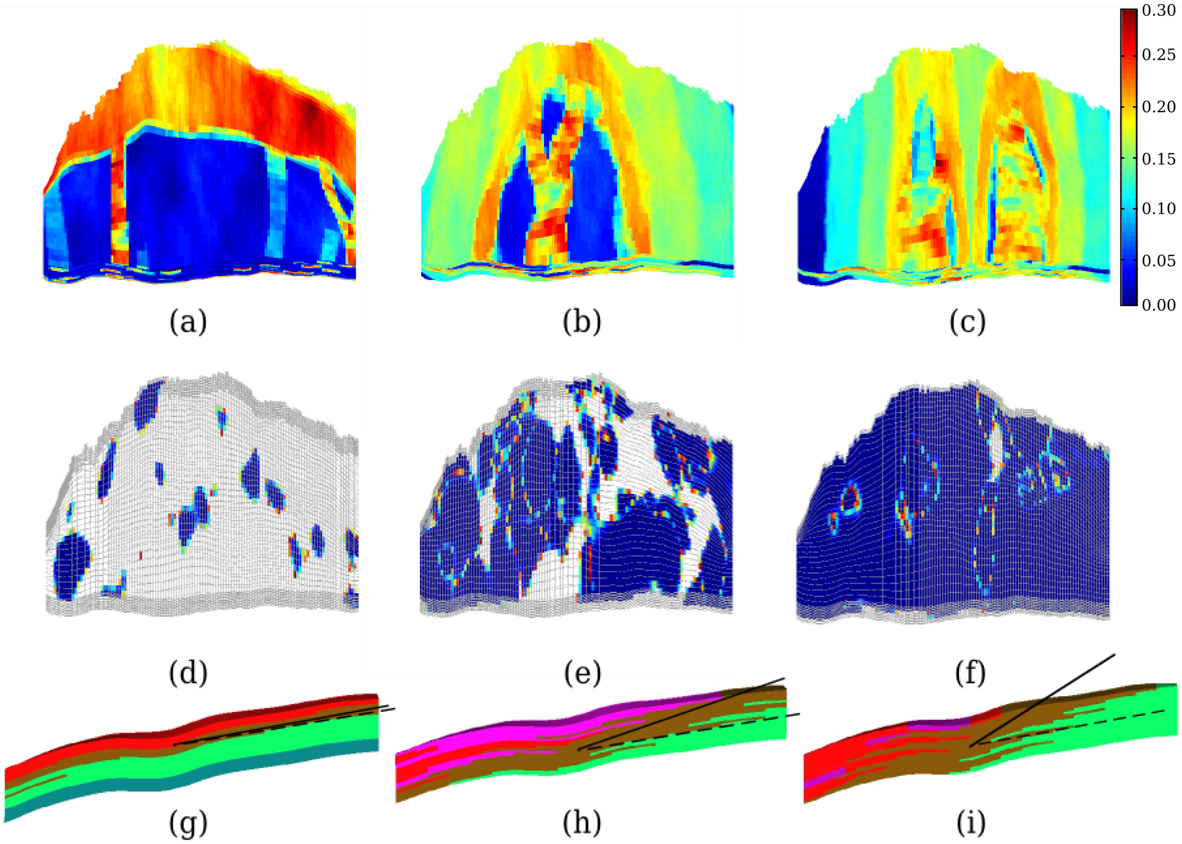

Figure 1 *Different geological features considered in this study. Top row shows 'lobosity' in porosity distribution: (a) flat shore-line, (b) one lobe, (c) two lobes. The middle row shows 'barrier' by the distribution of zero transmissibility multipliers: (d) low, (e) medium, (f) high. The lower row shows 'aggradation' in rock-type distribution: (g) low angle of interface between the transitional rock-types leads to parallel layers; this angle is increasing in cases (h) and (i), which correspond to higher levels of aggradation. An up-dip progradation direction is shown in (b), and if the lobe flips over the long axis, we will have down-dip progradation.*

Scenario design

We are using an injector down in the flank and hydrostatic boundary conditions on the sides, except the faulted side on the crest (Fig. 3). 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 used simulator, 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.

Results

As our objective function, we seek to maximize the CO_2 storage volume and minimize the risk of leakage. The results are discussed in three parts: first we look at model responses, then correlation between these responses. Afterwards we consider the sensitivity of each response to the studied geological feature.