Cooperating Country Report
Belgium

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Outline

1. Introduction to the Geological Survey of Belgium

2. Country report - ongoing projects Asia

3. Future opportunities for cooperation with CCOP member countries and organisations.
1. GSB

1896
Creation of Geological Survey of Belgium, (GSB)
‘125 year anniversary in 2021’

1971
GSB member of EuroGeosurveys

2002
GSB becomes part of the Royal Belgian Institute of Natural Sciences

2025...
Towards 1 European Geological Service in collaboration with EuroGeoSurveys – GSB partner
GSB main activities

• Scientific research and services

• Collection management

• Education and public engagement (museum, geopark)
Conduct fundamental and applied scientific research on the evolution of the lithosphere, on the geological component of our environment, and on its mineral and energetic resources.

Carry out scientific expertise in the scope of EuroGeoSurveys and international research institutes: cartography of geological resources and natural risks, traceability of raw materials, sustainability of mineral and energetic resources.

Geological Survey of Belgium – Research axes

Axis 1: Dynamics of the Sedimentary Basins – Geohazard research group

Axis 2: Geological Model of Belgium

Axis 3: Minerals and Raw Materials

Axis 4: Geo-energy

Axis 5: Geoheritage

- Reconstructing the geological history of natural hazards by studying their sedimentary record (onshore & offshore).
- Monitoring of earth surface deformation with remote sensing (InSAR, aerial mapping) technologies
- Historical aerial photographs & digital photogrammetry for landslide assessment
- Human impact on river flooding
- Mapping
Sentinel-1 data and PSI Techniques for monitoring earth surface deformation

Opportunities:

• Sustainable use of groundwater (groundwater pumping)
• Earth surface deformation - coastal flooding
• Patterns, amounts & rates of inter-seismic deformation – crucial for understanding subduction processes & hazards, inter-seismic strain models
• ...

Ground water rise since 1980s

Uplift of Brussels due to recharge of aquifers (extreme groundwater pumping stopped)
GSB Research

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- Most active topics: geothermal and CCS

- Exploration, assessment and full chain analyses (modelling)
  - From desktop studies to drilling and seismic campaigns
  - Specialized thermal conductivity lab

DGE-Rollout (EU Interreg NWE): Roll-out of deep geothermal energy in NWE

BruGeo (BCR-ERDF): Valorisation du potentiel géothermique de la Région Bruxelles-Capitale
http://geothermie.brussels/fr

GEOCAMB (BELSPO BRAIN-be 2.0): Geothermal energy in Cambrian rocks with public buildings focus

Geothermal-DHC (EU COST Action): Research network for including geothermal technologies into decarbonized heating and cooling grids
https://www.geothermal-dhc.eu

HyStorIES (EU H2020): Hydrogen storage in European subsurface
GSB Research

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Axis 5: Geoheritage - karst research

www.geoparkfamenneardenne.be

Karst

- Air temperature and pCO₂ monitoring in (archaeological) caves
- Climate and environmental reconstructions
- Impact of earthquakes on karst areas / caves
- Setting up and scientific support of the first Belgian UNESCO Global Geopark Famenne-Ardenne.


Palaeoclimatic reconstruction study inferred from a stalagmite from the Ta Chinh cave, NW Vietnam.
2. Country report – ongoing research Asia

Bilateral research projects by Belgian research institutes and universities, mainly funded by Belgian Science Policy and VLIR-UOS.

**Georesources**

**Vietnam**

- Impact of saltwater intrusion on water resources and irrigation in the Southern Central region of Vietnam under climate change.
  - Funded by VLIR-UOS TEAM project (2019-2022)
  - Ghent University and Vietnam Institute of Geosciences and Mineral Resources, Vietnam National University of Agriculture, National Center for Water Resources Planning and Investigation

- Developing expertise for deep seawater intrusion characterization through electrical resistivity tomography in the Mekong Delta.
  - Funded by VLIR-UOS
  - Ghent University, Vietnam Institute of Geosciences and Mineral Resources

**Geoheritage**

**Vietnam**

- The Palaeozoic treasure trove of Vietnam
  - Funded by VLIR-UOS Global Minds – University Development Cooperation Capacity Building (2020)
Sawahlunto Formation in the Ombilin Basin, West Sumatra yielded terrestrial late Eocene-early Oligocene vertebrates contemporary with the initial emergence of the Sunda Shelf Islands.

Wallace’s Line today demarcates the separation between an Asian biotic province in northern Oceanic Southeast Asia (OSEA) and an Australian biotic province in southern OSEA. Likely related to northward movement of the Indo-Australian plate towards and along the Sunda Shelf.

Tanjung Formation in the Asem Asem Basin, southwestern Kalimantan yielded marine middle-late Eocene vertebrates.
Country report – ongoing research Asia

**Geohazards - Japan**

Paleo-tsunami and earthquake records of ruptures along the Nankai Trough, offshore South-Central Japan

**International cooperation project**, Funded by BELSPO Brain.be (2013-2019)
Partners: Geological Survey of Belgium, Geological Survey of Japan, Ghent University, Liege University, University of Tokyo, Mount Fuji Research Institute, University of Cologne.

**Aims:**
- To generate a longer time series of tsunami and (megathrust) earthquake recurrences
- Investigate the pre-historic geological record of:
  - paleo-tsunami in the coastal region around Lake Hamana and onshore Lake Hamana
  - paleo-earthquakes, Mnt Fuji Five lakes.

**WIN-WIN:**
- Transfer of knowledge Japan- Europe and vice-versa.
- Training of Japanese and Belgian PhD and postdoc researchers
- High amount of impact factor research papers published with Japanese and Belgian lead authors
New records of prehistoric-tsunami deposits in the coastal area and offshore Hamana Lake

Coring Mnt Fuji lakes – paleoearthquake record and eruption history

The fieldwork team during a high-resolution reflection seismic expedition on Lake Motosu (Fuji Five Lakes, Japan).
Study of the earthquake activity and paleoenvironmental changes using lake sediment records from western Sumatra.

Bilateral (Belgium-Indonesia) cooperation project (2018-2021)
Ghent University, Indonesian Institute of Sciences (LIPI, Bandung), GDA Consulting (Indonesia)

Aim: Establish a multi-source earthquake history for western Sumatra

- Collect high-resolution reflection seismic profiles and short sediment cores from Lakes Singkarak and Maninjau (western Sumatra)
- Identify, map, characterize and date underwater landslide deposits and turbidites
- Disentangle turbidites caused by earthquakes, volcanic activity or strong precipitation events
- Distinguish between turbidites triggered by megathrust earthquakes and by crustal or intraslab earthquakes
- Verify if crustal earthquake doublets can be recognized in the sedimentary record
- Establish a multi-source earthquake history
- Verify if the lake sediments also hold a useful record of (recent) past climate and environmental changes
3. Future opportunities for cooperation CCOP

- GSB will continue to **seek funding for collaboration projects** with CCOP member countries and geoscience agencies for opportunities to cooperate.
- GSB will continue to **facilitate and enable collaboration** between Belgian research entities (institutes, universities) and CCOP member countries and organizations.

- In particular GSB/Belgium has an interest for collaboration in the following geoscience disciplines
  - **Geoenergy** (geothermal and CCS)
  - **Geohazards** (the sedimentological imprint of onshore and offshore extreme events, landslide and earth surface deformation monitoring,..)
  - **Geoheritage** (karst, paleontology, natural building stones, support in development of UNESCO Geoparks,)
Walk Online Through the Museum of Natural Sciences, Brussels, Thanks to Google
Thank you for your attention!

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