Disaster Loss Data
Disaster Impact and Loss Assessment DAT

May 2012
Angelika Wirtz

IRDR
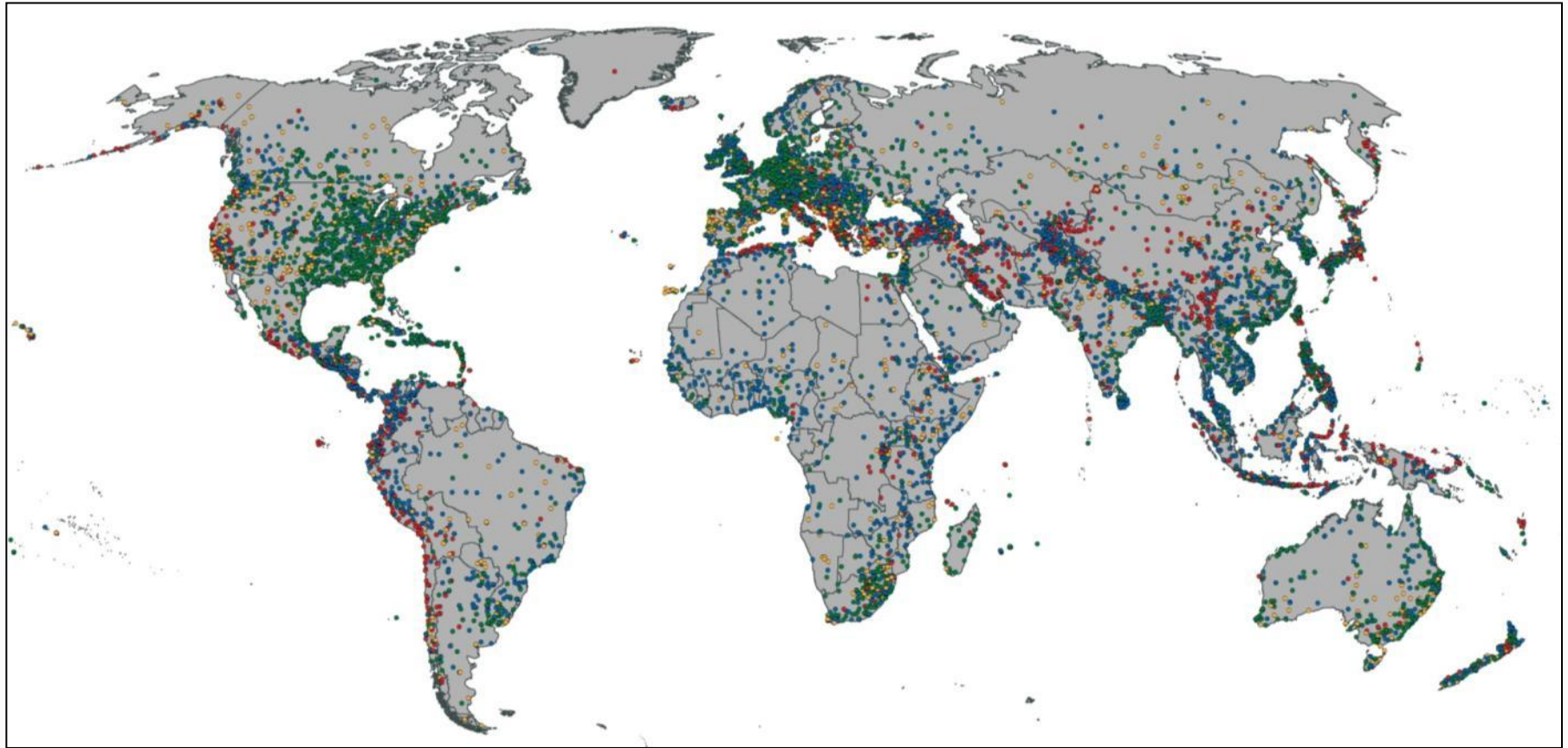Integrated Research on Disaster Risk

Munich RE

Agenda

- **Analysis natural disasters**

- **ICSU IRDR Working Group DATA**

- **Disaster loss data – overview of stakeholders**

- **Next steps**

Why has IRDR established a working group on
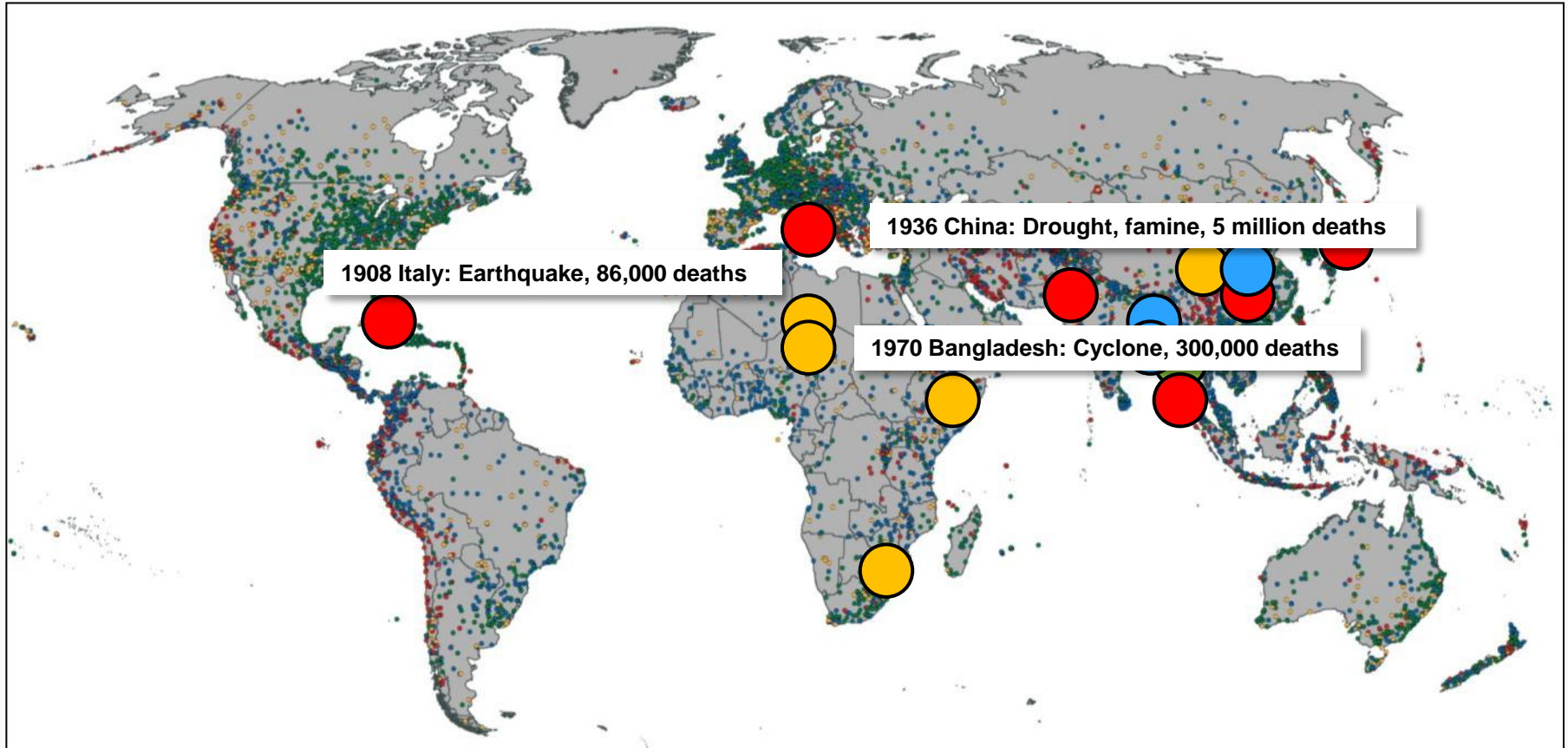# Disaster Loss Data and Impact Assessment?

Natural disasters 1980 – 2011

- 🔴 **Geophysical events**
  (Earthquake, tsunami, volcanic activity)
- 🟢 **Meteorological events**
  (Storm)
- 🔵 **Hydrological events**
  (Flood, mass movement)
- 🟡 **Climatological events**
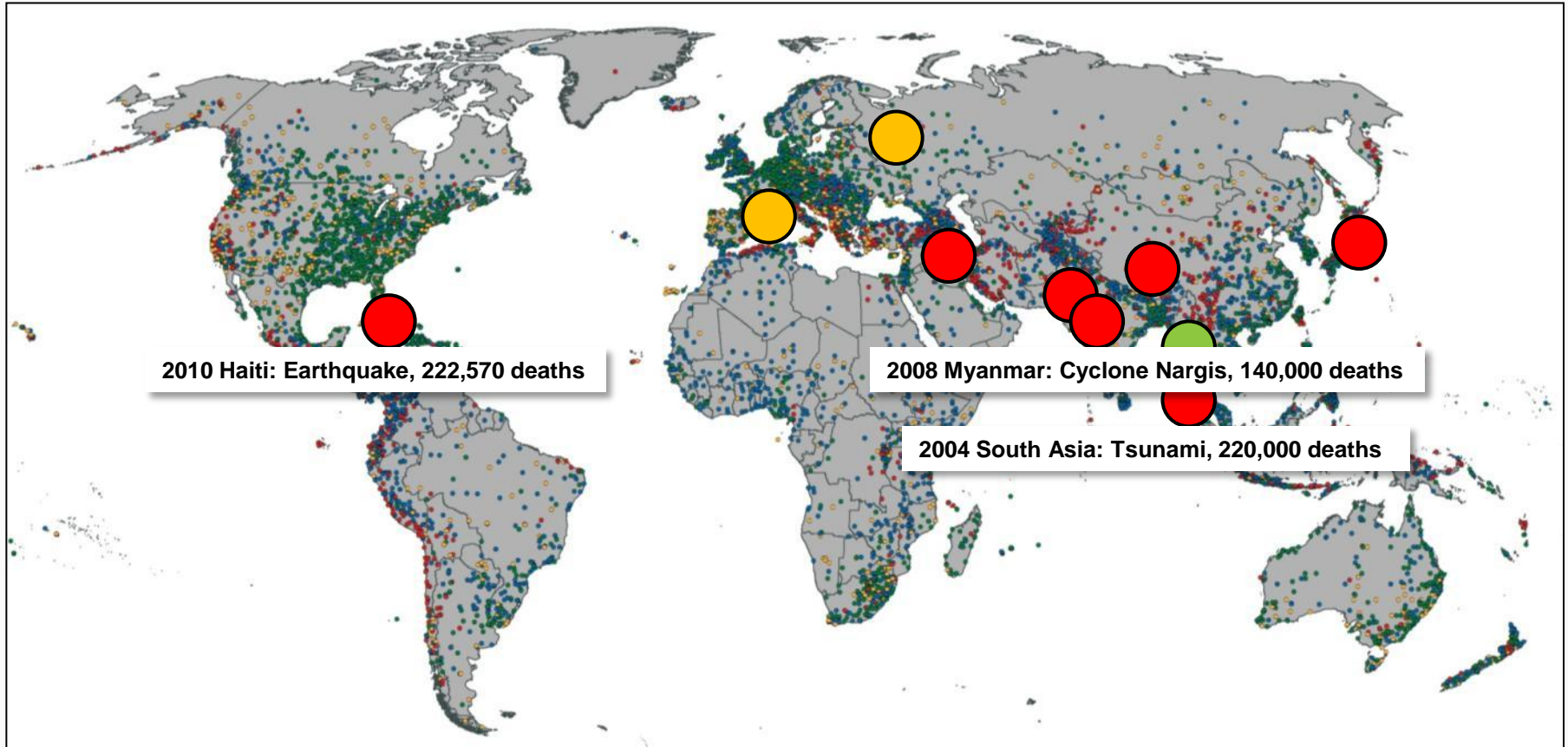 (Extreme temperature, drought, wildfire)

Major disasters since 1900

1936 China: Drought, famine, 5 million deaths

1908 Italy: Earthquake, 86,000 deaths

1970 Bangladesh: Cyclone, 300,000 deaths

● Geophysical events
(Earthquake, tsunami, volcanic activity)

● Hydrological events
(Flood, mass movement)

● Meteorological events
(Storm)

● Climatological events
(Extreme temperature, drought, wildfire)

Natural disasters 2000 – 2011
10 deadliest disasters

2010 Haiti: Earthquake, 222,570 deaths

2008 Myanmar: Cyclone Nargis, 140,000 deaths

2004 South Asia: Tsunami, 220,000 deaths

Geophysical events
(Earthquake, tsunami, volcanic activity)

Hydrological events
(Flood, mass movement)

Meteorological events
(Storm)

Climatological events
(Extreme temperature, drought, wildfire)

Natural disasters 2000 – 2011
10 costliest disasters – insured losses
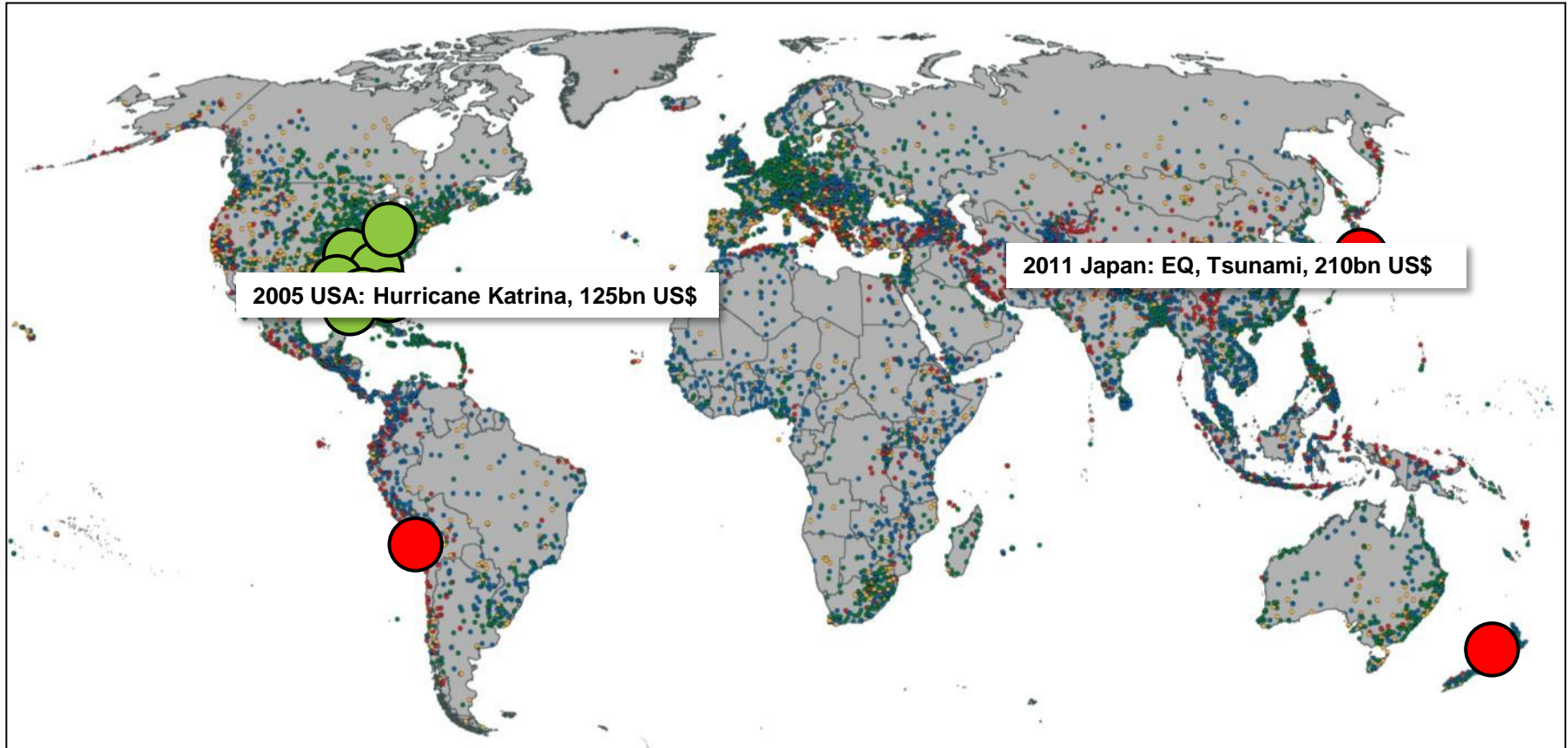
2011 Japan: EQ, Tsunami, 210bn US$

2005 USA: Hurricane Katrina, 125bn US$

Geophysical events
(Earthquake, tsunami, volcanic activity)

Hydrological events
(Flood, mass movement)

Meteorological events
(Storm)

Climatological events
(Extreme temperature, drought, wildfire)

Natural disasters 2000 – 2011
10 costliest disasters – economic losses

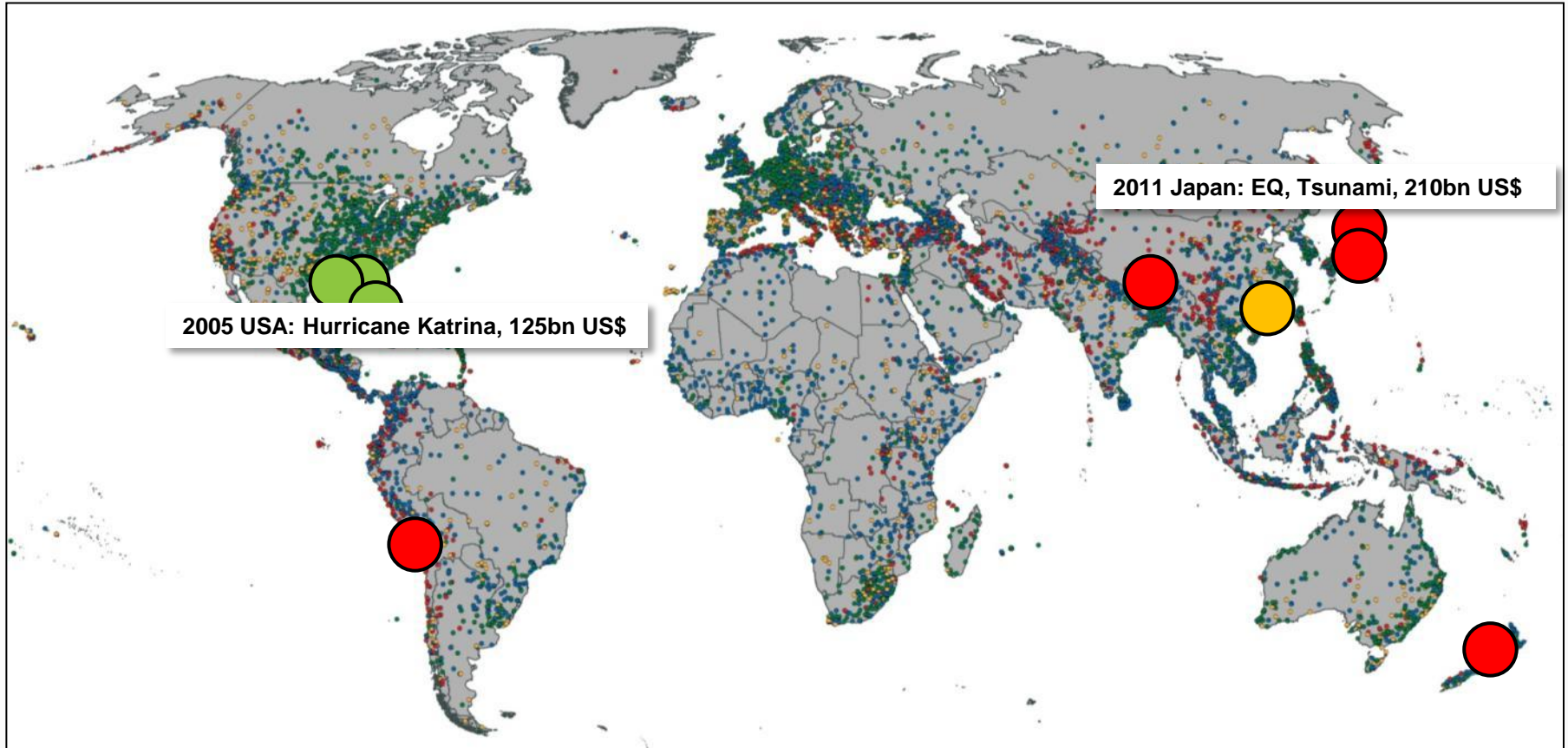2011 Japan: EQ, Tsunami, 210bn US$

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Geophysical events
(Earthquake, tsunami, volcanic activity)

Meteorological events
(Storm)

Hydrological events
(Flood, mass movement)

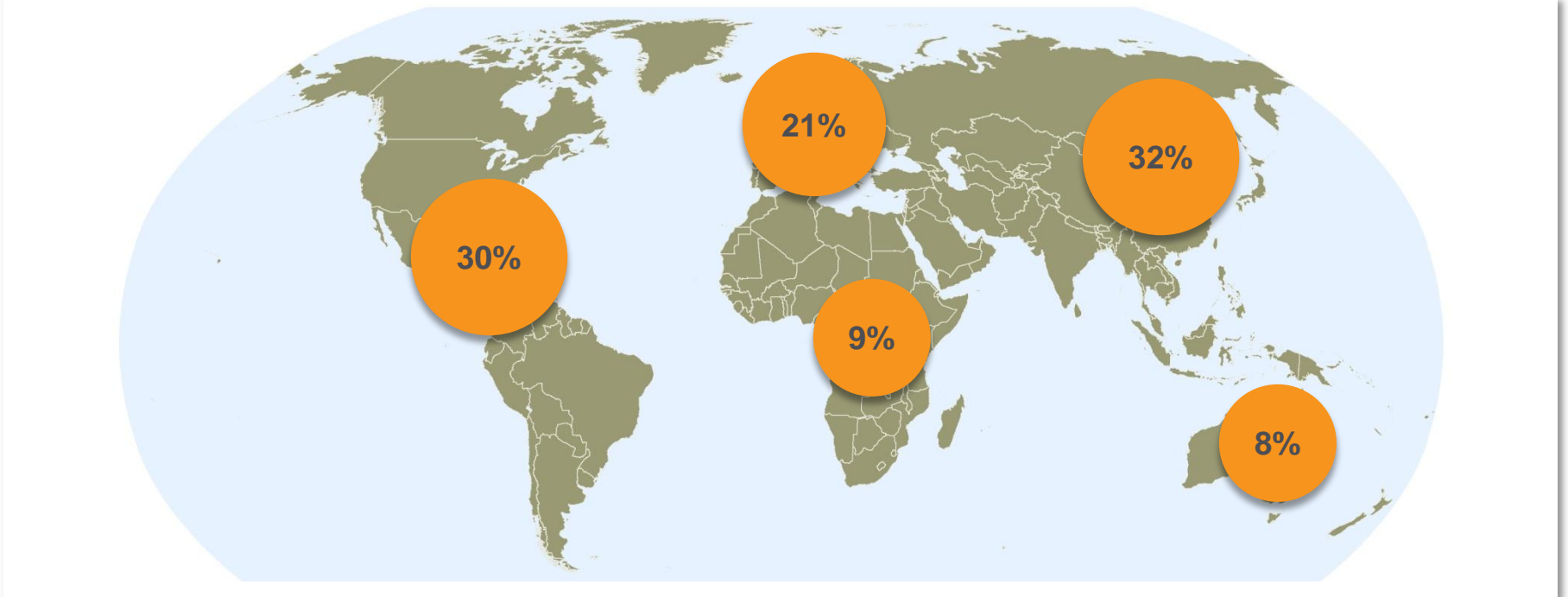**Climatological events**
(Extreme temperature, drought, wildfire)

Worldwide Natural Disasters 1980 – 2011
Overall and Insured Losses

Legend:
- Overall losses (in 2011 values) — green
- Insured losses (in 2011 values) — dark blue
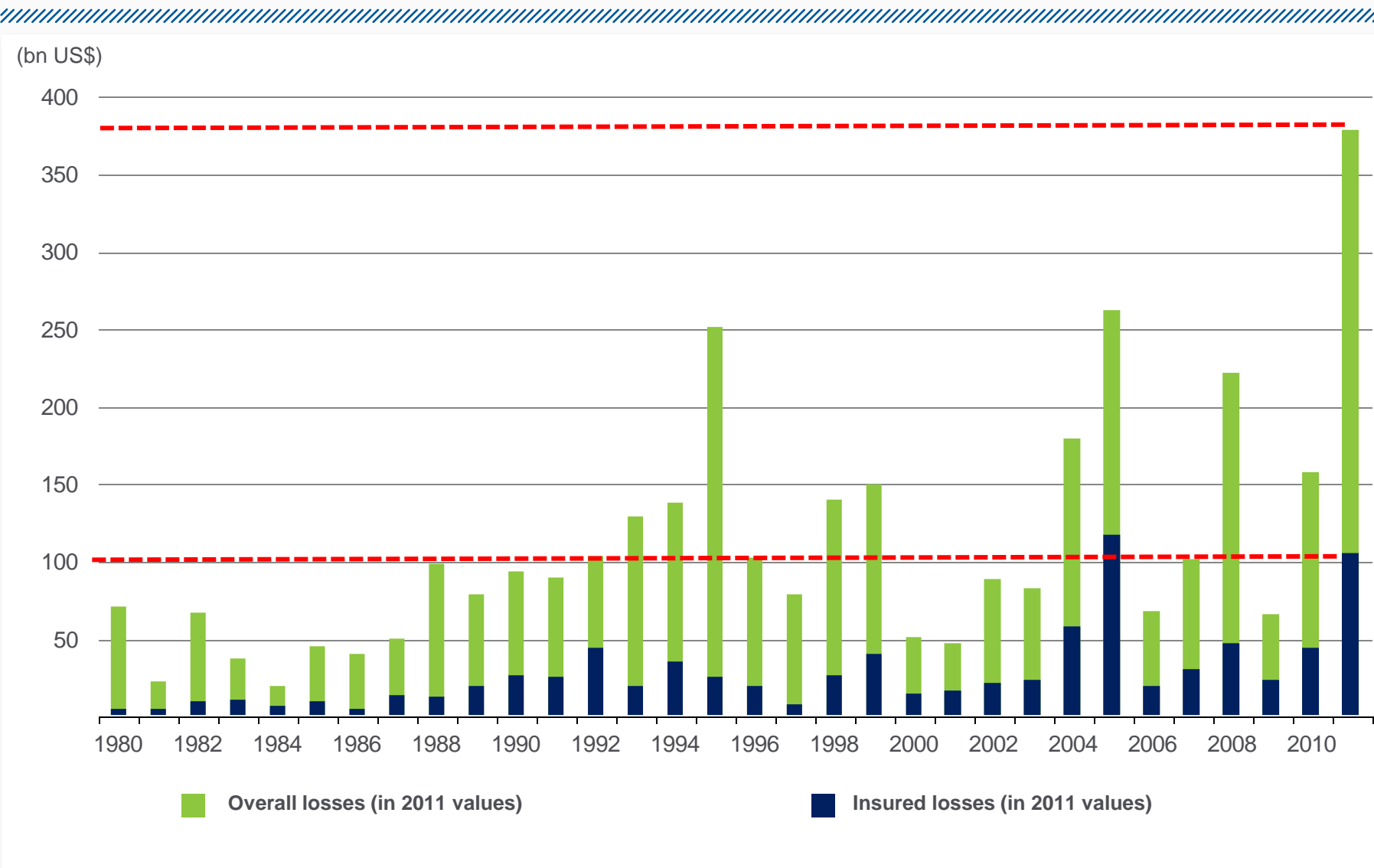
Natural catastrophes worldwide 1980 – 2011
20,200 events - Percentage distribution per continent

Munich RE

Continent	Number of events
America (North and South America)	**6,200**
Europe	**4,200**
Africa	**1,800**
Asia	**6,500**
Australia/Oceania	**1,500**

Natural catastrophes worldwide 1980 – 2011
Overall losses US$ 3,500bn - Percentage distribution per continent

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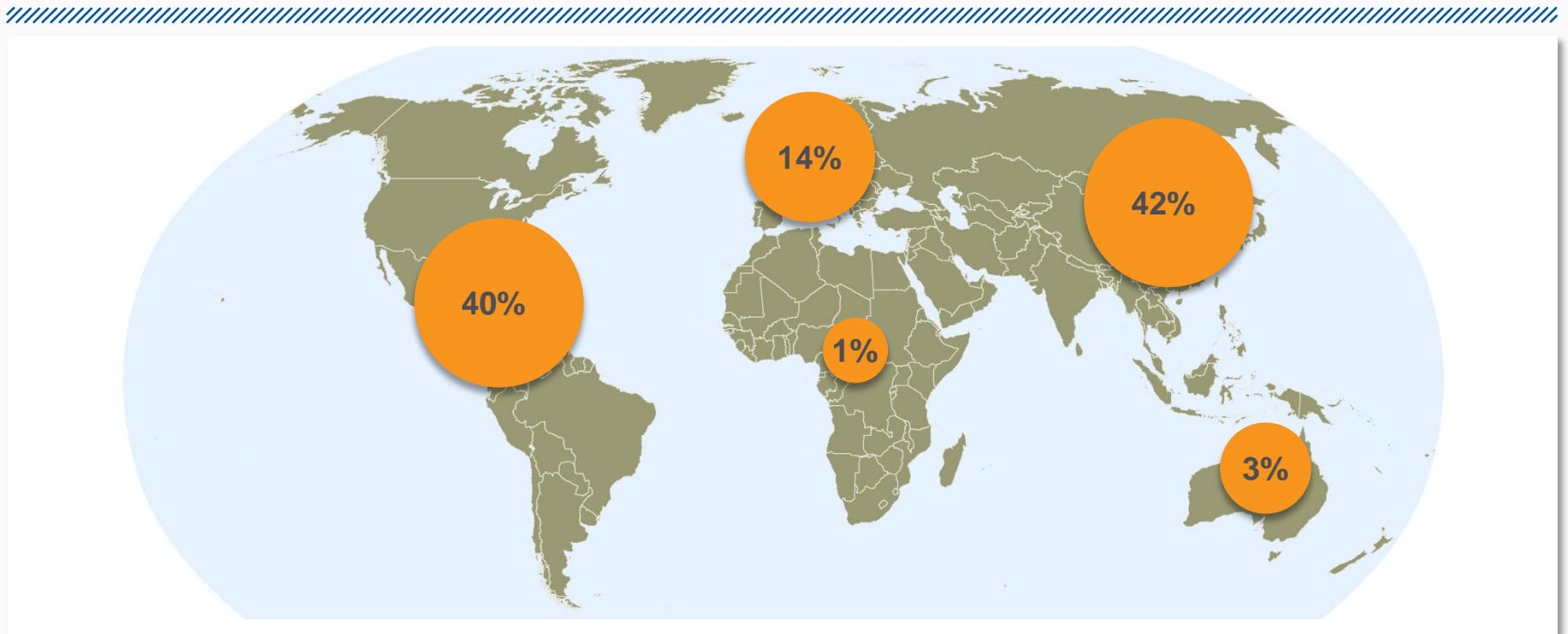
Continent	Overall losses US$ m
America (North and South America)	**1,407,000**
Europe	**495,000**
Africa	**44,000**
Asia	**1,450,000**
Australia/Oceania	**104,000**

Natural catastrophes worldwide 1980 – 2011
Insured losses US$ 870bn - Percentage distribution per continent

Munich RE
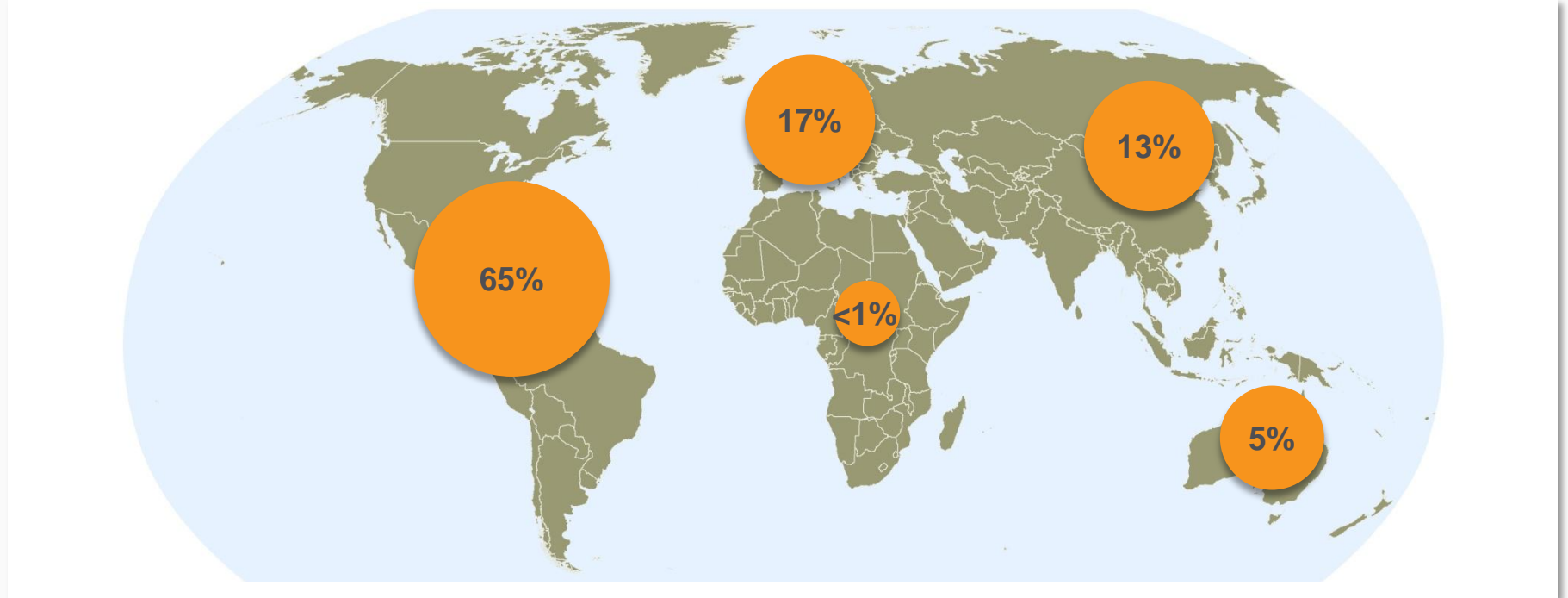
Continent	Insured losses US$ m
America (North and South America)	**566,000**
Europe	**146,000**
Africa	**2,000**
Asia	**115,000**
Australia/Oceania	**41,000**

Natural catastrophes worldwide 1980 – 2011
2,275,000 Fatalities - Percentage distribution per continent

Munich RE
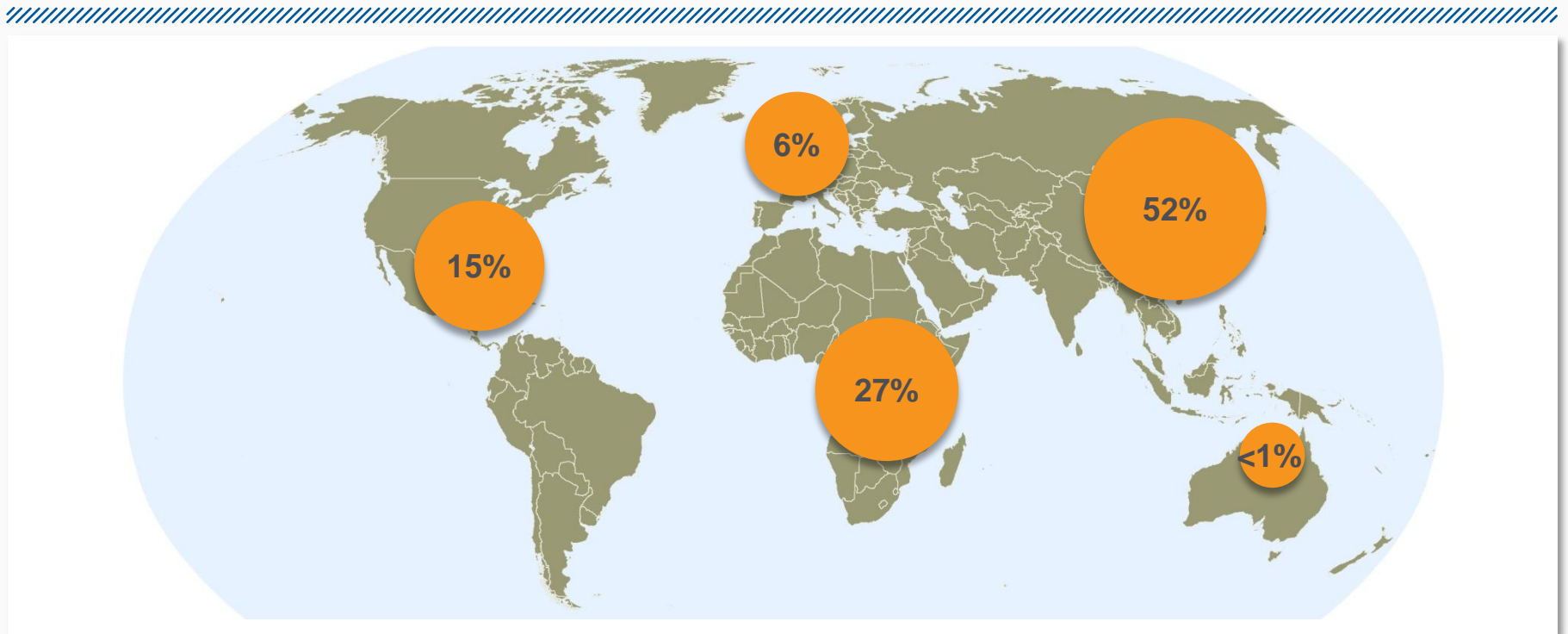
Continent	Fatalities
America (North and South America)	336,000
Europe	149,000
Africa	608,000
Asia	1,176,000
Australia/Oceania	5,900

Naturkatastrophen weltweit 1980 – 2011
Anzahl der Ereignisse – relative Trends pro Kontinent

Munich RE

Nordamerika, Karibik, Zentralamerika

Südamerika

Afrika

Asien

Australien/Ozeanien

Europa
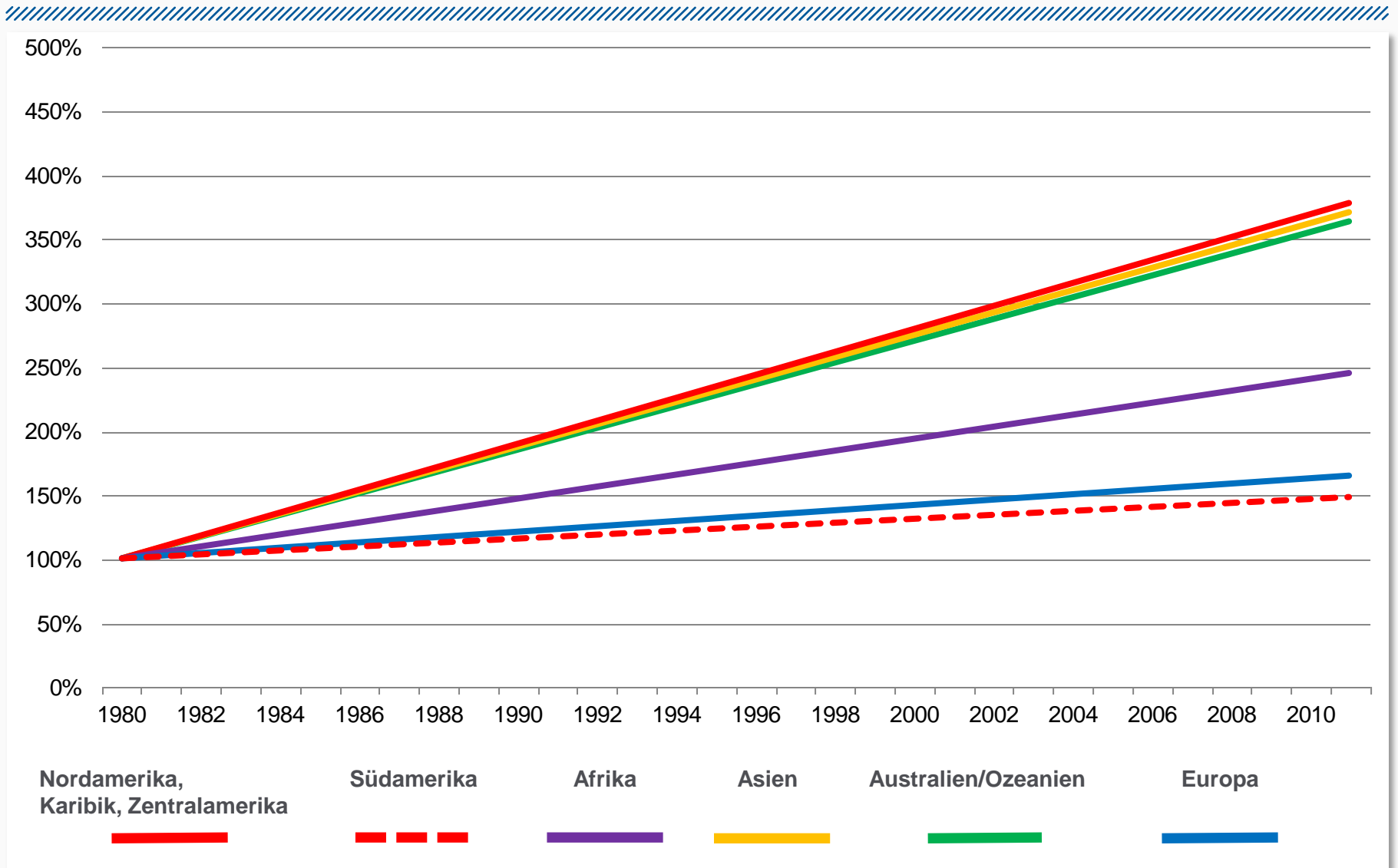
Natural catastrophes worldwide 1980 – 2011
Number of events with relative trend

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Number

500%

450%

400%

350%

300%

250%

200%

150%

100%

50%

0%

1980 1982 1984 1986 1988 1990 1992 1994 1996 1998 2000 2002 2004 2006 2008 2010

Geophysical events
(Earthquake, tsunami, volcanic eruption)

Meteorological events
(Storm)

Hydrological events
(Flood, mass movement)

Climatological events
(Extreme temperature, drought, forest fire)
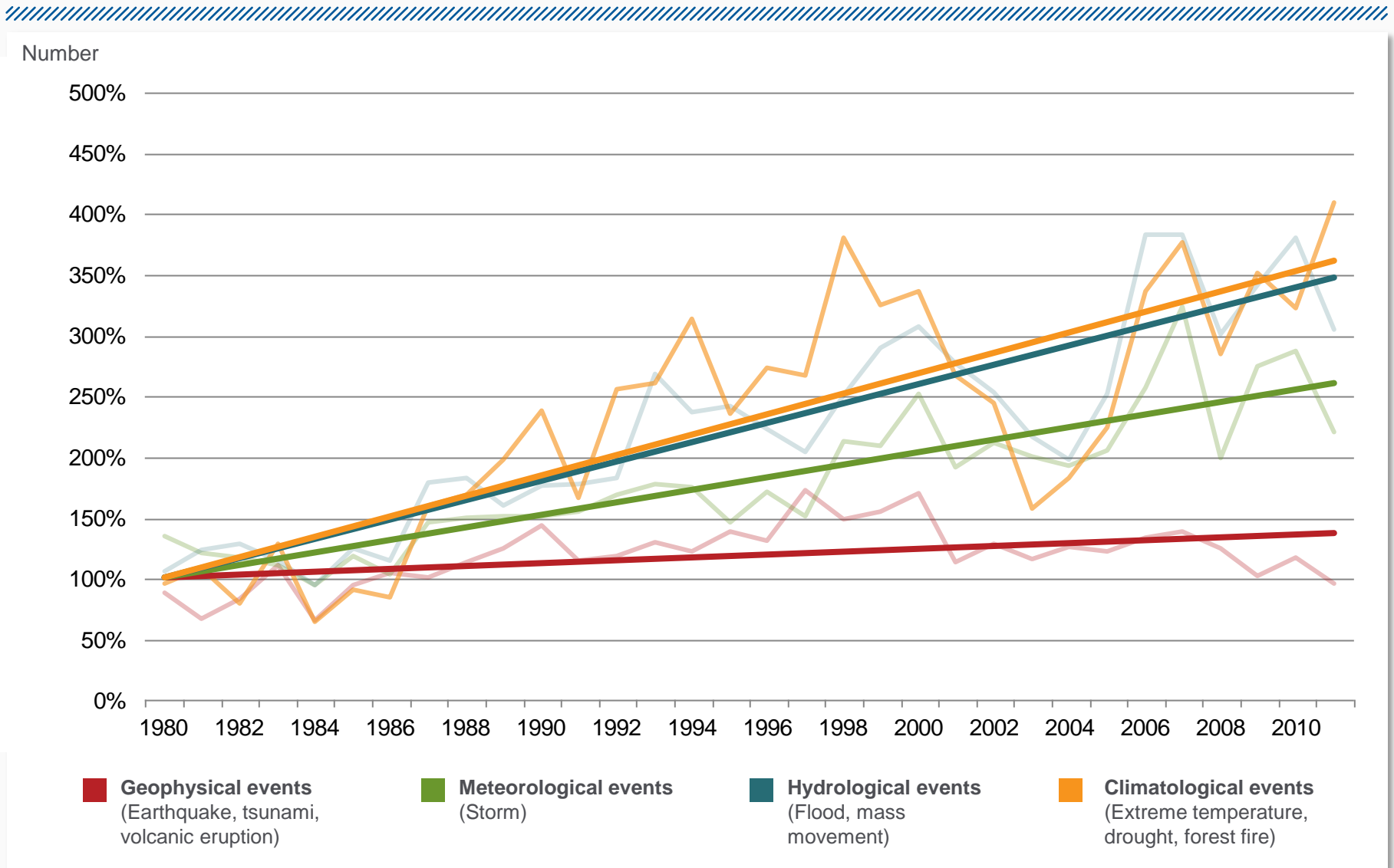
Significant natural catastrophes worldwide 1980 – 2011
10 deadliest events

Munich RE

Period	Event	Affected Area	Overall losses	Insured losses	Fatalities
			US$ m, original values		
12.1.2010	Earthquake	Haiti: Port-au-Prince, Petionville	8,000	200	222,570
26.12.2004	Earthquake, tsunamis	Sri Lanka, Indonesia, Thailand, India, Bangladesh, Myanmar, Maldives, Malaysia	10,000	1,000	220,000
2-5.5.2008	Cyclone Nargis, storm surge	Myanmar: Ayeyawaddy, Yangon, Bugalay, Rangun, Irrawaddy, Bago, Karen, Mon, Laputta, Haing Kyi	4,000		140,000
29-30.4.1991	Tropical cyclone, storm surge	Bangladesh: Gulf of Bengal, Cox's Bazar, Chittagong, Bola, Noakhali districts, Kutubdia	3,000	100	139,000
8.10.2005	Earthquake	Pakistan, India (Kashmir region), Afghanistan	5,200	5	88,000
12.5.2008	Earthquake	China: Sichuan, Mianyang, Beichuan, Wenchuan, Shifang, Chengdu, Guangyuan, Ngawa, Ya'an	85,000	300	84,000
July-Aug.2003	Heat wave, drought	France, Germany, Italy, Portugal, Romania, Spain, United Kingdom	13,800	1,120	70,000
July-Sept.2010	Heat wave	Russia	400		56,000
20.6.1990	Earthquake	Iran: Caspian Sea, Gilan province, Manjil, Rudbar, Zanjan, Safid, Qazvin	7,100	100	40,000
26.12.2003	Earthquake	Iran: Bam	500	19	26,200

World Map of Natural Hazards
Nuclear power plants overlaid with hazard zones
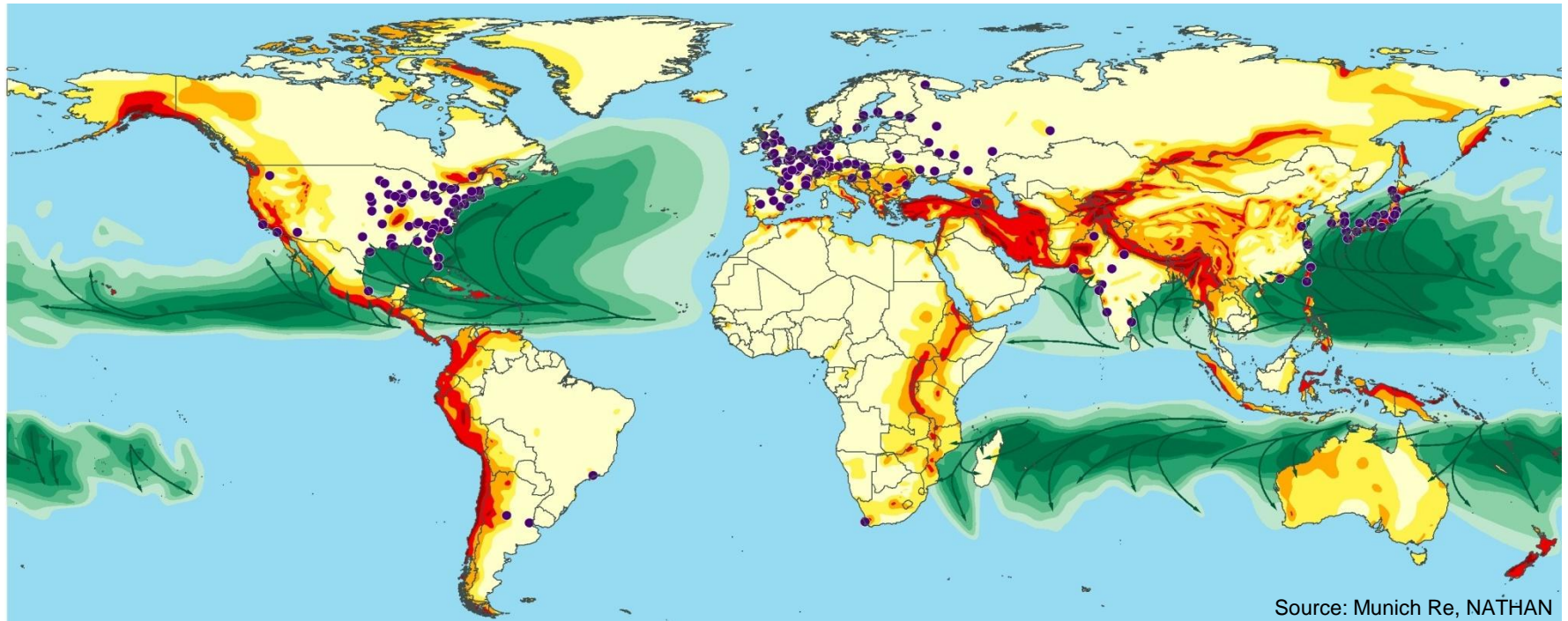
Source: Munich Re, NATHAN

● **Operating nuclear power plants (as at Dec 2010)**

443 reactor blocks, thereof:

- 26 blocks in earthquake zone 3
- 18 blocks in earthquake zone 4

- 27 blocks in tropical cyclone zone 4
- 8 blocks in tropical cyclone zone 5

Earthquake**

☐	Zone 0: ≤ MM V
☐	Zone 1: MM VI
☐	Zone 2: MM VII
☐	Zone 3: MM VIII
☐	Zone 4: ≥ MM IX

**Probable maximum intensity
(MM: modified Mercalli scale) with
an exceedance probability of 10%
in 50 years (equivalent to a "return
period" of 475 years) for medium
subsoil conditions.

Tropical cyclone
Peak wind speeds***

☐	Zone 0: 76-141 km/h
☐	Zone 1: 142-184 km/h
☐	Zone 2: 185-212 km/h
☐	Zone 3: 213-251 km/h
☐	Zone 4: 252-299 km/h
☐	Zone 5: ≥ 300 km/h

***Probable maximum intensity with an
exceedance probability of 10% in
10 years (equivalent to a "return period"
of 100 years)

In order to avoid and
in order to minimize catastrophic impacts
by establishing good and effective

Disaster Risk Reduction Measurements,

It is crucial to know as much as possible about
the disaster history up to the current situation.

Objective 3: Reducing Risk and Curbing Losses Through Knowledge-Based Actions

3.1: Vulnerability assessments

3.2: Effective approaches to risk reduction

Disaster loss data are necessary to improve integrated disaster risk management

9

IRDR – Integrated Research on Disaster Risk
Working Group Disaster Loss Data and Impact Assessment

Objectives
Identify what **data and quality are needed** to improve integrated disaster risk management
Bring together loss data stakeholders and utilize synergies
Have recognized standards, **minimize uncertainty**
Education of users regarding **data interpretation** and data biases
Ensure increased **downscaling** of loss data to sub-national geographies for policy makers
Definition of "losses" and creation of a methodology for assessing it

What exactly is disaster loss data
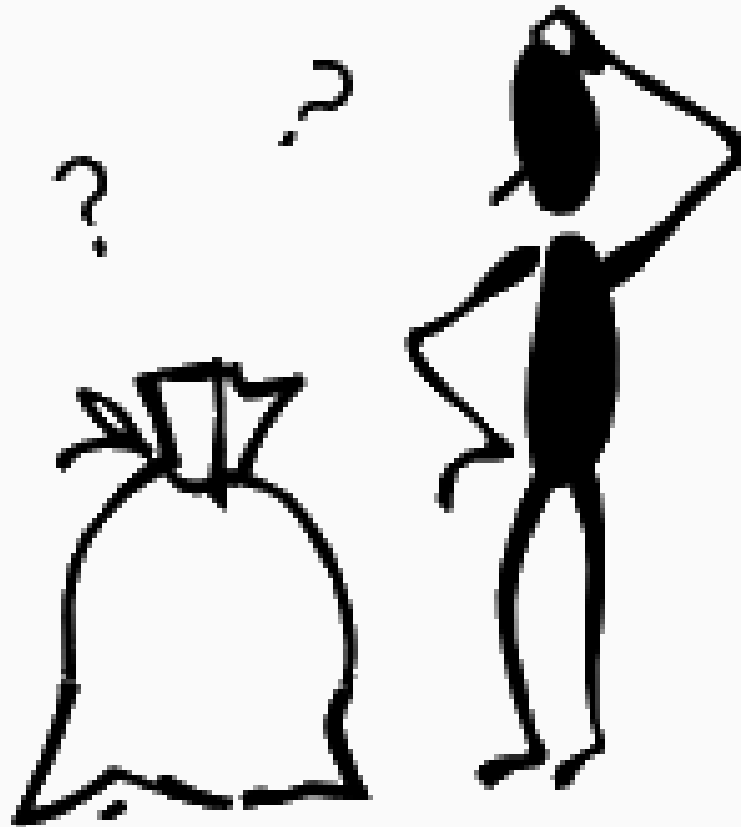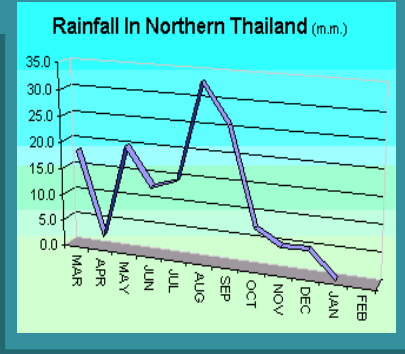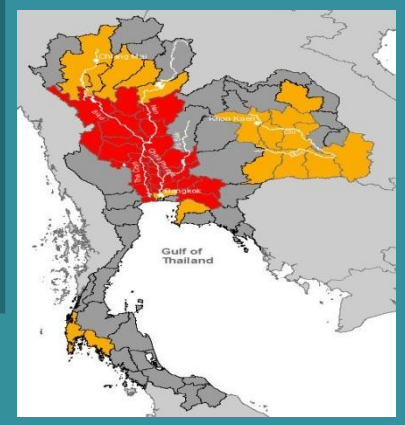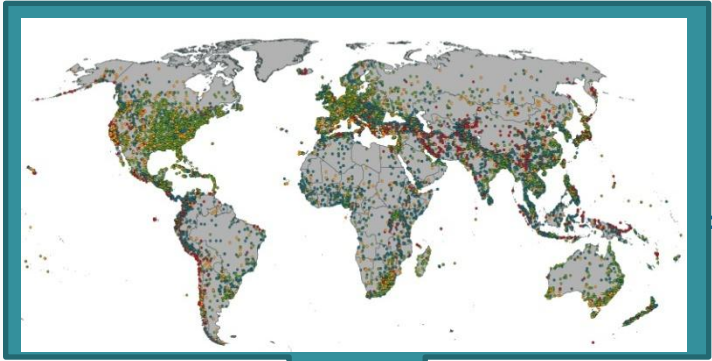
Disaster Loss Data
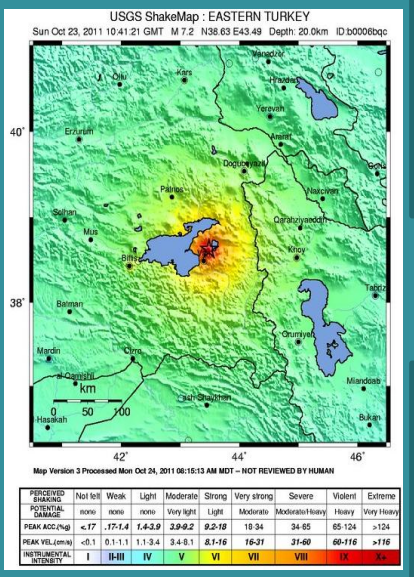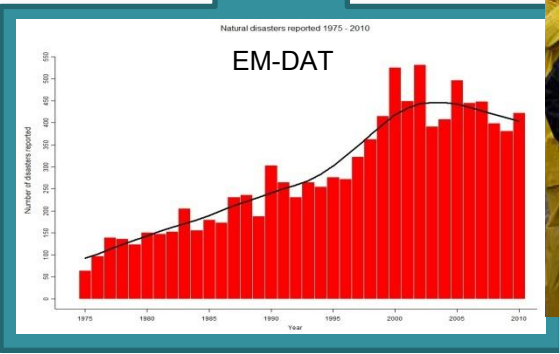
Facts

Disaster loss data landscape is complex

Many organisations and institutes are active

Loss data community is growing

Data providers

Data collectors

Data platforms

Data users

overlaps

Disaster loss data
Overview of data providers - examples

Kind of data	Example Information	Example Data Providers
General informaion	Description of event	Media, satellite images, case studies

Disaster loss data
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Monetary loss information		

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Monetary loss information		
- Economic loss	Financial impact of disaster (direct loss, indirect loss, secondary loss)	Different organisations (governments, World Bank,ECLAC, professional loss provider, etc)

Disaster loss data
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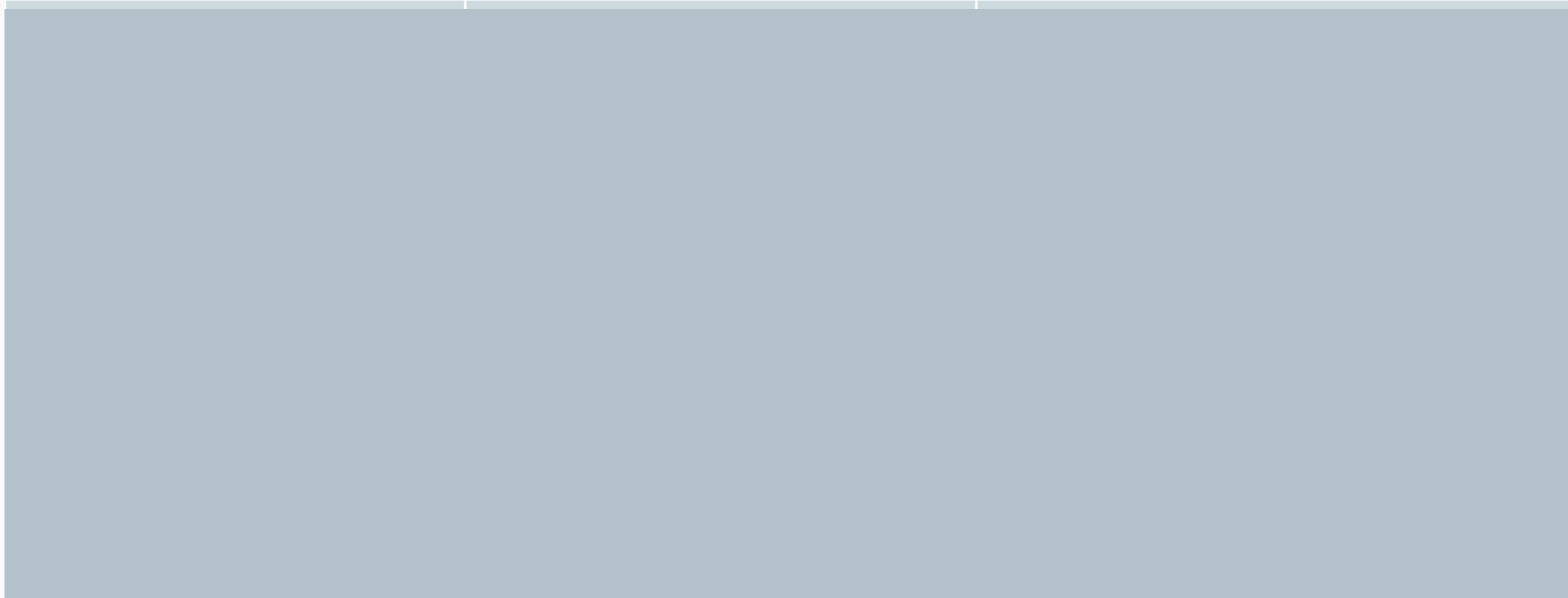| Kind of data	Example Information	Example Data Providers
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- **Insured loss**	Regional, national, local loss	Reinsurance, insurance associations, local insurance, professional loss provider
	Sector based national loss	NFIP (flood), USDA (agro)

Disaster loss data
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	Sector based national loss	NFIP (flood), USDA (agro)
Automatic generated information	Region affected, people involved	Joint Research Centre/GDACS, USGS-Pager

Disaster loss data
Overview of data collectors - examples

Kind of data	Examples Data Collectors	Comments
Global multi peril	EmDat, Munich Re, Swiss Re	

Disaster loss data
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Disaster loss data
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Event based	Dartmouth Flood Observatory CEDIM Center for Disaster Management and Risk Reduction Technology	Flood Earthquakes, Landslides

Disaster loss data
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Event based	Dartmouth Flood Observatory CEDIM Center for Disaster Management and Risk Reduction Technology	Flood Earthquakes, Landslides
Sector based	Ascend USDA (US Dept. of Agriculture)	Aviation Agriculture

Disaster loss data
Overview of global data platforms

Organisation	Examples	Comments
UNDP GRIP	National Loss Data Observatory	Aim: 50-100 countries
UN ISDR	National databases	
GLIDE	Unique identifier	
Relief Web, OCHA	Information from various sources	Focus on human impact
ICSU / IRDR	Working Group on Disaster Loss Data and Impac Assessment	

Disaster loss data
Overview of data users - examples

Sector		Examples
Science	Research projects	Trend analyses, IPCC, Global Assessment Report, GEM

Disaster loss data
Overview of data users - examples

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Disaster loss data
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Decision makers	Governments, NGOs	Loss reduction purposes, risk reduction measurements
Finance industry	Insurance	Risk calculation, development of new solutions, Microinsurance schemes, government schemes, PCS
	Alternative (monetary) risk transfers	Cat Bonds, weather derivate
	Modelling companies (RMS, EQE Cat, AIR)	Calibrate models

Agenda

Is there an ideal world of disaster loss data?
What could be the role of IRDR-DATA?

Is there an ideal world of disaster loss data?

Global databases

Local databases

National and regional databases

**Literature:
Forensic case studies
Scientific analyses**

GLIDE

**WORLD DATA ORGANISATION / PLATFORM
with Meta-Data and links to specialized data provider**

Funding organisations

Local Decision Makers

Governments

Finance industry

Insurance industry

NGOs
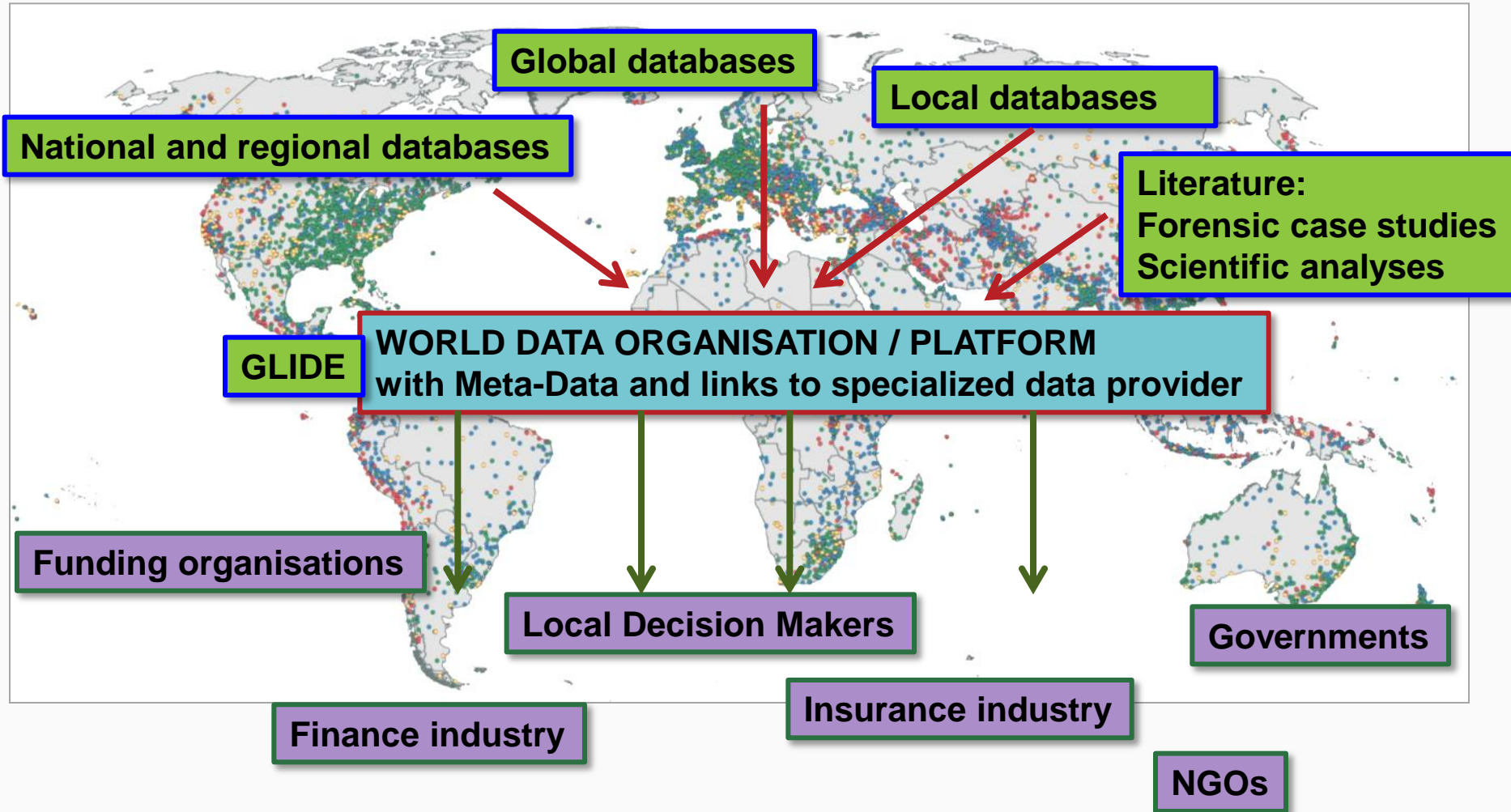
The ideal world of disaster loss data
We do not start from scratch

CRED

Swiss Re

Munich RE

UNDP

Asia Disaster Reduction Center

DesInventar

UN-ISDR

Peril hierarchy and terminology

Geophysical events

Meteorological events

Hydrological events

Climatological events

Earthquake

Volcanic eruption

Mass movement (dry)
- Rockfall
- Landslide
- Subsidence

Storm
- Tropical storm
- Extratropical storm
- Convective storm
- Local storm

Flood
- General flood
- Flash flood
- Storm surge

Mass movement (wet)
- Rockfall
- Avalange
- Landslide
- Subsidence

Extreme temperature
- Heat wave
- Cold wave
- Extreme winter conditions

Drought

Forest fire

Standards and Methodologies:

- **Harmonization of Terminology of Perils (2007)**

- **Guidelines for geocoding (2010)**

- **Survey and quality check of existing databases (2010)**

- **Definition of human impact indicators (October 2011 and March 2012)**

Next steps:

. **Paper „Human and economic impact indicators"**

. **Applicable methodology to estimate direct economic impact**

IRDR – Integrated Research on Disaster Risk
Working Group Disaster Loss Data and Impact Assessment

Organisations / Programmes

Plattforms

Databases Global, national

Social Economic Parameter

Modelling Loss Assessment

Aid organisaitons NGOs

Science & Emergency Management

Why had we to postpone the Kick-Off meeting in May 2012 in Vienna?

Why had we to postpone the Kick-Off meeting in May 2012 in Vienna?

Budget was not available or unclear

Host: Maria Patek, Austrian Ministry of Life

IRDR – Integrated Research on Disaster Risk
Working Group Disaster Loss Data and Impact Assessment

2012		
9-11 May	7th IRDR Meeting, Ravello	Organisation and budget
		Paper Cutter/Wirtz „The Complexity about Disaster Data Landscape" – Timeframe, work-sharing
	Kick-Off Meeting	Discussion about **Kick-Off Meeting** and Student's workshop in Taipei, China
		•What are the expectations of START?
		•Remains IRDR-DATA independent?
		•Brainstorming and Finalising Agenda Kick-Off Meeting
		•Finalise and agree on list of members
		•Accommodation (assistant in Taipei, China available?)
	Student's workshop	**Student's workshop**: -Subject -Organisational To Do's (budget, application form, accommodation, etc.) -Questions: is it good to have the kick-off and the student's workshop at the same time?

IRDR – Integrated Research on Disaster Risk
Working Group Disaster Loss Data and Impact Assessment

2012		
May		Invitation Letter
		Start organisation with Taipei, China
21-27 Oct	Taipei	Kick-Off Meeting
		Student's workshop
Nov	Chengdu	SC meeting: Report of progress and discussion next steps

2013		
March	Taipei	2nd DATA meeting (2-3 days) at Taipei University, China?
		Question to Jane: is this date still valid
May	Geneva	Presenting of DATA, current state, activities, results, outlook

Project Plan

Literature Research
Provides overview about Papers related to Disaster losses and damages, Databases, Normalization of loss data, Definition, What is available "The gaps of data - the needs of data"

Overview of existing loss databases
See survey from CRED

Definitions and Terminology
Overview of already accomplished actions. Identify missing issues.

Loss Assessment – Economic Impact (direct, indirect, secondary)
Prepare an overview of applied methodologies to assess losses.
Many different methodologies are currently applied: Examples – ECLAC, Munich Re, Swiss Re, Desinventar, Pielke, Modelling losses (GEM, Pager, Joint Research Center Italy), professional Modelling Organisations (EQE Cat, RMS).

We cannot come to one single methodology, however, we can provide an overview and make the different methodologies more transparent.

Loss data and uncertainties
How to treat and overcome weaknesses in loss data.

Bring together stakeholder
Bring different disciplines that are dealing or working with disaster loss data together – have an interdisciplinary and integrated approach. Stakeholders are for example: data provider, data collector, data platforms, data user, governments, economic knowledge, emergency management

From bottom to top
Disaster loss data are needed from local, to national, to regional, to global level. Where are the nodes and where can we utilize synergies?

The need of data
Work out the requirements of data. What data are needed and perhaps not yet available to do Disaster Risk reduction. Examples: situation at the time of the disaster, like war, civil war, population, vulnerability information etc.

Disaster Classification
It is necessary to differentiate between extensive/intensive, high frequent/low frequent, high impact/local routine events. Is it possible to establish an internationally agreed disaster scale – like Hurricane Saffir-Simpson scale, or tornado scale?

THANK YOU

Angelika Wirtz
Geo Risks Research/Corporate Climate Centre
Munich Re

Munich RE ≣

IRDR – Integrated Research on Disaster Risk
Working Group Disaster Loss Data – Student's Workshop

Literature survey

Survey of methodologies to assess monetary loss

IRDR – Integrated Research on Disaster Risk
Working Group Disaster Loss Data – Student's Workshop

Literature survey

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IRDR – Integrated Research on Disaster Risk
Working Group Disaster Loss Data and Impact Assessment

Organisations/Programmes	**IRDR**
	CoDATA (Bob Chen)
	WDS (Prof. Takashi Watanabe)
Plattforms	**GLIDE ADRC (Takahiro Ono)**
	UNDP GRIP (Carlos Villacis)
	UN ISDR (Julio Serges)
Databases	**Global (EmDat, Swiss Re)**
	National
Loss Assessment	**ECLAC**
	World Bank

IRDR – Integrated Research on Disaster Risk
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Automatic Generater	**European Joint Research (..Rudari)**
	GDACS (Ehrlich)
Aid Organisations, NGOS	**Red Cross (Zanetti)**
Science	
Emergency Management	
Government	