Review comments from PhD Robert Earon, specialist in hydrogeology at SKB, Sweden:

- While I understand that this type of project involves a lot of collaboration and many parties and hence the length of the author list, it would be beneficial to briefly explain in the text the contributions of the various groups.
- Line 47-48: Surely if there is a plethora of research there can be more up to date references?
- Line 68: it is not certain that all readers will be familiar with all facilities. Countries or regions should be included in this list.
- Line 74: I'm unclear on what is meant here regarding tailored heterogeneity and complexity.
- Line 156: Please elaborate on what is meant by semi-quantitatively.
- Line 158-159: this is a common effect of the Cubic Law. It would be beneficial to quantify this claim or provide a reference.
- Line 190-191: These pressure decay tests need a bit more explanation or a reference.
- Line 191: Please provide the in-situ hydrostatic pressure at the lab elevation (or groundwater level for reference)
- Line 245 and Figure 2: this is probably one of the largest issues with the study, in that the 3 longest boreholes are all oriented in roughly the same direction. It is unsurprising that the fracture data is weighted to fractures and fracture sets which the boreholes would be geometrically more likely to intercept. Any claim regarding knowledge of the heterogeneity of fracture-related geoscientific data must be carefully examined in this light. Fracture data should be treated as inherently biased based according to the orientation of the boreholes, even when corrected.
- Line 295: Is it possible that the change in the dielectric permittivity seen in the GPR survey could be due to mineral fillings such as graphite?
- Line 301-304: I think that readers would appreciate a more thorough interpretation of the GPR profiles. What are all the reflectors above the fault zone? Do they correspond with air reflections (i.e. through checking the geometry of the parabolas using) or do the parabolic shape and depth correspond with velocities in rock? What are the actual distances to the fault zones and do they correspond with your conceptual understanding of the site?
- Line 307-313: What are the length of the packers? How do you characterize connectivity? What are the durations of the tests and magnitude of the flow rates? I find the description of the hydrogeological testing methods needs considerable elaboration.
- Line 317-319: What was the analytical method for analysis and why is this violated by the pressure gradient?
- Line 330: What was the corresponding head change and was pseudo-steady state achieved?
- Line 335-344: It is unsurprising that the fracture network is heterogeneous and anisotropic. However, the times of responses are difficult to interpret without the estimated distance between the sections. It seems from Figure 9 that the boreholes intercept a major fault. Where are the sections with regards to the fault? The Structural geological information is absolutely vital in interpreting the results of the interference tests. Did you match the drawdowns against analytical solutions using i.e. Aqtesolv? How do the hydraulic properties compare with the ones of the packer tests? This could be vital in separating the near-field effects (closed fractures or fracture clusters which give high transmissivities during transient hydraulic tests) from the actual connected hydraulic properties.
- Figure 1: Please include a contour map. The topography is vital in understanding the placement and orientation of the tunnels and boreholes.
- Figure 4: Are all fractures treated similarly? It would be interesting to see the open vs. closed fracture count and perhaps plot major fault zones which were intercepted.

- Figure 10: Please normalise this figure so that simply drawdown is shown. (Assuming either a water density or simply showing the change in pressure. CB2 interval 1 looks odd, and usually one isn't concerned with the absolute pressure in these types of tests.
- Line 410: I'm relieved that the authors have included this, but this this should have been mentioned far earlier. Additionally, why was no effort made to correct for the bias? The authors mention that several fractures were found at acute angles to the borehole orientation, but what is the fracture intensity? These could be the fracture sets with highest true intensities.
- 414-415: the logical conclusion of this claim is that a borehole oriented orthogonally to the 3 existing boreholes would provide an entirely new data set and give a better understanding of the fracture matrix properties.
- 415-416: This claim needs to be carefully motivated. At present it lacks sufficient evidence to be included in the article.
- 454-455: I'm not a rock mechanics expert, but I believe that given a reasonably stiff rock at depth dilation due to stress is mitigated by the rock matrix itself. However, in proximity to stress gradients like tunnels and the ground surface the effects will be far more prominent. I would suggest removing the claim regarding the weakening of the dilation concept.
- Line 474: I think the word "apparently" is misused. However, I agree with the claim. Often the fracture core may have clay gouge, fillings etc which inhibit transverse flow.
- Line 487: I'm unfamiliar with the term "hydraulic backbone"
- Line 492-494: I think the authors are correct, although the more care and perhaps a figure (in 3 dimensions) showing the hydraulic diffusivity of the sections and the location of the fault would make the point clearer. I believe the structure of the major zones is the underlying cause for the compartmentalization the authors indicate, but a bit more work needs to be done to really support the argument.