Natural analogues in Europe – overviewing the CGS Europe questionnaire survey

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Natural analogues

Why interesting? Why study?

- To study CO$_2$-induced or CO$_2$-mediated processes (e.g. fluid-rock interactions in reservoir).
- To investigate potential CO$_2$ or brine leakage processes.
- To study environmental impacts (by CO$_2$ or brine).
- To test monitoring techniques.
- To...

At natural settings/conditions/timescales!
Natural analogues

What could be a natural analogue? “CO₂”

- Natural CO₂ reservoirs
- CO₂-rich HC fields
- Pathways of fossil CO₂-fluid conduits
- Mofettes or CO₂-bearing springs
  incl. thermal springs, CO₂ seeps
- Sub-aquatic CO₂ sources
- Methane seeps
- CO₂-rich groundwater
- CO₂-affected ecosystems
- ...

October 17-19, 2011
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2nd CGS Europe Knowledge Sharing Workshop
Natural Analogues
Natural analogues

What could be a natural analogue? “Brine”

- Groundwater impacted by ascending formation brines
- Salty springs
- Brine-related ecosystems
- ...

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Natural analogues in CGS Europe countries

Present & studied
Present
Absent
$\text{CO}_2$ reservoirs in CGS Europe countries

Present & studied

Present

Unknown
Mofettes and CO$_2$ seeps in CGS Europe countries

Present & studied
Present
Unknown
Subaquatic CO$_2$ sources in CGS Europe countries
CO$_2$-affected ecosystems in CGS Europe countries

- **Present & studied**
- **Present**
- **Unknown**

Map showing the distribution of CO$_2$-affected ecosystems in CGS Europe countries with specific regions marked in green, yellow, and gray.
Occurrence of CO$_2$-rich groundwater in CGS Europe countries

Present & studied
Present
Unknown

NOT STUDIED VERY MUCH IN CONTEXT OF CGS
Salty springs in CGS Europe countries

Present
Unknown

NOT STUDIED SO FAR IN CONTEXT OF CGS
Groundwater impacted by ascending formation brine in CGS Europe countries

NOT STUDIED SO FAR IN CONTEXT OF CGS
Brine-related ecosystems in CGS Europe countries

NOT STUDIED SO FAR IN CONTEXT OF CGS
Summary: Natural analogues

Natural analogues in CGS Europe countries are....

- manifold and present in many different countries

- studied to varying degrees:
  - well studied where present/known: subaquatic CO$_2$ sources
  - well studied in some countries: mofettes, CO$_2$ reservoirs
  - less intensely studied: CO$_2$-affected ecosystems; CO$_2$-affected groundwater.

- Natural analogues for salt water impacts not well known and not well studied!
  (But important issue in public debate...)

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Presentations about natural analogues in CGS Europe countries

Map of Europe showing countries where natural analogues are present, studied, or absent.
Acknowledgements

Many thanks to CGS Europe partners for their input!

Thank you very much for your attention!