Supplementary material: Seismic monitoring of the STIMTEC hydraulic stimulation experiment in anisotropic metamorphic gneiss

Carolin M. Boese¹, Grzegorz Kwiatek¹, Thomas Fischer², Katrin Plenkers³, Juliane Starke¹, Felix Blümle^{1,4}, Christoph Janssen¹, Georg Dresen¹

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- ¹Helmholtz Centre Potsdam, GFZ German Research Centre for Geosciences, Section 4.2: Geomechanics and Scientific Drilling, Telegrafenberg, 14473 Potsdam, Germany
²GmuG mbh, Bad Nauheim, 61231, Germany
³ETH Zurich, Bedretto Lab, NO F27, 8092 Zürich
⁴ASIR Seismic GmbH, Aachen, 52062, Germany
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- Correspondence to: C. M. Boese (carolin.boese@gfz-potsdam.de)

Supplementary material Table S1: Data gaps in the continuous recording

Start Date	Start Time	End Date	End Time	Comment
03.07.2018	13:38:25	03.07.2018	14:27:20	Power outage
14.07.2018	00:57:25	14.07.2018	01:30:59	Unknown
16.07.2018	07:12:20	16.07.2018	07:13:30	Correlate PC time
16.07.2018	07:47:03	16.07.2018	08:xx	Test USV
17.07.2018	06:56:10	17.07.2018	07:22:30	Test USV
17.07.2018	07:33:41	18.07.2018	07:12:18	False operation
18.07.2018	07:23:29	18.07.2018	07:37:00	Data Check
19.07.2018	07:17:31	19.07.2018	07:53:38	Data Check
20.07.2018	10:33:07	20.07.2018	10:37:45	Data Check
05.08.2018	19:12:58	07.08.2018	13:28:30	Hard drive full

Supplementary Material Figure 1: Comparison of the power spectra density of an ultrasonic transmission (UT) signal, a hammer hit (Ha), a centre punch (CP) hit, and an AE event recorded by AE-sensor AE10 (in driftway). Note that the AE event occurred slightly offset (at greater depth) compared to the other nearly co-located active source points. Also the sampling rate of the AE event is one fifths of that of the other signals. The power spectral density of the signal is shown on the right with circles indicating the 68% occupied bandwidth of the signal energy.

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Supplementary Material Figure 2: Top: Raw waveform before (blue) and after (red) pump noise suppression at station AE03, which is most of all stations affected by noise. Bottom: Frequency-time plot from continuous wavelet decomposition to determine Morse wavelet coefficients for filtering.

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Supplementary Material Figure 3: Daily records of the horizontal channel of the ASIR and vertical channel FBE broadband sensor located at Reiche Zeche mine for the second and third day of stimulation on 17 and 18 July 2018. Hydrofrac start and end times are marked (by yellow stars and labelled at the start time) as listed in Table 2. Note that long period swings in the records result from bandpass filtering (0.001–1 Hz) in combination with data gaps as seen for the beginning of the records for the ASIR sensor and throughout the day for FBE. Some earthquakes and local quarry blasts are seen on both sensors, whereas stimulation related signals are only visible on the ASIR broadband sensor deployed at the STIMTEC site. The distance between both sensors

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is ca. 440 m. Note that the interpretation of some of the drops seen for the ASIR sensor remain unclear but are likely associated with sensor self-centering as determined on a shake table at GFZ lab after the experiment.

Supplementary Material Figure 4: Trade-off in Thomsen parameters ϵ (strength of P-wave anisotropy) and v_{P0} (velocity along symmetry axis) for all AE sensors.