slows down until stagnation. The deposition happens in a spectrum from larger grains depositing earlier in the land side to fine deposits in the deep basin. If the river flux or sea level fluctuates, the equilibrium changes into a new bedding shape based on the balance of these factors.

In the SAIGUP study, the progradational cases are considered in which, for example, the river flux increases and shifts the whole depositional system into the sea. The angle at which the transitional deposits are stacked on each-other because of this shifting, is called aggradation angle. Three levels of aggradation are modeled here: low, medium and high (Fig. 1). As we will observe later, aggradation can have a dramatic influence on the injection and migration process.

Progradation: The final factor varied is the progradation or the depositional-dip direction. Two types are considered here: up and down the dominant structural dip. Since the model is tilted a little, this corresponds to the lobe direction from flank to the crest or vice-versa (Fig. 1). This has a potential influence on the CO_2 flow from the injection point up to the crest.

3 Simulation workflow

A fully automated workflow was designed for this study, starting from variational parameters in the SAIGUP models and ending into comprehensive result outputs based on the objective of the work. As a first step, 54 representative cases are studied using a commercial simulator (Eclipse). However, the parallel aim of future work is to develop fast simulation methods that are suitable for performing thousands of runs, using e.g., a vertically-averaged formulation [5].

4 Scenario design

After studying several scenarios for a typical CO_2 injection, we ended up using an injector down in the flank and hydrostatic boundary conditions on the sides, except the faulted side on the crest (Fig. 2). No-flow boundary conditions are imposed on the top and bottom surfaces of the model. The well is completed only in the last three layers.

Simple linear saturation functions with zero capillarity are used. This can be justified because the permeability contrast in channels has the dominating effect on the flow. Also, simple PVT data for a slightly compressible supercritical CO_2 is used. To model the hydrostatic boundaries in Eclipse, high multipliers are used to magnify the pore volume of the outer cells in the model. About 40MM m^3 of supercritical CO_2 is injected for thirty years, which amounts to 20% of the models' pore volumes. After the injection period, seventy years of early plume migration is simulated.

5 Results

As our objective function, we seek to maximize the CO_2 storage volume and minimize the risk of leakage. These quantities are measured indirectly by various simulation outputs