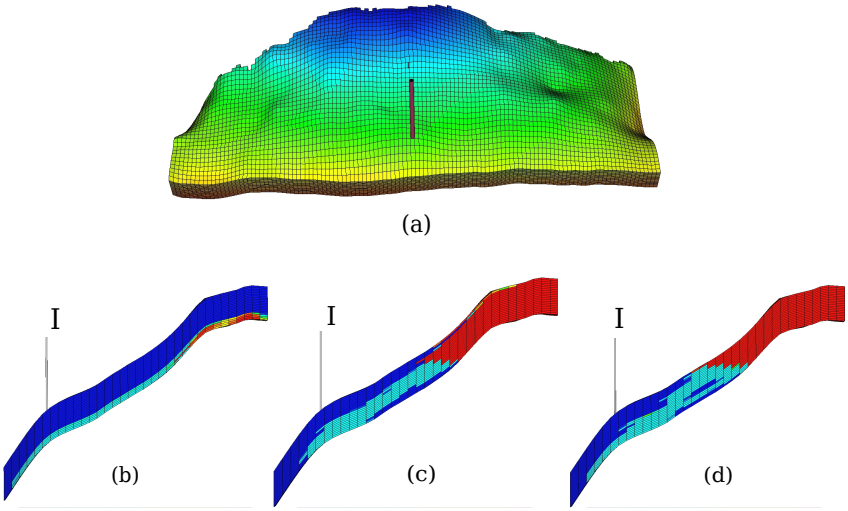

Figure 2: (a) Model geometry and well position. Model dimensions are 3km×9km×80m with 20 layers. The bottom row shows the side view of CO_2 distribution (in red) at the end of simulation in different aggradation cases, from low (b) to high (d). The vertical direction is exaggerated.

that are discussed below.

In all outputs, we recognize the effect of aggradation. Cases with low aggradation have continuous facies layering parallel to the horizontal direction of the grid. Because the three lowest layers, in which the well is completed, are sealing in the cross-layering direction, the flow is forced to stay in the same layers rather than accumulating in the crest (Fig. 2).

Reservoir pressure: The pressure response in general shows a sharp jump at the start of injection and a declining trend during the injection and plume migration. Pressure behavior of different cases at the end of the injection period is shown in Fig. 3. Low aggradation cases show higher pressure.

Boundary fluxes: The flux out of the open boundaries is a measure of the sweep efficiency of the CO_2 plume. As channeling can lead to early CO_2 breakthrough at boundaries, we prefer cases with less fluxes out of the boundaries. The down boundary that is closer to the injector is a potential loss for the injected volume (Fig. 4). Again, the flow is led readily to the boundaries in cases with low aggradations .

Total mobile/residual CO_2: If the CO_2 saturation is below the critical value, it will be immobile in the bulk flow, although not in the molecular sense. Less mobile CO_2 means less risk of leakage and more residual volumes (with saturations less than the critical) resulting from a more efficient volume sweep as preferable (Fig. 4). We use critical saturation of 0.2 for both water and CO_2.

Connected CO_2 volumes: To estimate the risk of leakage from the caprock, we