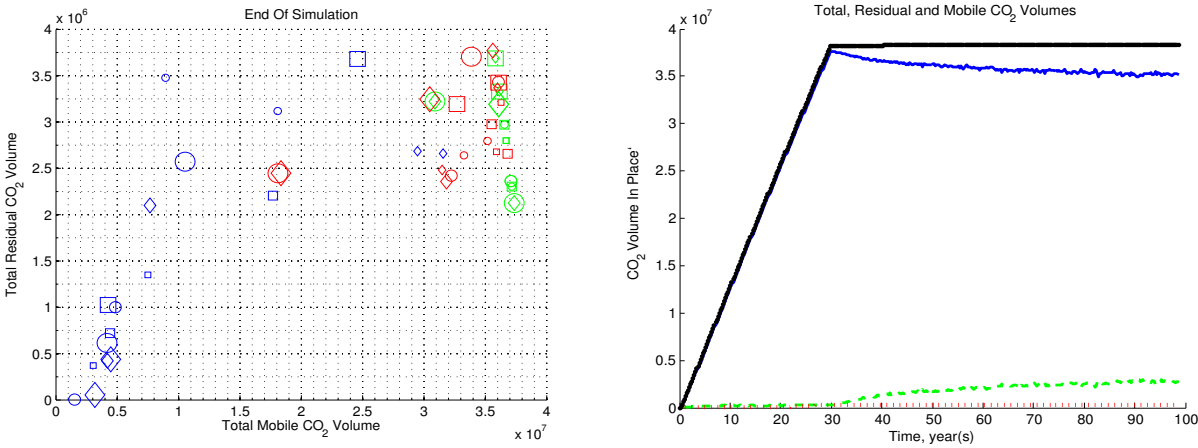

Figure 5: CO_2 volumes. Left: residual versus mobile volume at the end of simulation. Most of the green colored cases follow a linear trend, which is expected because the injected CO_2 must be conserved if no CO_2 leaves the system. For the rest of the cases, some CO_2 goes out of boundaries. Right: Total CO_2 volumes with time plotted for one case. Green curve is the residual volumes, dotted red denotes volumes that have left the domain, solid blue is mobile volumes, and the solid black shows the summation, which is the total volume and stays constant after injection because no more CO_2 is added to the system.

assume that all mobile CO_2 connected to a leakage point will escape out of the reservoir. Hence, it is preferable if the total mobile CO_2 volume is split into smaller plumes rather than forming a big mobile plume. Though the area exposed to potential leakage points will increase by splitting the plume, yet the volume reduction is overtaking the area effect.

On the other hand, the split CO_2 plumes can sweep more cross-areas than a big single plume. The no-flow faulted side can be considered to be connected to an imaginary large volume available for long-term plume migration. Thus, it makes sense to talk about plume sweeping cross area. Larger areas leave more residual CO_2 in the tail of the plume. Hence, we looked at the largest plume size, the number of plumes, and other statistical parameters. The number of plumes at the end of simulation for all cases are given in Fig. 6. Two-lobed cases include more branching channels which result in more plume numbers. Also barrier effect increases the lateral distribution of the plume.

6 Conclusions

Herein, we have reported on a preliminary study of the influence of various geological parameters on the injection and early-stage migration of CO_2 in progradational shallow-marine systems. Large variations in the flow responses show the importance of considering uncertainty in the geological parameters. In particular, our results highlight how variation in aggradation and barriers significantly change the flow direction within the medium. Therefor we believe that effort should be put into detailed geological modeling of potential injection sites. This way, one can better balance the influence of simplifications made in the models of geology and flow physics.