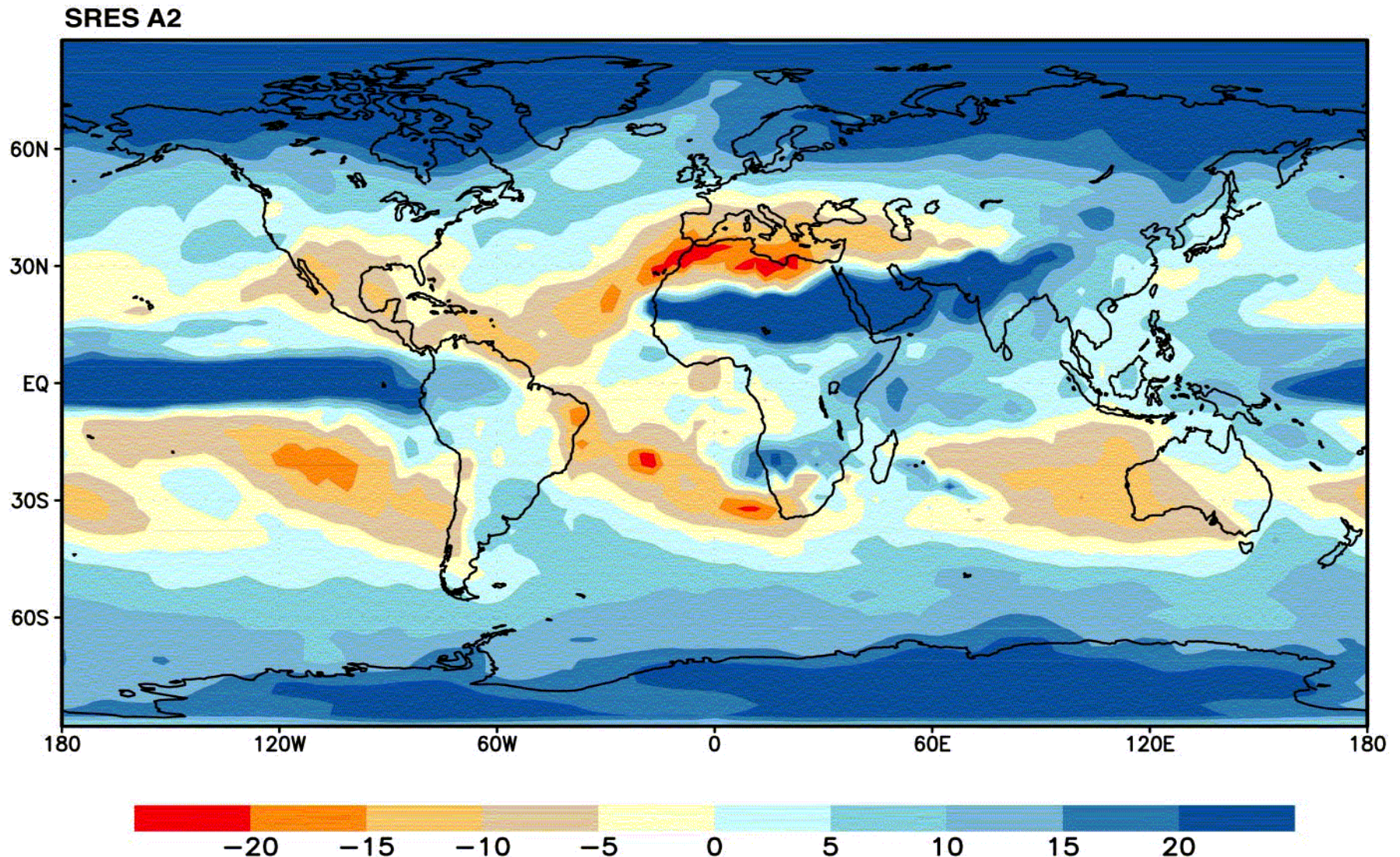
Source: Faust, Munich Re 2006, work in progress.

Model forecast of changes

in annual mean air temperatures ($^{\circ}\text{C}$) (comparison 1980 with 2080)



Model forecast of changes in annual precipitation (%) (comparison 1980 with 2080)



Climate change and India: threats

Source: Ritu Kumar (TERI)



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Still relatively low priority, distant concern

Current vulnerability

- 2/3 of total sown area is drought-prone
- 40 mha liable to floods (3-times the German agricultural area)
- Coastline vulnerable to tropical cyclones

Future impacts (NATCOM 2004)

- Further increase in air temperature
- Fall in number of rainfall days and rise in rainfall intensity
- Increase in severity of droughts and intensity of floods
- SLR and extreme events may lead to loss of settlements, property, and tourism infrastructure



Requirements for successful crop insurance programs

Insurance carrier

- Companies specialised in agricultural insurance
- Competition on service
- Insurance product development
- Loss adjustment expertise

Loss insurance (hail and named peril)

- Fixed sum insured (e.g. hail insurance in Europe)
- Adjustable sum insured (e.g. cotton insurance in Australia)

Yield guarantee insurance (MPCI)

- Regional average yield (e.g. new MPCI programs)
- Individual historic yields (APH) (e.g. MPCI in USA, Spain)

Index insurance

- meteorological trigger (single parameter index not sufficient)
- area yield trigger (e.g. Group Risk Plan in USA)
- vegetation index (increasing use of satellite data and modeling yields; currently e.g. grassland program in Spain)

Revenue insurance

- Cover of yield and price elements (only for crops traded in existing commodity markets)



Requirements for successful crop insurance programs

Control of anti selection and moral hazard

- Risk adequate rates (exposure, crop type, fluctuation) facilitated by premium subsidies
- Regional differentiation of rates
- Sufficient market penetration
- Coverage level and deductibles according to exposure



MPCI- and crop hail markets 2005 (premium in Mio. Euro)

Country	MPCI	Hail	Total
USA	3.267	360	3.627
Canada	575	126	701
Spain	319	-	319
Italy	42	215	257
France	55	200	255
India	95	-	95
Austria	53	-	53
Portugal	28	-	28

Crop insurance started in 1972 and then developed in different phases.

National Agriculture Insurance Scheme (NAIS by AIC); since 1999 with availability in all states and to all farmers

- Main covers: Yield guarantee and area yield
(pilot project with meteorological trigger)
- 30 different crops insured during Kharif (SW-Monsoon, July-October)
25 crops during Rabi (winter months, only in the irrigated areas)
- Coverage in 2004/05 for nearly 18 million farmers,
4 million farmers receive benefits

- Dual agricultural structures:
 - o small scale farms with limited access to technology and markets
 - o modern farms with access to technology and markets
- Limited financial means of the government to support agricultural insurance programs
- Lack of insurance tradition/marketing of insurance difficult
- Difficult access to insured farms

- Small scale farms with difficult access to the financial market, including insurance
- ⇒ Micro-Insurance in agriculture
- Insurance for low income farmers
- Low premium and losses on an individual basis

Strategy 2005-2008

2004-2005

22 case studies



2005-Germany
2006-South Africa

Microinsurance Conferences

- Discussion of case studies and scientific results
- Networking
- Exchange of experience
- Awareness raising

www.microinsuranceconference.org



November 2006

Release of the
Microinsurance-Compendium

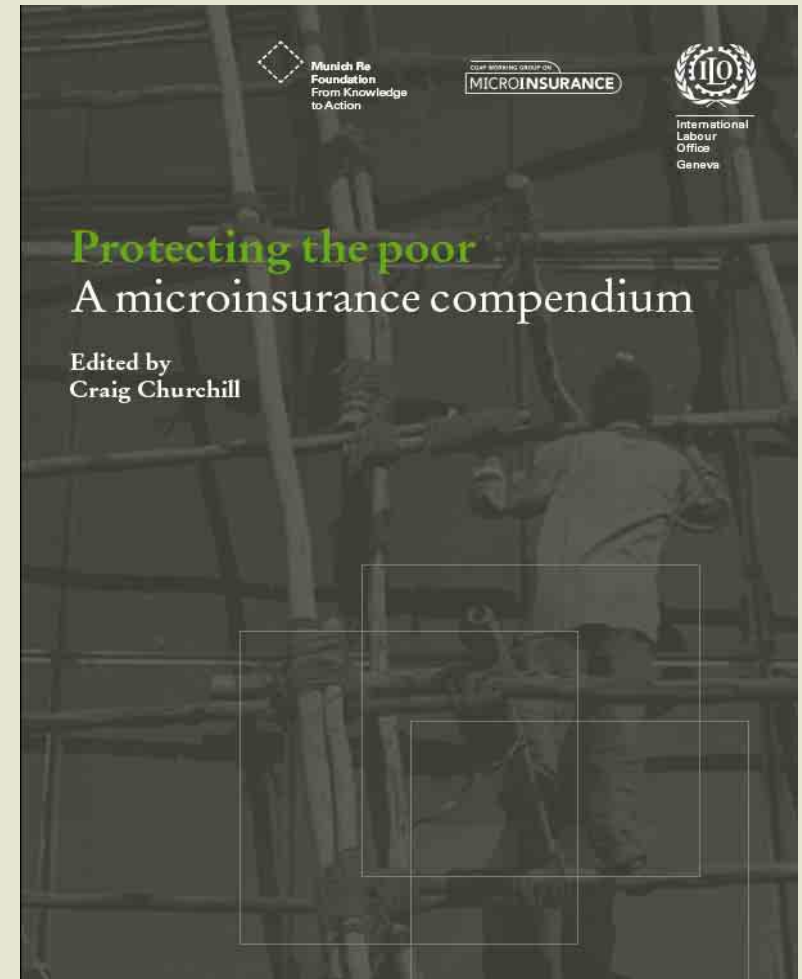


2007-India
2008-Latin America

Microinsurance Conferences

New Book on Microinsurance

Compendium
>600 pages
Lessons learnt from
intern. experience
Good for training and
educating staff
Available November 06



MR's conference "Microinsurance in emerging markets" in Goa



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Microinsurance in Emerging Markets

18 September 2006
at Park Hyatt Goa Resort & Spa



Programme Monday, 18 September 2006

- | | |
|--|--|
| <p>9.00 a.m. Welcome speech
<i>Mr. Karl Wittmann,
Member of the Board of Management,
Munich Re, Munich</i></p> <p>9.10 a.m. Inaugural address by the chairman
of the seminar
<i>Mr. C.S. Rao,
Chairman,
Insurance Regulatory & Development
Authority of India</i></p> <p>9.25 a.m. Address by the chief guest
<i>Dr. Nachiket Mor,
Deputy Managing Director,
ICICI Bank Limited, Mumbai</i></p> <p>9.40 a.m. Keynote address
<i>Dr. K.C. Mishra,
Director, National Insurance Academy,
Pune</i></p> <p>9.55 a.m. Introduction of expert speakers
<i>Mr. Sanjib Chaudhuri
Chief Representative for India, Munich Re</i></p> <p>10.00 a.m. Making insurance work for the poor
<i>Mr. Thomas Loster
Chairman, Munich Re Foundation, Munich</i></p> <p>11.00 a.m. Microinsurance in India
Interactive session:
<i>Mr. G.C. Chaturvedi – in the chair
Joint Secretary (Banking & Insurance)
Ministry of Finance, Government of India</i>

<i>Prof. Prabal Kumar Sen,
Institute of Rural Management, Anand</i>

<i>Mr. K.N. Bhandari,
Director, National Law University, Jodhpur</i></p> | <p>11.30 a.m. Coffee break</p> <p>11.45 a.m. Agricultural insurance in emerging
markets: possibilities and limitations
<i>Mr. Karl Murr,
Senior Executive,
Agricultural Insurance Department,
Munich Re, Munich</i></p> <p>12.45 p.m. Lunch</p> <p>2.15 p.m. Agricultural insurance in India
Interactive session:
<i>Mr. A.K. Singh – in the chair
Additional Secretary
(Agriculture & Co-operation),
Ministry of Agriculture, Government of India</i>

<i>Mr. M. Parshad,
Chairman cum Managing Director,
Agriculture Insurance Company of India</i>

<i>Mr. Vijay Mahajan,
Chairman – BASIX</i>

<i>Mr. Karl Murr,
Senior Executive,
Agricultural Insurance Department,
Munich Re, Munich</i></p> <p>2.45 p.m. Concluding remarks & vote of thanks
<i>Mr. Karl Wittmann,
Member of the Board of Management,
Munich Re, Munich</i></p> <p>3.00 p.m. End</p> |
|--|--|

Microinsurance Conference 2007

Making insurance work for the poor

**We are planning to host the 2007 International
Microinsurance Conference in Mumbai, India!**

Date: Mid-November 2007



More information will be available in December 2006 at
www.microinsuranceconference.org
Contact: dreinhard@munichre-foundation.org

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.



- Almost all regions on this globe will be affected by the increase of natural catastrophes. While the wealthy countries will be able to cope with this 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

- Weather related catastrophes like storms, floods and droughts are increasing worldwide
- There is increasing evidence that global warming increases the hazard situation
- Agriculture is especially vulnerable to the changing weather patterns, if no adaptation measures are taken (new seeds, production techniques)
- Proper insurance systems can help farmers to cope with the increasing volatility of their losses
- Munich Re is the worldwide leading re-insurer for agro risks
- Munich Re offers its expertise to promote agro insurance systems in developing countries
- Munich Re Foundation has been and will be very active to promote micro-insurance systems

Thank you for your attention!



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