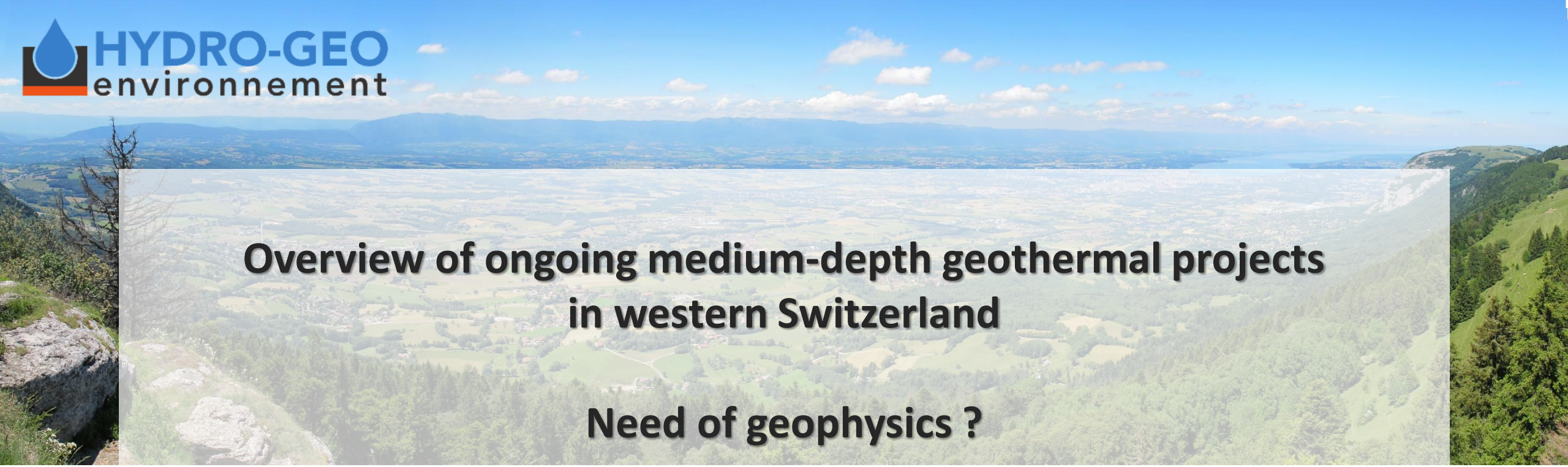


Overview of ongoing medium-depth geothermal projects in western Switzerland

Need of geophysics ?

Jérôme Chablais (HGE)

21th January 2022

PIXIL Workshop

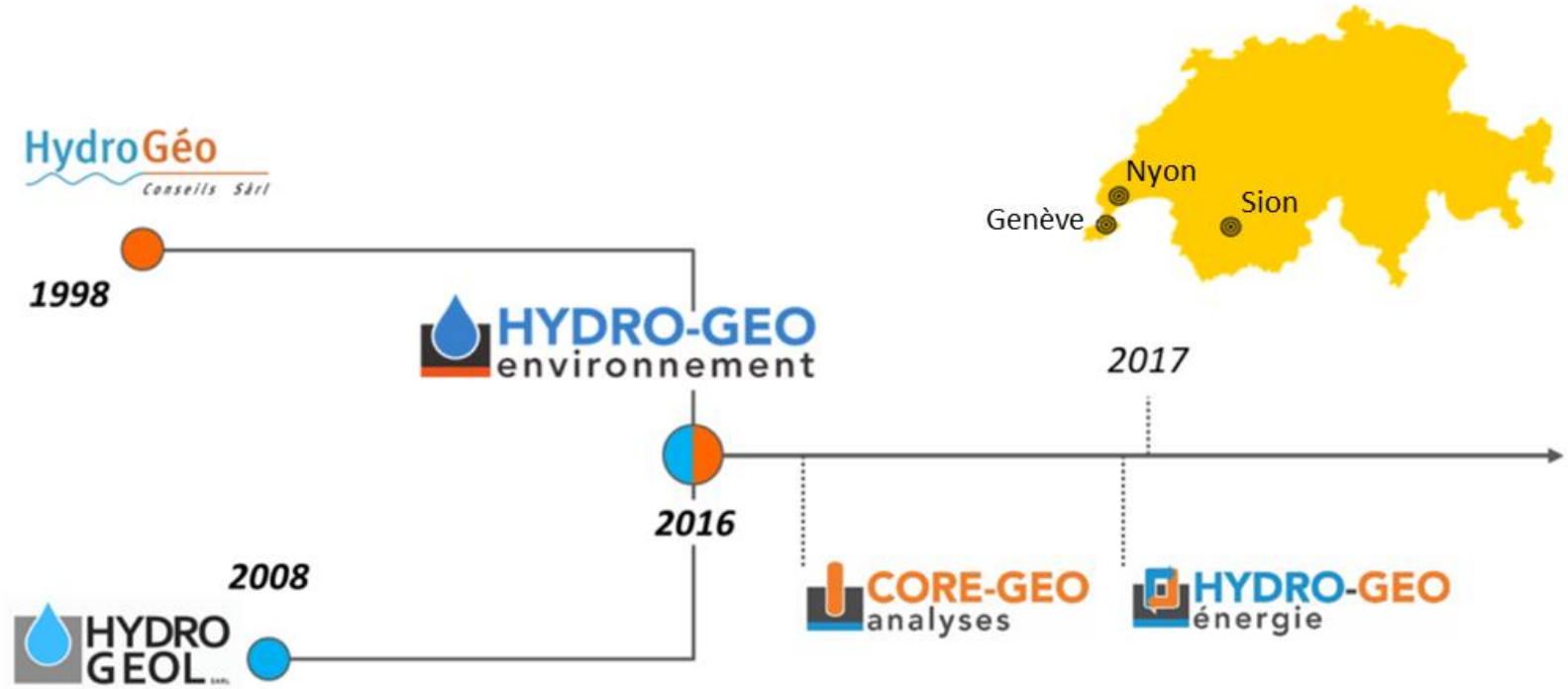
Interreg POCTEFA

UNIÓN EUROPEA
UNION EUROPÉENNE

Fondo Europeo de Desarrollo Nacional (FEDER)

PIXIL

Company presentation



- Head office in Geneva, one branch in Nyon and one in Sion
- 24 collaborators active in geosciences, environment & drilling engineering
- Specific department/team dedicated to geothermal projects (shallow to deep)

NOS COMPETENCES

RESSOURCES

GEOTHERMIE

PROJETS DE GÉOTHERMIE DE FAIBLE A GRANDE PROFONDEUR: BAMO-Planification, Organisation, Permis & Procédures, Interprétation Sismique, Programme de Forage, Exécution, Géologie d'OPS & Suivi de Forage (DLT), Gestion des Boues et Eaux de forages, Tests, Exploitation, Modélisation

NOTRE EXPERTISE ›

EXPLORATION

HYDROGEOLOGIE

HYDROGÉOLOGIE RÉGIONALE ET LOCALE: Prospection, Délimitation des Aquifères & Nappes, Analyses de Sources Karstiques, Essais de Traçage, Gestion de la Ressource en Eau, Géothermie de Nappes, Essais de pompage, Échantillonnage, Essais d'Infiltrations & Dimensionnement

ANALYSES

ENVIRONNEMENT

EXPERTS EN ENVIRONNEMENT ET SITES POLLUES: Diagnostic de Pollution, Investigations Historiques et Techniques, Investigation & Implantation de Décharge, Échantillonnage, EIE & NIE, Travaux d'Assainissement, Gestion Matériaux Pollués, SER, Renaturation

CHALEUR & FROID

ENERGIE

PLANIFICATION, ENERGIES RENOUVELABLES, RÉSEAUX THERMIQUES: Analyses de Systèmes Energétiques Complexes, Dynamique des Ressources Renouvelables, Planification Energétique Territoriale, Champs de Sondes, PAC sur nappe, Aquifère Profond

HYDRO-GEO ENERGIE ›

ROCK-TYPING

STRATIGRAPHIE

CARACTERISATION DES RESERVOIRS ET GEOLOGIE D'OPERATIONS: Rock-Typing, Description de Carottes de forages, Pétrographie, Diagénèse, Etudes d'Affleurements, Suivi Géologique des Cuttings, Détermination des Limites Stratigraphiques (Casing), Litholog

CORE-GEO ›

SIMULATION

MODELISATION 3D

MODÉLISATION STATIQUE: Modèles géologiques 3D, modèles structuraux et trajectomètrie de forages profonds – MODÉLISATION DYNAMIQUE: réalisation de modèles réservoirs, modèles hydrogéologiques conceptuels, simulations d'écoulements et simulations de tests hydrauliques

DIMENSIONNEMENT

GEOTECHNIQUE

ETUDES GEOTECHNIQUES GENERALES: Définition des Caractéristiques Physiques et Mécaniques des Sols, Définition des Contraintes Admissibles, Principes d'Excavation, Analyse de Stabilité de Talus, Définition Types de Blindages et de Fondations, Dimensionnement & Travaux Spéciaux

INGÉNIERIE

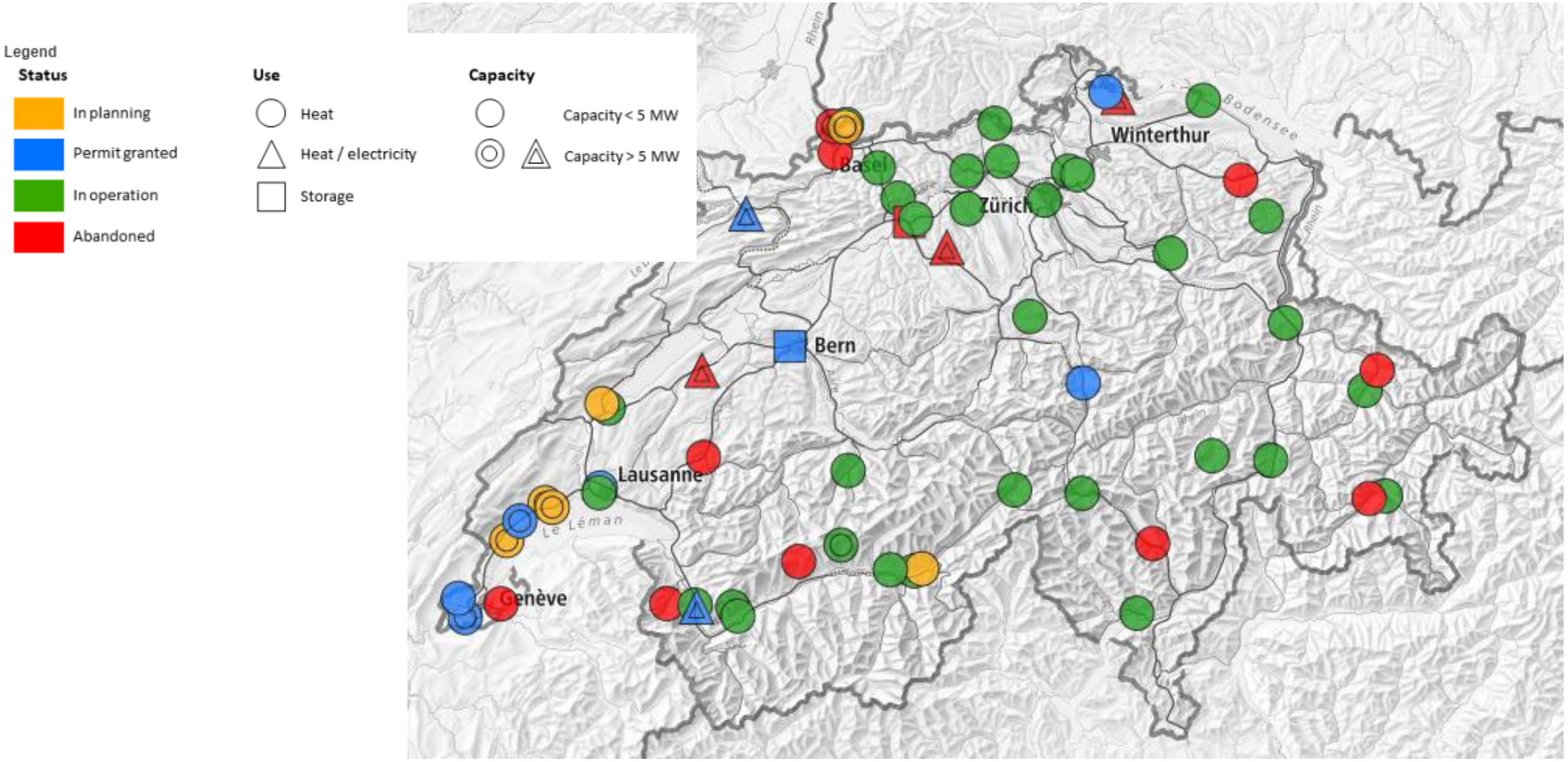
INGENIERIE FORAGE

INGENIERIE FORAGE EN GEOTHERMIE PROFONDE: Well design, well engineering, drilling program, well operations, contracting strategies, cost estimate, cost control, control of provision of materials and equipment for drilling operations, direction and supervision of onsite works of service companies

HYDRO-GEO environnement

Geothermal projects in Switzerland

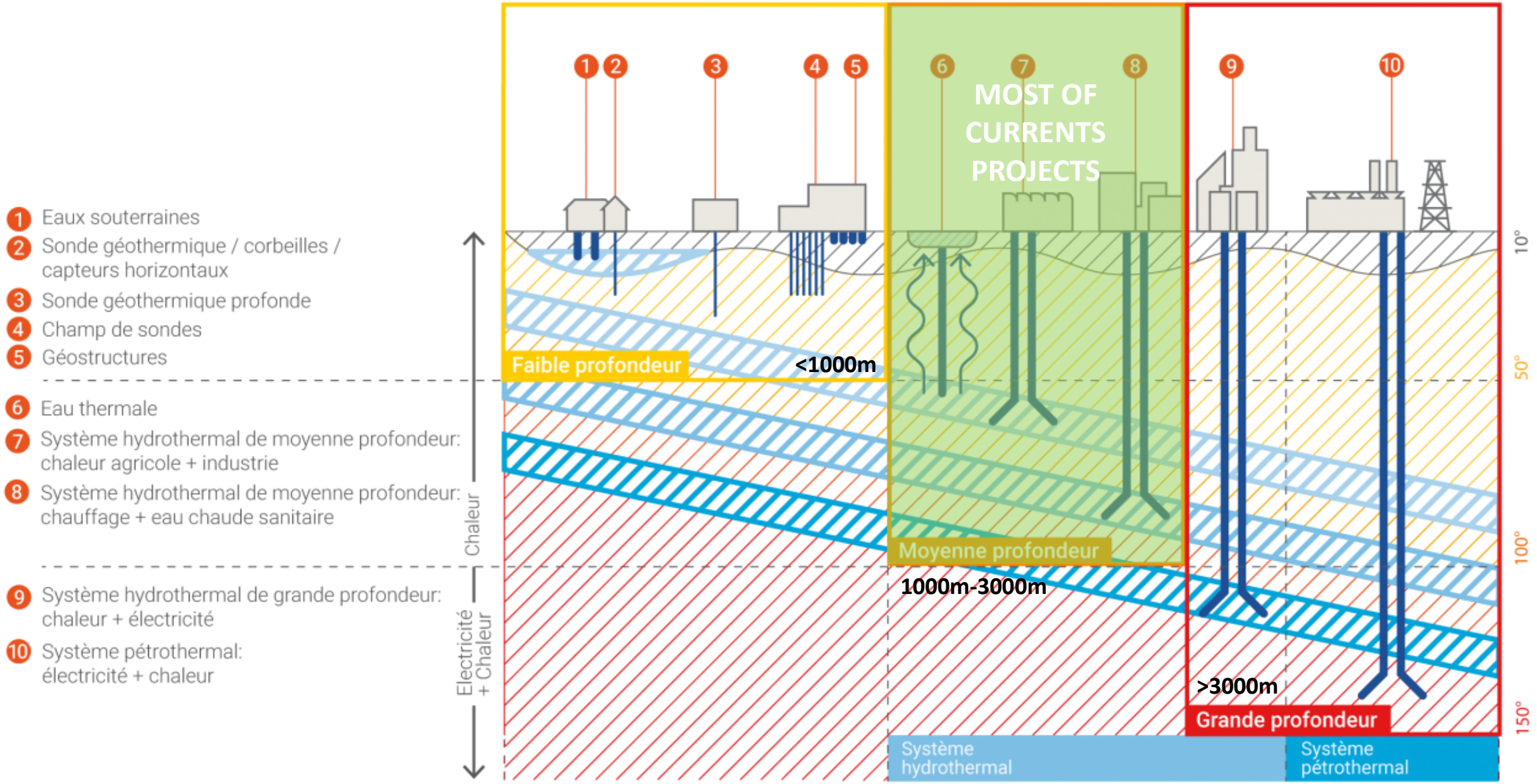
Current project location



HYDRO-GEO environnement

Geothermal projects in Switzerland

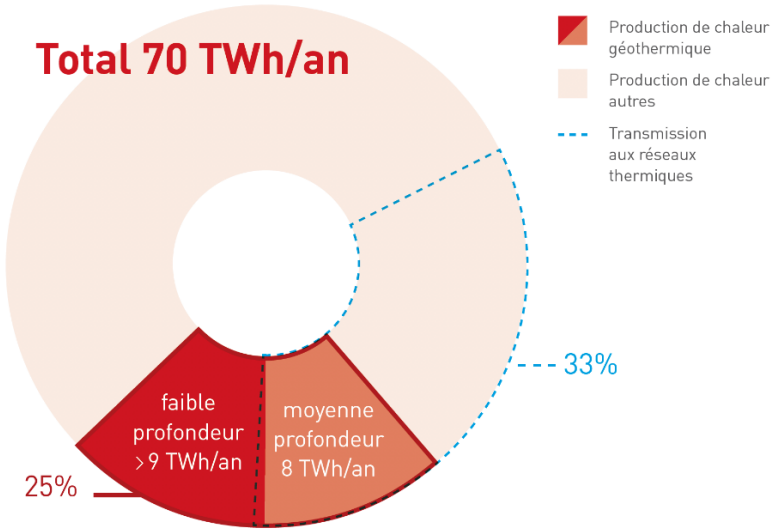
What kind of projects ?



Geothermal projects in Switzerland

Heat objectives & SFOE Financial support

Le besoin en chaleur en 2050 en Suisse sera d'env. 70 TWh/an. La géothermie y contribue pour au moins un quart.



70 TWh/an	Besoin en chaleur en Suisse en 2050
25 % (= 17 TWh/a)	Part de la géothermie dans la production de chaleur 2050
4.5 millions de tonnes	d'économies de CO_2 par an (substitution mazout par la géothermie)
1.7 mrd. de litres	d'économie de mazout par an
1.2 mrd. de fr.	d'économie de frais annuelle pour le mazout
250	Nombre d'installations géothermiques de moyenne profondeur d'ici 2050
6 mrd. de fr.	Total des coûts d'investissement pour les installations géothermiques de moyenne profondeur (hors subventions)

https://geothermie-schweiz.ch/waermepotenzial/?lang=fr

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Swiss Federal Office of Energy

https://www.bfe.admin.ch/bfe/fr/home/mesures-d-encouragement/energies-renouvelables/promotion-de-la-geothermie.html

Promotion geothermal energy

Support measures are available for geothermal projects focusing on electricity production and direct use of geothermal energy for heat production.

For geothermal projects electricity production, subsidies for the search of geothermal resources are available for the prospecting and exploration phases. Guarantees are also available for these projects. In addition, feed-in-tariffs also apply to the production of electricity from geothermal energy.

Since 1 January 2018, subsidies for projects focusing on the direct use of geothermal energy for the heat production have also been available for the prospecting and subsurface development stages.

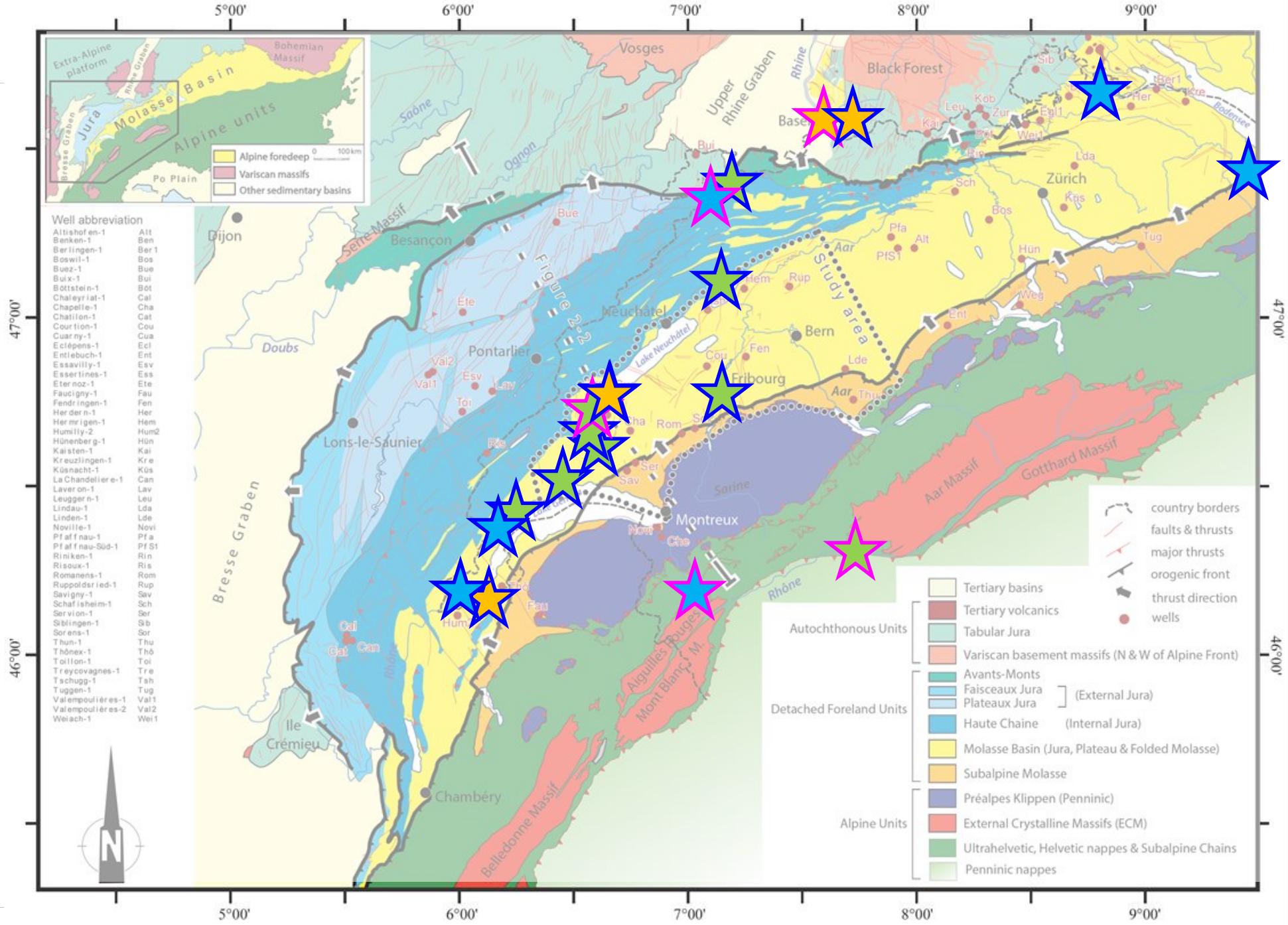
Currently supported >~50 Mio for heat production & ~100Mio for electricity production

HYDRO-GEO environnement

Geothermal projects in Switzerland

Past, recent & new projects

- Heat
- Electricity
- <2010
- 2010-2020
- >2020



Geothermal projects in Switzerland

Typical exploration program

Classical exploration program followed in swiss projects

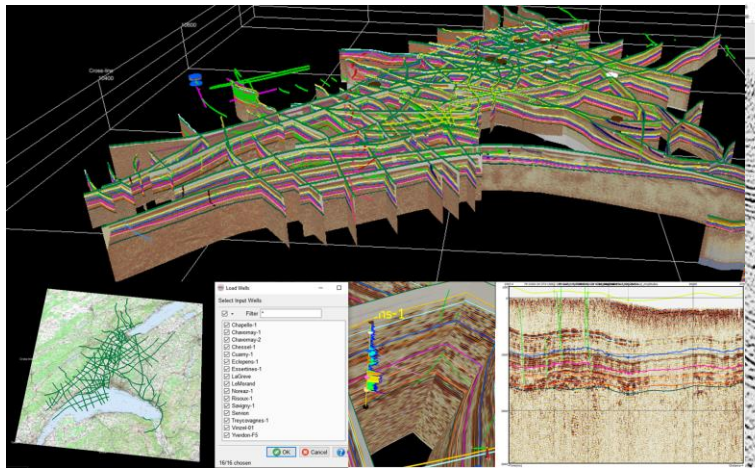
Step A: Reservoir exploration

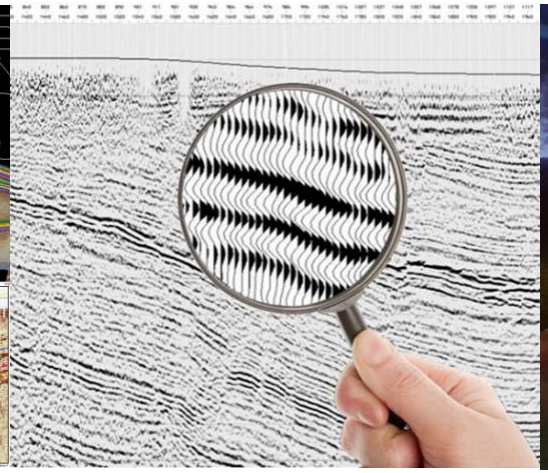
Step B: Well planification & drilling operation

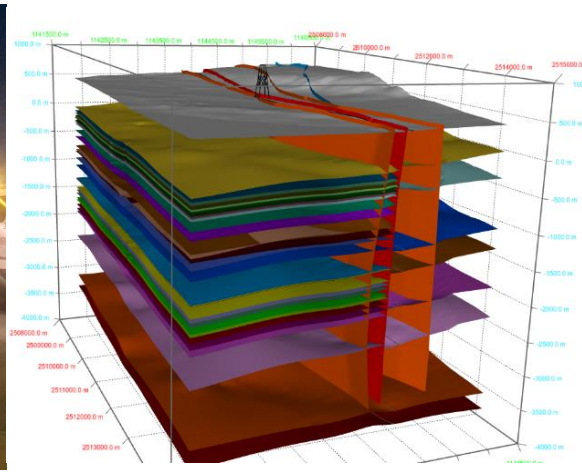
- Datamining & Exploration permits
- Seismic reprocessing & seismic acquisition 2D/3D
- Seismic interpretation
- 3D Geological & reservoir modelling
- Prospects & Well proposal
- Drilling permits & drilling program
- Drilling OPS

2 à 4 years

~ 2-3 years





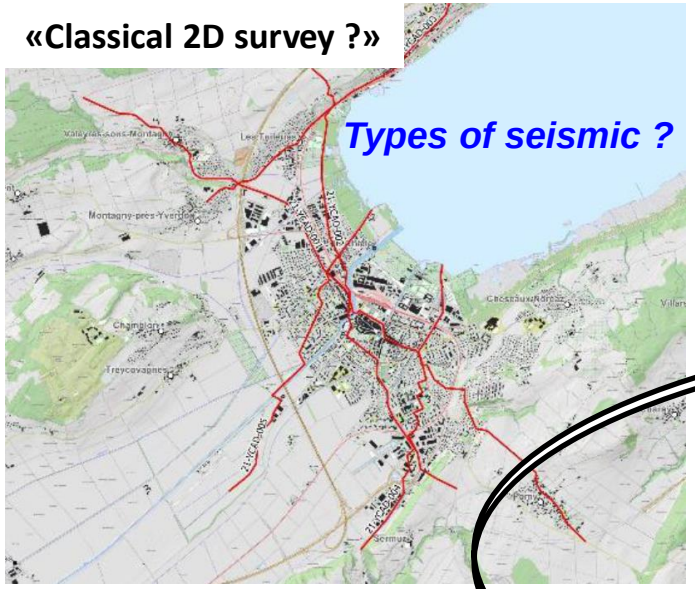


HYDRO-GEO environnement

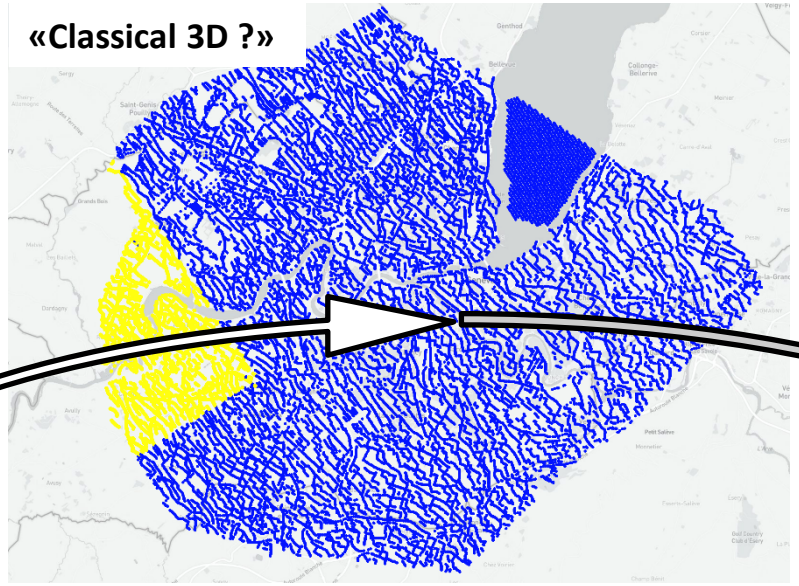
Geothermal projects in Switzerland

Reservoir exploration steps → challenges from geophysics/best approaches?

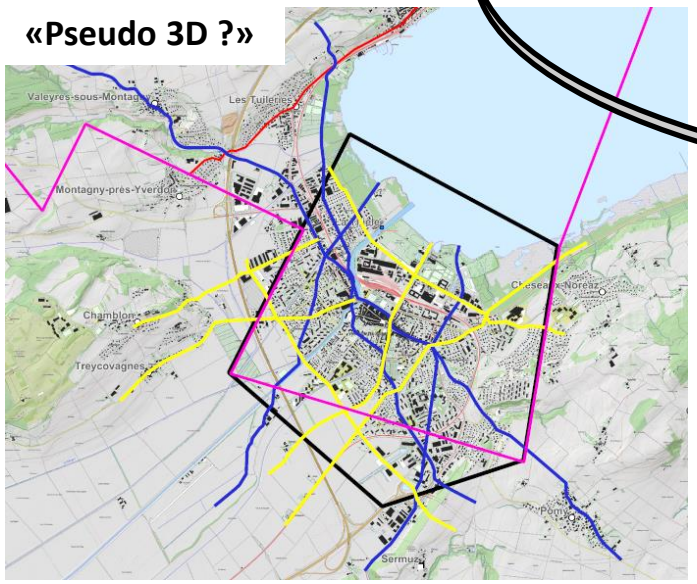
«Classical 2D survey ?»

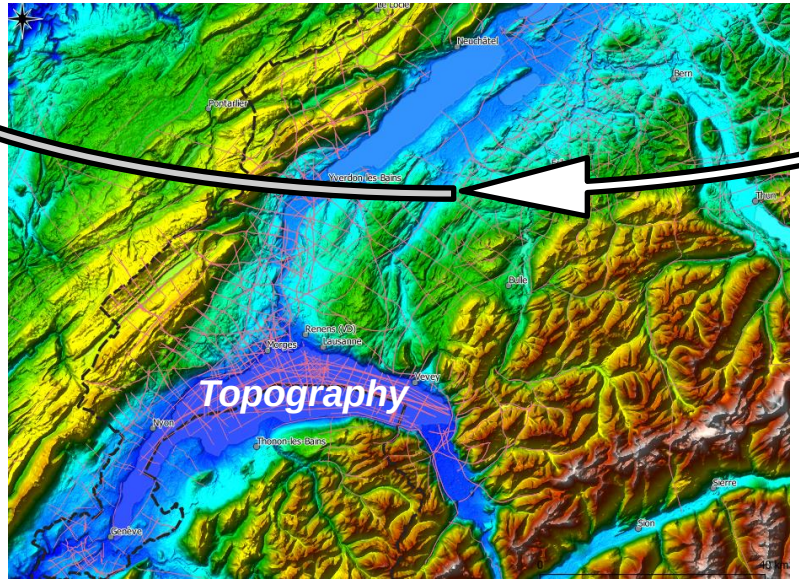


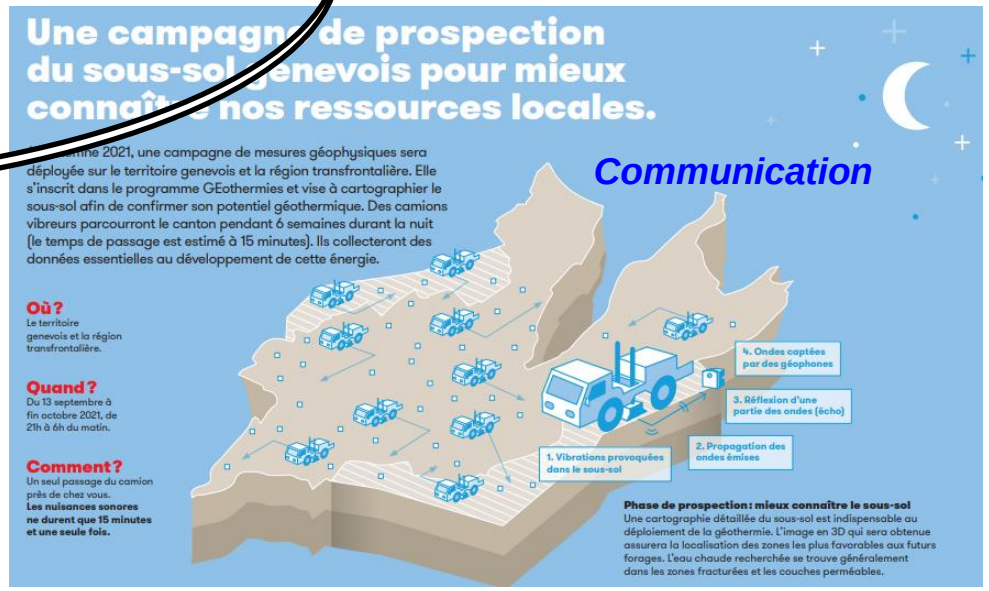
«Classical 3D ?»



«Pseudo 3D ?»



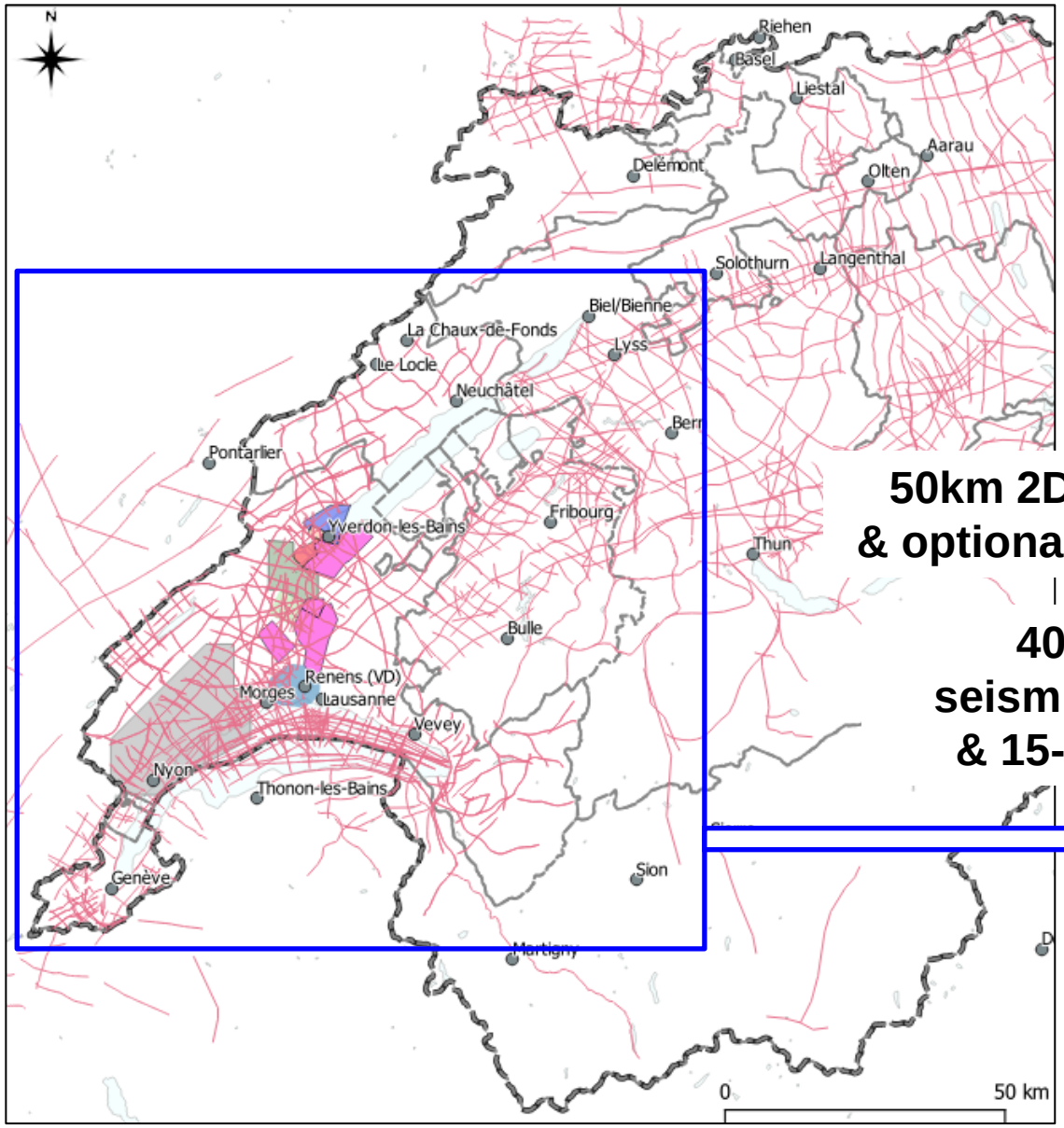




HYDRO-GEO environnement

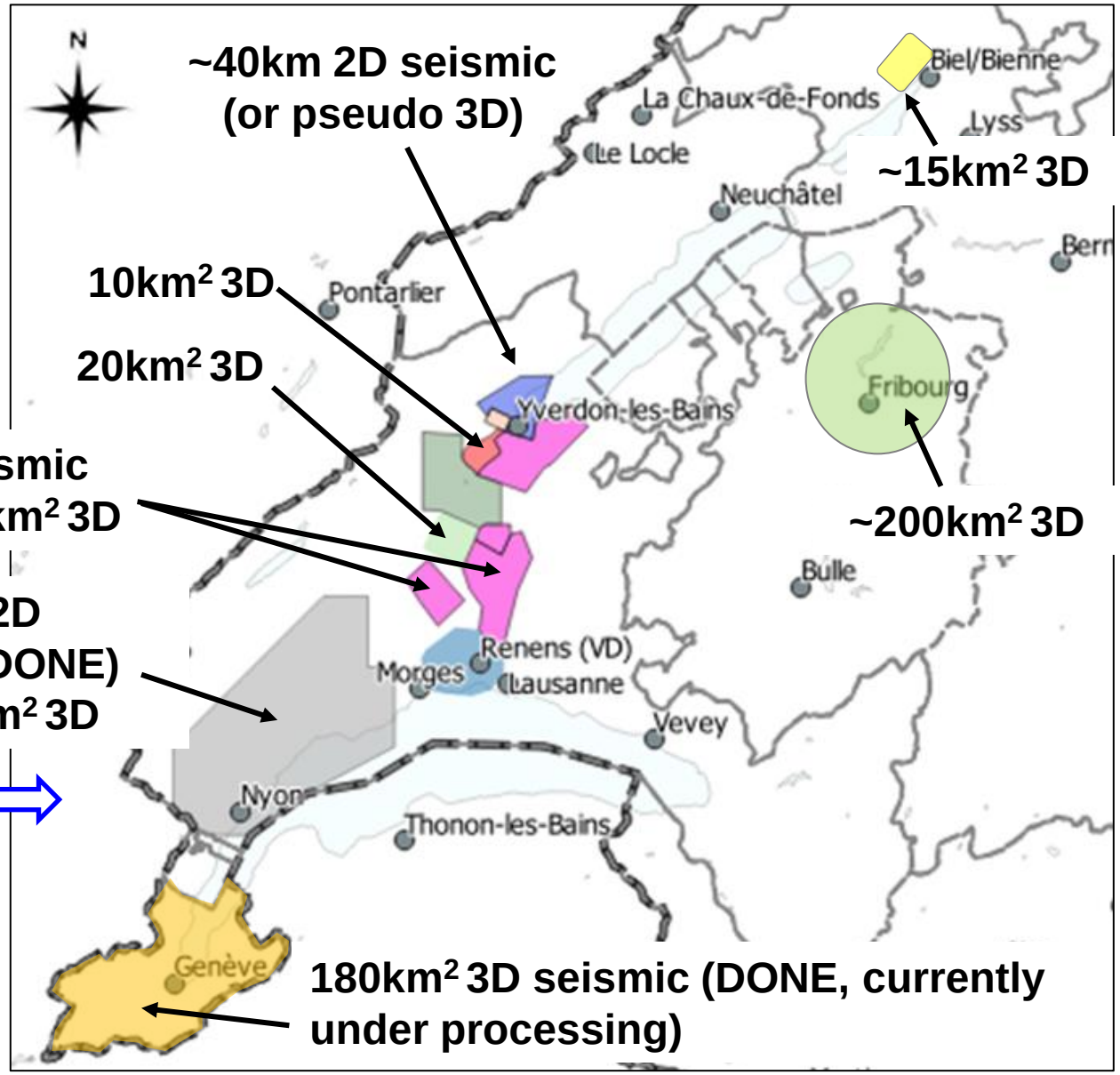
Geothermal projects in Switzerland

Actual projects & Perspectives → high use of geophysics in a close future



50km 2D seismic & optional 15km² 3D

40km 2D seismic»(DONE) & 15-20km² 3D



HYDRO-GEO environnement

2D Campaign 2021
EnergeÔ La Côte project (Vaud)

THANK YOU !

GEo-01 (Geneva, 2018)
~200 m3/h artesian flow