

SCHWEIZER KOMPETENZZENTRUM FÜR TIEFENGEOTHERMIE ZUR STROM- UND WÄRMEPRODUKTION

EGS PILOT PROJECTS IN SWITZERLAND: STATUS AND OUTLOOK

SCCER-SOE, ETH ZÜRICH, 30.09.2014

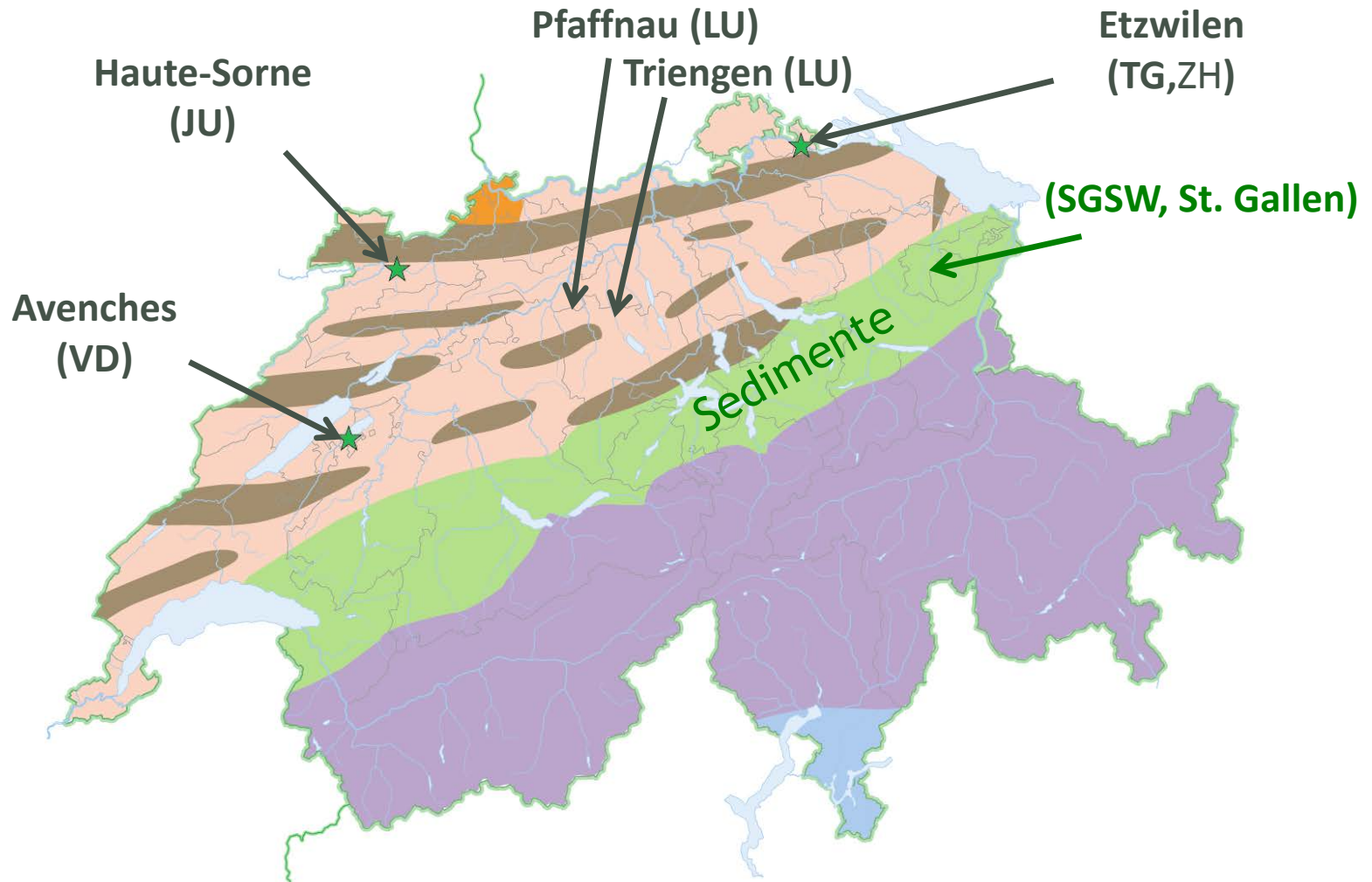
DR. PETER MEIER, CEO
WWW.GEO-ENERGIE.CH

Ein Gemeinschaftsunternehmen Sieben Schweizer Energieversorger



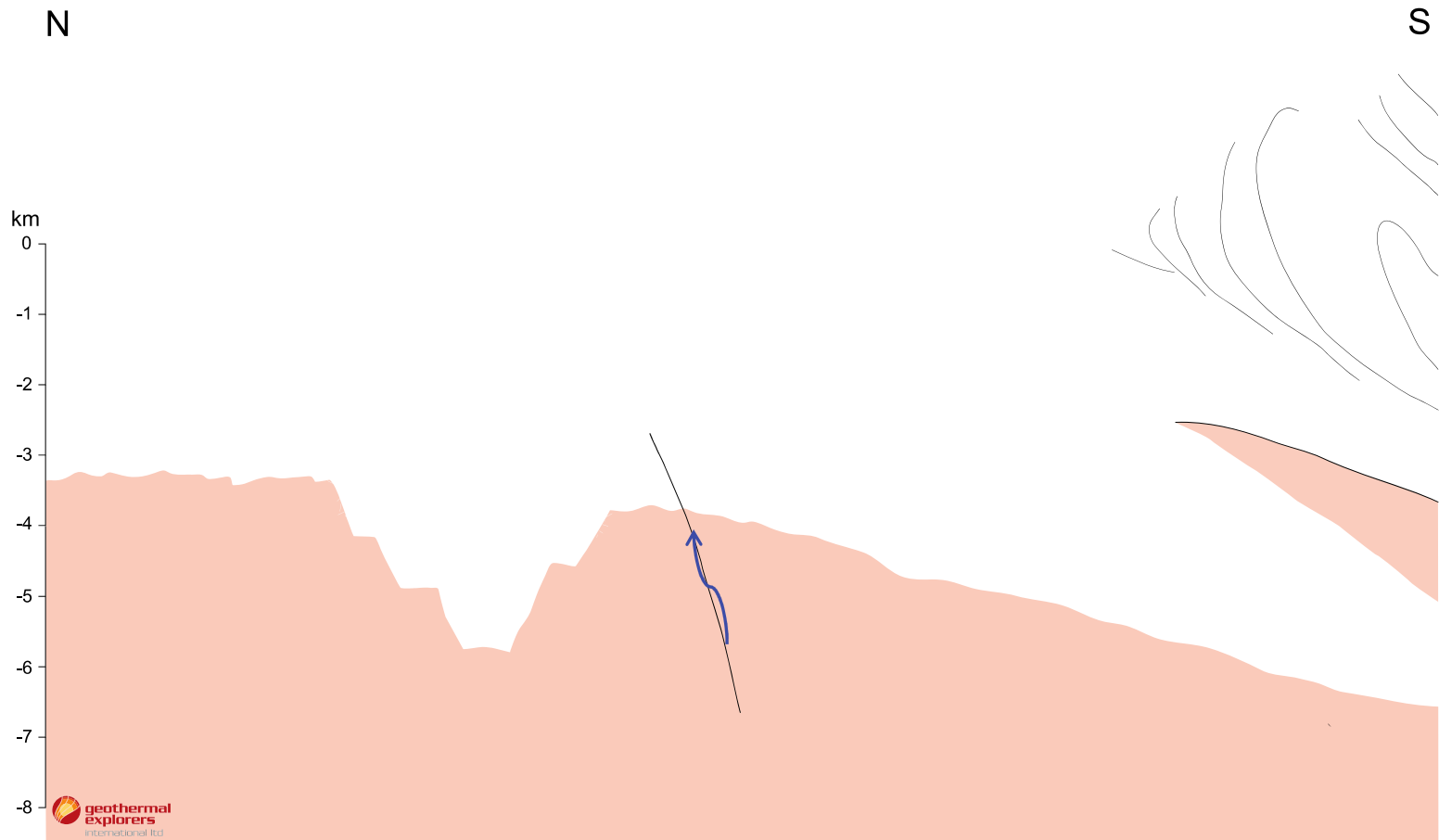
Geo-Energie Suisse:

Project development at 3 to 5 sites
Focus on petrothermal in crystalline rock



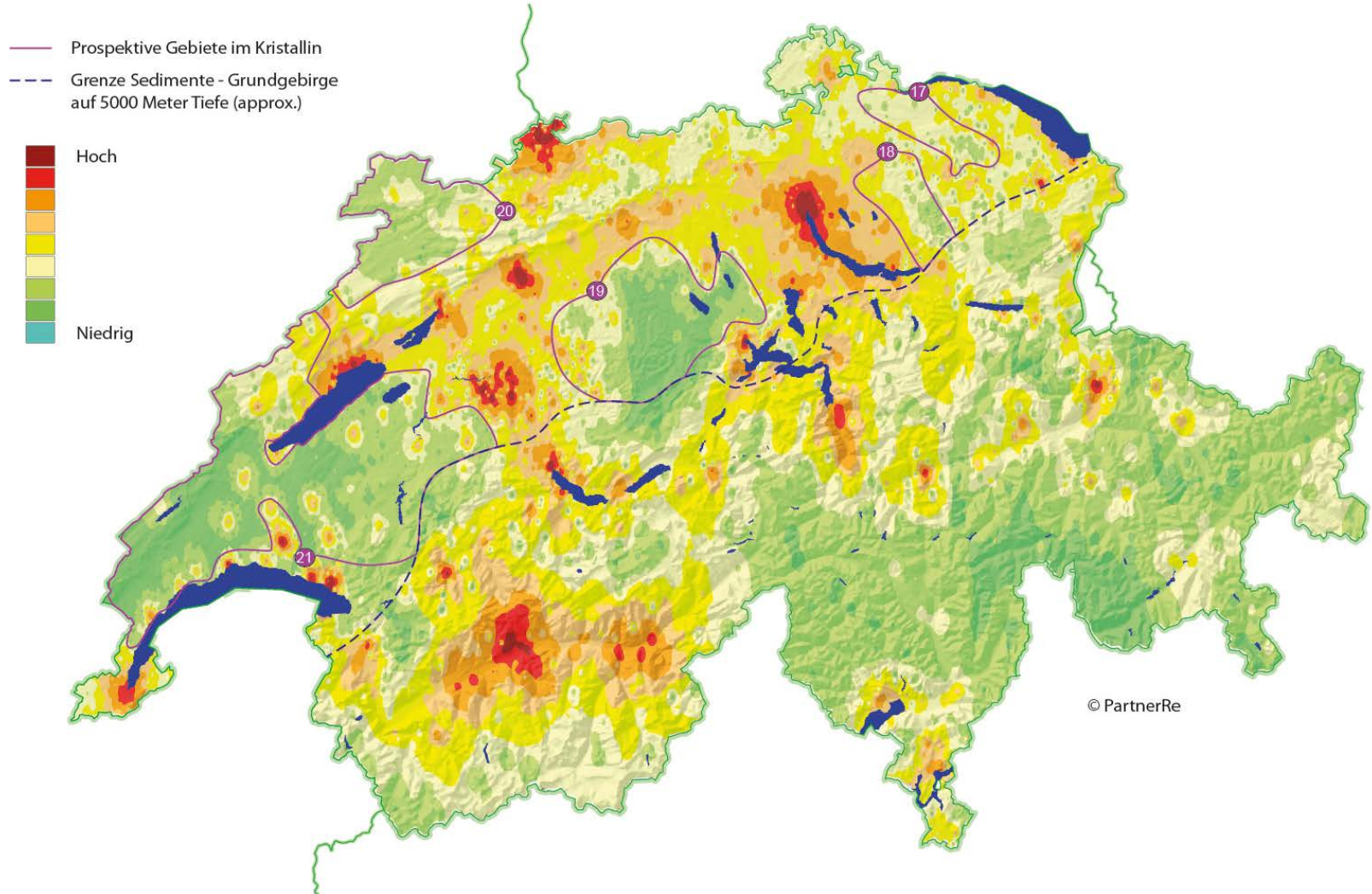
Cross-section Jura, molasse basin, alps: crystalline rocks are the target for the pilot projects

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Low risk areas for first pilot projects

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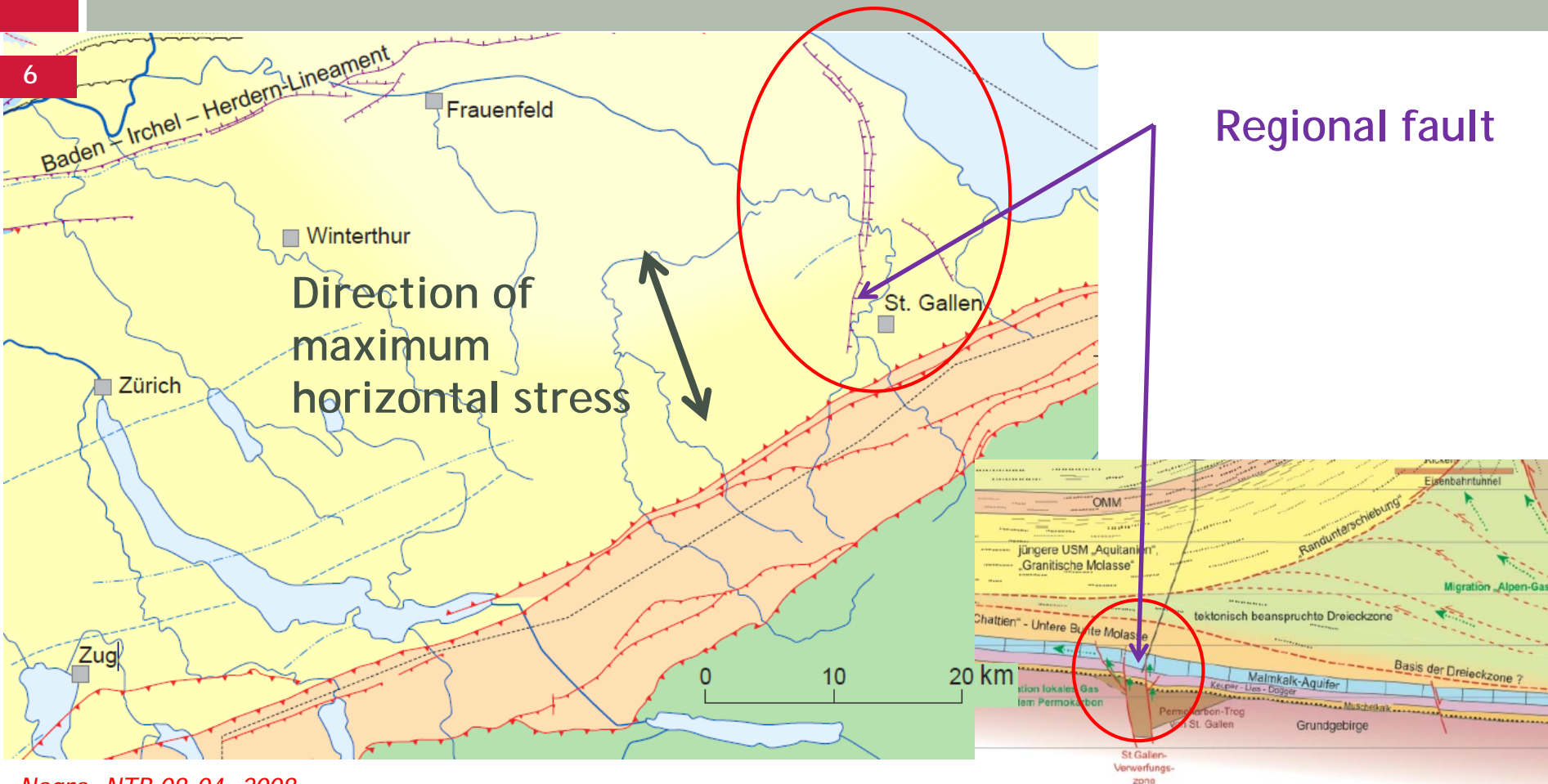


Five Recommendations of Prof. Mark D. Zoback (managing the risk posed by waste water injection, Earth, 2012)

1. Avoid injection into active faults
2. Minimize pore pressure changes at depth
3. Install local seismic monitoring arrays
4. Establish modification protocols in advance
5. Be prepared to alter plans or to abandon wells

St. Gallen: regional fault

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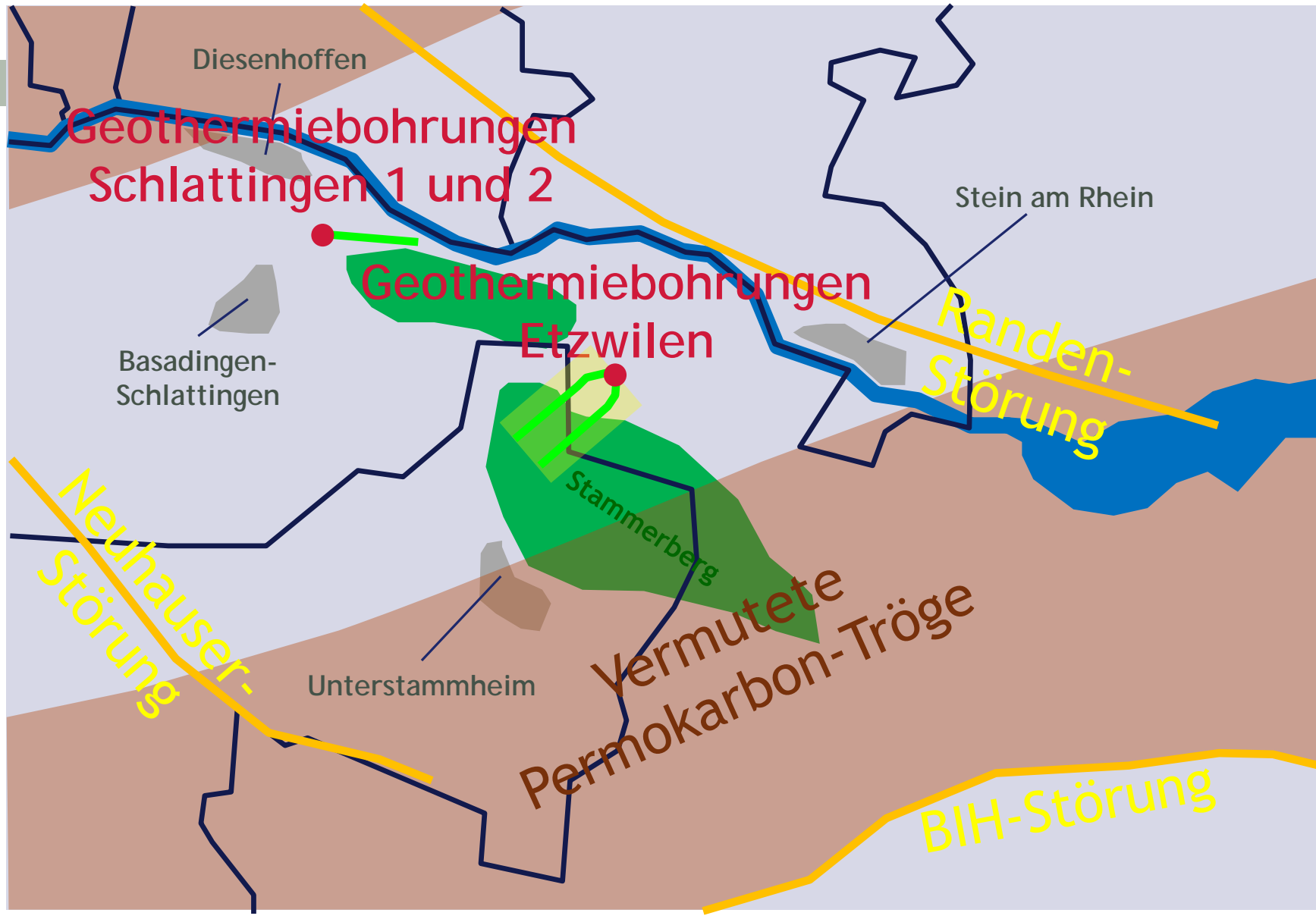
Regional fault

Direction of maximum horizontal stress

0 10 20 km

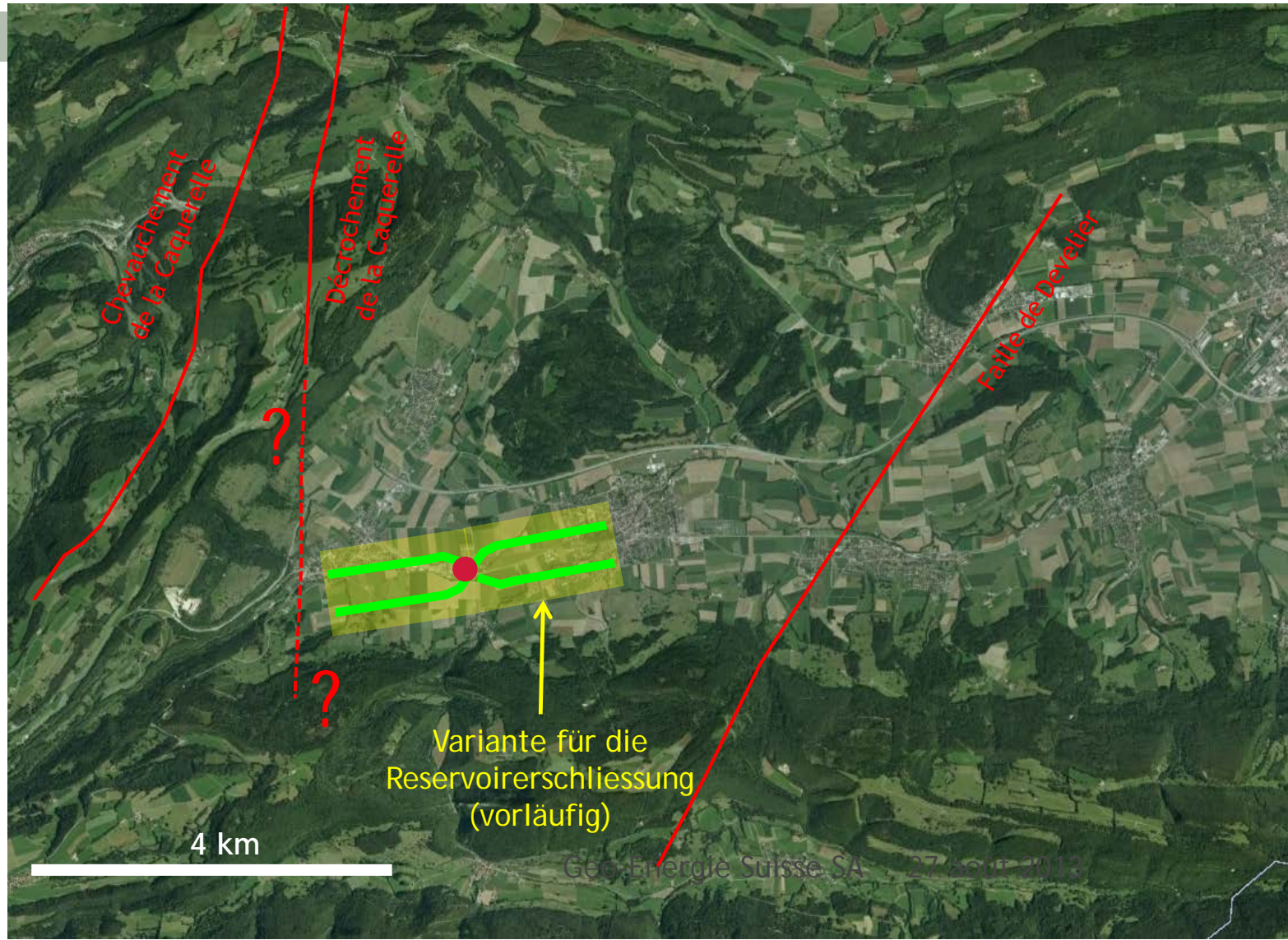
Site Etzwilen: safety distance to regional faults

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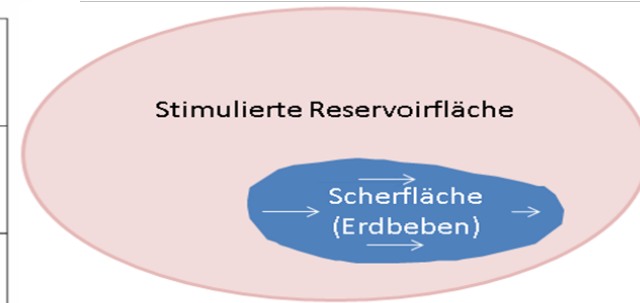
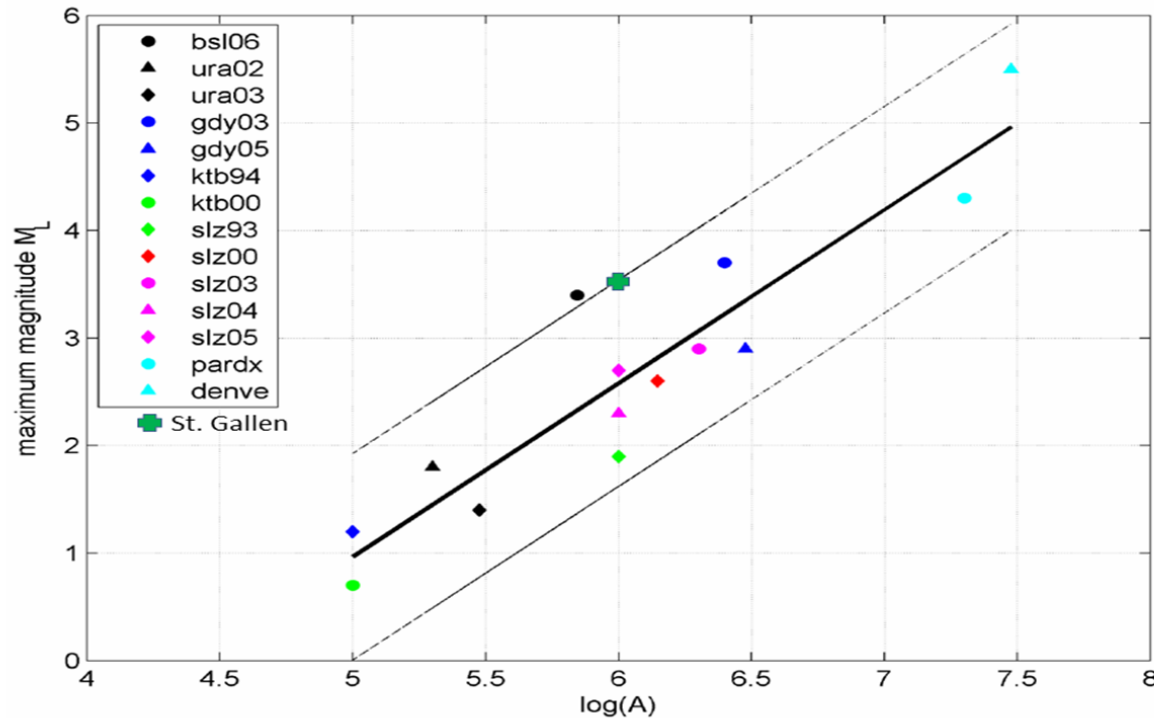


Haute-Sorne: safety distance to regional faults

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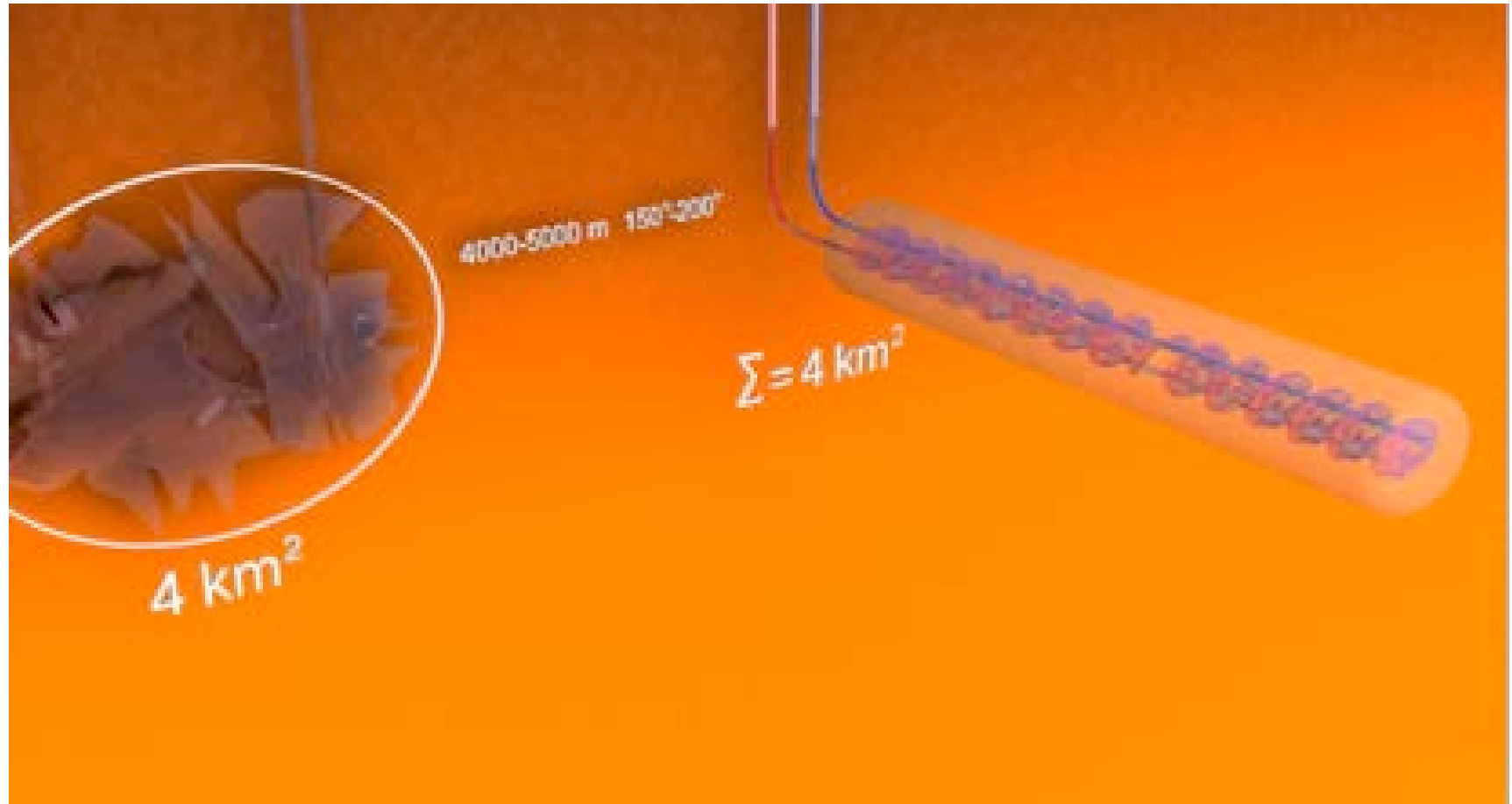
Reservoir size vs. magnitude of induced seismicity (Serianex, 2009)



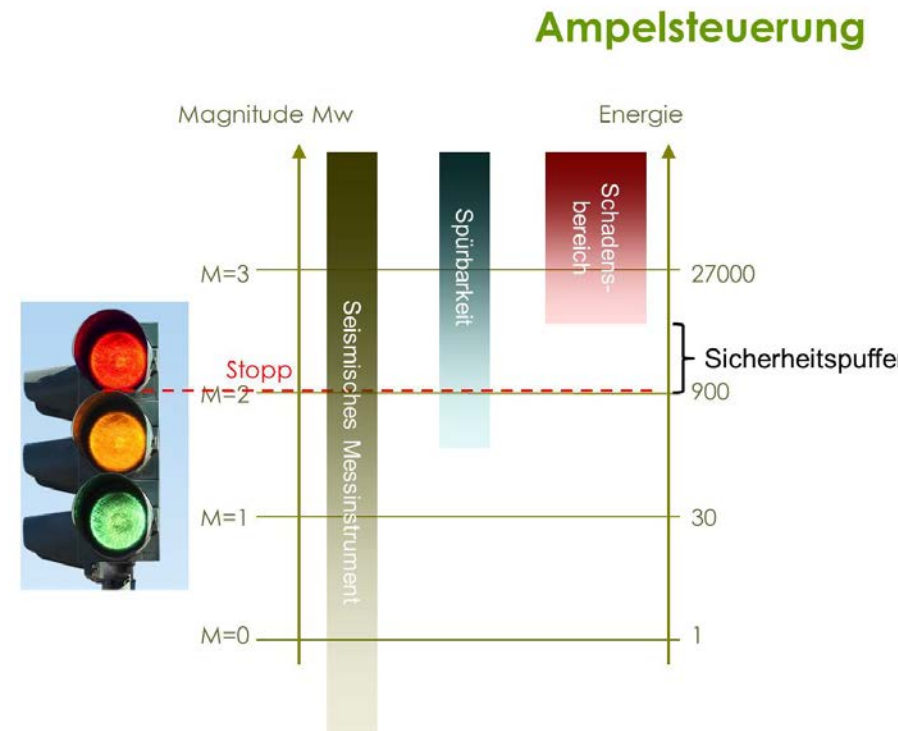
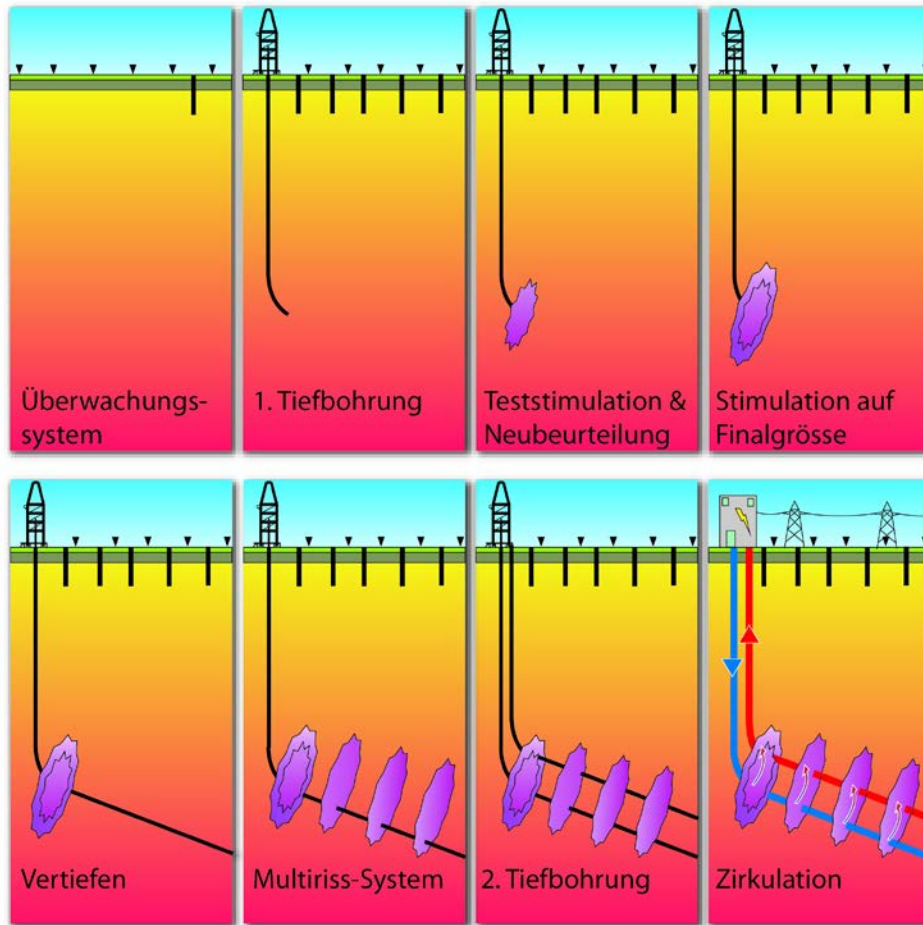
**Nach St.Gallen:
Stimmt unser
Konzept?**

Detailed analysis of the Basel data set and numerical simulations corroborate this general relationship and serve as design parameters for "safe" EGS-systems in conditions similar to the Basel project. Also the project in St. Gallen follows this relationship.

Concept DHM Basel vs. „new“ horizontal multi-frac system



Careful stepwise procedure, monitoring and prediction



Preservation of evidence

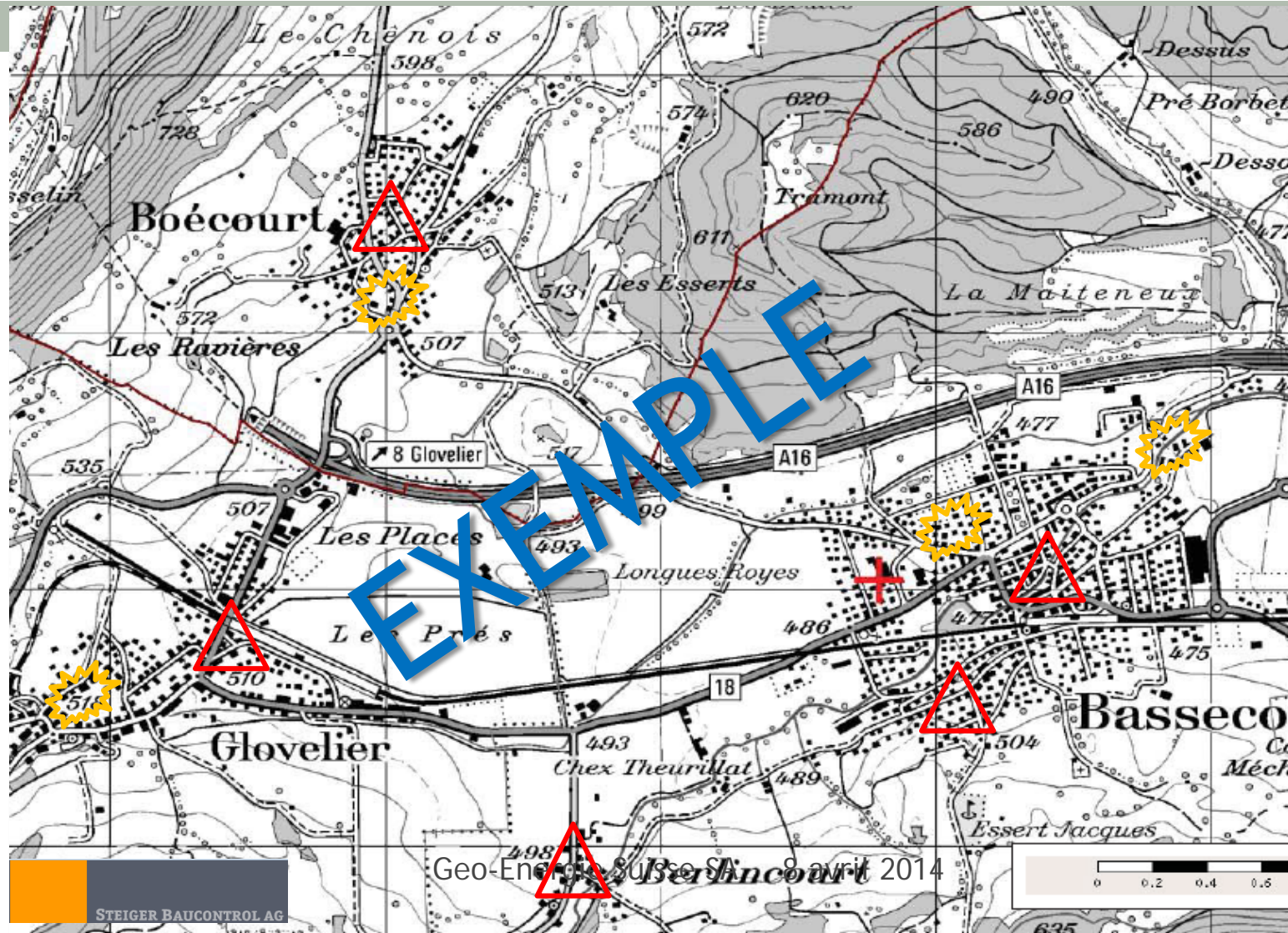
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Groupes de bâtiments représentatifs



Objet individuels sensibles



New concept and better site selection: In addition we improved



1. Start with risk study



2. Low threshold values



3. Safety margin

New concept and better site selection:

In addition we improved



4. Stop injection timely



5. Preservation of evidence

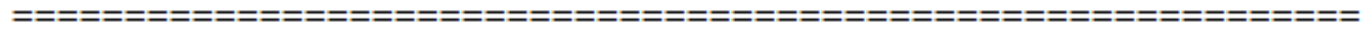
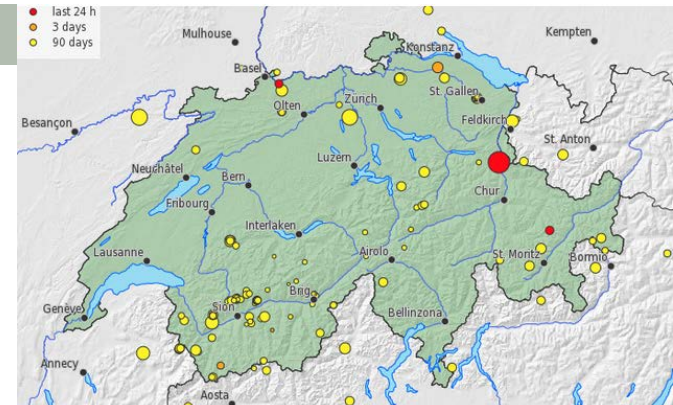


6. Insurances

Erdbeben Sargans 12.Dez.2013

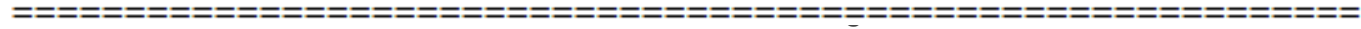
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- Magnitude ML= 4.0
- Tiefe 3.5 to 7 km
- Keine Schäden gemeldet
- Freigesetzte Energie 125x stärker als 2.6
- Auftretenswahrscheinlichkeit gemäss SED Service: 1:100 bis 1:1000

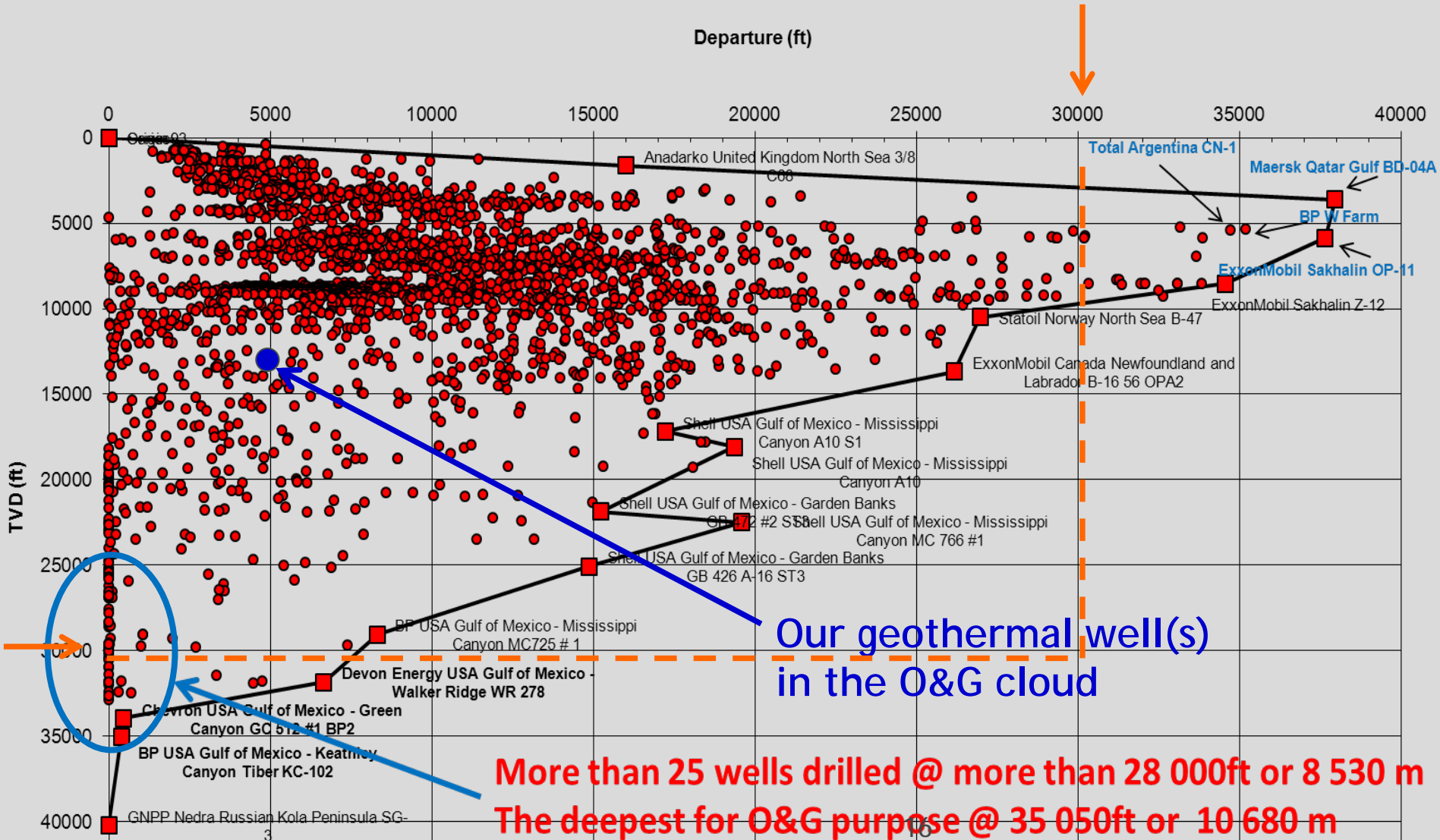


Announce de TREMBLEMENT DE TERRE du Service Sismologique Suisse

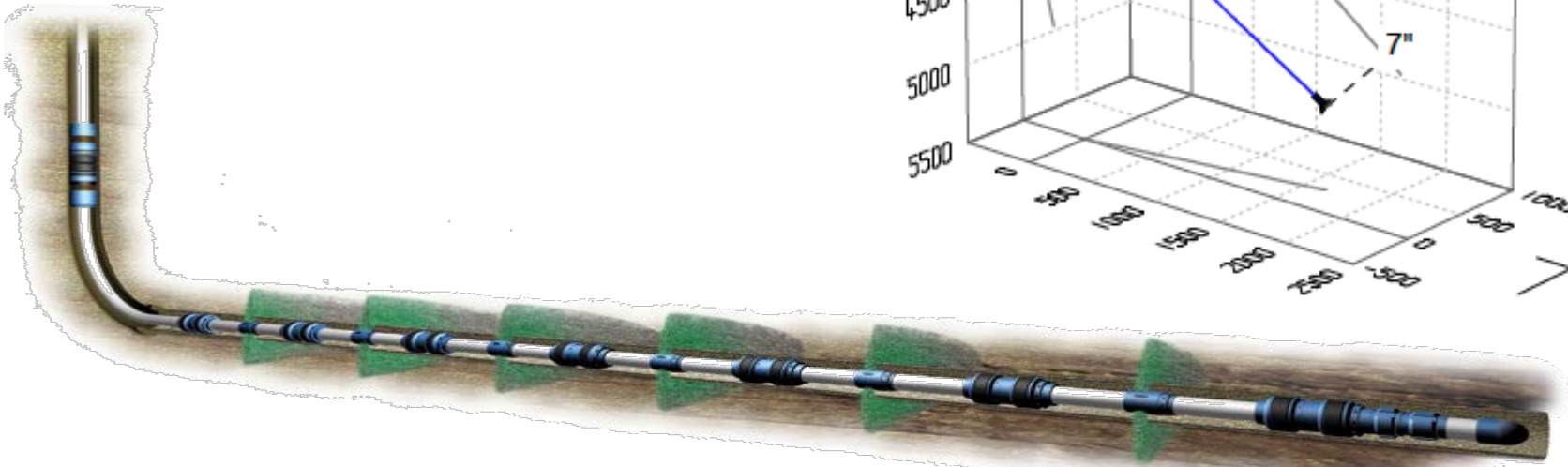
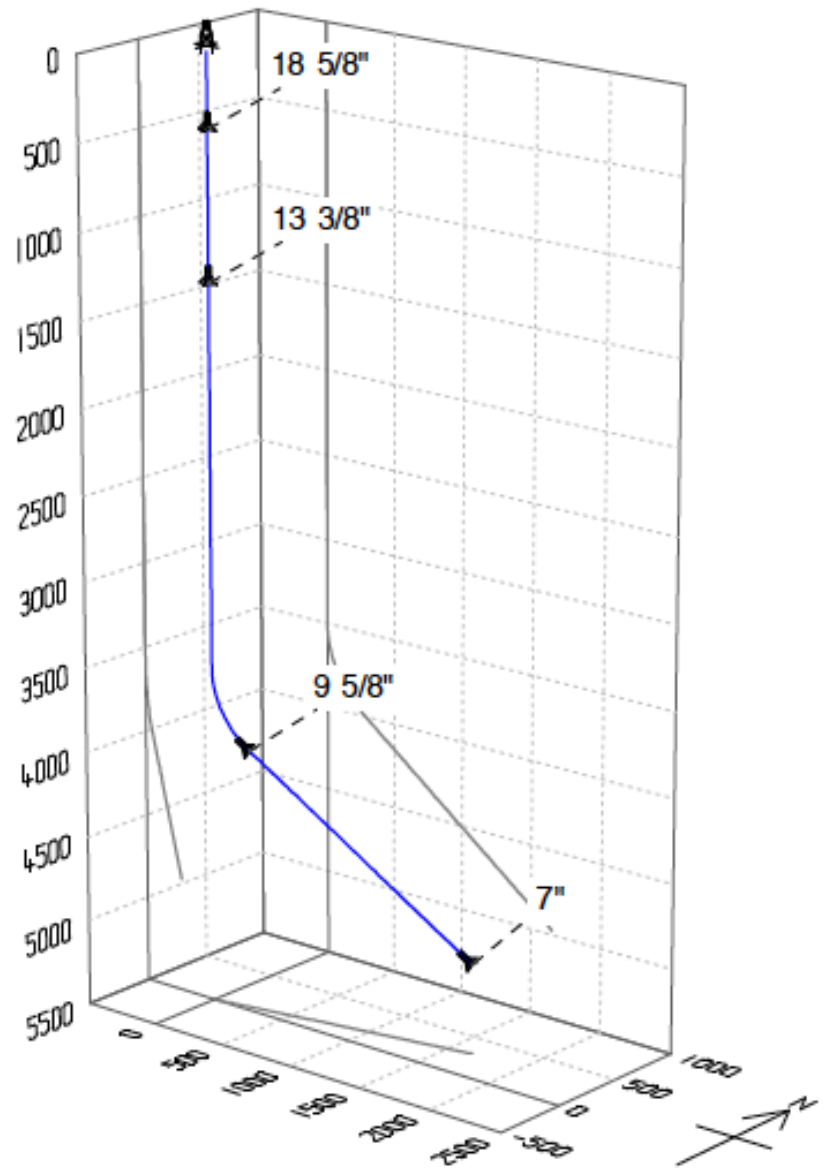
Le Service Sismologique Suisse de l' ETH Zurich a enregistré un tremblement de terre dans le canton St-Gall, près de Sargans. La secousse a eu lieu le 12 décembre 2013 à 01:59:18 (heure locale) avec une magnitude de 4.0 sur l'échelle de Richter. Ce tremblement de terre a pu être ressenti sur une zone étendue. En règle générale, on ne s'attend pas à des dégâts pour un tremblement de terre de cette magnitude.



Ausgeführte Horizontalbohrungen weltweit



Well planning by experts of the Oil&Gas business



Strategic outlook for cost savings

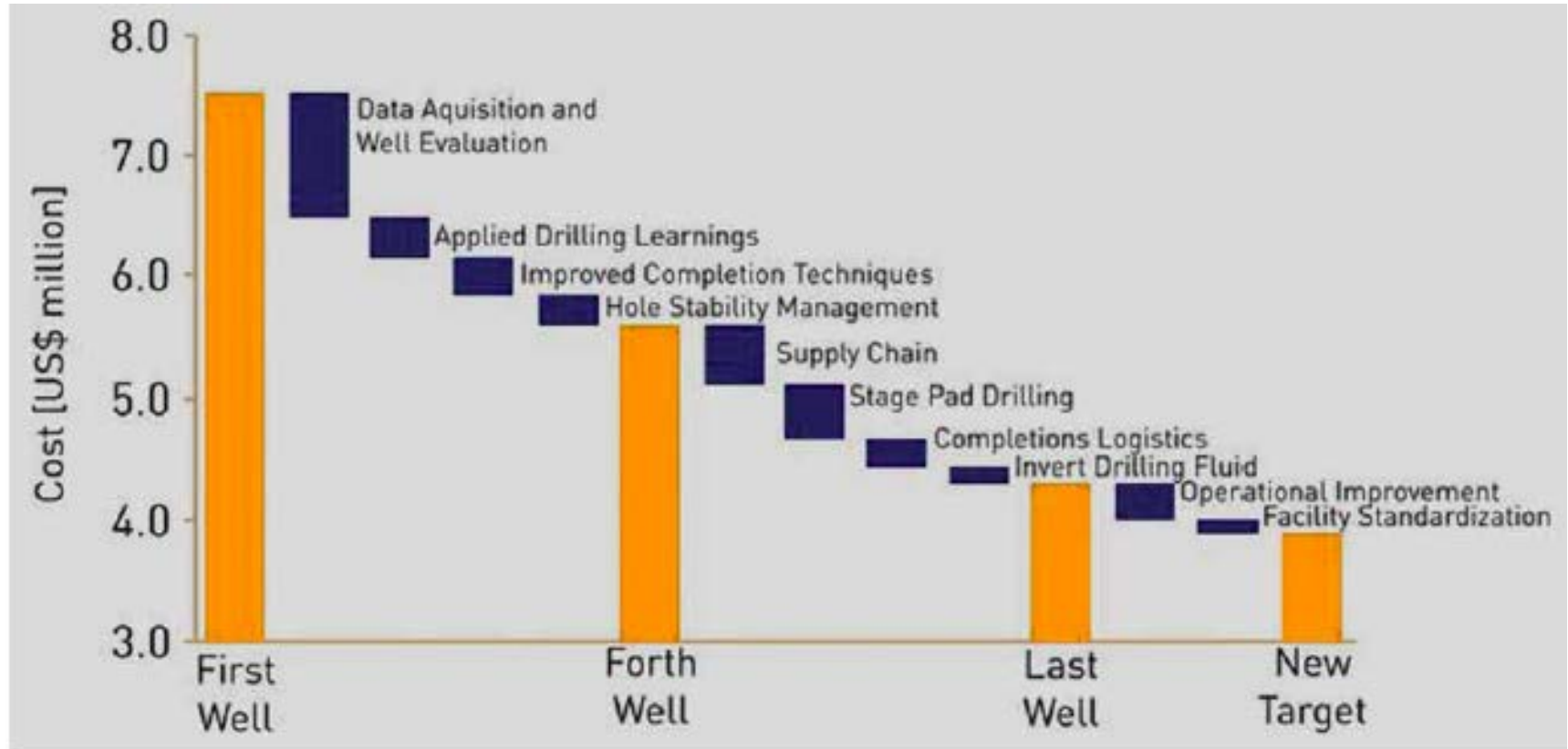
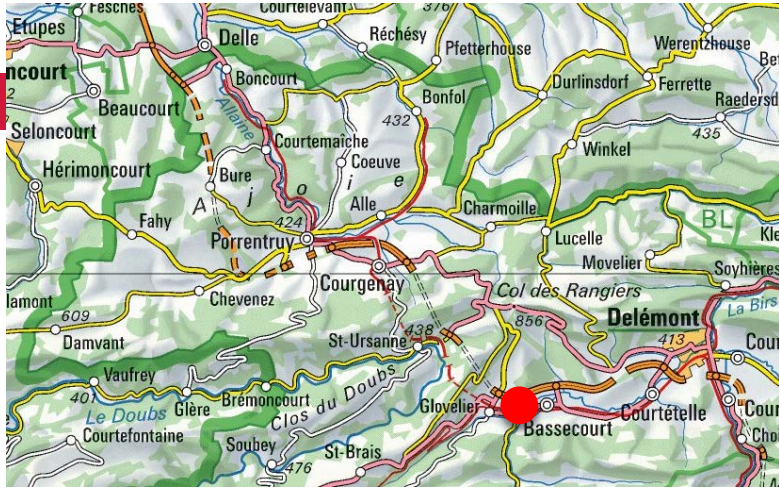


Bild 10. Entwicklung der Bohrkosten am Shale-Gas-Standort „Marcellus Field“.

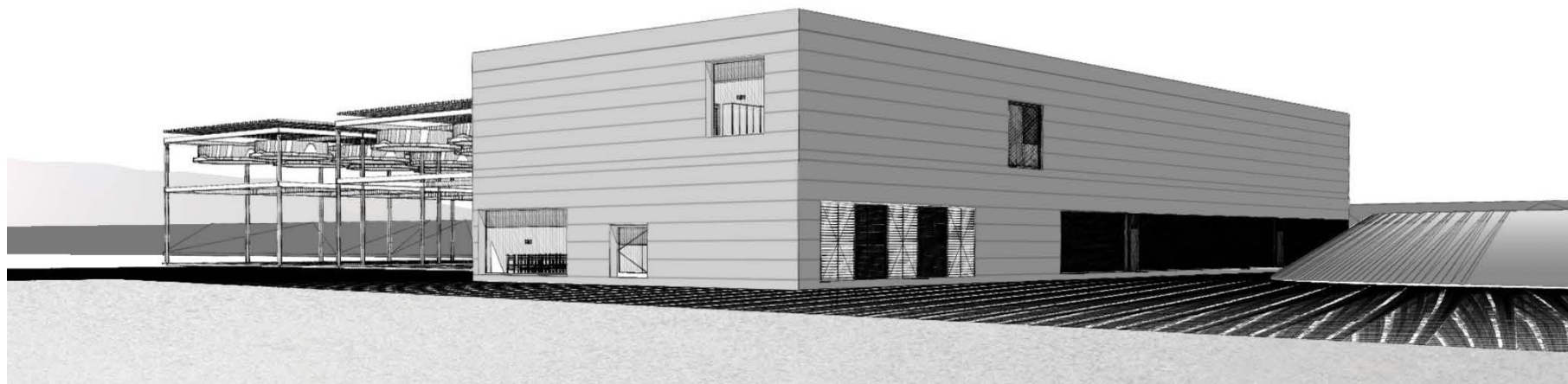
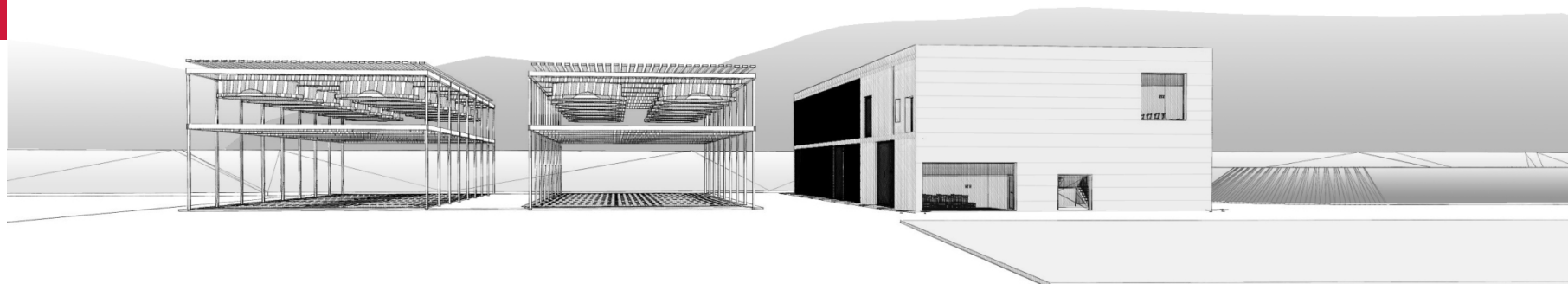
(Quelle der Daten: EFCO Resources Inc. 2009)

Haute-Sorne Project site



Description du projet

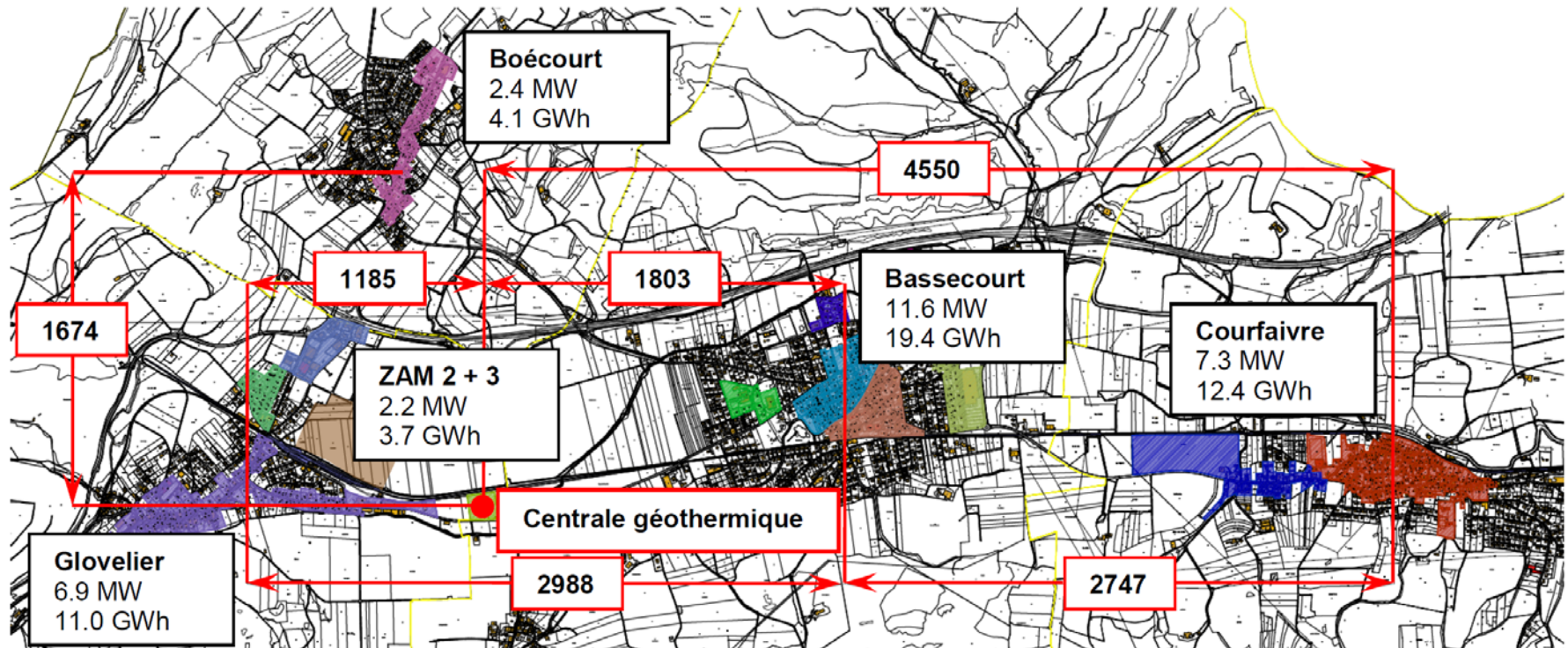
Les constructions (phase exploitation)



plans: Kury&Stahelin

Potentiel de valorisation de la chaleur

1) Zones de valorisation



Plan de répartition de des zones d'approvisionnement

Le groupe d'accompagnement

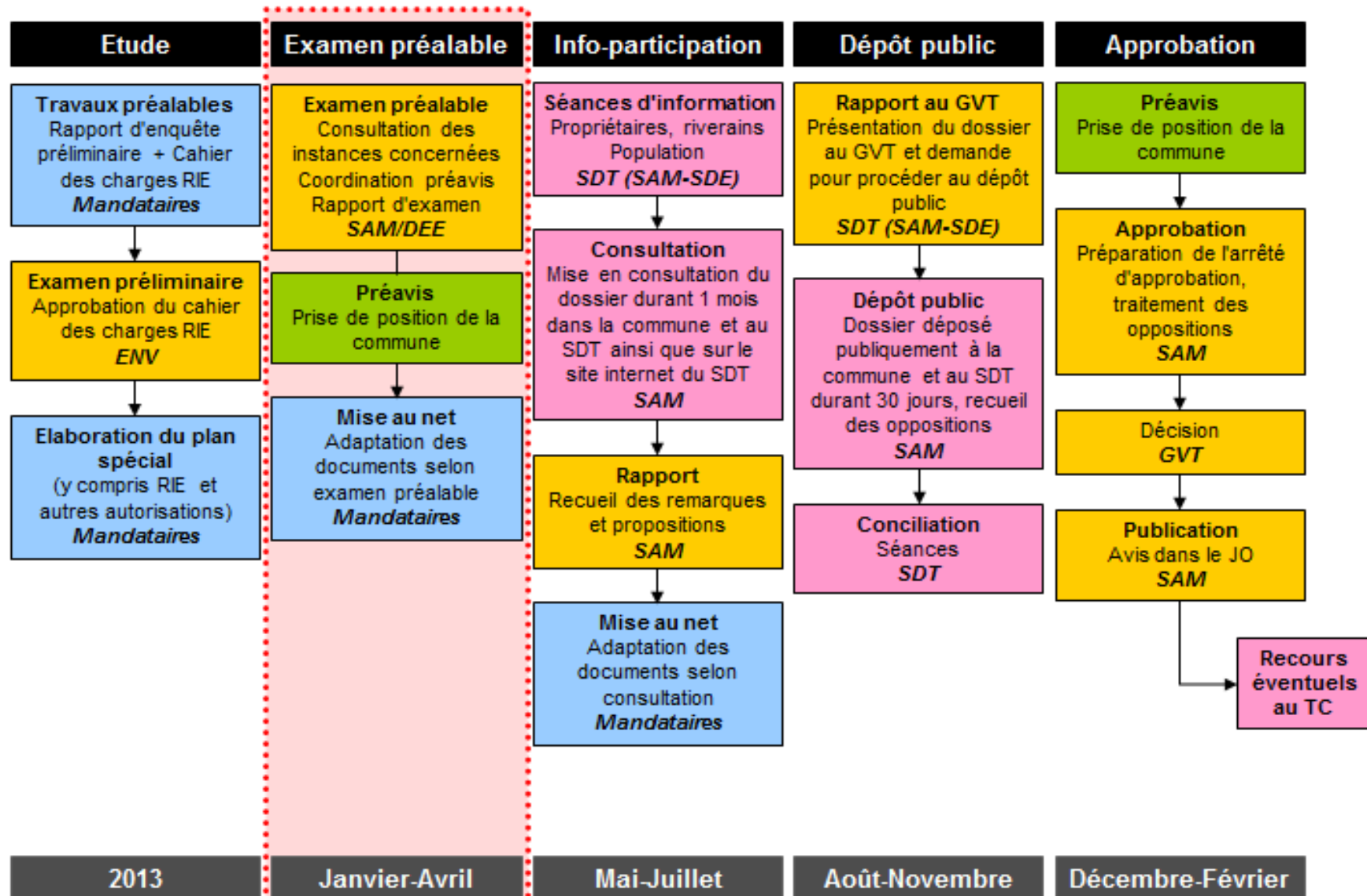
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- Informer de manière détaillée les parties concernées
- Transmettre l'information à la population
- Prendre en compte les remarques durant la planification



Plan spécial cantonal – procédure

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Country side: noise turns out to be acceptance problem number 1



Deep Heat Mining Basel

Geothermiebohrung St. Gallen



Geothermiebohrung Triemli (ZH)

Next steps

2012



Preliminary impact and risk studies

2013



- Accompanying groups
- Application of construction permit and main environmental impact and risk studies

2014



Examination by authorities
Risk insurance BFE/Swissgrid

2016



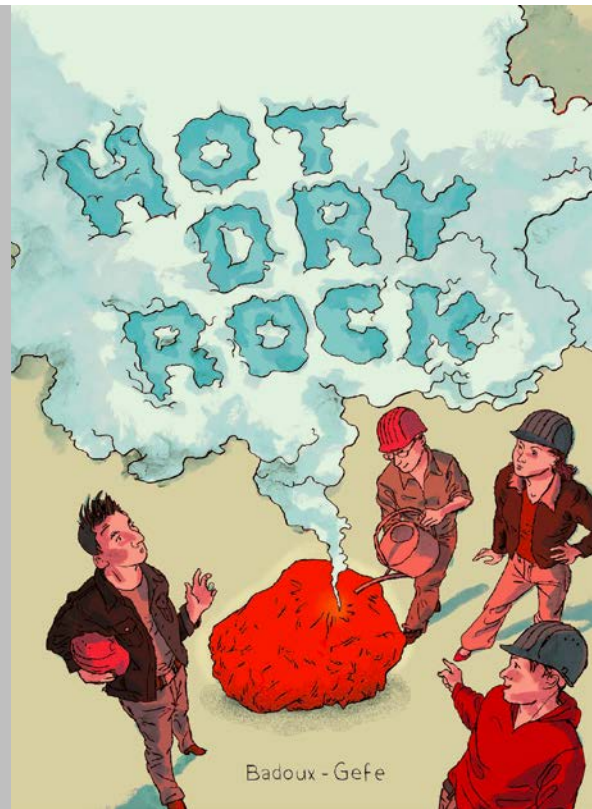
Drilling

2020



Power plant working

Geothermie - Aus gutem Grund



Thank you for your attention