pressures that may occur in an injection operation. The build-up volume fraction and the farthest pulse are indicators of how the pressure disturbance is spread in the system. We are interested in limiting both the pressure increase and the area of the well pressure influence in the aquifer.

In most of the results, aggradation angle, progradation direction, and faults play a major role in the pressure behavior. For low aggradation angles, geological layers are made of rock types piled in a parallel stratigraphy. Thus, efficient vertical permeability is the harmonic average of these layers. If any of these layers contain a low-permeability rock, this fact will result in a low vertical permeability. Injecting into a limited space sealed vertically increases the pressure in the injection point.

The progradation direction can dominate the pressure behavior. It is very important to locate the injector in a high permeability zone that is connected to other parts of the domain via permeable channels. Injecting into the riverside of a shallow marine depositional system may result in locating the injection point in low-quality rock between river branches joining the sea. This fact increases the pressure significantly near the injection point and can result in a high well-bore and aquifer pressure.

Structural deformations due to faulting process can increase the connectivity in the medium. If the transmissibity in the aquifer scale is high, the injection pressure releases through the open boundaries. However, if the injection area is surrounded by low-quality medium, the pressure increases in the aquifer and the connectivity enhanced by the fault geometries spreads the build-up region in the domain. On the other hand, sealing faults results in high pressures within closed zones around the injection point. However, sealing faults may limit the pressure disturbance propagation in the domain.

From an operational perspective, pressure limits must be set to keep the operations within safe margins. One approach to study the safety of an operation could be setting critical limits on the pressure responses measured here. This limit is used to filter cases with desirable/acceptable pressure behaviors. The critical margins are inferred from the realistic operational requirments. In our pracice, we assume these margins to be 53 years for the injection time, 0.0787 for the pressurised volume fraction, 0.0745 for the build-up volume fraction, and 3822 m for the farthest pulse distance from the injection point. These values are selected from the mid points of range of variations in the results. By these assumptions, 49 cases out of total number of 160 cases exceed the critical limits.

Figure 19 shows the cases filtered by the pressure criteria. In Figure 19, the pressurized volume fraction is also considered in the filtration, although it is not shown in the plot axes. The plot shows that most of the cases that pass the filtering are concentrated in a region of low build-up fraction values. Figure 20 shows the histogram of filterd cases compared with the histogram of all studied cases for each response.

6 Conclusions

This work is a part of comprehensive sensitivity studies to assess the impact of geological heterogeneity on CO_2 injection and early migration. The aim of this study is to define preventing measures that can be used to avoid high pressures and the damages that accompanied them during the injection operations. Simulation responses related to the pressure behavior in