

GEO Geohazards Community of Practice

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Co-Chair of GHCP

With input from:

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→ INTERNATIONAL FORUM ON SATELLITE EARTH OBSERVATION FOR GEO-HAZARD RISK MANAGEMENT



GeoHazards Community of Practice (GHCP)

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International Forum on Satellite Earth Observation for Geohazard Risk Management, May 21st-23rd, Santorini: The European Space Agency is organising the International Forum on Satellite Earth Observation for Geohazard Risk Management on May 21st-23rd, 2012 at the Santorini Convention Centre, Greece. Event attendance is open to geo-science, users and experts working in the field of geohazard risk assessment and management. Visit the forum web page ...; See the announcement ...

Conference report published: A brief report on the ESF/COST Conference on extreme geohazards organized under the lead of the co-chairs of the GHCP has been published in the GEO Newsletter No. 18. Read the article ...

Meeting of the GHCP at EGU: The GHCP is convening a meeting collocated with the Annual Meeting of the European Geosciences Union (EGU) in Vienna. The GHCP meeting will take place on Wednesday, April 25, 2012 from 8:30 to 12:00. Read more ...

Conference Declaration available: The declaration of the ESF/COST Conference *Understanding Extreme Geohazards: The Science of the*



Geohazards: A challenge to Society

In many regions, geohazards are a major threat to society, costing lives, disrupting infrastructure and destroying livelihoods. Understanding the associated processes and gaining a comprehensive knowledge of the location and behaviour of these hazards is pivotal for risk assessment, hazard mitigation and adaptation, reduction of vulnerability and preparedness. The importance of observing and understanding geohazards to the GEO Disasters Societal Benefit Area (SBA), in particular, in building a successful Global Earth Observation System of Systems (GEOSS) is clear. Communities of Practice support GEO in its goal to provide the observations required to support informed decisions in the nine SBAs. In particular, Communities of Practice are a key mechanism for the linkage of GEO to the users of products and services provided by the GEOSS.

The Geohazards Community of Practice for GEO

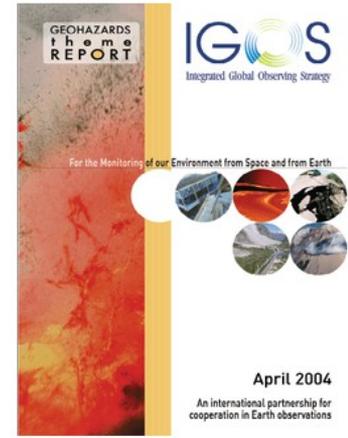
Over the past few years, initial steps have been taken by members of the former IGOS Geohazards Theme Team to make



The Declaration on Extreme Geohazards ...

The Draft Roadmap of the GHCP ...

The GHCP participated in the GEOSS Exhibition co-located with the GEO Plenary and the Ministerial Summit on Earth Observations, held November 1-5, 2010 in Beijing, China. The GHCP presented a poster and was also featured in the COP Brochure.



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GHCP Heritage:

**GEOHAZARDS
t h e m e
R E P O R T**

IGOS
Integrated Global Observing Strategy

For the Monitoring of our Environment from Space and from Earth

April 2004

An international partnership for cooperation in Earth observations

2004

**IGOS Geohazards
Theme Report**
BRGM/RP-55739-FR
August, 2007

igps
integrated global observing strategy

esa **brgm**

2007

**Geohazards Earth
Observation Requirements**
BRGM/RP 55719-FR
August, 2007

igps
integrated global observing strategy

esa **brgm**

2007



GHCP Heritage:

Three international workshops on geohazards

2007: “Frascati Declaration”: Supersites

2009: IGOS-P Geohazards Theme transitioned into the Geohazards Community of Practice

GEOSS STRATEGIC TARGET OF THE DISASTER SBA:

Before 2015, GEO aims to:

9. Enable the global coordination of observing and information systems to support all phases of the risk management cycle associated with hazards (mitigation and preparedness, early warning, response, and recovery).

This will be achieved through:

- more timely dissemination of information from globally-coordinated systems for monitoring, predicting, risk assessment, early warning, mitigating, and responding to hazards at local, national, regional, and global levels;
- development of multi-hazard and/or end-to-end approaches, as appropriate to meet the needs for disaster risk reduction, preparedness and response in relevant hazard environments;
- supporting the implementation of the priorities for action identified in the Hyogo Framework for Action 2005-2015: Building the resilience of nations and communities to disasters (HFA).

GHCP (2010) Road Map, GHCP Strategic Target:

STRATEGIC TARGET OF THE GHCP

By 2020 **put in place all building blocks** for **comprehensive monitoring** of geohazards and the provision of **timely information** on spatio-temporal characteristics, risks, and occurrence of geohazards, **in support of all phases of the risk management cycle** (mitigation and preparedness, early warning, response, and recovery), and as a basis for increased **resilience and disaster reduction**.

GHCP (2010) Road Map, GHCP Strategic Target:

This will be achieved

by developing a **global network of very few carefully selected core sites**. These core sites will provide focal points for a large geographical region, where all building blocks of a **value chain from observations to end users** can be linked together and applied to the phases of the risk management cycle relevant for this region. Thus, these **core sites will demonstrate the concept**, enable scientific studies and technological developments, provide for **capacity building**, and **inform policy and decision making** in the region.



GHCP (2010) Road Map, GHCP Strategic Target:

GHCP Road Map:

- Consistent with GEOSS Strategic Target “Disasters”;
- addresses the full risk management cycle;
- applicable to all natural hazards;
- implementation: *see below*

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**Understanding Extreme Geohazards: The Science of the
Disaster Risk Management Cycle**

European Science Foundation Conference
November 28 to December 1, 2011, Sant Feliu de Guixols, Spain



United Nations
Educational, Scientific and
Cultural Organization



Participants of the Conference.

Declaration on Extreme Geohazards and the Reduction of Disaster Risks



Participants of the Conference.

Declaration:

Recognizing that

- **major research efforts** have been made to understand geohazard causes & processes
- **significant advances** have been achieved in our knowledge of the hazardous areas &, many measures required to prepare for, and adapt to, hazards have been developed
- **international programmes** informing governments, decision makers, and the general public on disaster risks, and ways to reduce these risks, are being conducted



Declaration:

Realizing that

- the **loss of lives** and properties through natural hazards is **rapidly increasing**;
- the direct and indirect consequences of extreme events will likely increase;
- **few options exist to reduce and mitigate geohazards, but vulnerability can be reduced**;
- proper planning of land use, particularly in urban areas, is key to risk reduction;
- the **failure** to significantly reduce the impacts of geohazards on society is partially **due to a gap between science and research programmes and decision makers**;
- **disaster risk reduction rarely happens in communities suffering from poverty, high levels of corruption, or opaque decision making**;
- adaptation to geohazards is hampered by a biased and uninformed perception of the risks and a lack of publicly available, and easy to understand, information;
- research in traditional disciplines faces challenges that discourage integrated research;
- in many regions, rules, laws, and legislation facilitating a safe built environment are either absent, or enforcement is hampered by organizational obstacles inc. corruption;
- large fraction of deaths caused by earthquakes is due to delayed, inefficient response.



Declaration:

Emphasizing the importance of the contributions of many international programmes and organizations, in particular that:

- ...
- the Hyogo Framework for Action (2005-2015) facilitates the implementation of measures to increase the resilience of nations and communities to disasters
- the Group on Earth Observations (GEO) aims to provide the monitoring required to understand the natural hazards and to detect hazardous events in a timely manner;
- the Geohazards Community of Practice of GEO is developing the building blocks informing the four phases of the risk management cycle
- ...

Declaration:

We Participants of the ESF-COST High-Level Research Conference on “Understanding Extreme Geohazards: Science of the Risk Management Cycle,” declare the need that:

- ...
- a **sustained geohazard monitoring system** be implemented to provide observations for research, detection of hazardous events and support of prevention, response, recovery
- **data** relevant to the monitoring and understanding of geohazards **be shared freely**
- ...
- a **dedicated outreach and education programme** be developed to support a **change** in the citizens' and authorities' **perception of the risks** associated with major geohazards
- **information on geohazards be disseminated** so that relevant governmental bodies and citizens can make informed and transparent **decisions on where to build what and how, and where to reduce the vulnerability of existing buildings to future hazards**



Declaration:

We Participants of the ESF-COST High-Level Research Conference on “Understanding Extreme Geohazards: Science of the Risk Management Cycle,” declare the need that:

- ...
- **state-of-the-art products, actionable for policy makers**, be elaborated, to support the development of legislation for risk reduction and planning for a safe built environment
- ...
- a **community-based white paper**, addressing the scientific and societal challenges of increasing disaster risk due to extreme geohazards, be prepared and distributed to funding agencies and governmental and intergovernmental bodies
- a process for an integrated assessment of geohazards disaster risk be established and the results **articulated through an authoritative scientific body** (like IPCC).



Declaration:

Resulted in two main activities:

- White Paper on Extreme Geohazards
- Global Geohazards Information System for Disaster Risk Reduction (GGIS-DRR)

Hans-Peter Plag



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White Paper on Extreme Geohazards

White Paper on Extreme Geohazards

Leads: H.-P. Plag, S. Stein, S. Marsh

Assembling of Drafting Team under way; broad involvement of community

Funding: ESF, ?

Contents:

- How should society confront extreme geohazards?
- What are extreme geohazards? What are the public health impacts?
- How do they compare to other extreme hazards (extreme floods and droughts, impacts from space, solar storms, ...)
- What do we know about probabilities at the upper end and what are the uncertainties?
- How can we deal and/or reduce the uncertainties?
- What are the consequences of the current scientific dialog?
- What are the major vulnerabilities and risks?
- How can we reduce vulnerability and risks?
- Cost/benefit analysis of planning for extreme geohazards

White Paper on Extreme Geohazards

Main goal: Inform mitigation of disaster risk for extreme hazards:

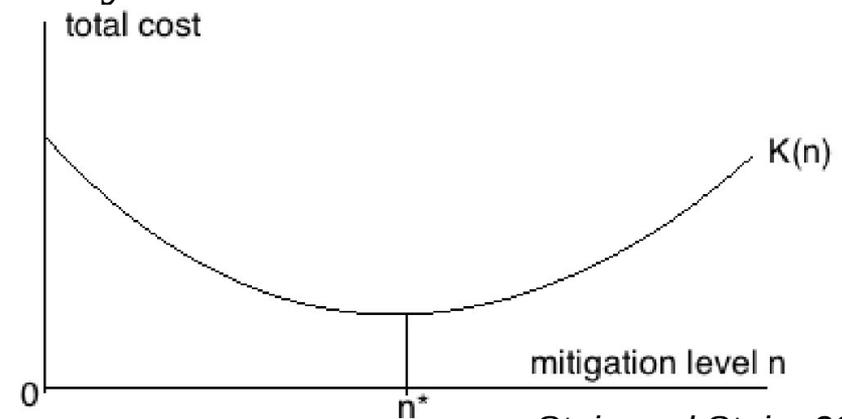
$$r_h^T(I, x, t) = p_h^T(I, t) \cdot V_h^{a(x,t)}(I, t) \cdot a(x, t)$$

$$R_h^T(x, t) = \int_0^{I_{\max}} r_h^T(I, x, t) di$$

Risk = hazard probability X vulnerability X assets

Total cost = mitigation costs
+ expected loss

Optimization of mitigation level n



Stein and Stein, 2012

White Paper on Extreme Geohazards

Main goal: Inform mitigation of disaster risk for extreme hazards:

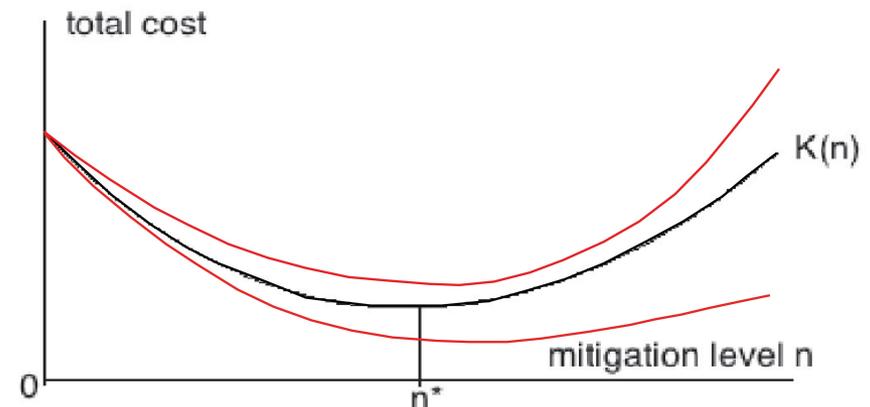
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Optimization of mitigation level n



White Paper on Extreme Geohazards

Time schedule:

- End of May 2012: drafting team assembled
- 1 August 2012: Draft available for community responses
- Before 1 September 2012: Meeting of Drafting team
- 1 October 2012: Final Draft available for comments
- 1 December 2012: White Paper available for public launching (at AGU, IUGG CRC conference on extreme Disasters, ...)

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Global Geohazards Information System for Disaster Risk Reduction (GGIS-DRR)

Whatever is decided today is out-of-date by the time it is designed, tested, and implemented!

Alan Edwards, 2012

The design of ... of the future must be very flexible and highly adaptive

Challenge: Developing today the concepts for the technology of tomorrow!

Question: What are the basic characteristics of an information and management system based on tomorrow's technology?

- globally available and accessible;
- processing resources where the data sources are;
- scalable;
- best and next practices and workflows available to everybody;
- access to base datasets;
- updated in real-time;
- information density and quality increased through crowd sourcing.

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Recovery

- revised hazard maps
- informed land use planning
- risk-based, post-event planning

Contents
& Functions



Preparedness

- hazard maps
- past hazards and disasters
- vulnerabilities and assets
- hazard monitoring



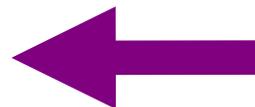
GGIS-DRR

- globally available and accessible
 - scalable
- cloud hosting and computing
 - multi-media accessible
 - best and next practices
 - crowd sourcing
- GIS, web-based, interactive
 - visualizations



Response

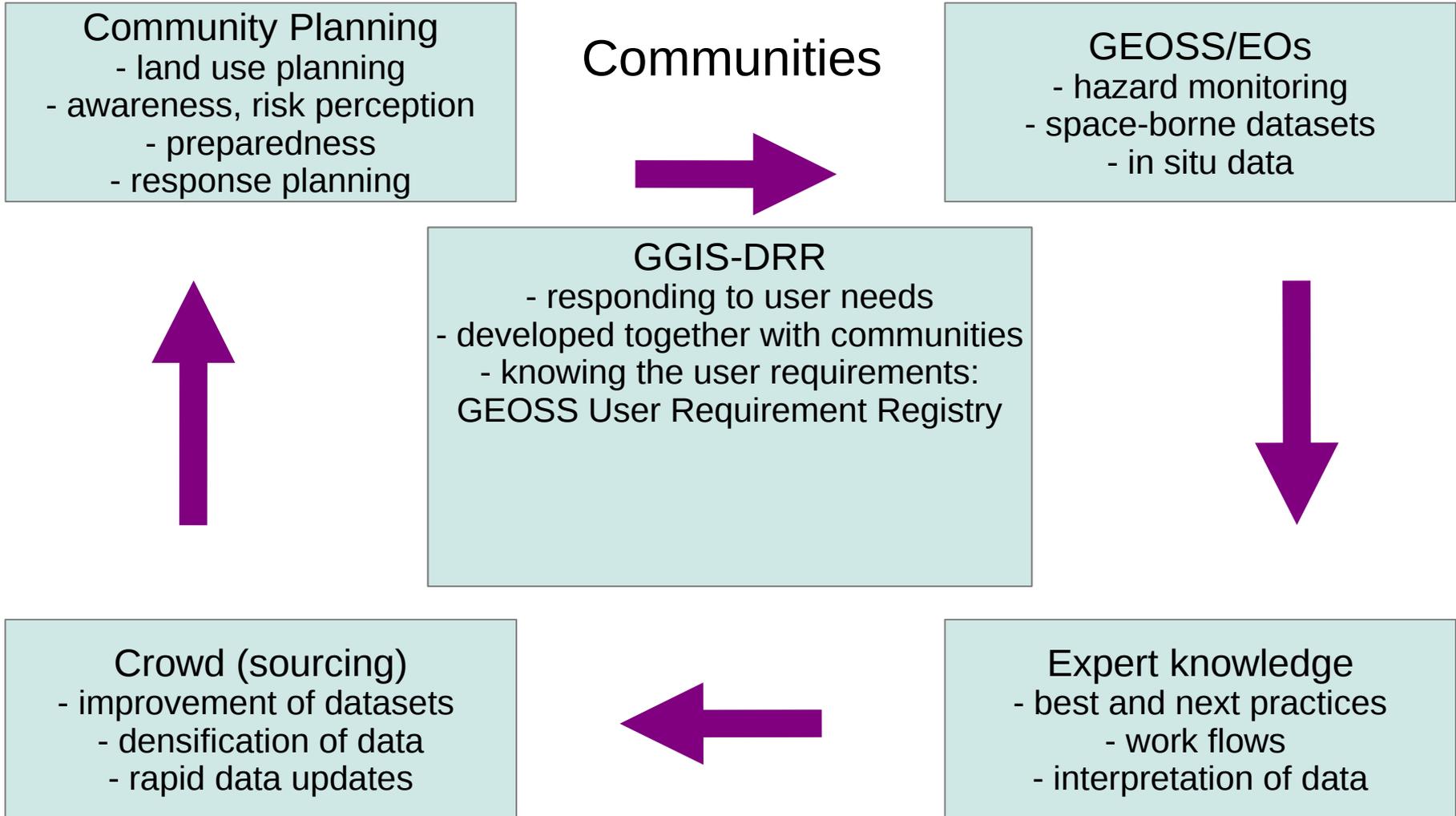
- rapid disaster assessments
 - crowd sourcing
- guidance for response teams
 - response planning



Early Warning

- early detection
- time-variable risks
- warnings to authorities
- public information system

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ADDITIONAL IMPACTS:

- equal opportunity: urban and rural; developed and developing;
- support focus on most relevant hazards;
- change risk perception;
- support improved decision making to access to information, intelligence;
- standardization, interoperability, data sharing

IMPLEMENTATION:

- provision of key resources through developed countries;
- web-based access provides global availability;
- scalable;
- community support (from state/national agencies, research groups, use cases)
- makes best/next practices available to others

PARTICIPATION:

- Task Team of DI-01 and GHCP;
- GEO Participating Organizations (POs);
- international and national agencies;
- non-governmental organizations;
- links to national and regional agencies through Member Countries of GEO;
- re-insurances;
- private industry (Esri, ...)

POPULATION THROUGH USE CASES, E.G.:

- Strain maps (global: UNR; regional: Nevada)
- Shakemaps (California, Nevada)
- Fault database (Nevada)
- Landslide data (Italy)
- Volcanoes (Italy and Democratic Republic of Congo)
- Land use planning based on hazard assessments (tbd)
- Tsunamis (tbd)



Two main activities of the GHCP:

- White Paper on Extreme Geohazards
- Global Geohazards Information System for Disaster Risk Reduction (GGIS-DRR)

Thank You