Estimated Monetary Value of a Project (EMV)
=
Probability of Success (POS) * $NPV_{success}$
+
Probability of Failure * $NPV_{failure}$

Installed Capacity (P_{el})	Feed-in tariff (Rp./kWh)
≤ 5 MW	40.0
≤ 10 MW	36.0
≤ 20 MW	28.0
> 20 MW	22.7

EMV

$= POS*NPV_{success}$

$+ (1-POS)*NPV_{failure}$

Federal risk guarantee: CHF 150 million
(up to 50% of sunk subsurface project
development cost may be reimbursed)

Federally sponsored R&D
and funds for pilot and demonstration projects
- Swiss Fed. Office of Energy (dominant)
- Swiss Nat. Science Foundation
- ETH Domain
- CTI Swiss Innovation Promotion Agency

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... and international: IPGT membership

5 Countries:

Australia, Iceland, New Zealand, Switzerland
  and the United States (280 funded EGS and EGS-relevant R&D projects)

Purpose:

Accelerate the development of geothermal technology
                                        through international cooperation.
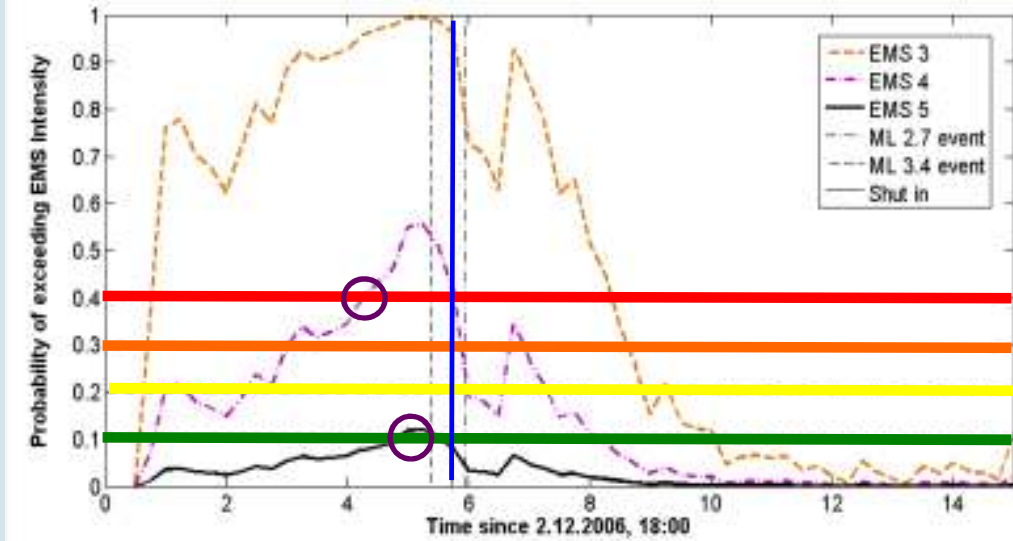
Focus on EGS to develop effective methodologies and practices.

7 Working Groups:

- Lower Cost Drilling
- High Temperature Tools
- Modeling
- **Induced Seismicity (Switzerland is lead convener)**

- Zonal Isolation
- Stimulation Procedures
- Exploration Technologies

Learning from EGS project at Basel to build tools for project developers and operators
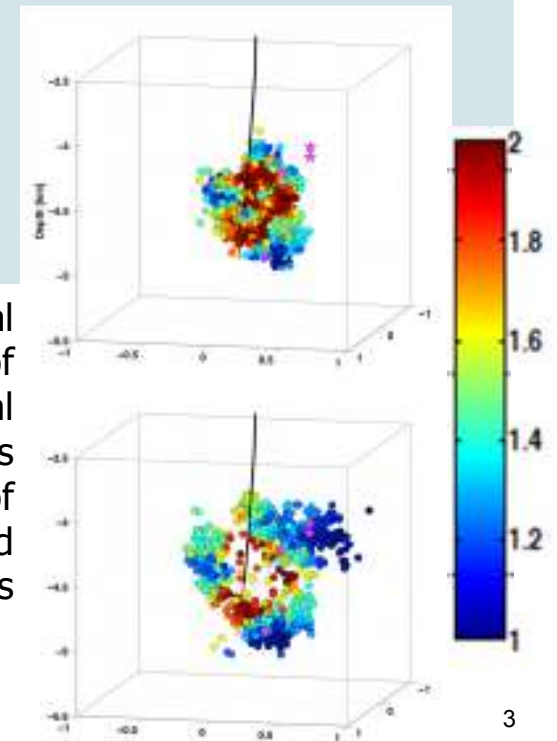

Learning to control:
6-hour forecasts using an evolving time-varying hazard curve during the hydraulic stimulation
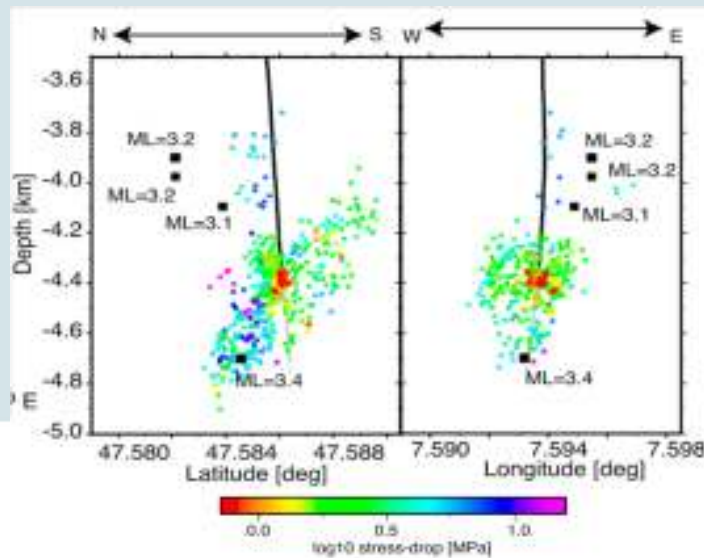
Mapping relative stress drops during hydraulic stimulation

Using spatial distribution of statistical features (b-values) of induced events

Sources: Corinne Bachmann and Bettina Allmann-Goertz , ETH Zurich

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Challenges „Hydrothermal Spallation Drilling"

Fluid Dynamics

- Heat loss trough entrainment
- Injection of cooling water
- Injection of water/flame jet
- Injection of drilling fluid

Combustion in pressurized and aqueous environment

- Flame ignition and operation
- Design burning chamber
- Alternating heating/cooling

Particle Transport

- In treatmeant zone
- In annular zone

Heat Transfer from Jet to Rock

- Heat transfer coefficients from supercritical water jets to rock
- Influence of operational parameters (distance to rock, jet velocity, temperature,...)
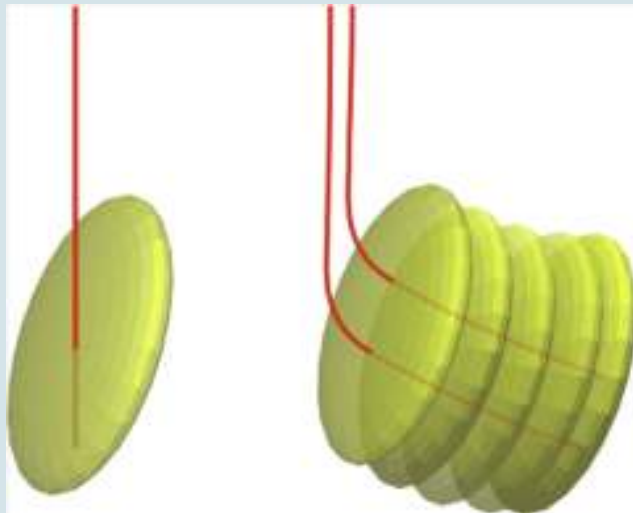- Estimation of spallation performance and efficiency
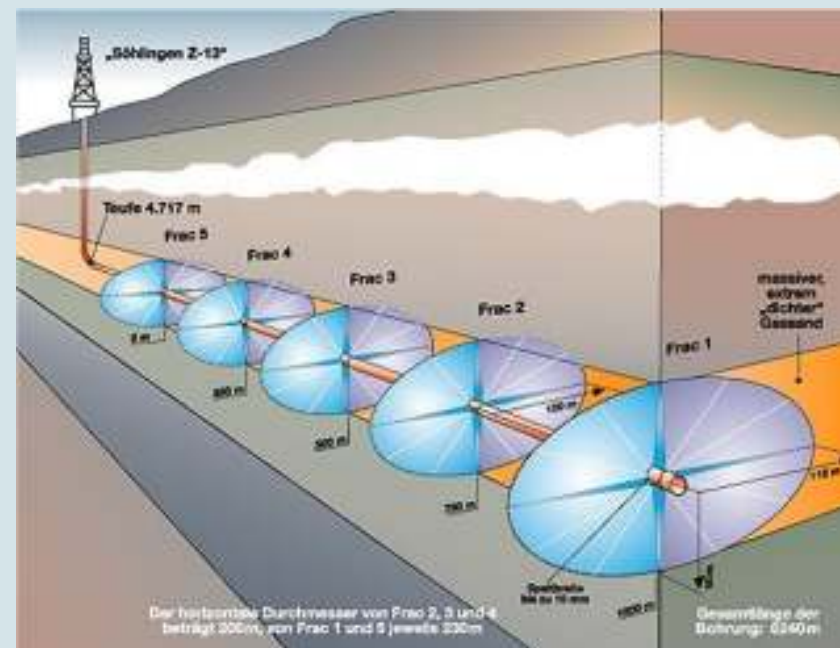
Challenge: EGS multiple completion

Achieved in Basel   Goal in new pilot plant

tight gas & shale gas drilling