

# **Consortium of Earth Science National Laboratories**

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# **Consortium of Earth Science National Laboratories**

- Istituto Nazionale de Geofisica e Volcanologia, INGV
- ETH Zürich
- L'institute de Physique du Globe de Paris, IPGP
- National Environment Reserach Council –  
British Geological Survey, NERC-BGS
- Utrecht University
- Institute of Earth Sciences "Jaume Almera", ICTJA
- German Research Centre for Geosciences, GFZ
- Polish GeoPlanet Initiative

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The participants of the meeting accepted the strong demand to foster the institutional co-operation on the European level and to bring together the Earth science community. Future joint activities will focus on those societal challenges, requiring reliable knowledge of the Earth's interconnected systems and related research infrastructures for its profound investigation. Among others, accordant top sciences priorities could be

- climate change
- natural hazards
- natural resources (geo-resources)

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Future cooperation/coordination (to be discussed, not yet confirmed)

- Major participation in EPOS
- Mobile instrumentpools for geosciences (i.e. Alp-Array)
- Multi parameter Observatories (i.e. IPOC, Central Asia,..)
- Preparation, construction and operation of joint infrastructures

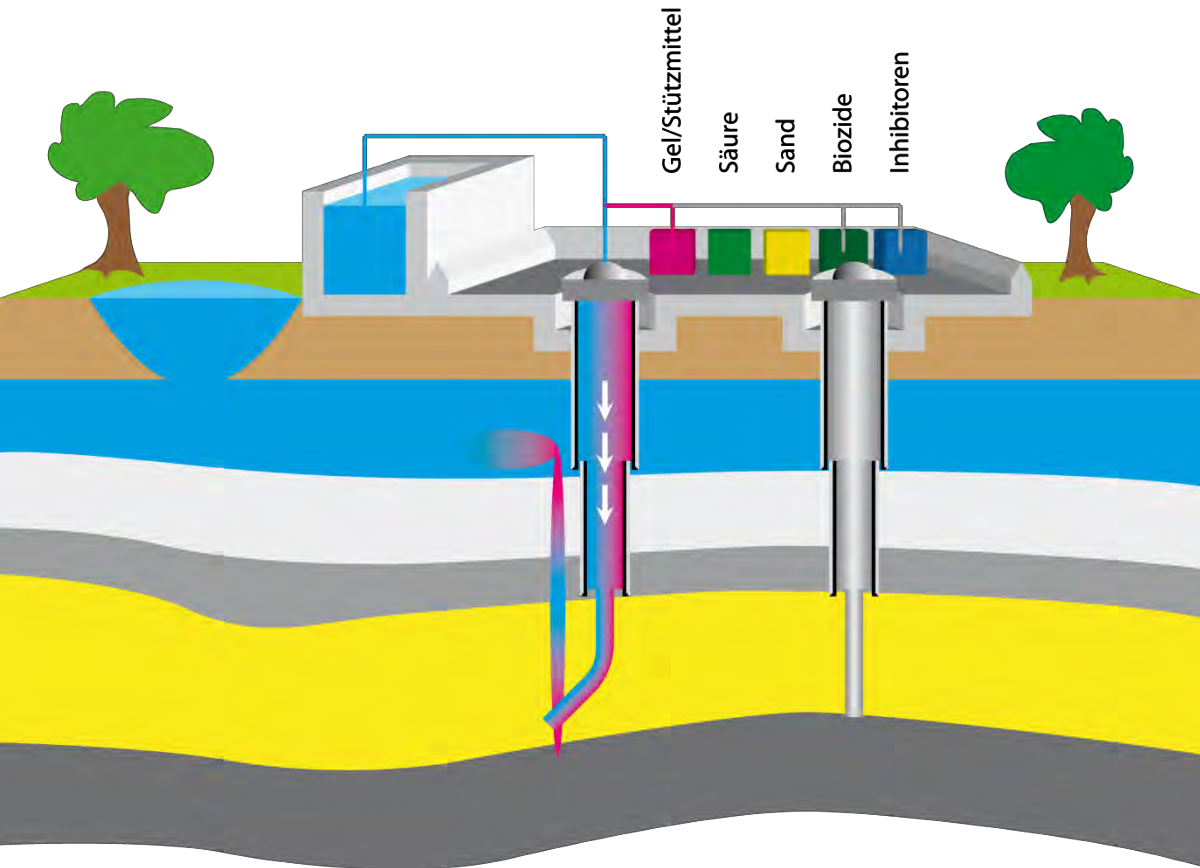
# Example: Risk Assessment

- Time dependency of risks, multi-risks
- Risk assessments mainly static and oriented along one hazard
- We are confronted with dynamic Inputparameters:
  - a) Hazard (i.e. climate change induced)
  - b) Vulnerability (population increase, Change of accumulated values, infrastructure)
  - c) New hazards induced by intensified usage of the underground (storage and usage)

## Strategy

Monitoring:	improved Integration of land-based and satellite-based methods, „Change Management“, early warning
Simulation:	hazard + vulnerability, handling of uncertainties (probabilities)
Cascade effects:	Assessment of coupled or cascading risks (i.e. Fukushima)
Knowledge Transfer:	construction codes, security norms, legal regulations

# Example: Risk Assessment for Subsurface Stimulation, a Contribution to Societal Security



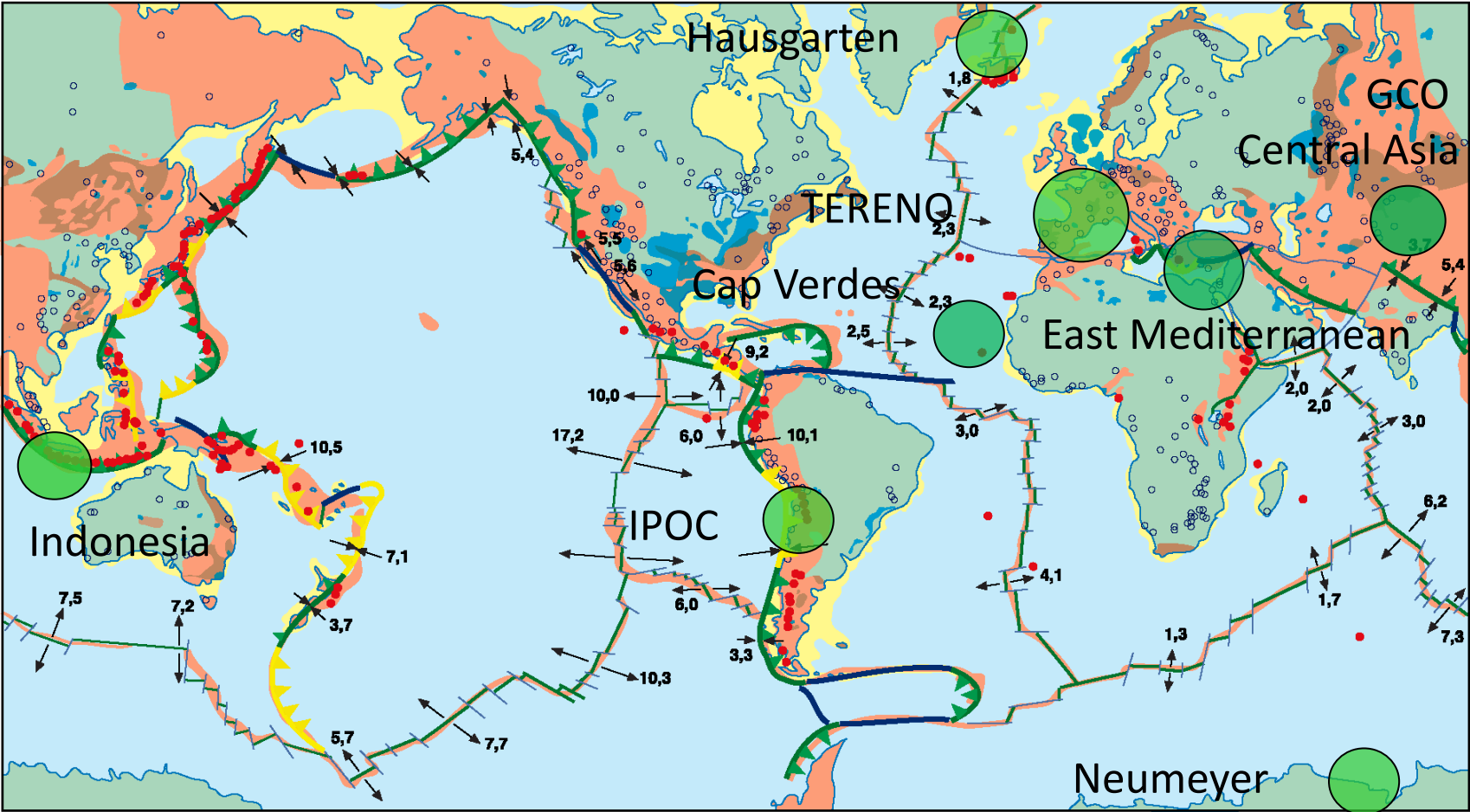
## Risk:

- Activation of existing faults
- Connectivity of deep (saline) and near surface aquifers
- Induced seismicity

## Strategy:

- Modelling of rupture propagation
- Stress field analysis
- Monitoring of stimulation
- Microseismic monitoring

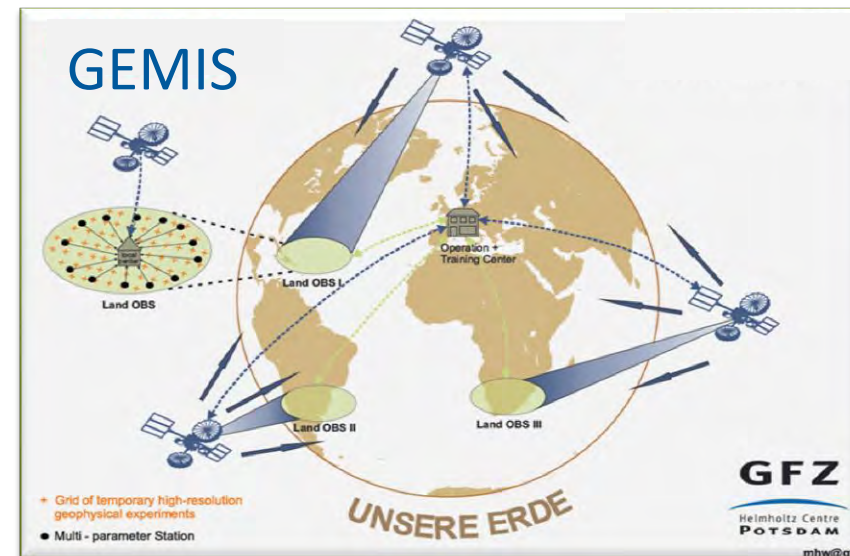
# Plate Boundary and Global Change Observatories



# GFZ – Vision: Global Integrated Multiparameter Earth Observation System (GEMIS)

GEMIS may consist of different components:

- **Priority 1:** Land-based multi parameter observatories, consisting of a basis observatory, multi parameter stations, temporary instrument arrays. It is mandatory to establish land-based observatories to serve as the urgently needed scientific ground segment for all types of Earth observation satellites for calibration and ground truthing.
- **Priority 2:** Centre for infrastructure operation and for Capacity Development in developing countries
- **Priority 3:** System of small satellites for global near real-time coverage of key parameters
- Lifetime: 10 years +





# Global integrated multi-parameter earth observation and validation system (GEMIS)

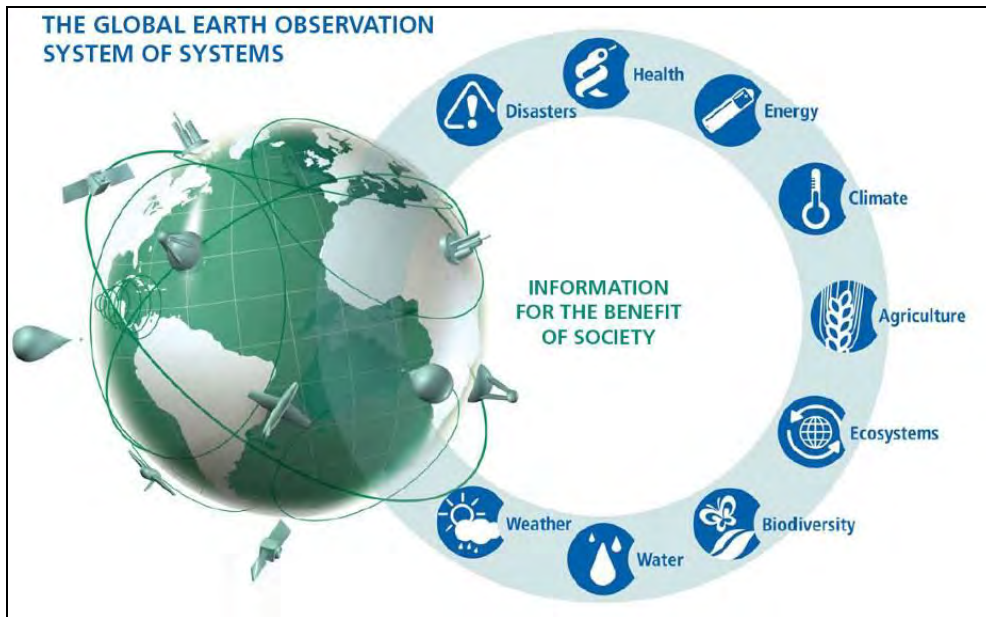
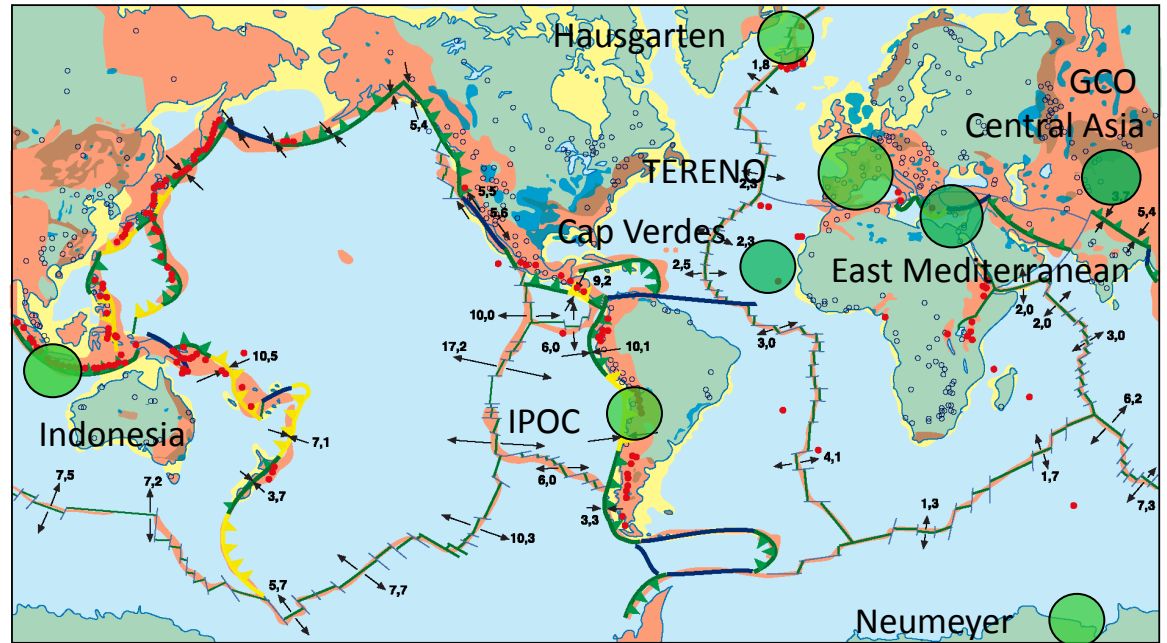
## GOALS

- Long time series of key parameters of continuous high quality for joint assessment, attribution and forecasting with earth system models.
- Select critical locations where high risk hazards and significant global change occurs.
- Facilitate tight integration of information from satellite based remote sensing and in-situ long term observatories (scientific satellite ground segment).
- Where possible regional co-location of observation infrastructure in integrated observatories that serve more than one purpose (hazards, climate- and land use changes)

## IMPLEMENTAION

- Support a finite number of land/coastal/ocean based multi parameter integrative long term observatories supplemented by temporary process experiments.
  - Support distributed operation centres to ensure the operation of the observatory and provide local capacity development in less developed regions.
  - Supplement operational satellite missions by a number of mini-satellites for better space and time resolution of key parameters.
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Already existing observatories, operated by the participating centres forming the basis for GEMIS. Other potential target regions might be Siberia, South Africa, Brasilia



GEMIS: Major contribution to EPOS, GEO, GEOSS.