How USAID/OFDA Uses Geoscience to Reduce the Impact of Geological Disasters Worldwide



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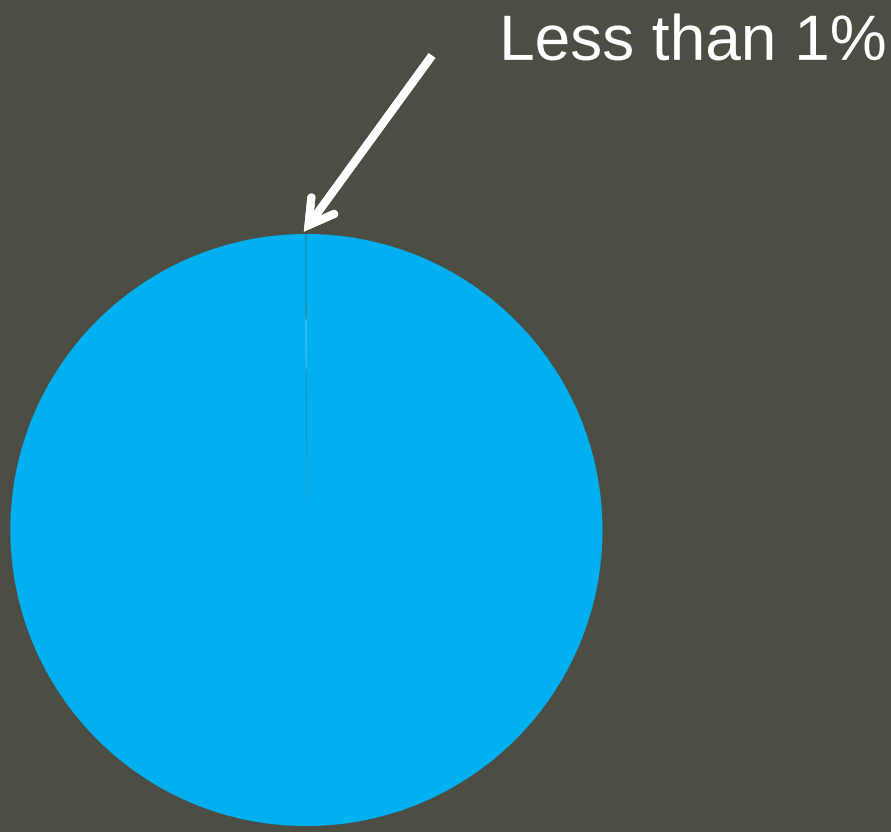
What is USAID?

The U.S. Agency for International Development is the independent federal government agency that provides foreign assistance and humanitarian aid to advance the political and economic interests of the United States.

What USAID Does:

- Economic growth & trade
- Agriculture
- Global health
- Conservation of natural resources
- Democracy and governance
- Education, and…
- Humanitarian assistance

How Much Does U.S. Foreign Aid Cost?

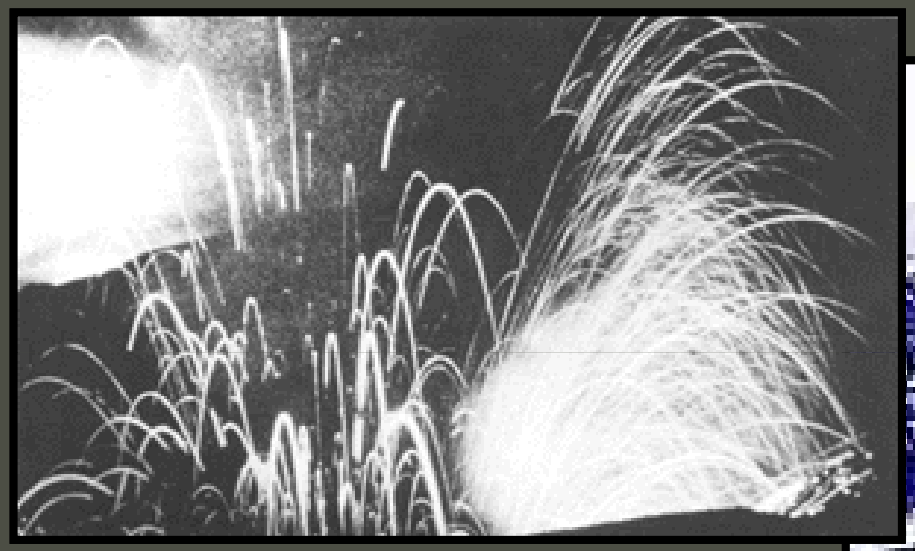


Office of Foreign Disaster Assistance

As the U.S. government agency charged with providing humanitarian relief on behalf of the American people, USAID provides both short- and long-term humanitarian assistance.

Office of Foreign Disaster Assistance

40+ Years of Disaster Assistance



1963, Irazu Volcano in Costa Rica

1963, Skopje Earthquake in Former Yugoslavia

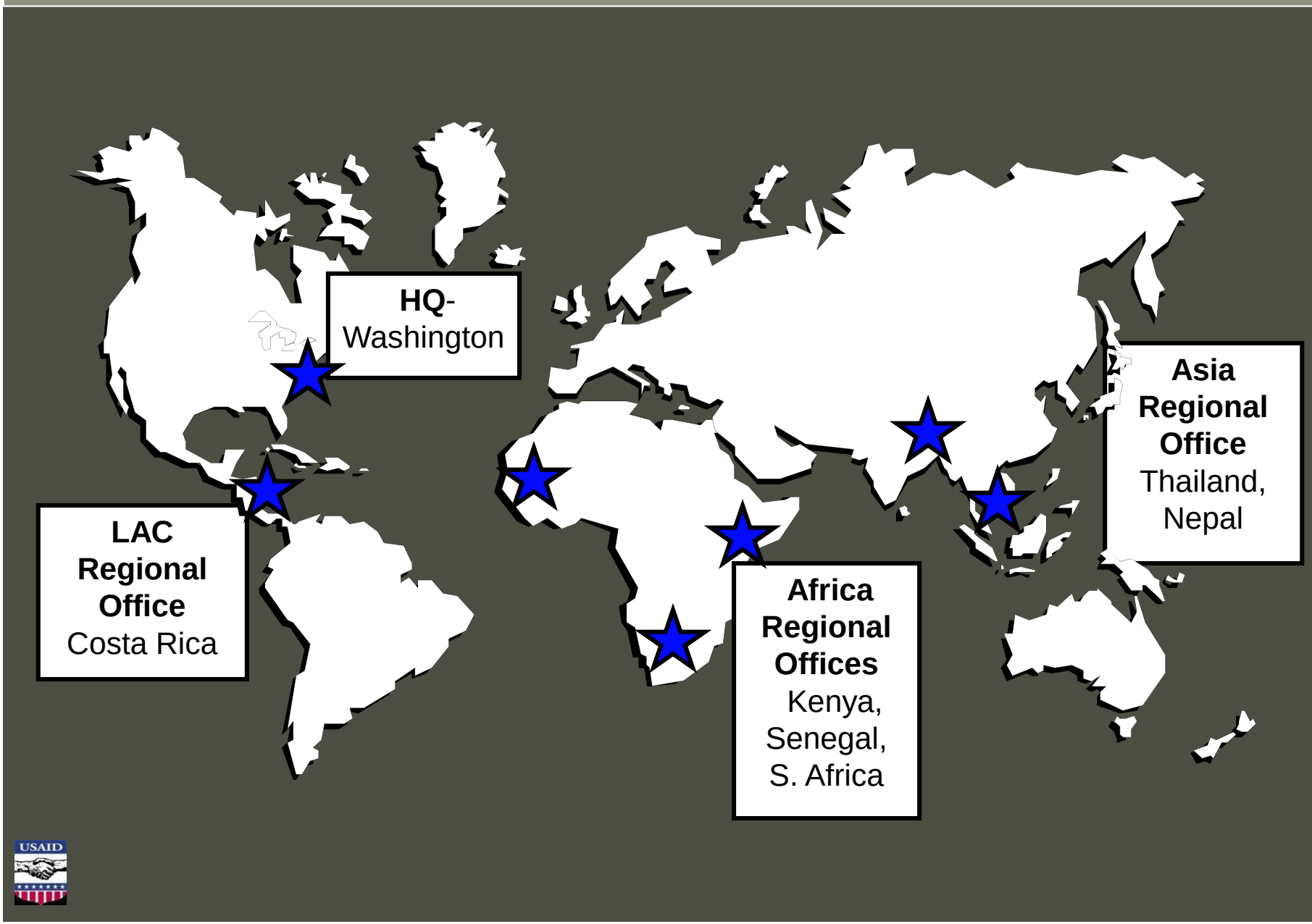
OFDA's Responsibility

- **Within the US Agency for International Development (USAID), the Office of Foreign Disaster Assistance (OFDA) is responsible for coordinating humanitarian assistance from the US government in response to international crises and disasters**

OFDA's Mandate

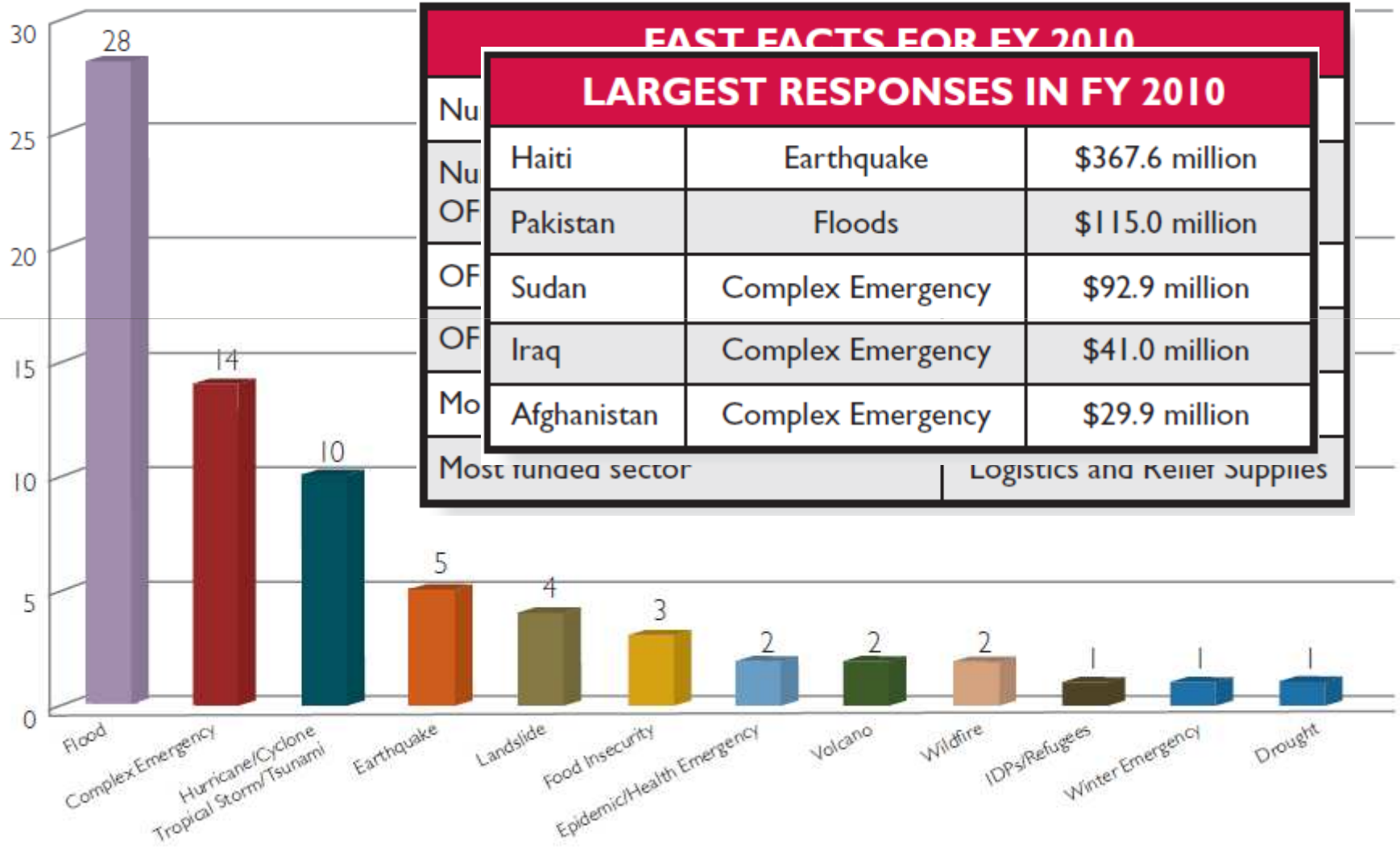
- Save lives
- Alleviate human suffering
- Reduce the economic and social impact of disasters

OFDA Regional Offices



A Year At OFDA

Types of Disasters Requiring OFDA Assistance



FAST FACTS FOR FY 2010

Nu

Nu
OF

OF

OF

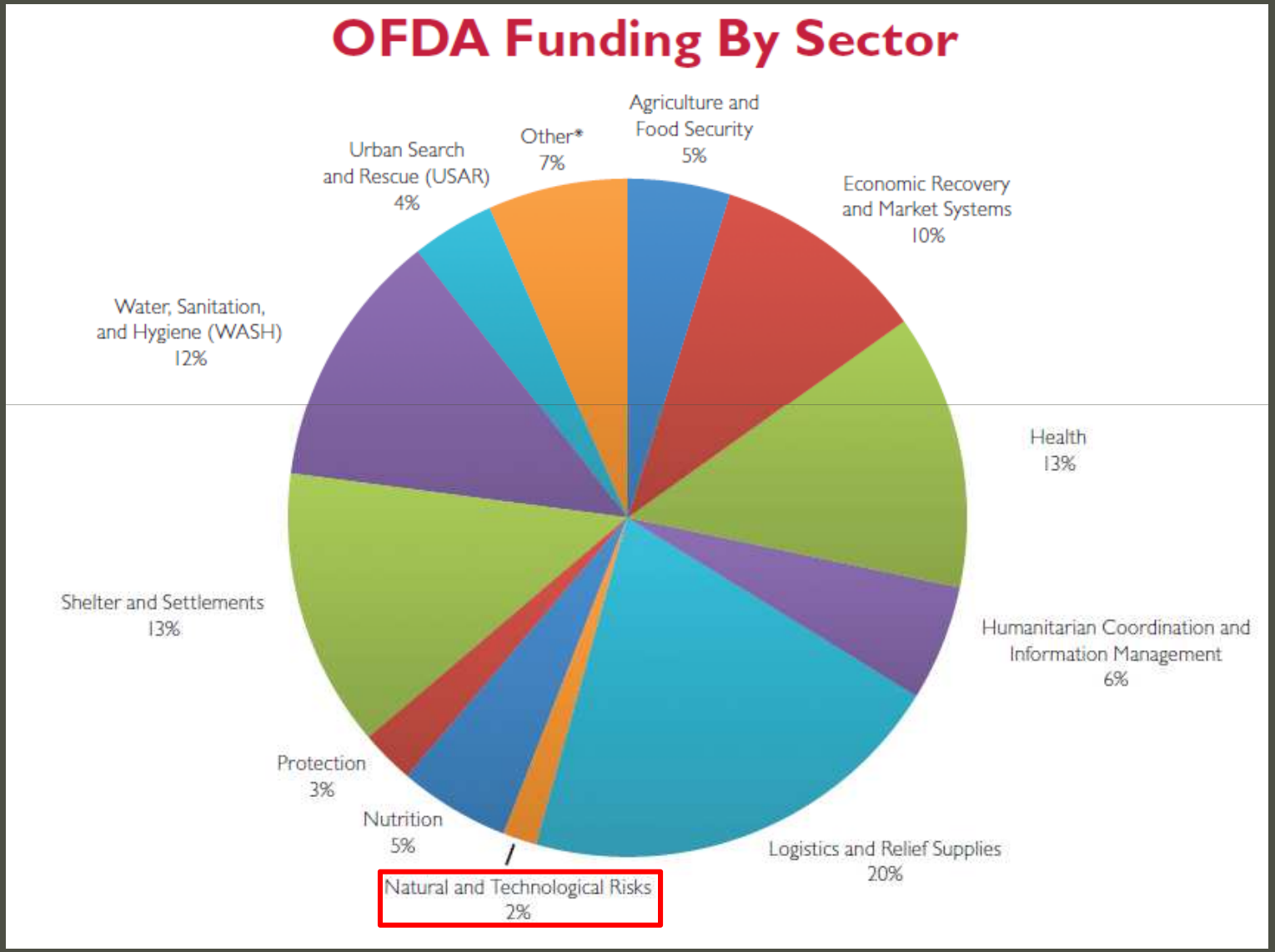
Mo

Most funded sector | Logistics and Relief Supplies

LARGEST RESPONSES IN FY 2010

Haiti	Earthquake	$367.6 million
Pakistan	Floods	$115.0 million
Sudan	Complex Emergency	$92.9 million
Iraq	Complex Emergency	$41.0 million
Afghanistan	Complex Emergency	$29.9 million

A Year At OFDA



USAID/OFDA's DRR Programs

- OFDA believes that mitigation and preparedness can reduce the impact of disasters

- FY 2011 $91 million
- Develop DRR strategies with U.N. and WB Global Facility for Disaster Reduction and Recovery
- Technical assistance specialists help guide DRR activities

Volcano DRR

- Nov. 13, 1985 Nevado Del Ruiz erupted, killing over 23,000 people in Amero
- No international team of volcanologists
- In 1986 VDAP was formed

Volcano DRR

Volcano Disaster Assistance Program

What: 25-year partnership between USAID/OFDA & USGS

Who: World's most experienced volcano crisis-response team

Why: Prevent volcanic crises from becoming disasters

http://volcanoes.usgs.gov/vdap/

How: By invitation only
Work in background with counterparts
Response and capacity building

- 26 major crises in 25 years
- Infrastructure built in 12 countries
- 10's of thousands of lives saved
- 100's of $ millions in property savings

Volcano Disaster Assistance Program

In FY11

- **4 Crisis Responses (red)**
- **19 Remote Assistance (blue)**
- **18 Trainings (green)**
- **2 Large Capacity Building Projects**
- **28 volcanoes in 6 countries**

USGS science for a changing world

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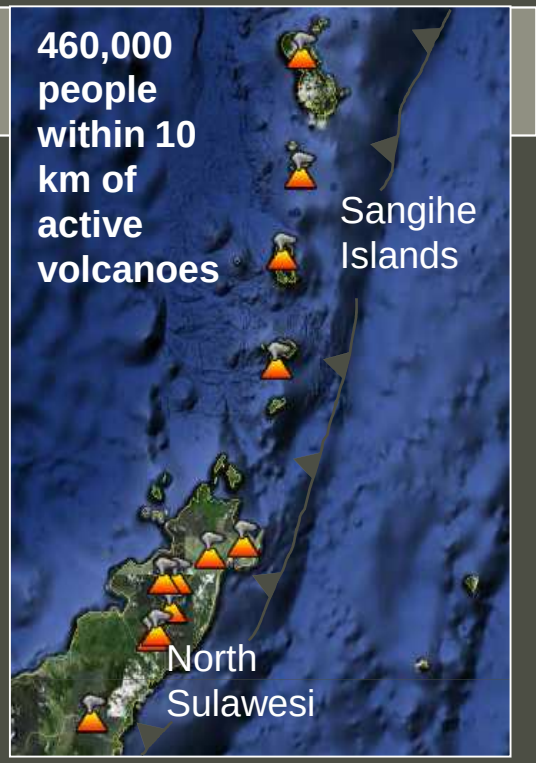
CVGHM & VDAP Response to Merapi, 2010

25-26 Oct. 2010

- CVGHM correctly anticipated large explosive eruption
- 25 October, 18:00 - CVGHM issued Level 4 Alert; Evacuations to 10 km
- 26 October, 17:02 - 23 hours later; large explosive eruption (VEI 3) – Deadly pyroclastic flows to 8 km
- Mbah Marigian & ~30 who refused to evacuate killed at Kinahrejo, 7 km from summit
- Thousands of lives saved by Alert and evacuations
- 27-30 October, people return to homes…

Capacity Building



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Earthquake DRR

- Improve the understanding of historical earthquakes
- Improve seismic monitoring

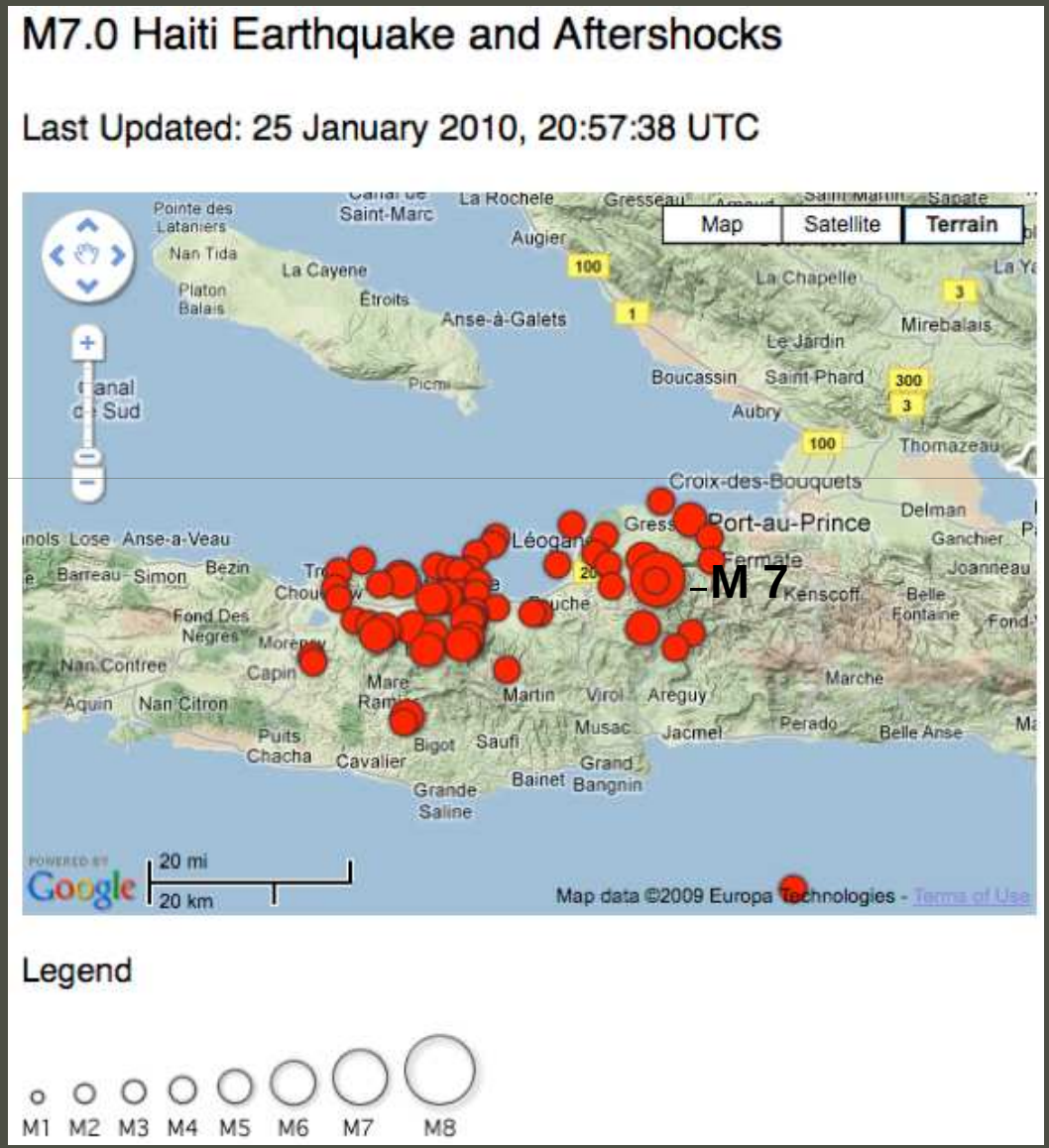
- Create detailed earthquake-hazard maps and improved building codes
- Educate at-risk communities
- Improve response

Earthquake Disaster Assistance Team

- Roster of US Geological Survey seismologists

- Liaise with other seismological groups
- By invitation
- Work in background with counterparts
- Response and capacity building

Haiti Jan 12 Earthquake



EDAT: Seismometer Deployment

Before EDAT

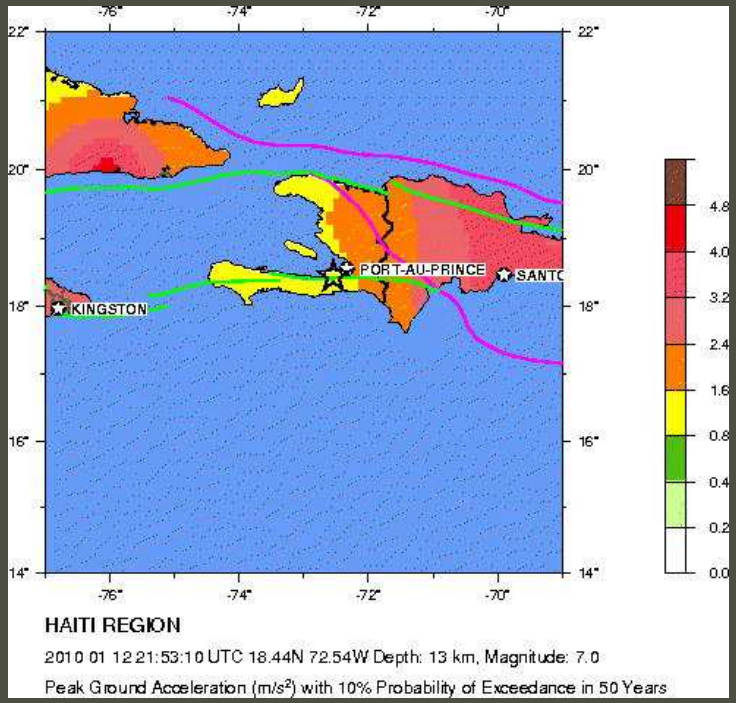
Haiti had one poorly functioning seismometer before the earthquake

After EDAT

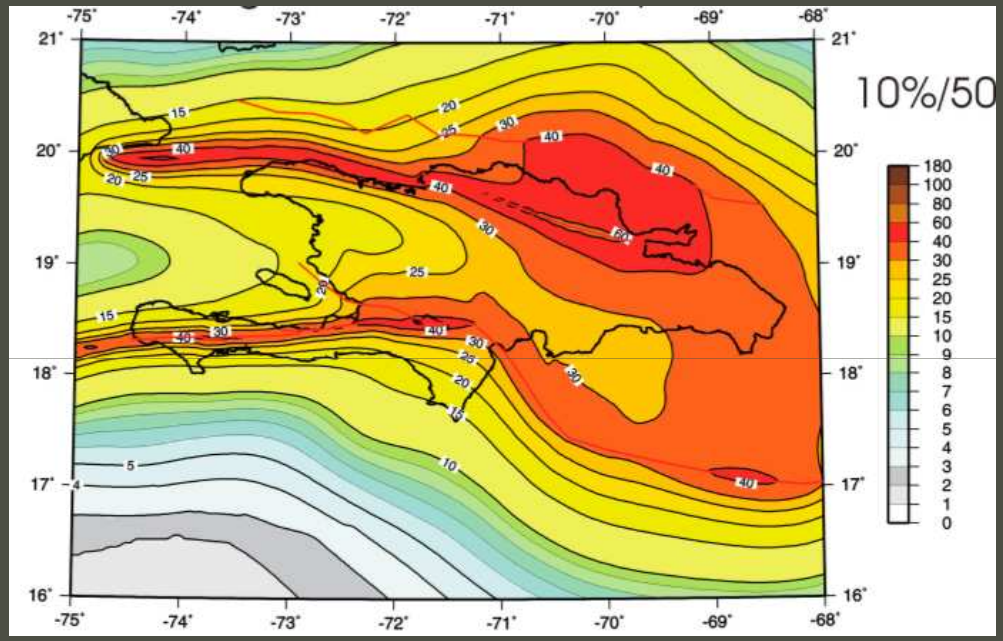
USGS and BME installed several seismometers around Haiti (red triangles)

EDAT: Seismic Hazard Assessment

Before EDAT



After EDAT



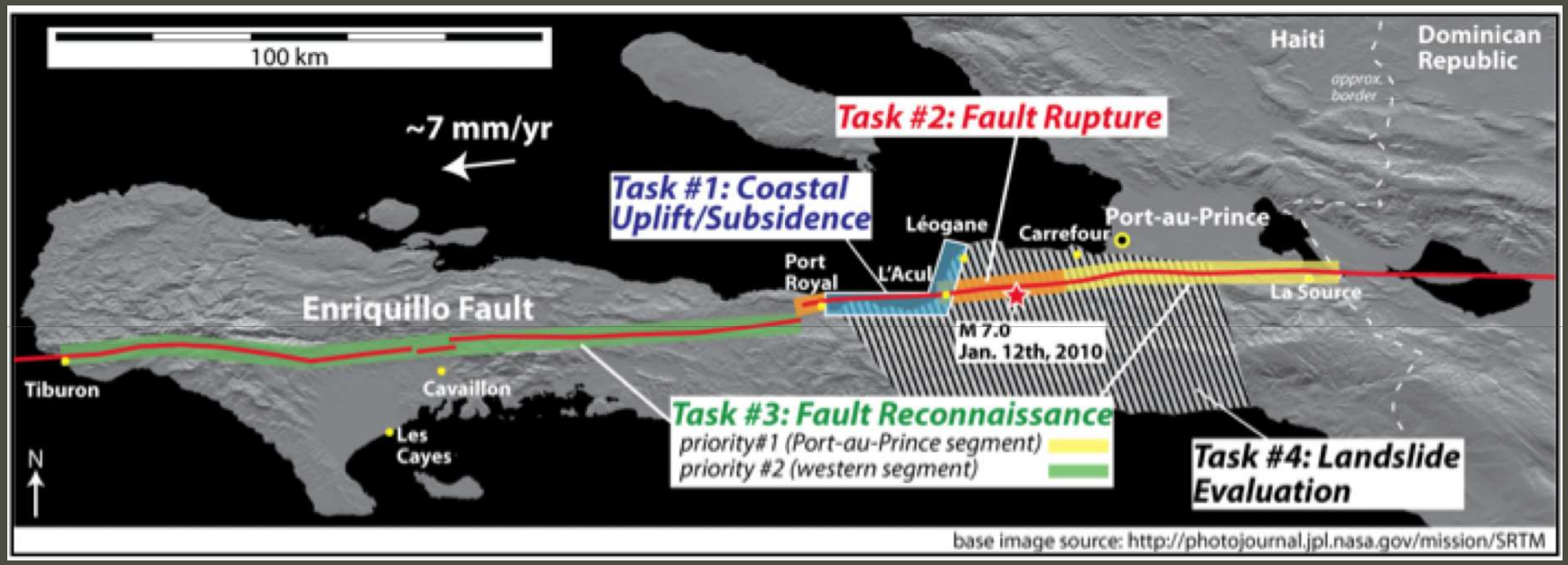
Only a general seismic hazard map of Haiti existed before the earthquake

EDAT and colleagues produced a more detailed seismic hazard map

EDAT: Landslide Assessment

Fig. 5. Preliminary inventory map of landslides triggered by the January 12, 2010, Haiti

EDAT: Geology Assessment



Impact of EDAT in Haiti

- Scientific results: risk mitigation
  - Small surface rupture found
  - More accurate seismic hazard map
  - Future landslides were assessed
  - Structure of the fault was characterized, leading to better microzonation information for Port-au-Prince
- Training, capacity building
  - BME colleagues will be trained at USGS
  - Funds from other USAID offices was obtained to install a permanent 5-station seismic network
  - USGS hopes to continue their relationship with BME
- Outreach in Haiti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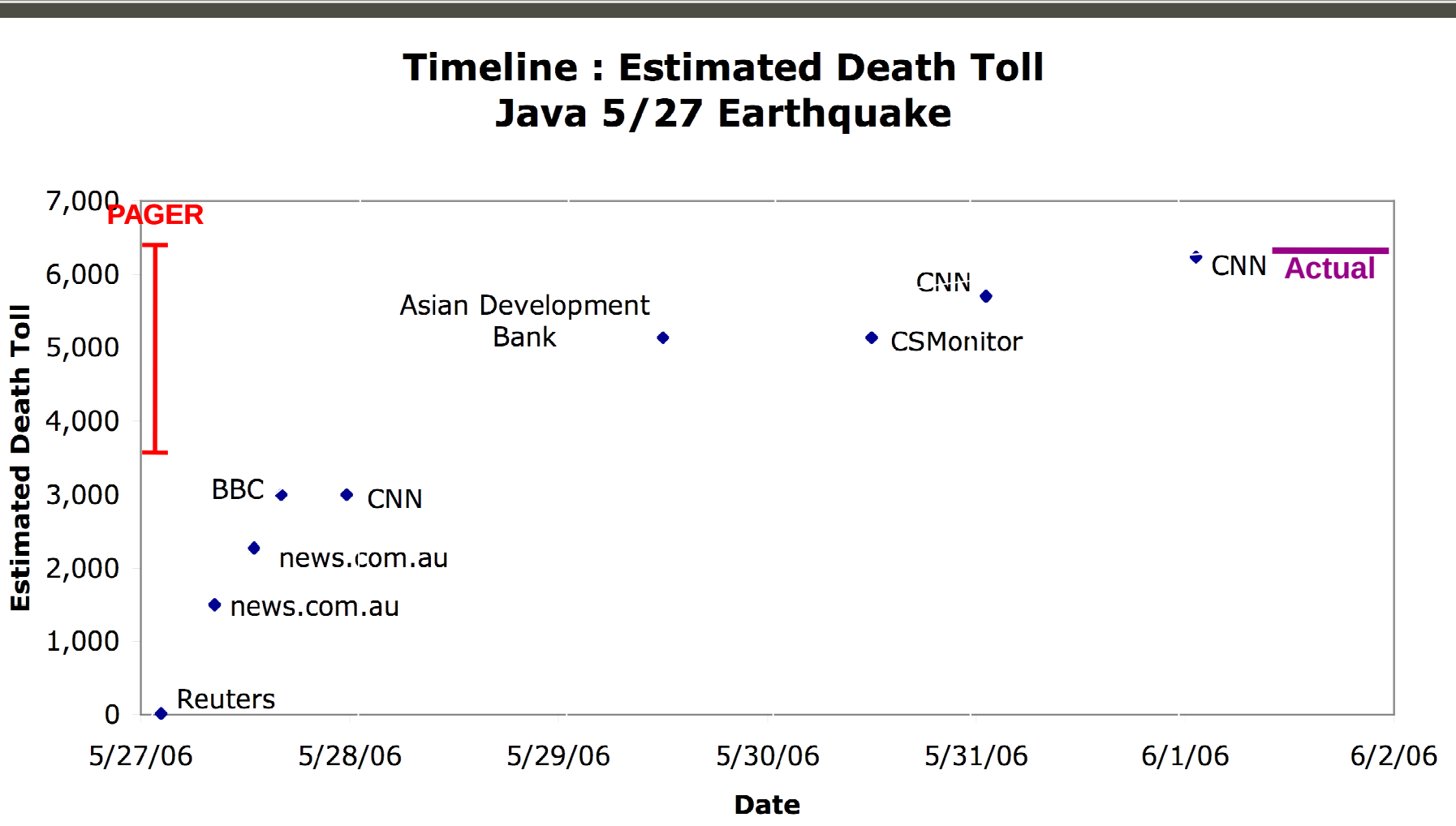
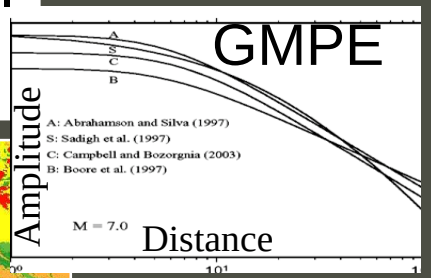
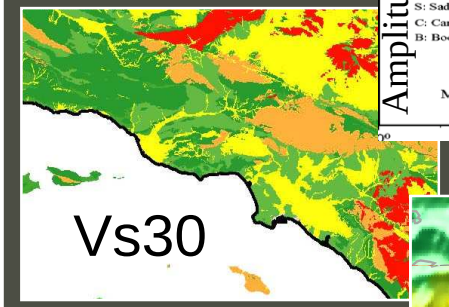
Home
Earthquake Center
Regional Information
Learning & Education
Research & Monitoring
Additional Resources
You are here: Home » Earthquake Center » Magnitude 6.3 - JAVA, INDONESIA
Latest Earthquakes
USA
World
EQ Notification Service
Feeds & Data
Animations
Recent Earthquakes
Historic Earthquakes
"Top 10" Lists & Maps
Significant EQs
Earthquake Search
EQ Summary Posters
Scientific Data
About EQ Maps
Did You Feel It?
Energy & Broadband Solutions
Fast Moment Tensors
Media Info
PAGER
Seismogram Displays
ShakeMaps
Magnitude 6.3 - JAVA, INDONESIA
2006 May 26 22:53:58 UTC
Versíon en Español
Details
Summary
Maps
Scientific & Technic
Earthquake Details
Magnitude
6.3 (Strong)
Date-Time
Friday, May 26, 2006 at
= Coordinated Universal
Saturday, May 27, 2006
= local time at epicenter
Time of Earthquake in other Time Zones
Location
7.962°S, 110.458°E
Depth
10 km (6.2 miles) set by
Region
JAVA, INDONESIA
Distances
20 km (10 miles) SSE of
110 km (70 miles) S of S
150 km (95 miles) SE of
455 km (285 miles) ESE
Location Uncertainty
horizontal +/- 7.5 km (4.
Parameters
Nst=130, Nph=130, Dmin=220.2 km, Rmss=1.4 sec, Gp= 43°,
M-type=teleseismic moment magnitude (Mw), Version=9
Source
USGS NEIC (WDCS-D)
Event ID
usneb6
This event has been reviewed by a seismologist.
Did you feel it?
Report shaking and damage at your location. You can also view a map displaying accumulated data from your report and others.
Magnitude &
< 20 min Epicenter
News Accounts
~ hours to days
USAID

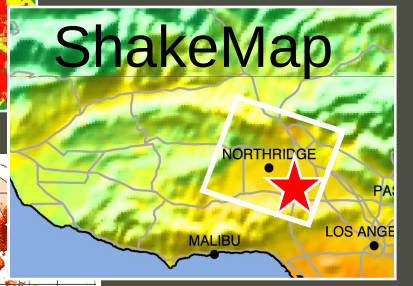

Timeline : Estimated Death Toll
Java 5/27 Earthquake
Estimated Death Toll
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
PAGER
Asian Development Bank
CNN
CSMonitor
CNN
Actual
BBC
CNN
news.com.au
news.com.au
Reuters
5/27/06
5/28/06
5/29/06
5/30/06
5/31/06
6/1/06
6/2/06
Date

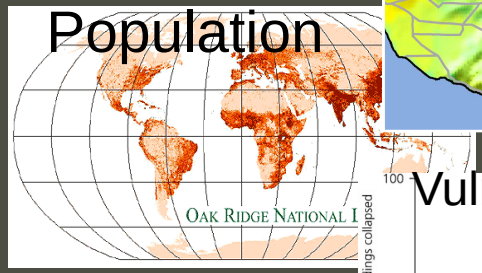
PAGER Ingredients

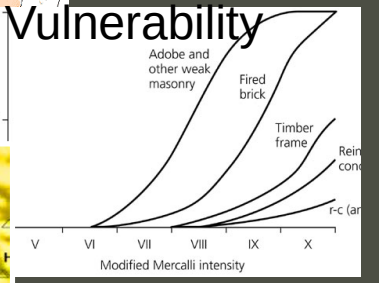
- Earthquake Information (location, magnitude, & rupture dimensions)
- Shaking Observations & Intensities
- Ground Motion Prediction Equations
- Site Conditions (Site Amplification)
- ShakeMap Shaking Estimates
- Population database
- Region-specific vulnerabilities
- Past earthquake database for calibration

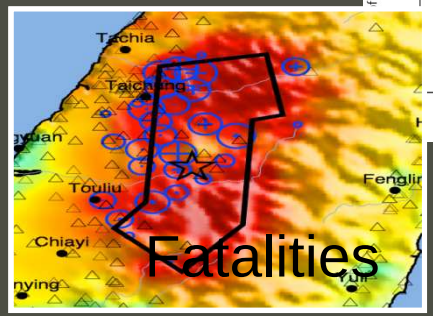












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Earthquake Shaking — Red Alert

GSN ANSS USAID FROM THE AMERICAN PEOPLE

M 7.2, EASTERN TURKEY

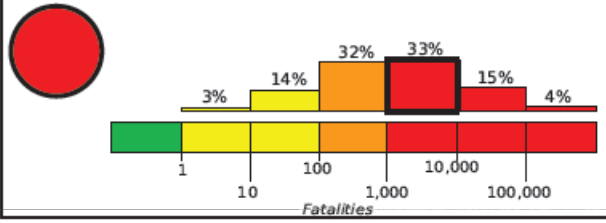
Origin Time: Sun 2011-10-23 10:41:21 UTC (13:41:21 local)

Location: 38.63°N 43.49°E Depth: 20 km

PAGER
Version 3

Created: 1 day, 3 hours after earthquake

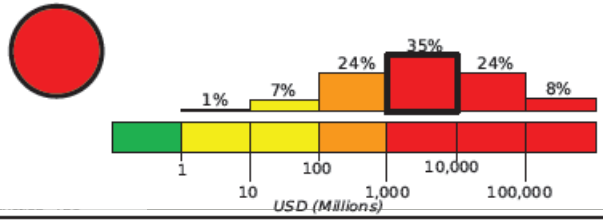
Estimated Fatalities



Red alert for shaking-related fatalities and economic losses. High casualties and extensive damage are probable and the disaster is likely widespread. Past red alerts have required a national or international response.

Estimated economic losses are 0-1% GDP of Turkey.

Estimated Economic Losses



Estimated Population Exposed to Earthquake Shaking

ESTIMATED POPULATION EXPOSURE (k = x1000)		- -*	109*	2,342k*	15,690k	528k	139k	384k	26k	0
ESTIMATED MODIFIED MERCALLI INTENSITY		I	II-III	IV	V	VI	VII	VIII	IX	X+
PERCEIVED SHAKING		Not felt	Weak	Light	Moderate	Strong	Very Strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	Resistant Structures	none	none	none	V. Light	Light	Moderate	Moderate/Heavy	Heavy	V. Heavy
	Vulnerable Structures	none	none	none	Light	Moderate	Moderate/Heavy	Heavy	V. Heavy	V. Heavy

VIII	Van	372k
VII	Sarmansuyu	7k
VII	Ercis	92k
VI	Ozalp	8k
VI	Gevas	12k
VI	Adilcevaz	53k
V	Siirt	114k
V	Batman	302k
V	Gyumri	148k
V	Erzurum	421k
IV	Yerevan	1,093k

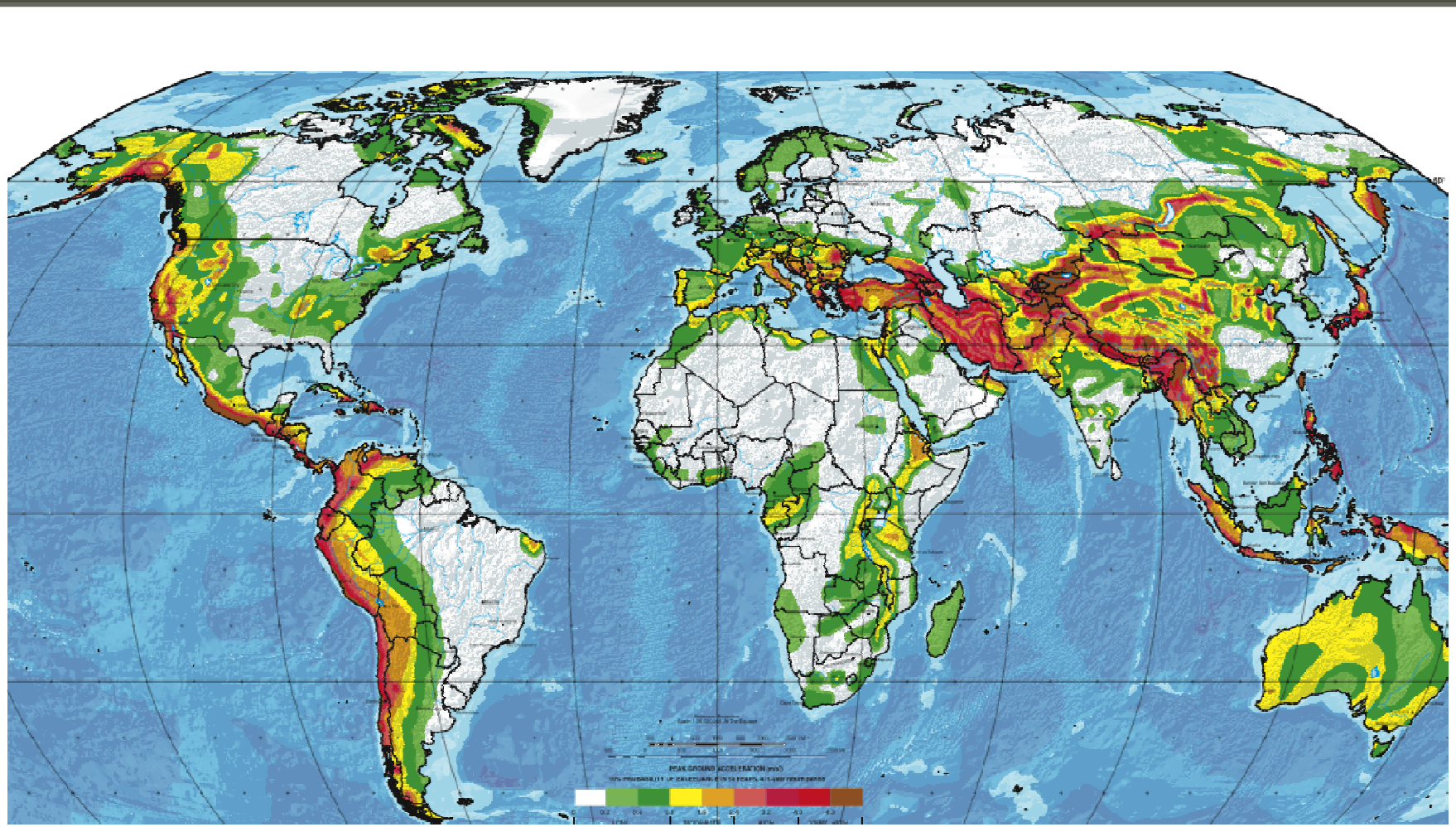
bold cities appear on map (k = x1000)

PAGER content is automatically generated, and only considers losses due to structural damage. Limitations of input data, shaking estimates, and loss models may add uncertainty.

http://earthquake.usgs.gov/pager

Event ID: usb0006bqc

USAID


PEAK GROUND ACCELERATION (m/s²)

Global Earthquake Model

A comprehensive interactive model: Calculating and communicating hazard, risk (exposure and vulnerability) and impacts on the society and the economy

State-of-the-art: Latest developments in science and technology

Community based: Community involved in designing and implementing GEM procedures, software, tools, methods, collecting data etc.

Open access: Open source software, transparent tools and accessible global datasets

Global coverage: Global and regional coverage. Interaction with Regional Programmes

Serving Multitude of Users: Intuitive, customised interfaces and users needs assessments

Dynamic ("alive"): Updatable, modular, flexible models and tools

Public / Private Partnership: Combines strengths and objectives of public and private sectors

Application beyond GEM: Expandable to other perils

PRIVATE PARTICIPANTS

Founders:

Munich RE — 5 Mill. €

AIR WORLDWIDE — 1 Mill. €

ZURICH — 3 Mill. €

Willis — 1 Mill. €

EUCENTRE — European Centre for Training and Research in Earthquake Engineering — 1.6 Mill. €

Sponsors:

FM Global — 1 Mill. €

hannover re — 1 Mill. €

GEM

PUBLIC PARTICIPANTS


Australia


Belgium


Ecuador


Germany


Italy

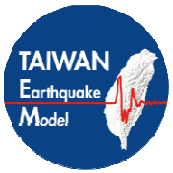

New Zealand


Norway


Singapore


Switzerland


Turkey



TEM


United Kingdom


United States

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Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

GFZ Helmholtz Centre POTSDAM

NANYANG TECHNOLOGICAL UNIVERSITY

NATURAL ENVIRONMENT RESEARCH COUNCIL

MINISTRY OF RESEARCH SCIENCE + TECHNOLOGY
MBIE TE MANATŪ PŪTAIAO

CÁMARA DE LA CONSTRUCCIÓN DE QUITO

The Research Council of Norway

Australian Government
Geoscience Australia

BOĞAZİÇİ ÜNİVERSİTESİ 1863

belspo

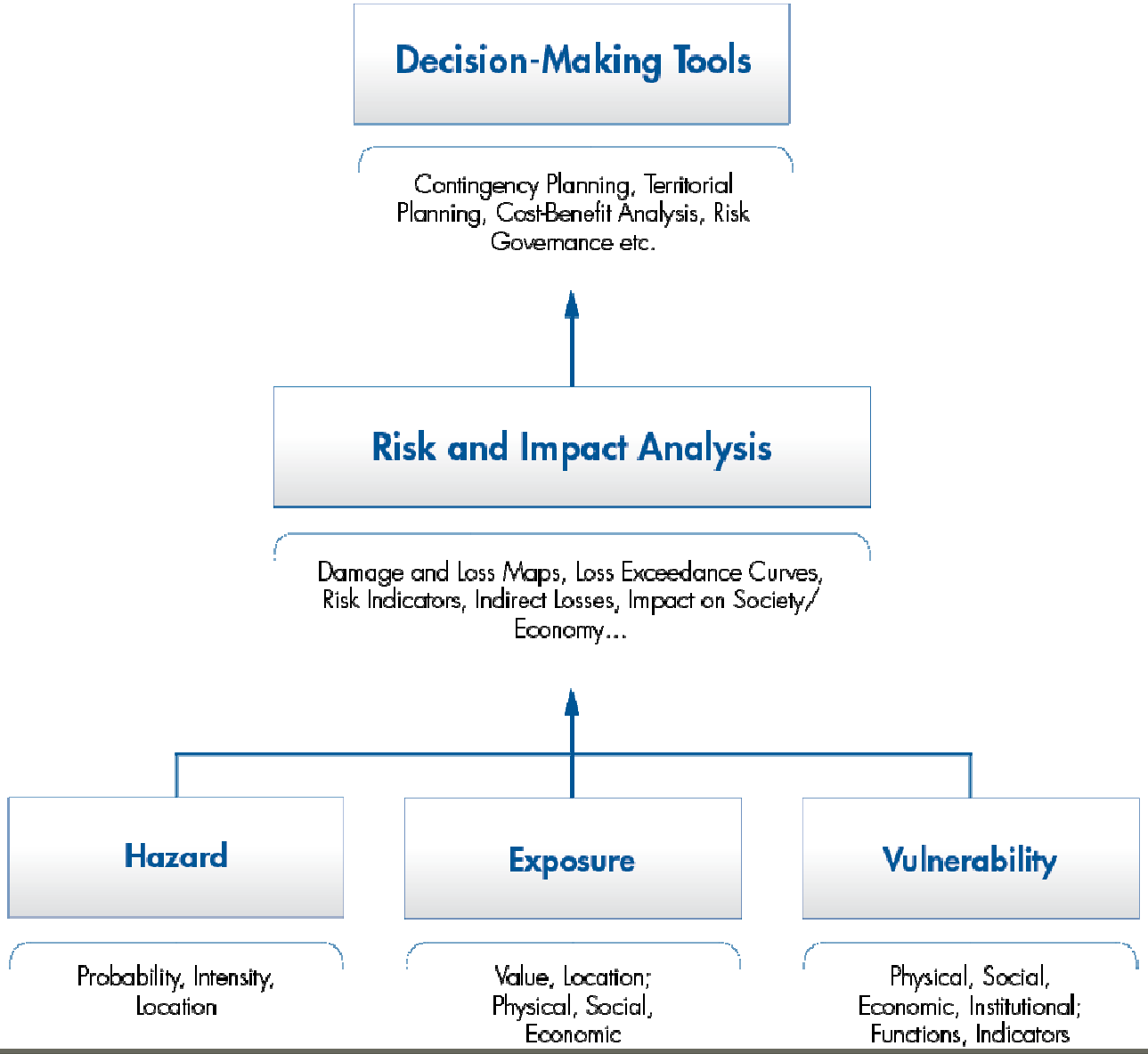
GEM GLOBAL EARTHQUAKE MODEL

ASSOCIATE PARTICIPANTS

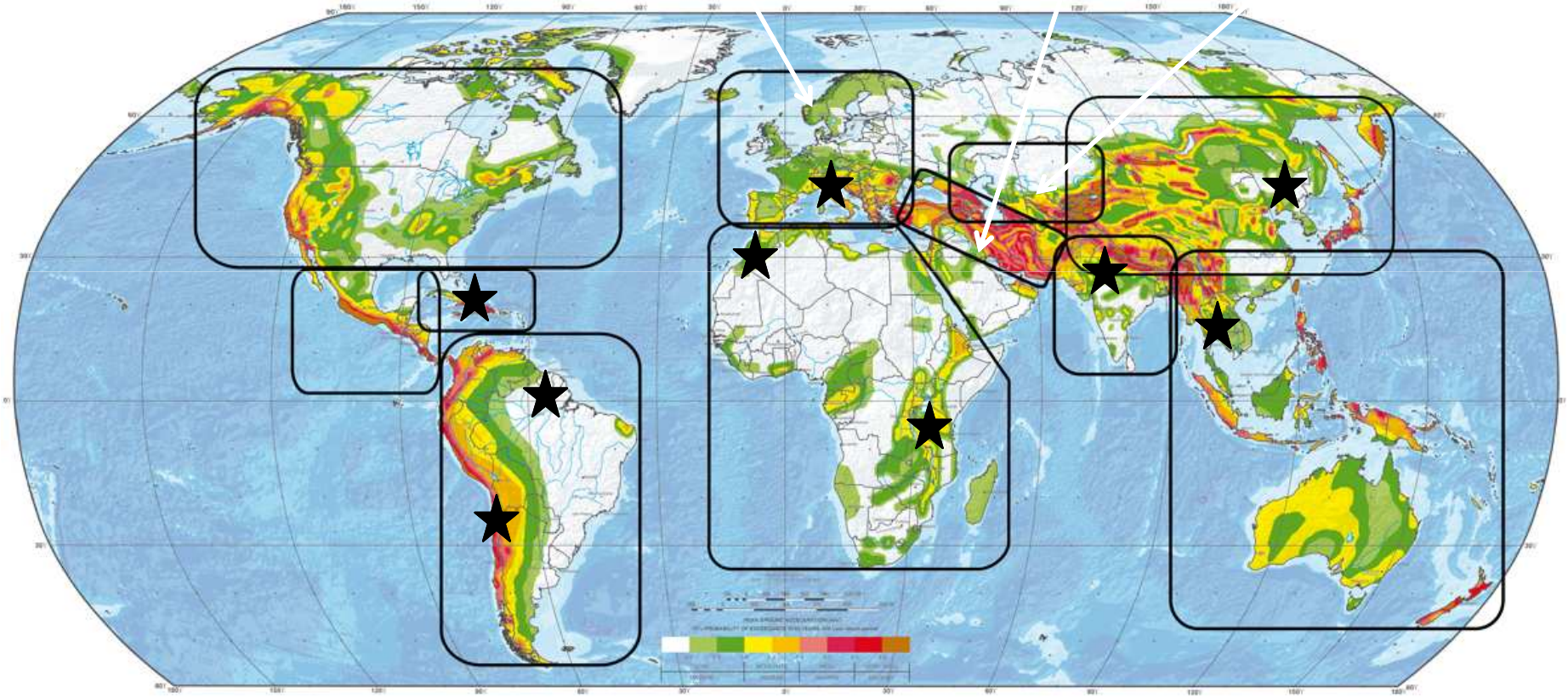
OECD	Organization for Economic Cooperation and Development
WORLD BANK	The World Bank
UN-ISDR	United Nations International Strategy for Disaster Risk Reduction
UNESCO	United Nations Educational, Scientific and Cultural Organization
IASPEI	International Association of Seismology and Physics of the Earth's Interior
IAEE	International Association of Earthquake Engineering

GEM

Scientific Framework of GEM

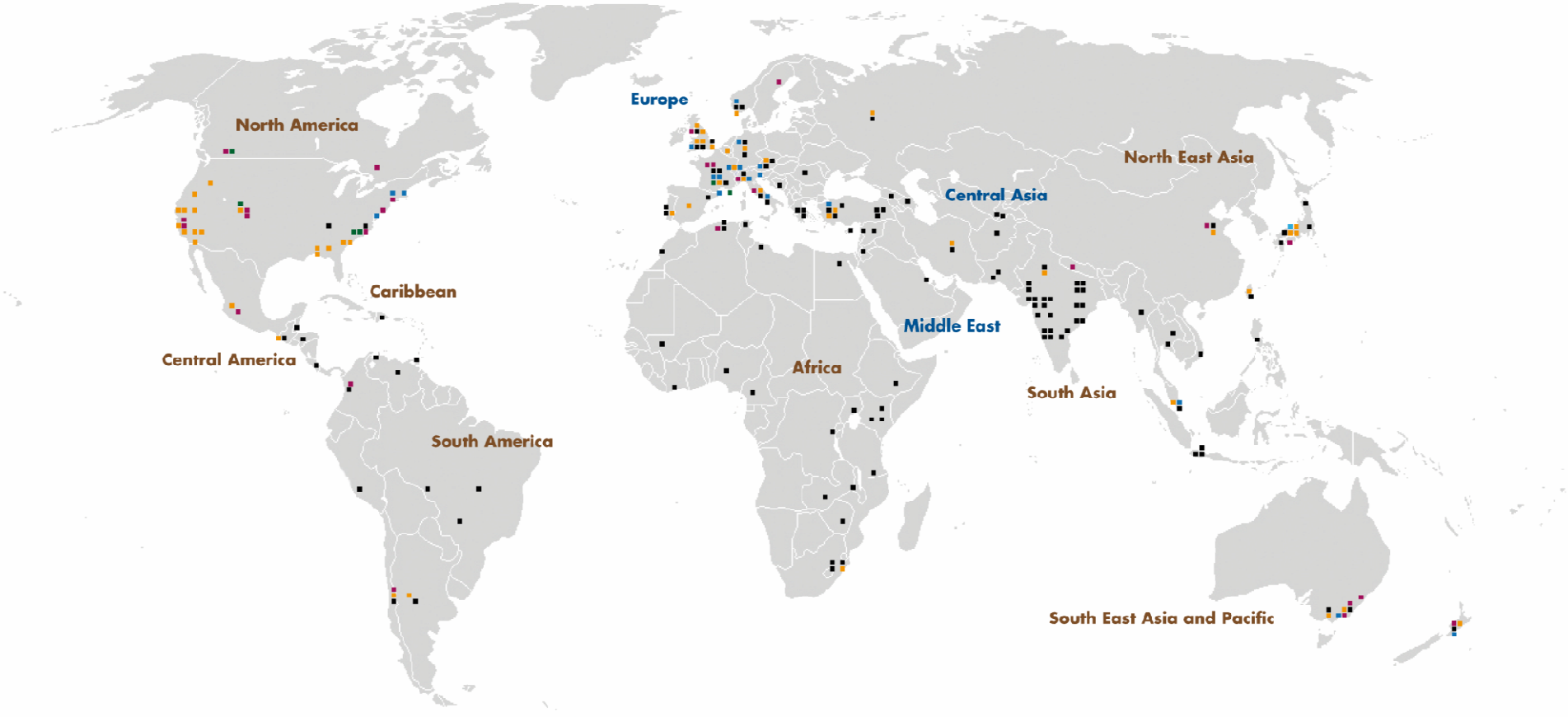


Feeding and feedbacking global models..



★ GEM Regional Workshops

GLOBAL INVOLVEMENT



Summary

- Geoscience is used by OFDA in a variety of ways to reduce the impact of international disasters
  - VDAP- Sustained, international program for volcano-risk reduction
  - EDAT- Seismic hazard assessments and trainings improve risk knowledge and build capacity
  - PAGER- Adds value by estimating the impact of earthquakes
  - GEM- Will improve the communication and calculation of seismic hazard and risk

Lessons Learned

- Training and monitoring saves lives

- Success is achieved through sustained assistance = capacity building
- Match monitoring technology to host-country capabilities and infrastructure
- Focus on risk, not just hazard

Issues

- Bridge the gap between scientists and decision makers
- Decreasing budgets
- Coordination, among donor and scientists, is challenging
- Communication is key

Thank You!

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gmayberry@usaid.gov