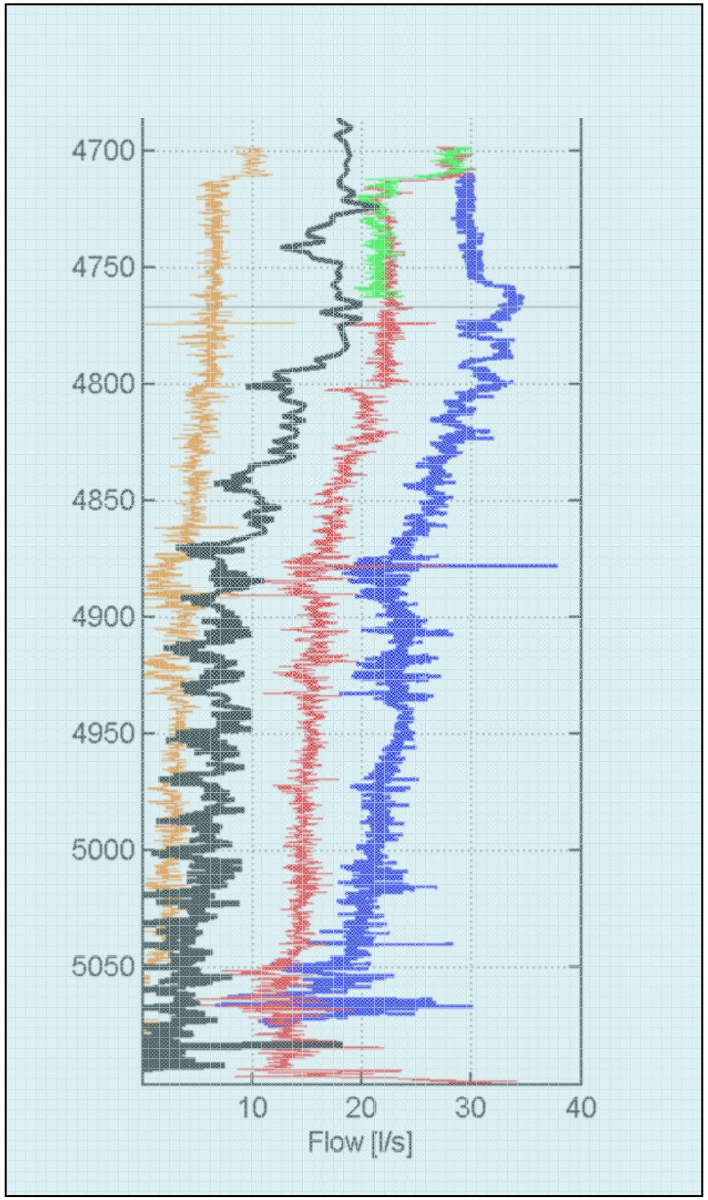
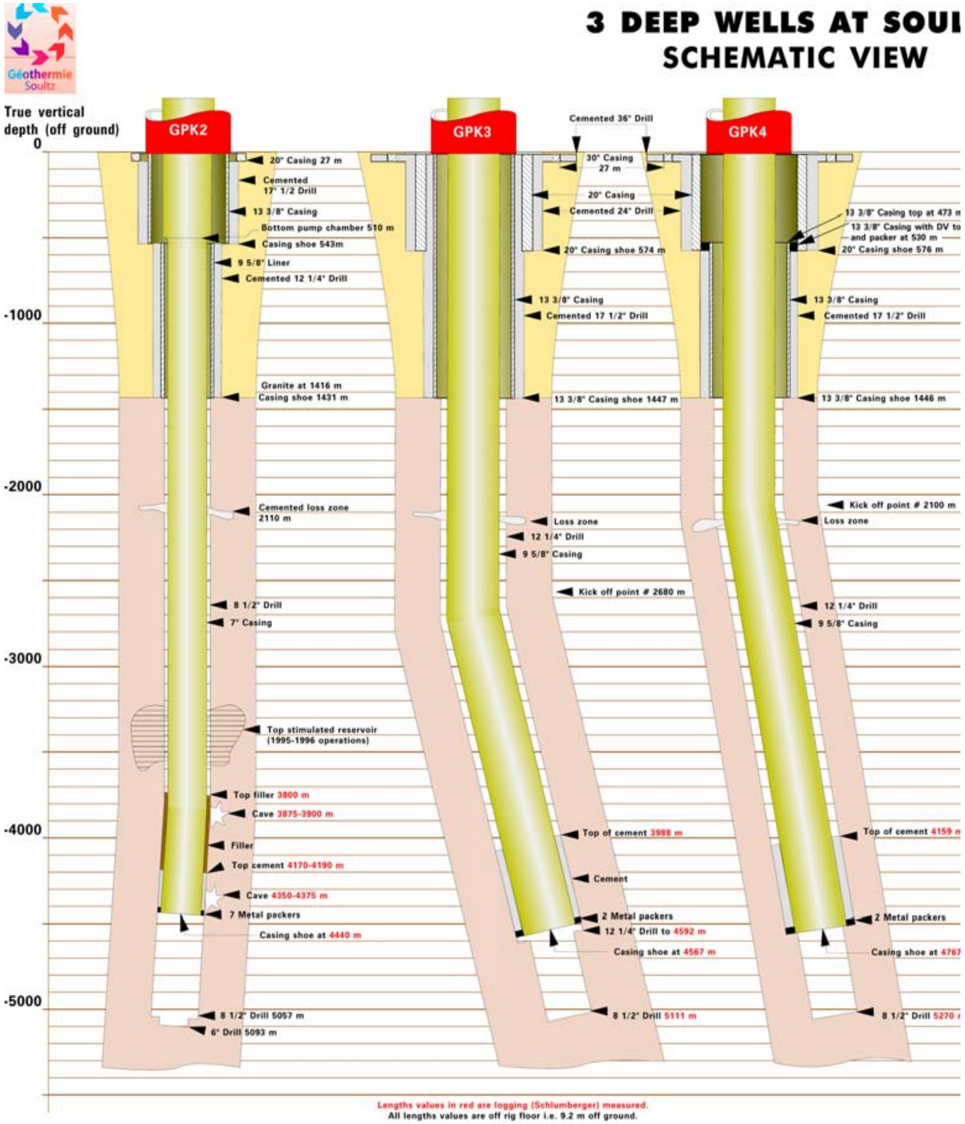


Results of flow-meter measurements in Soultz-sous-Forêts well GPK4 and implications for the fracturing mechanism in crystalline rock

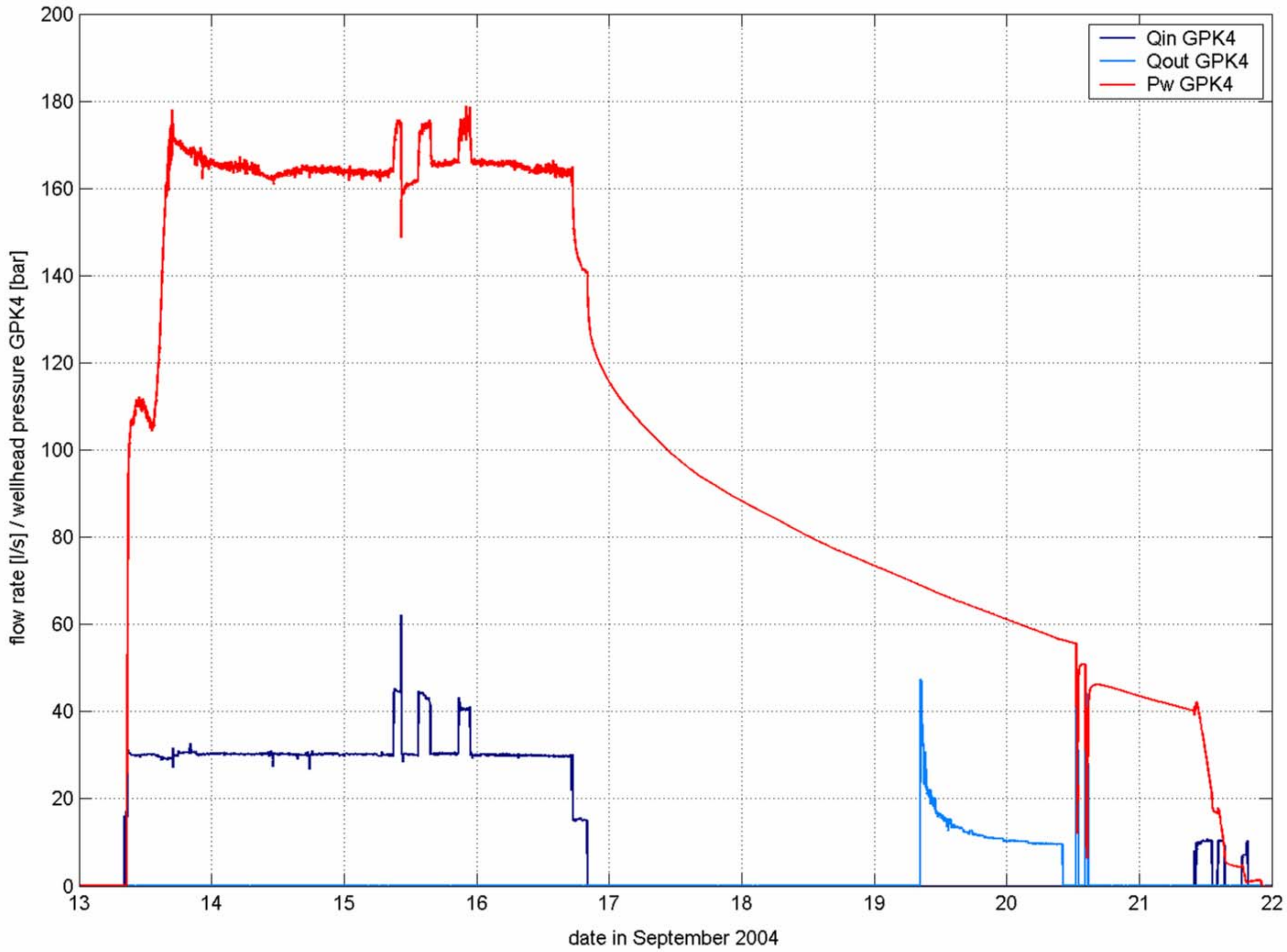
R. Jung, M. Pfender, P. Nami, T. Tischner

ENGINE Workshop 3
Ittingen 29./30.06.2006

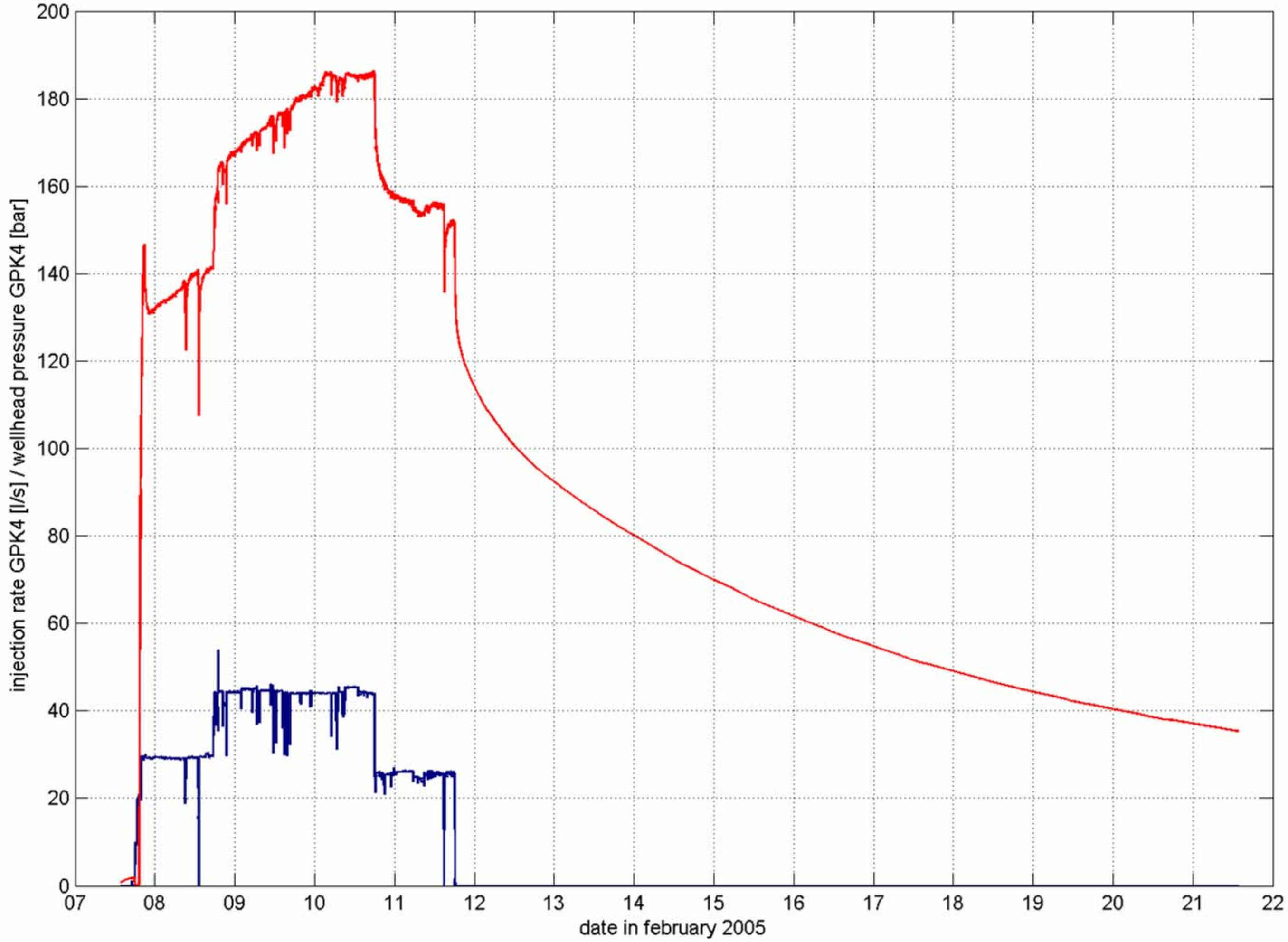
Relevant features of the wells

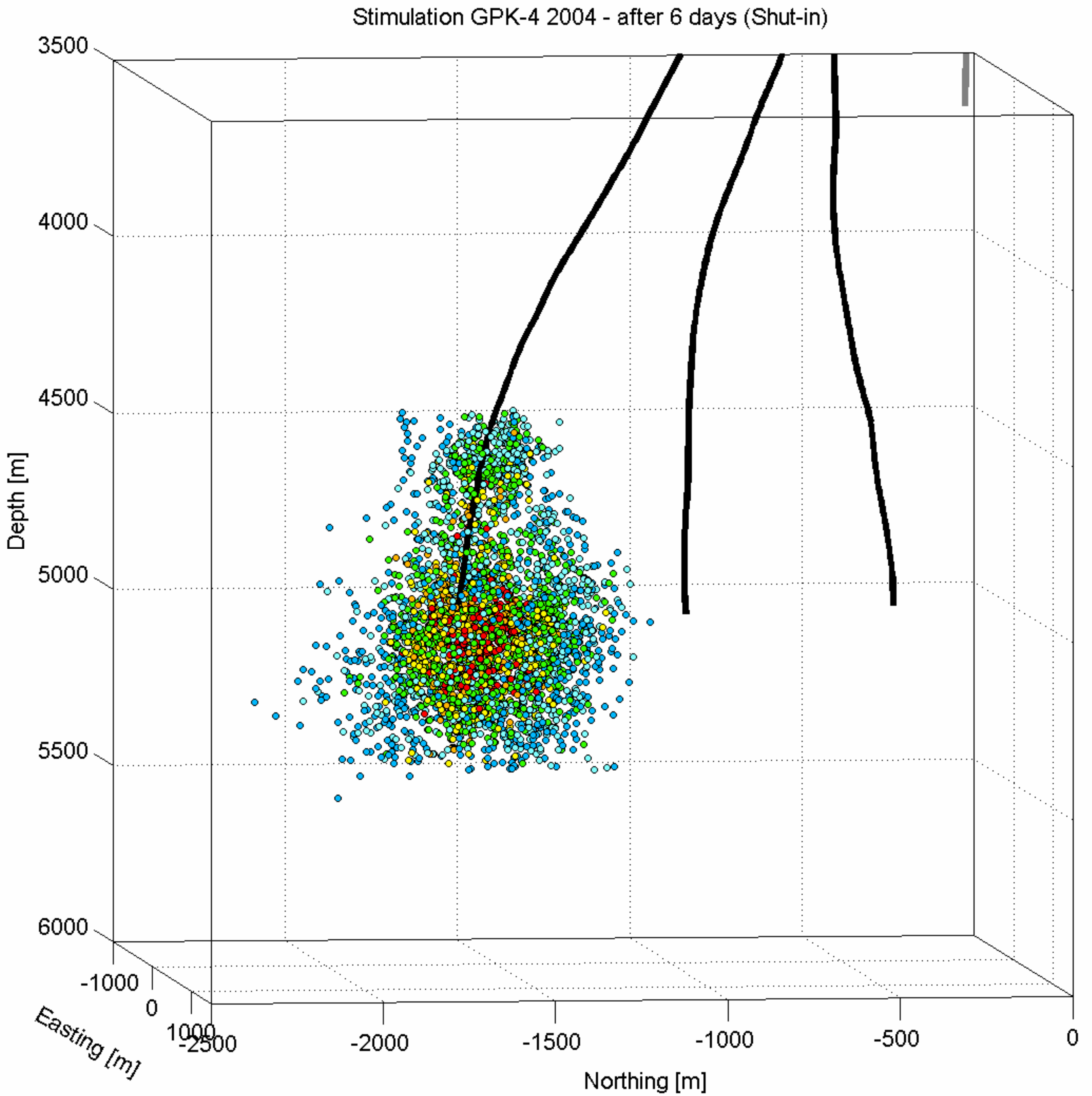


STIMULATION GPK4 – Part 1 – Pressure in GPK-4



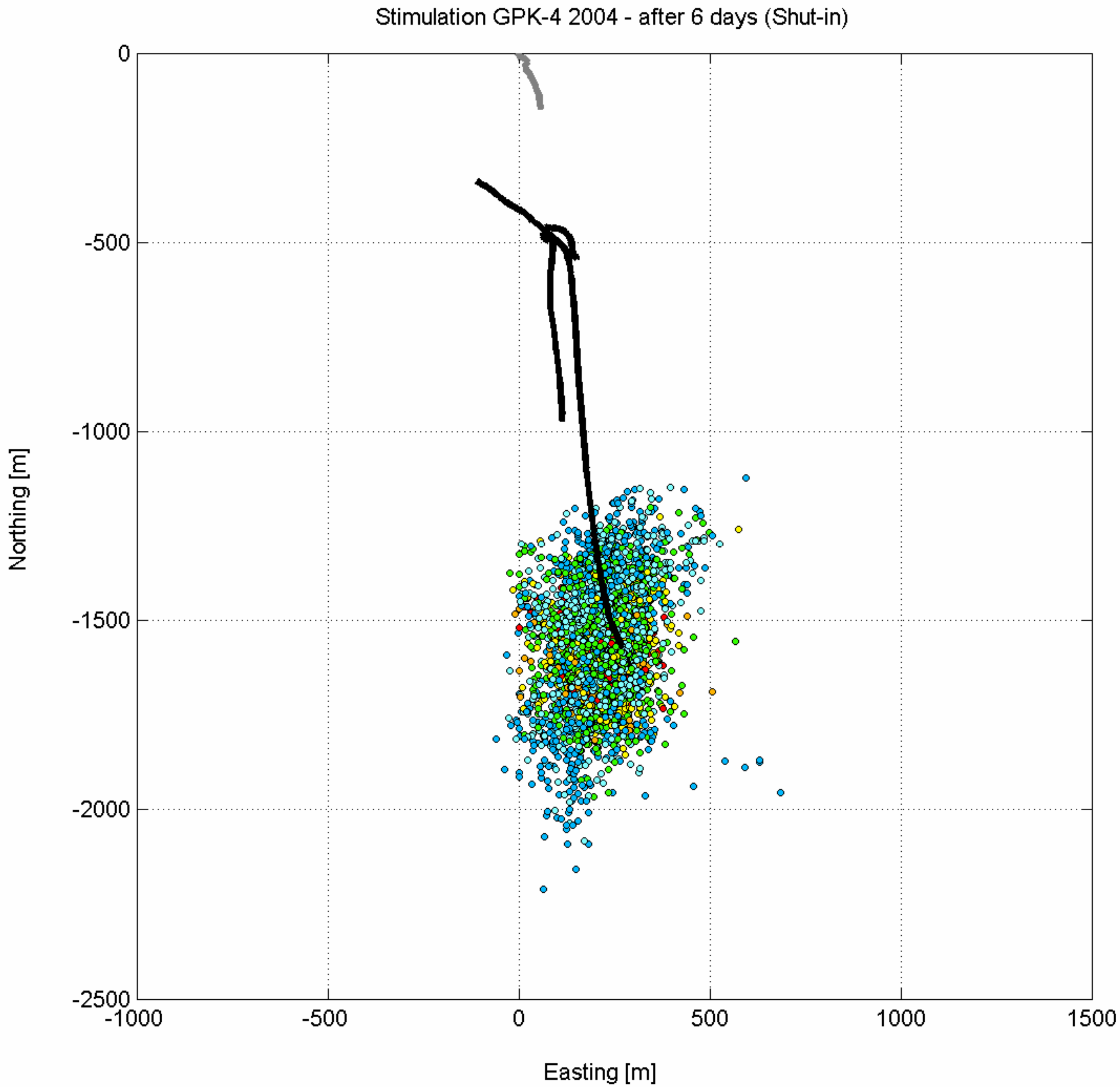
STIMULATION GPK4 – Part 2 – Pressure in GPK-4



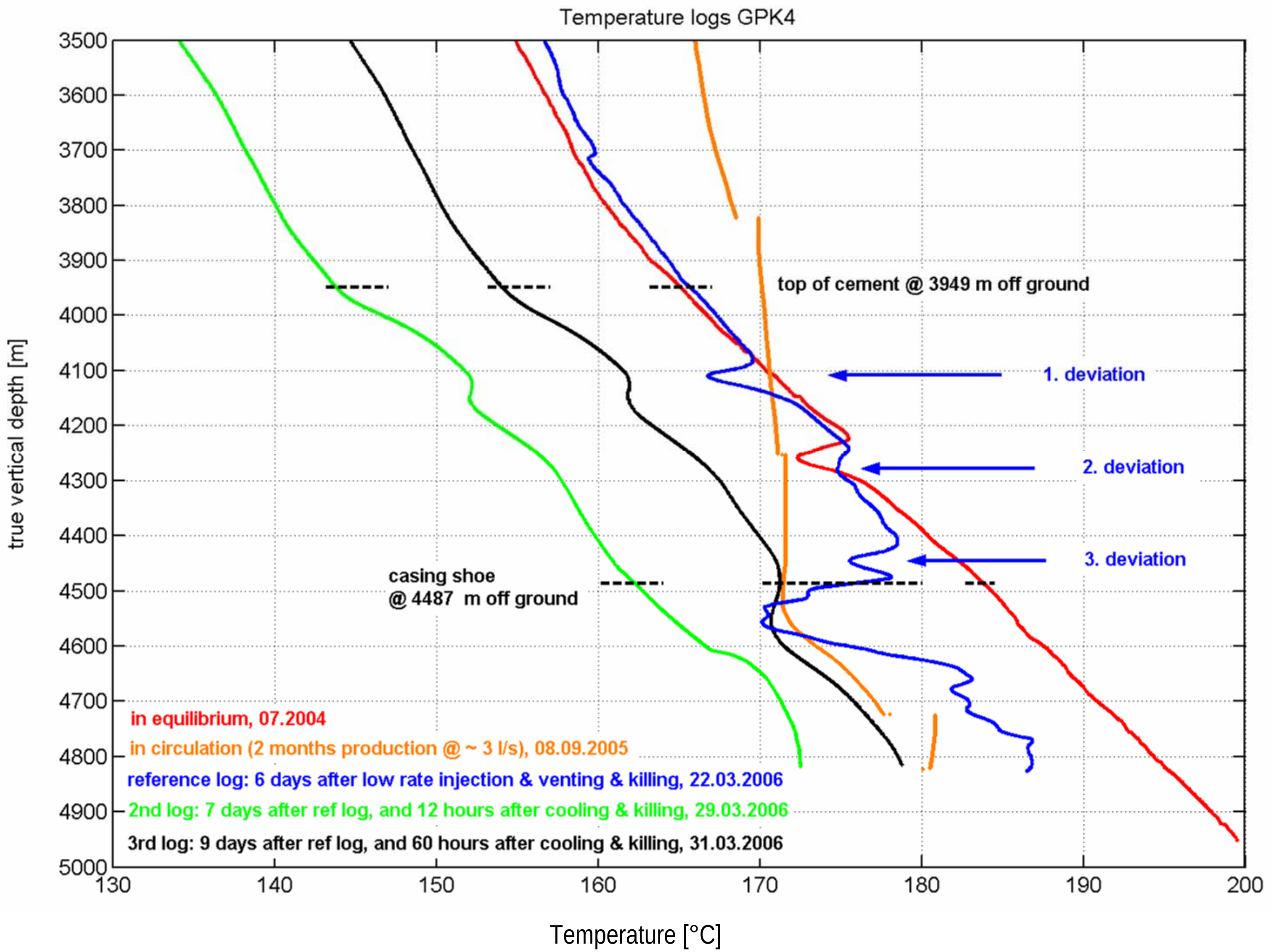


GGA

Leibniz Gemeinschaft


Stimulation GPK-4 2004 - after 6 days (Shut-in)
Northing [m]
Easting [m]
0
-500
-1000
-1500
-2000
-2500
-1000
-500
0
500
1000
1500

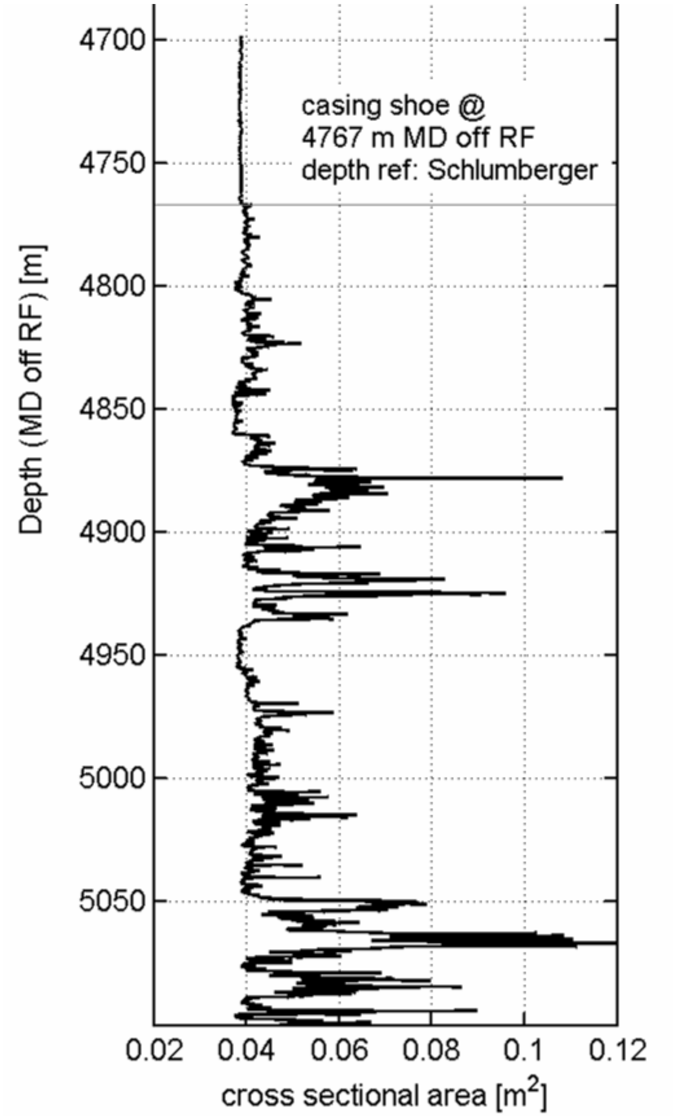
Temperature logs in GPK4 below 3500 m

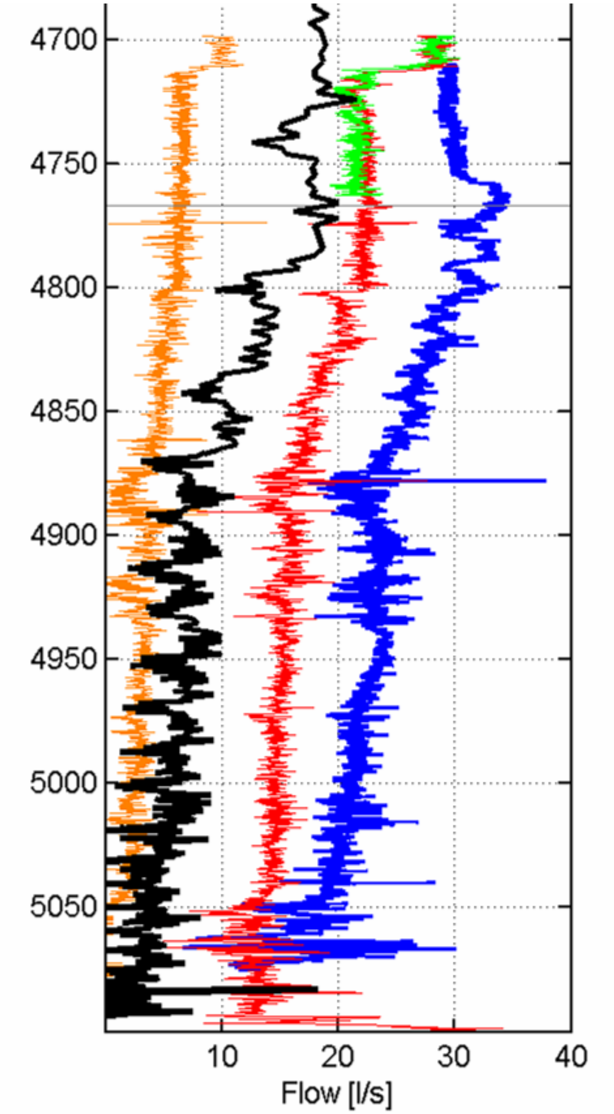


GGA INSTITUT

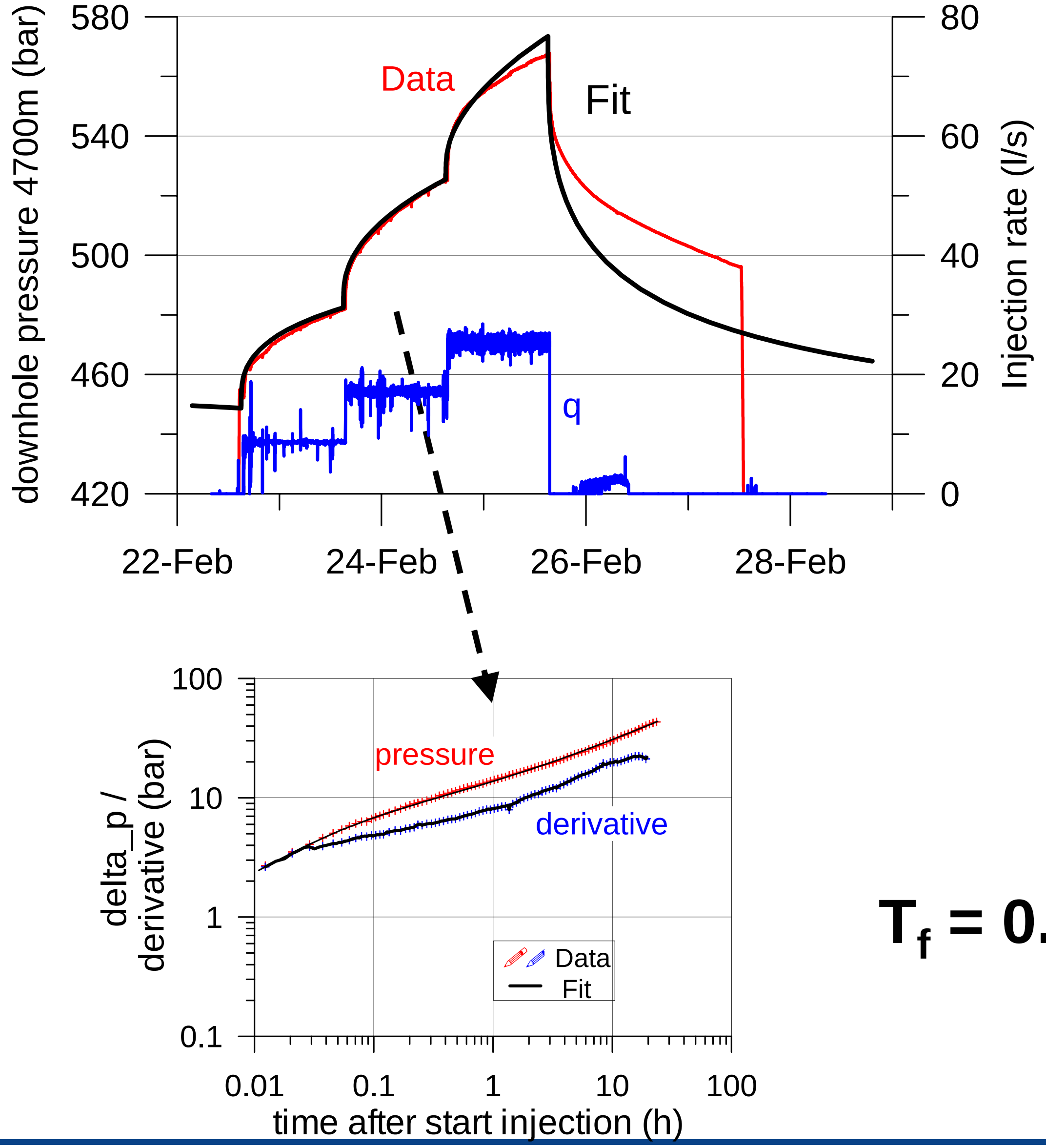
Mitglied der Leibniz Gemeinschaft

caliperlog & flow logs GPK4





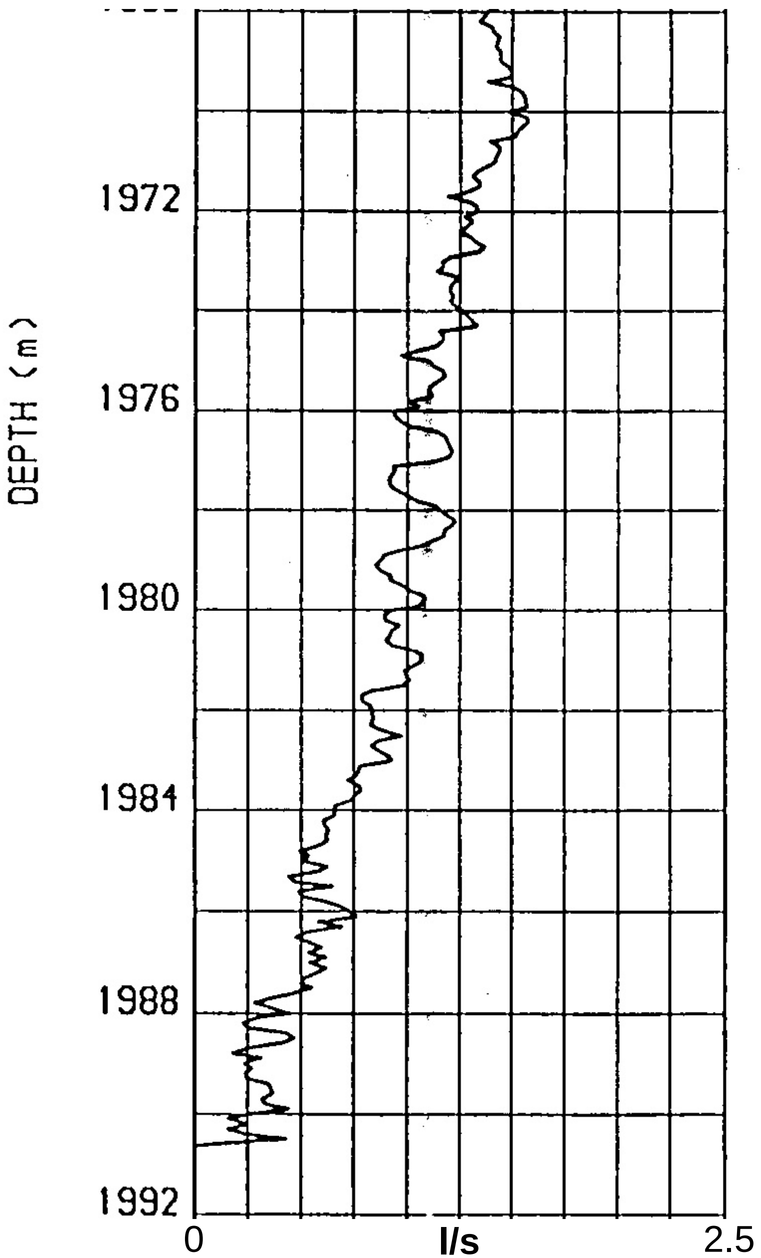
Post-Frac Test GPK4; Test 05FEB22

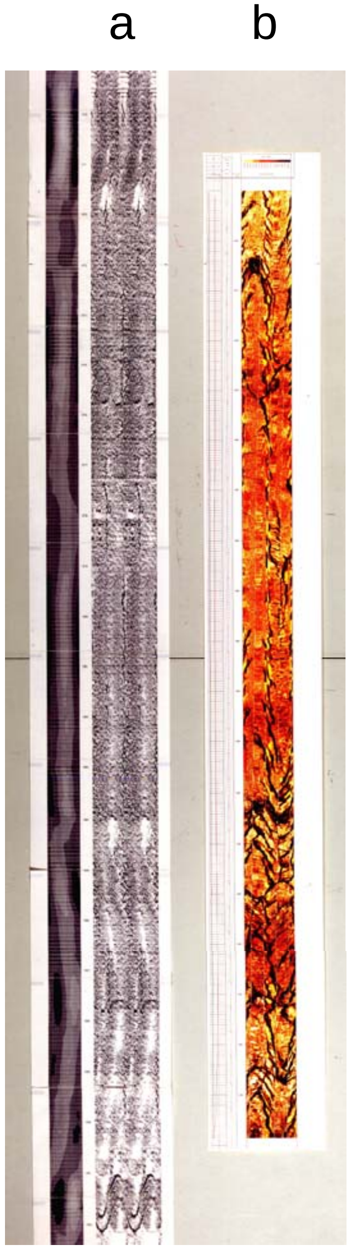


$T_f = 0.06$ Dm

GGA INSTITUT

Mitglied der Leibniz Gemeinschaft



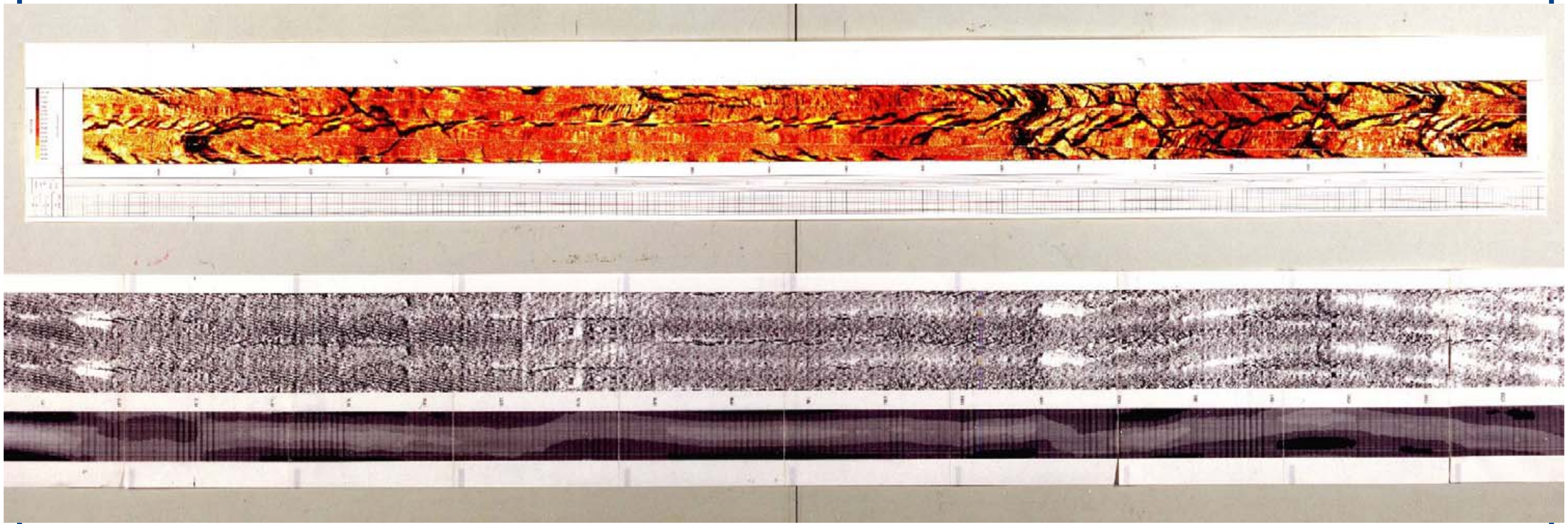


Soultz GPK1

a) before
b) after stimulation

Soultz GPK1 (1970 – 1990 m)

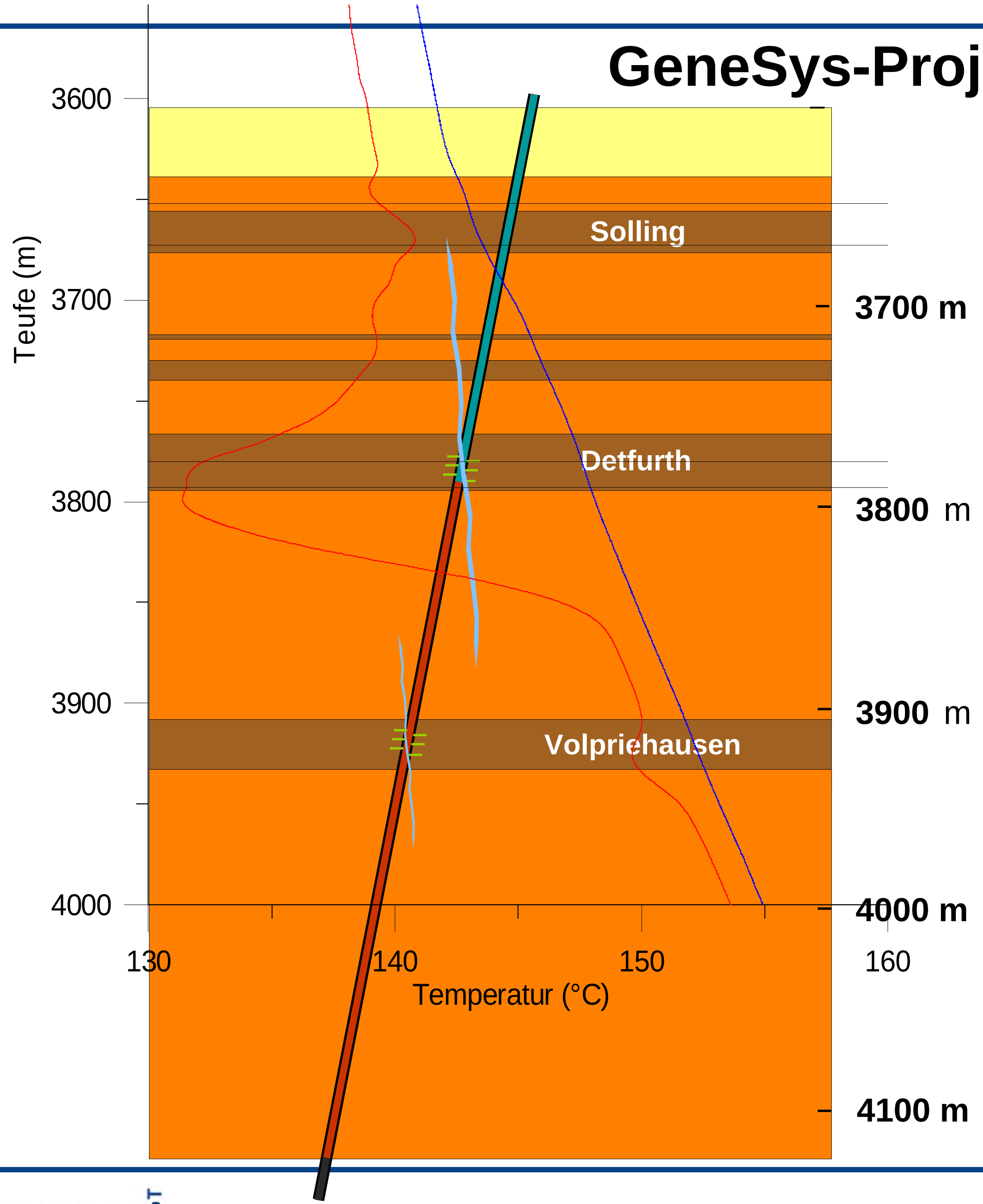
after stimulation



before stimulation

Mitglied der Leibniz Gemeinschaft

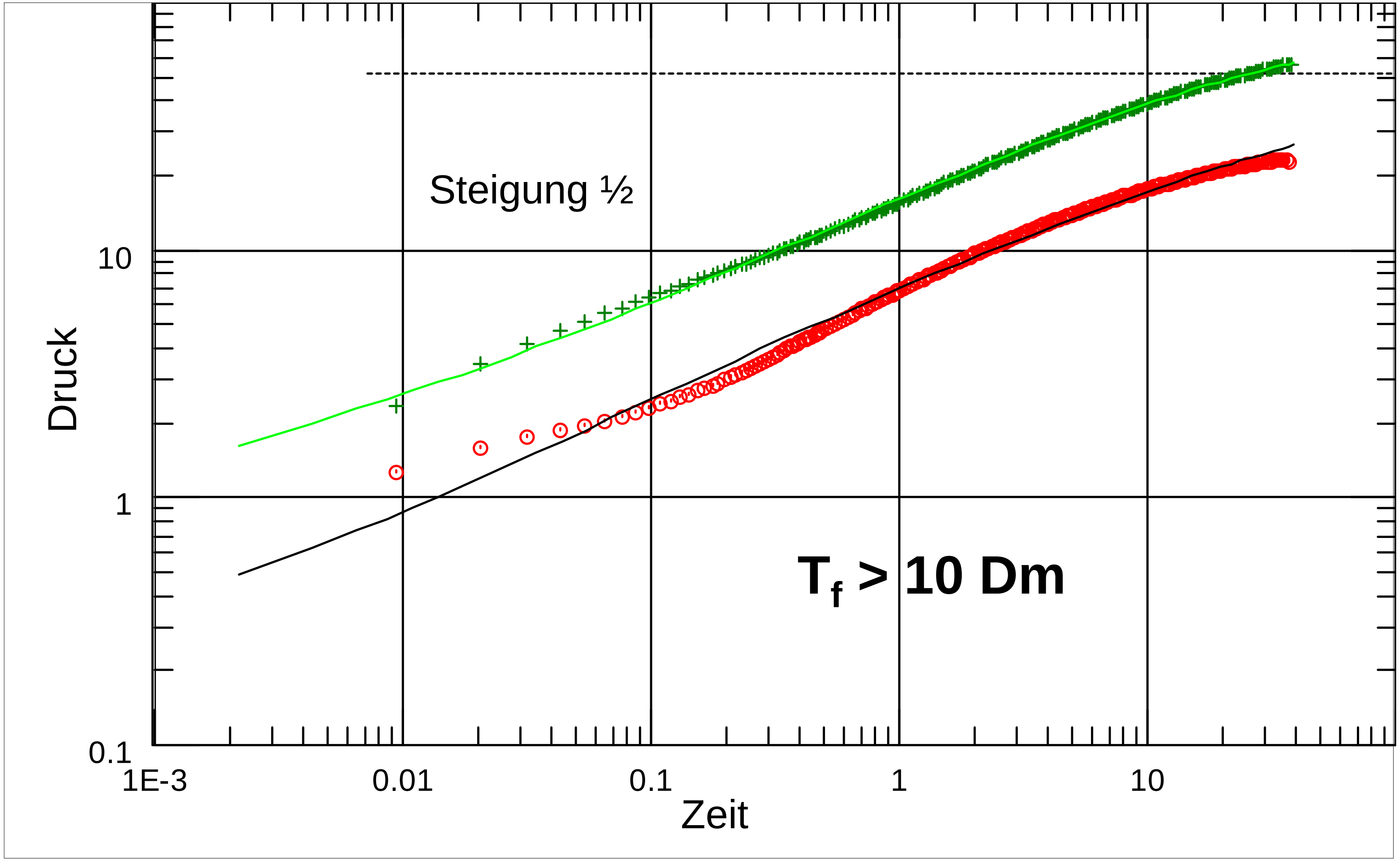
GeneSys-Project



Perforation & Frac 2
20.000 m³

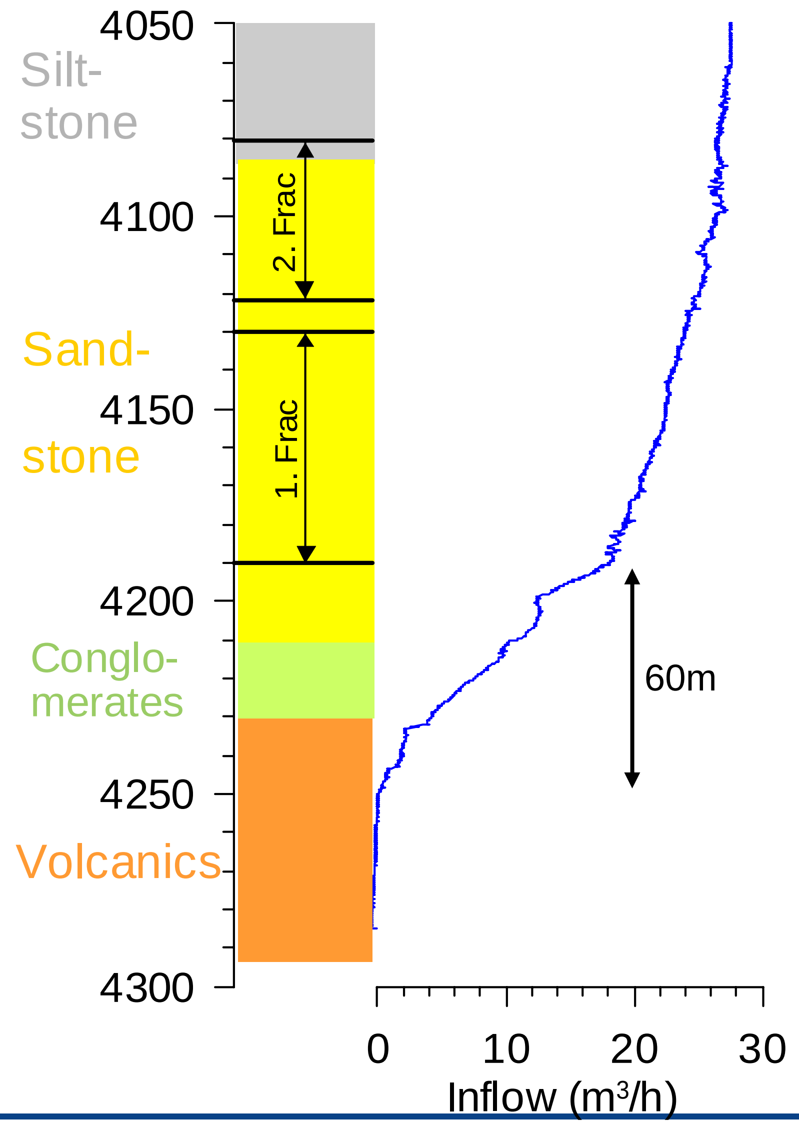
Perforation & Frac 1
1.000 m³

GeneSys-Project

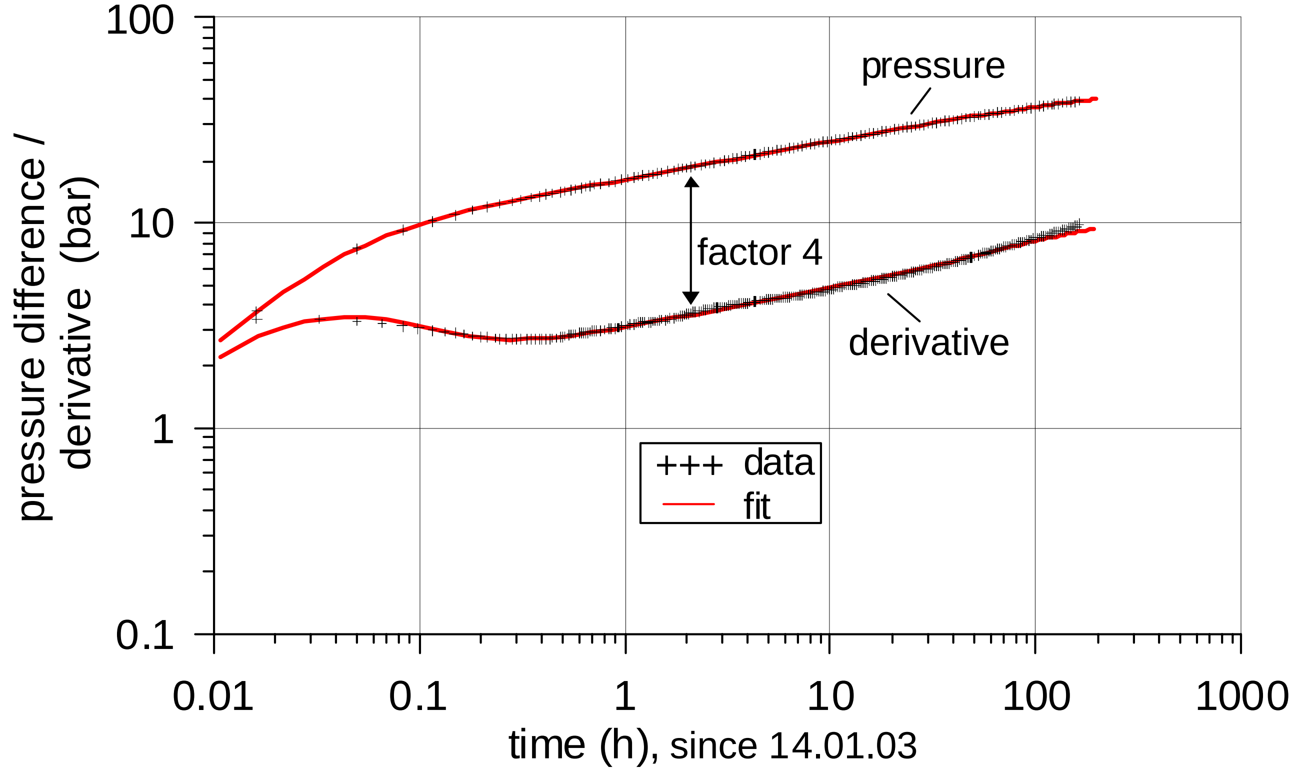


Log-Log plot

Großschönebeck



Großschönebeck



Parameter (h=60m):

Slope of pressure/derivative → $\sqrt[2]{T_f} \cdot \sqrt[4]{k}$ → T_f = 0.1 Dm at k = 0.35 mD

Duration of bilinear flow → x_f > 120m

Conclusions

- Massive waterfrac-tests created long axial fractures in granite and in sedimentary rock
- Fractures were not stopped by natural fractures or lithology changes
- Fractures are kept open by self propping
- Fracture conductivity insufficient in two cases, sufficient in one case
- Hydraulic fracturing has to be re-considered as the dominant stimulation mechanism also in granite