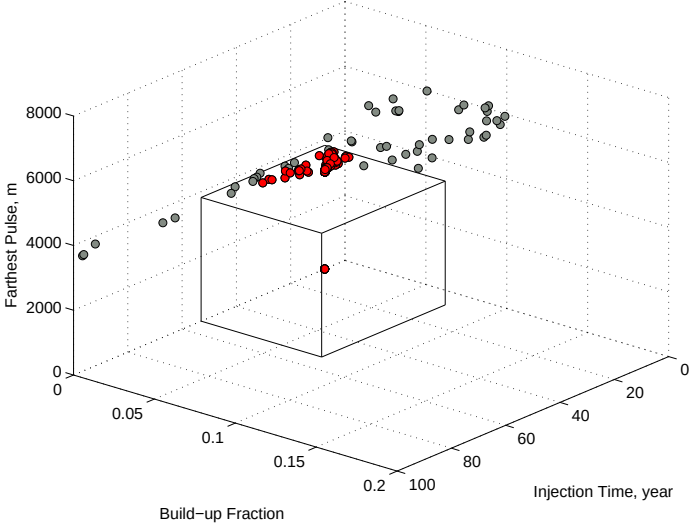

Figure 19: Pressure criteria implemented to filter the acceptable cases. Cases below the critical limits are plotted in red and cases exceeding the limits are plotted in gray.

injection point that falls within the buildup region defined earlier.

Figures 16 and 17 show the farthest pressure build-up distances from the injector in different injection scenarios. In Figure 16a, three groups of cases can be identified: cases with zero distance of farthest pressure build-up pulse, cases with medium distances, and those with large distances from the injection point. Three specific cases are chosen as samples from each of the groups. In the first group, the pressure does not exceed the 10 bar threshold from its initial value in the medium. For these cases, the injector is placed in a permeable region and the medium is conductive towards open boundaries (Figure 18a). Hence, the imposed injection pressure does not build up, neither locally around the well nor globally in the aquifer scale. The second group in Figure 16a have a medium range of $3 - 4$ km of distances from the injection point. Heterogeneity in these cases is not making a high pressure build-up around the injector and throughout the medium (Figure 18b).

In the third group, low permeability rocks in the injection layer cause a high pressure build-up around the injection point. If the injector zone is isolated by sealing heterogeneities, the pressure rises in a limited region. However, if the well is connected throughout the medium, and the heterogeneities in the aquifer scale contain relativly low permeability rocks, the pressure build up spreads wider in the aquifer. In Figure 18c, the injection point is located close to a low transmissibility rock. This rises the pressure level in the injector. Other parts of the aquifer are connected with poor quality rocks, resulting in a wide build-up region.

The farthest pulse distance ranges from 8 km to about 10 km in the extreme cases. By controlling the injection pressure, the maximum shrinks to less than 5 km (Figure 17a).

5 Discussion

So far, we reported the model responses that measure the pressure rise and pressure disturbance propagation in the domain. The pressurized volume fraction indicates the actual high