1 Effect directional spreading

Comparison of the 1D and 2DH model results for the 26 profiles. The dashed blue line represents the 1D model without reduction of the short-wave group variance. The red dashed line shows the result with an α_E parameter of 1.

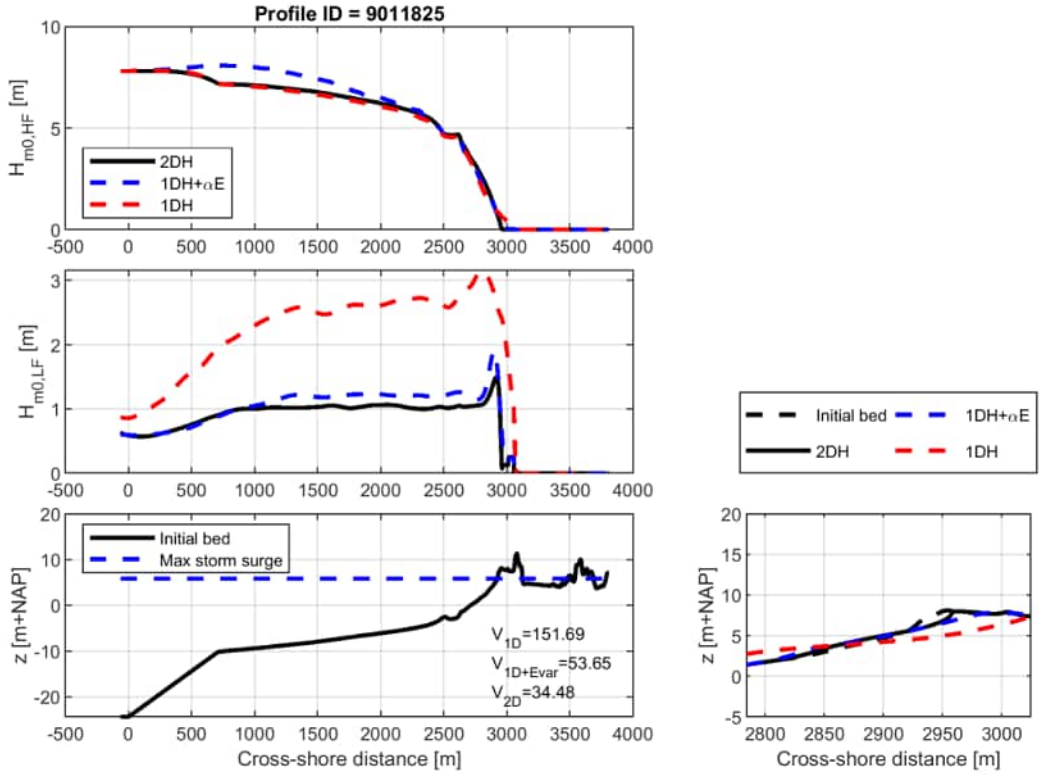

Figure 1.1: *Short-wave transformation (upper panel), infragravity transformation (second panel) and bed level (lower panel) for profile 9011825. The lower right panel shows a zoomed region of the erosion profile. The black lines show the results for a 2DH model and the blue line represents the 1DH model with a α_E of 0.3. The dashed red line shows the results with 1DH model with α_E of 0.3*

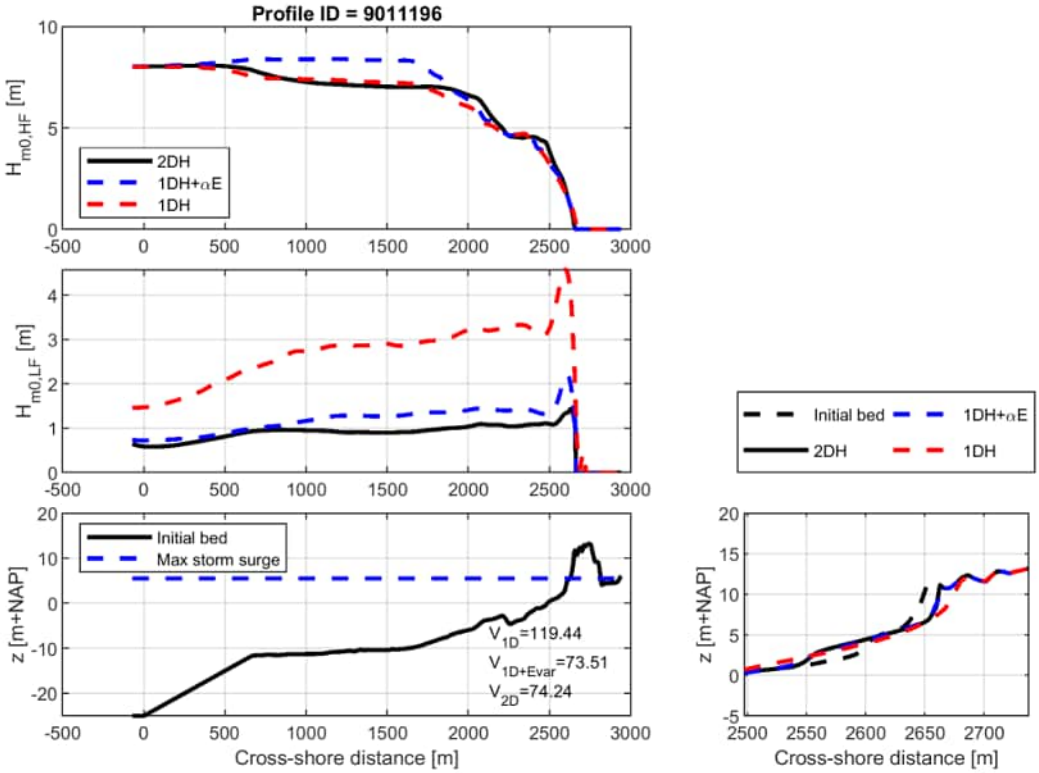

Figure 1.2: *Short-wave transformation (upper panel), infragravity transformation (second panel) and bed level (lower panel) for profile 9011196. The lower right panel shows a zoomed region of the erosion profile. The black lines show the results for a 2DH model and the blue line represents the 1DH model with a α_E of 0.3. The dashed red line shows the results with 1DH model with α_E of 0.3*

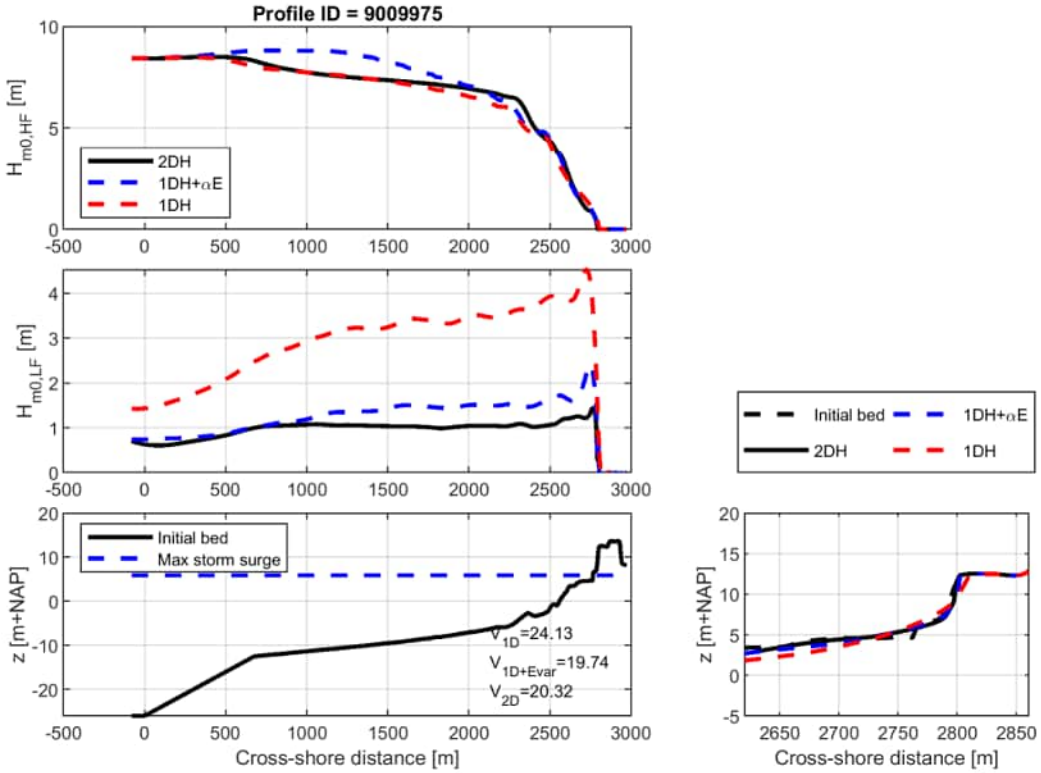

Figure 1.3: *Short-wave transformation (upper panel), infragravity transformation (second panel) and bed level (lower panel) for profile 9009975. The lower right panel shows a zoomed region of the erosion profile. The black lines show the results for a 2DH model and the blue line represents the 1DH model with a α_E of 0.3. The dashed red line shows the results with 1DH model with α_E of 0.3*

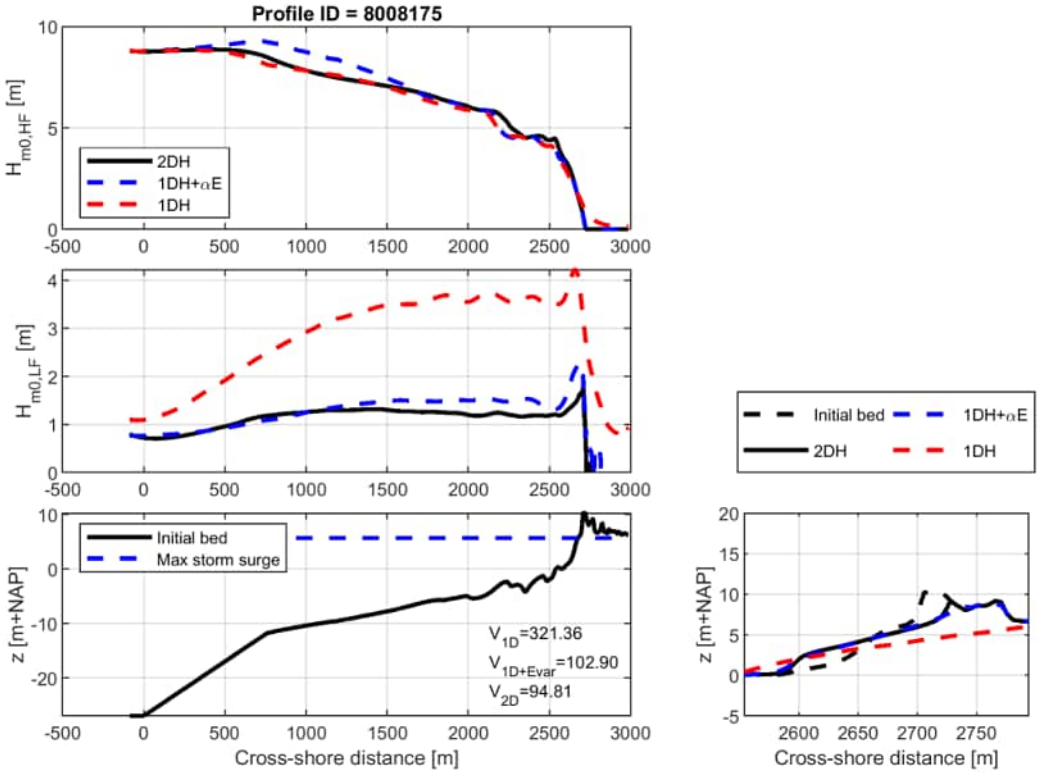

Figure 1.4: *Short-wave transformation (upper panel), infragravity transformation (second panel) and bed level (lower panel) for profile 8008175. The lower right panel shows a zoomed region of the erosion profile. The black lines show the results for a 2DH model and the blue line represents the 1DH model with a α_E of 0.3. The dashed red line shows the results with 1DH model with α_E of 0.3*

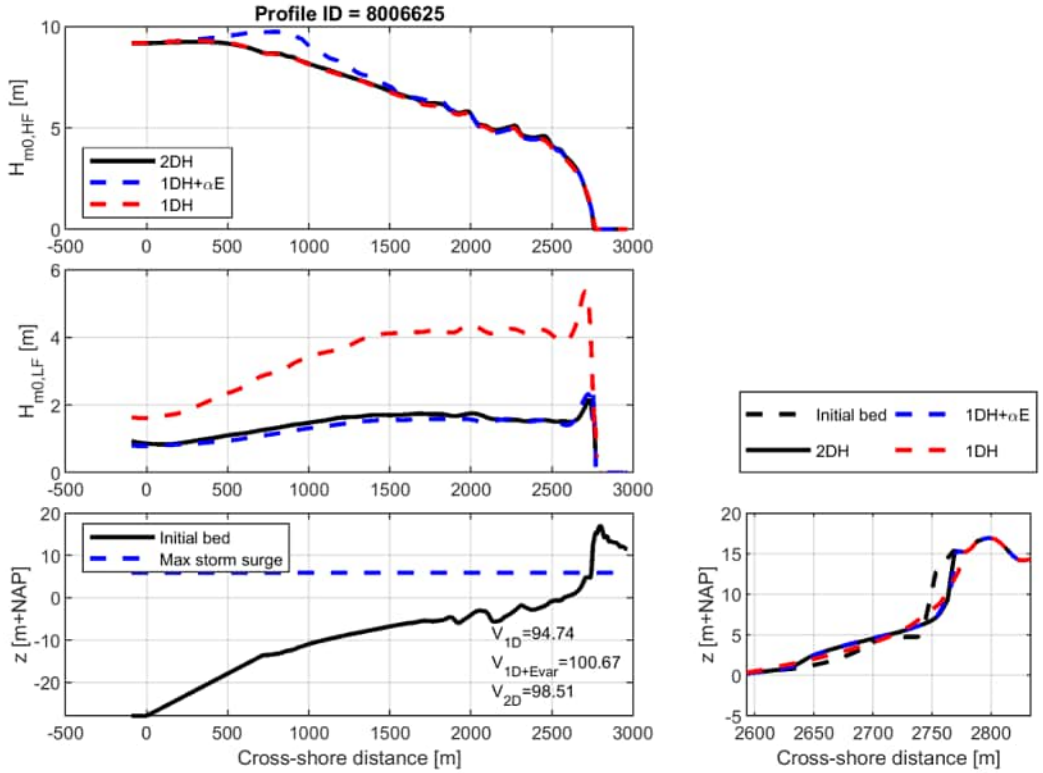

Figure 1.5: *Short-wave transformation (upper panel), infragravity transformation (second panel) and bed level (lower panel) for profile 8006625. The lower right panel shows a zoomed region of the erosion profile. The black lines show the results for a 2DH model and the blue line represents the 1DH model with a α_E of 0.3. The dashed red line shows the results with 1DH model with α_E of 0.3*

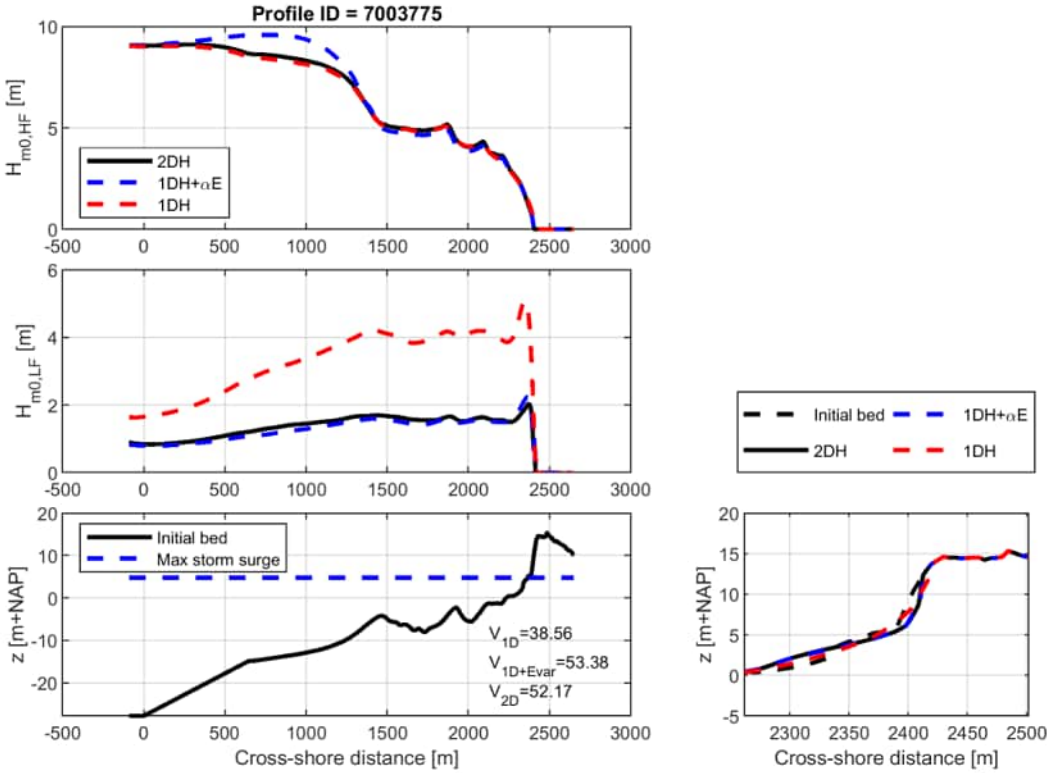

Figure 1.6: *Short-wave transformation (upper panel), infragravity transformation (second panel) and bed level (lower panel) for profile 7003775. The lower right panel shows a zoomed region of the erosion profile. The black lines show the results for a 2DH model and the blue line represents the 1DH model with a α_E of 0.3. The dashed red line shows the results with 1DH model with α_E of 0.3*

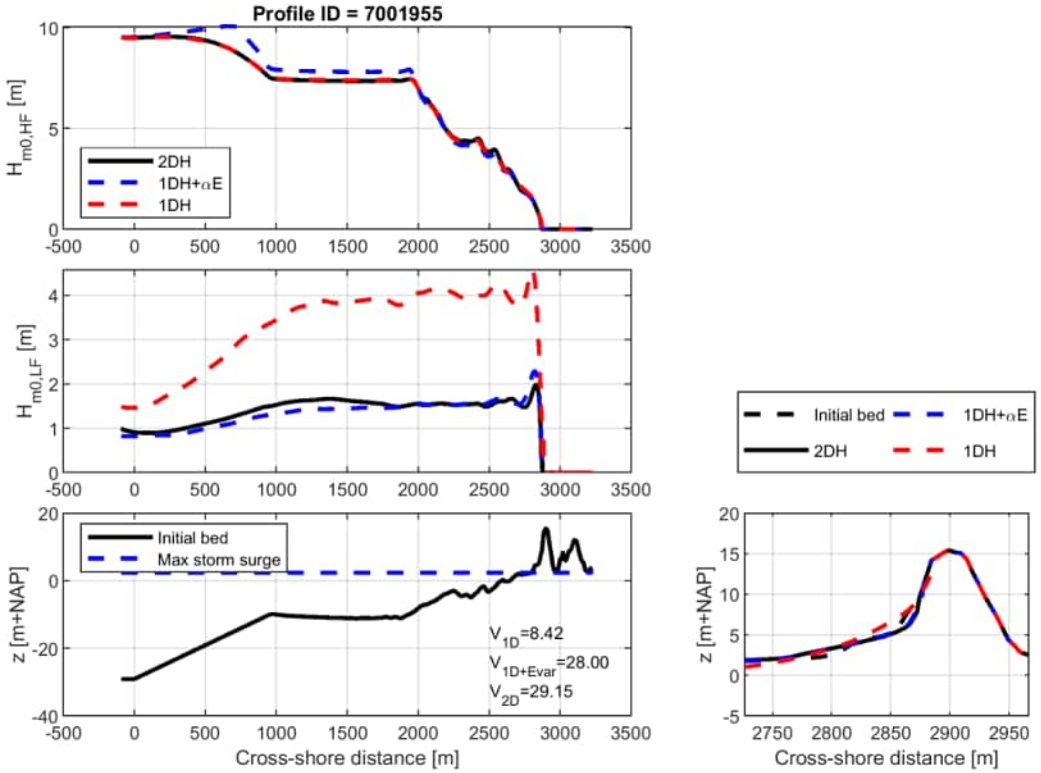

Figure 1.7: *Short-wave transformation (upper panel), infragravity transformation (second panel) and bed level (lower panel) for profile 7001955. The lower right panel shows a zoomed region of the erosion profile. The black lines show the results for a 2DH model and the blue line represents the 1DH model with a α_E of 0.3. The dashed red line shows the results with 1DH model with α_E of 0.3*

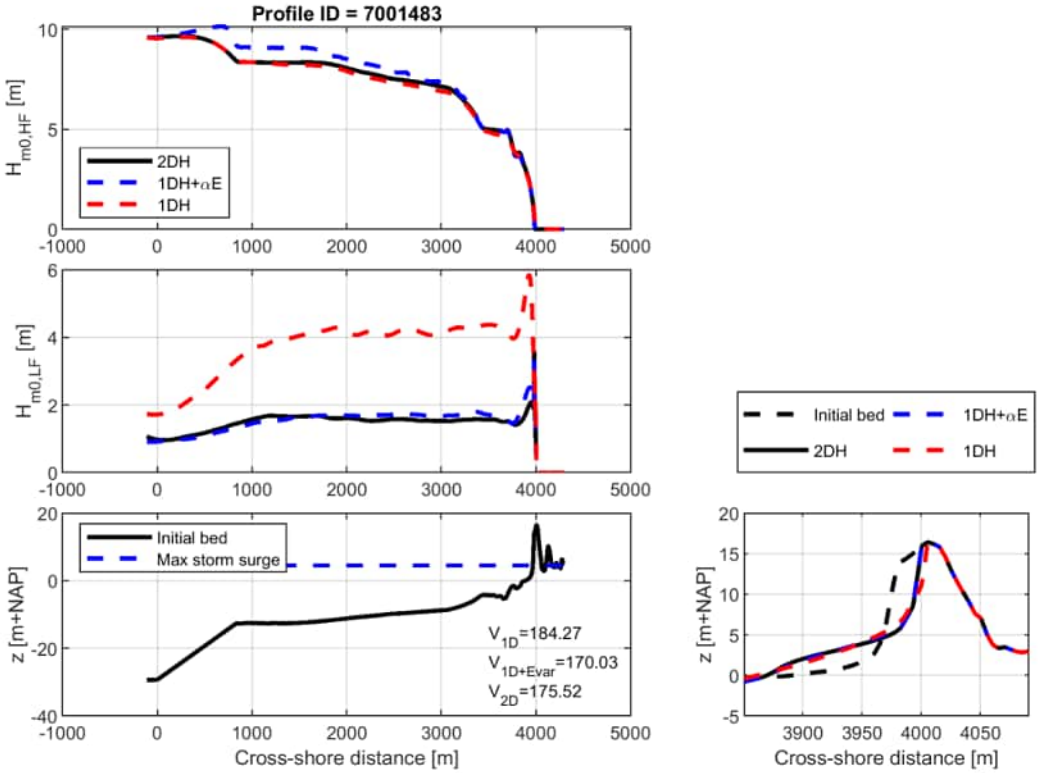

Figure 1.8: *Short-wave transformation (upper panel), infragravity transformation (second panel) and bed level (lower panel) for profile 7001483. The lower right panel shows a zoomed region of the erosion profile. The black lines show the results for a 2DH model and the blue line represents the 1DH model with a α_E of 0.3. The dashed red line shows the results with 1DH model with α_E of 0.3*

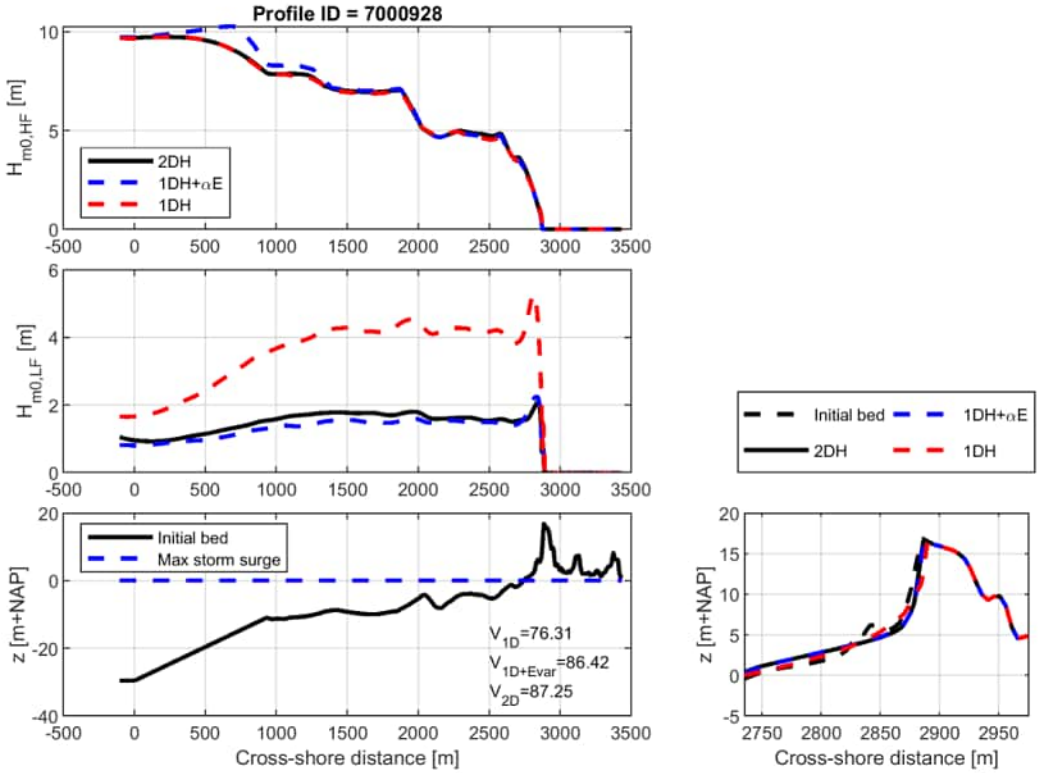

Figure 1.9: *Short-wave transformation (upper panel), infragravity transformation (second panel) and bed level (lower panel) for profile 7000928. The lower right panel shows a zoomed region of the erosion profile. The black lines show the results for a 2DH model and the blue line represents the 1DH model with a α_E of 0.3. The dashed red line shows the results with 1DH model with α_E of 0.3*

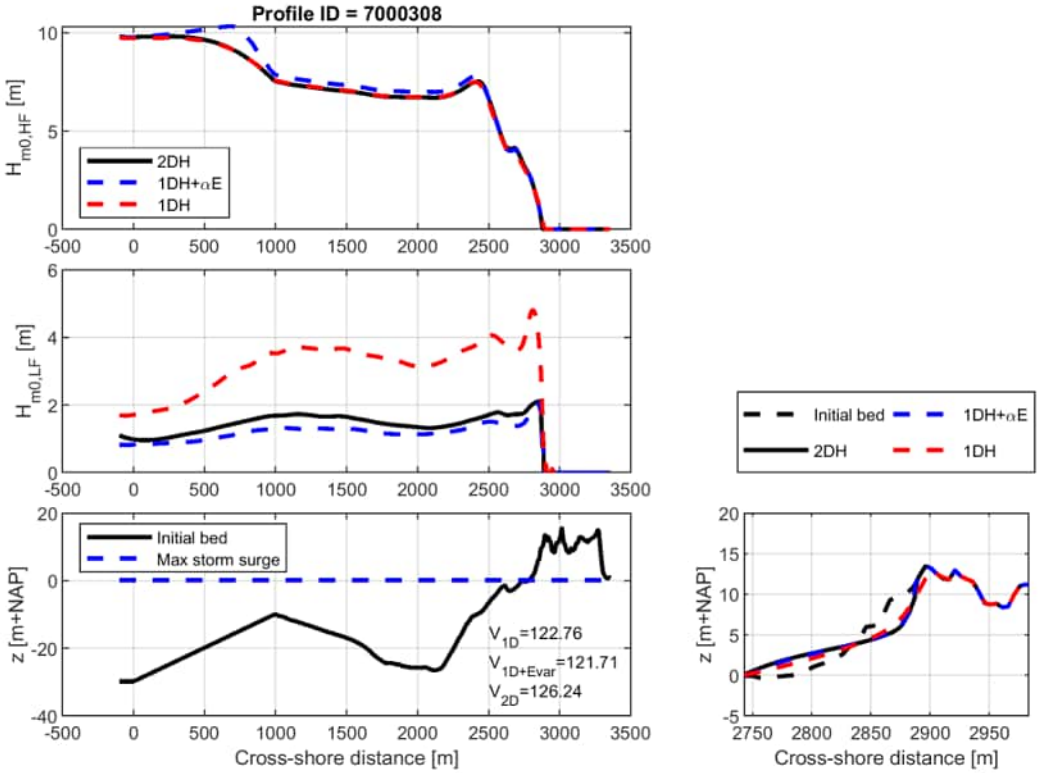

Figure 1.10: *Short-wave transformation (upper panel), infragravity transformation (second panel) and bed level (lower panel) for profile 7000308. The lower right panel shows a zoomed region of the erosion profile. The black lines show the results for a 2DH model and the blue line represents the 1DH model with a α_E of 0.3. The dashed red line shows the results with 1DH model with α_E of 0.3*

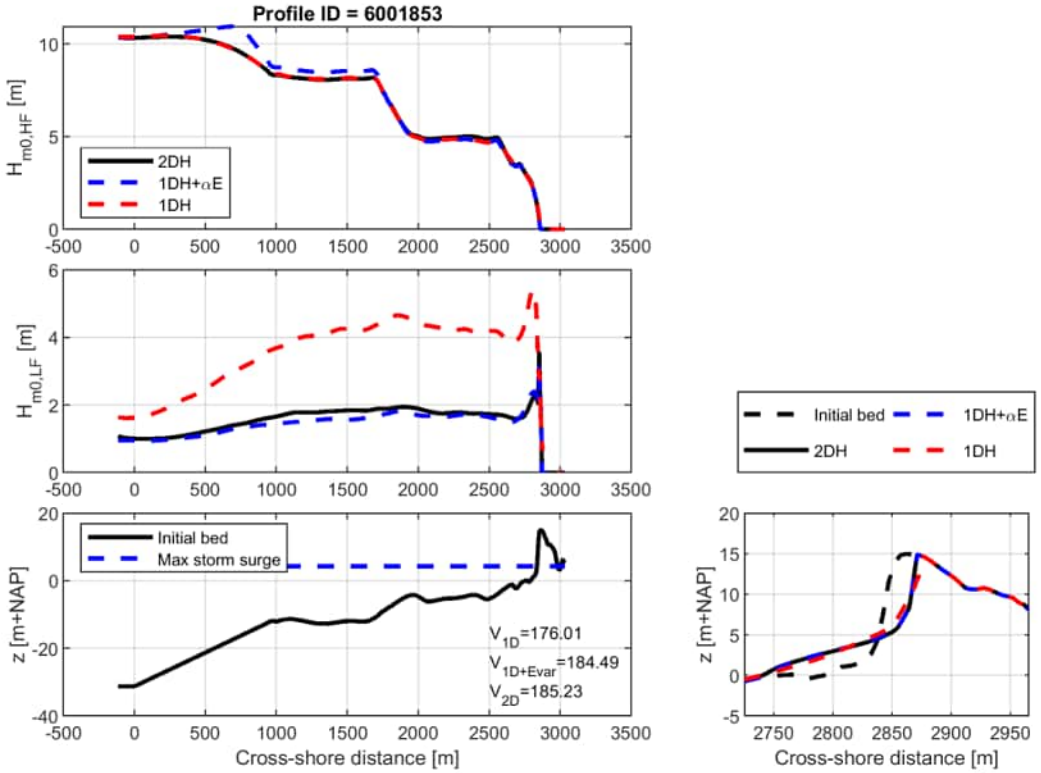

Figure 1.11: *Short-wave transformation (upper panel), infragravity transformation (second panel) and bed level (lower panel) for profile 6001853. The lower right panel shows a zoomed region of the erosion profile. The black lines show the results for a 2DH model and the blue line represents the 1DH model with a α_E of 0.3. The dashed red line shows the results with 1DH model with α_E of 0.3*

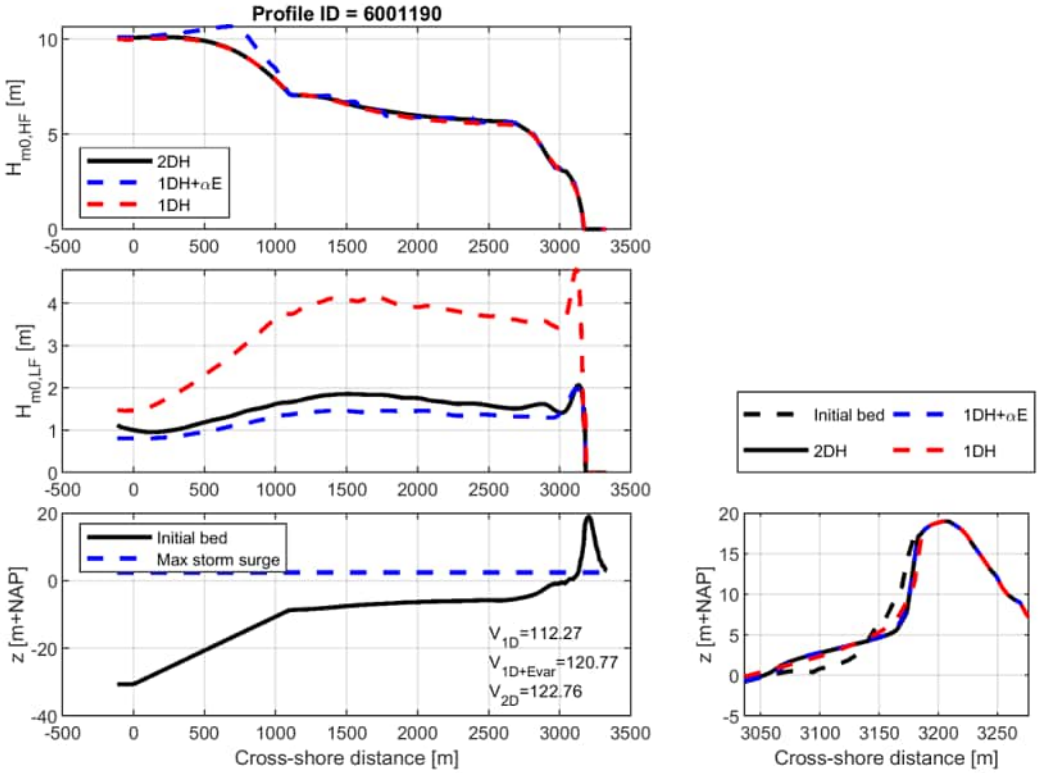

Figure 1.12: *Short-wave transformation (upper panel), infragravity transformation (second panel) and bed level (lower panel) for profile 6001190. The lower right panel shows a zoomed region of the erosion profile. The black lines show the results for a 2DH model and the blue line represents the 1DH model with a α_E of 0.3. The dashed red line shows the results with 1DH model with α_E of 0.3*

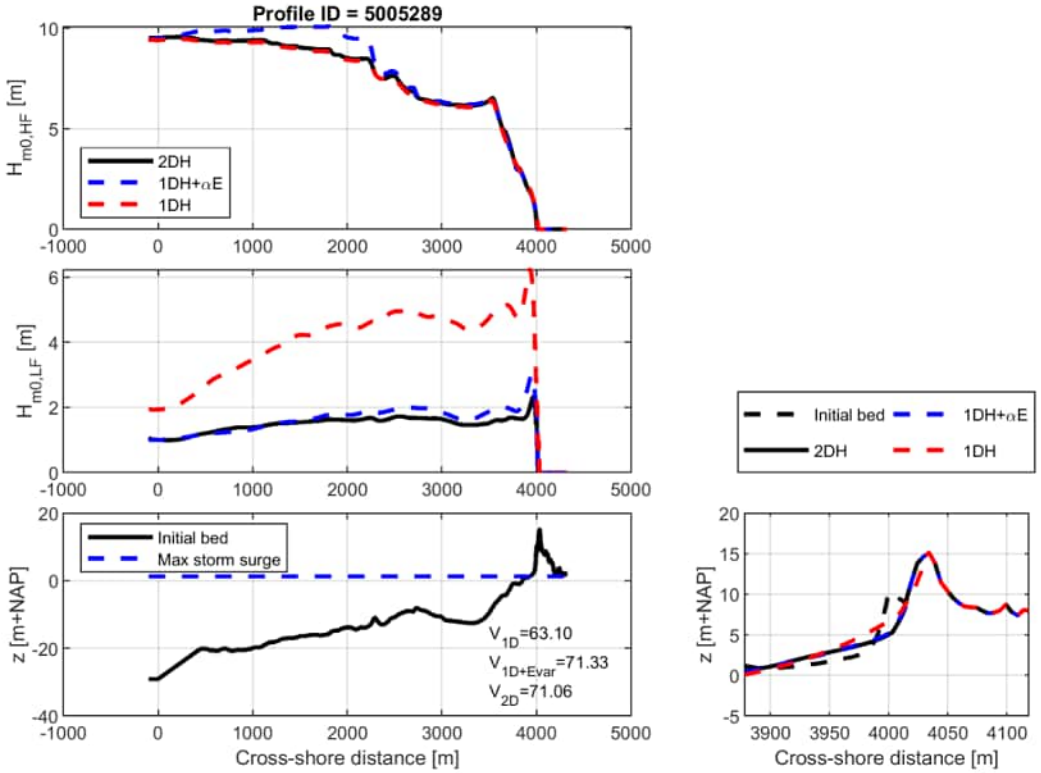

Figure 1.13: *Short-wave transformation (upper panel), infragravity transformation (second panel) and bed level (lower panel) for profile 5005289. The lower right panel shows a zoomed region of the erosion profile. The black lines show the results for a 2DH model and the blue line represents the 1DH model with a α_E of 0.3. The dashed red line shows the results with 1DH model with α_E of 0.3*

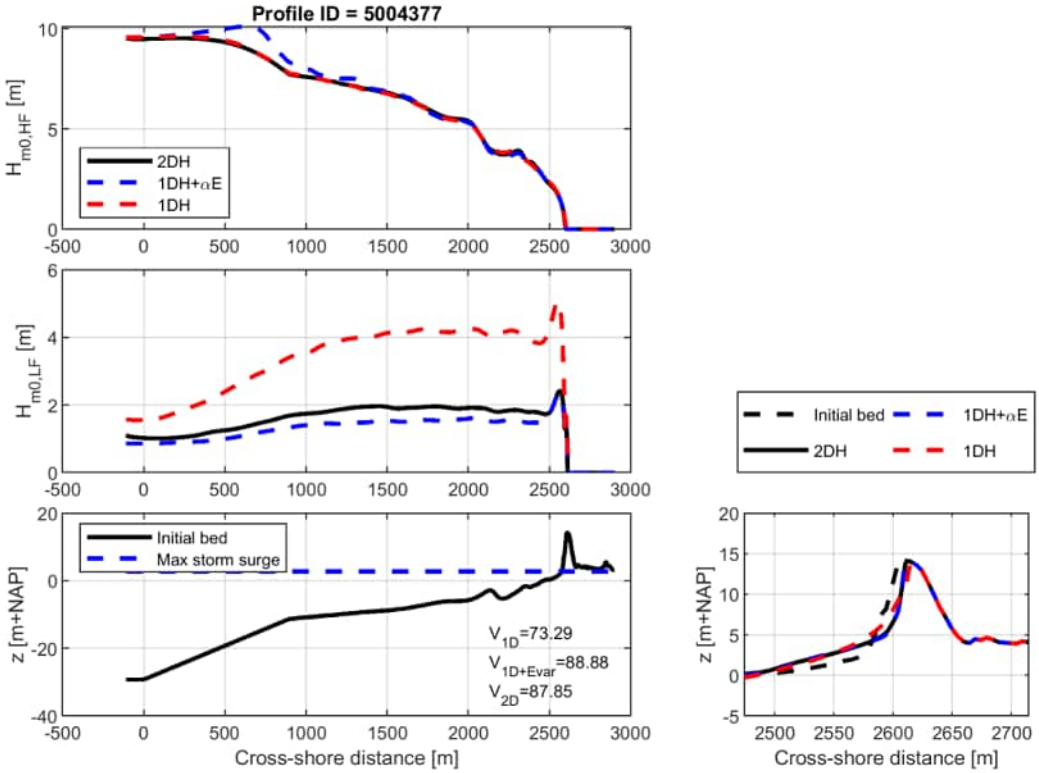

Figure 1.14: *Short-wave transformation (upper panel), infragravity transformation (second panel) and bed level (lower panel) for profile 5004377. The lower right panel shows a zoomed region of the erosion profile. The black lines show the results for a 2DH model and the blue line represents the 1DH model with a α_E of 0.3. The dashed red line shows the results with 1DH model with α_E of 0.3*

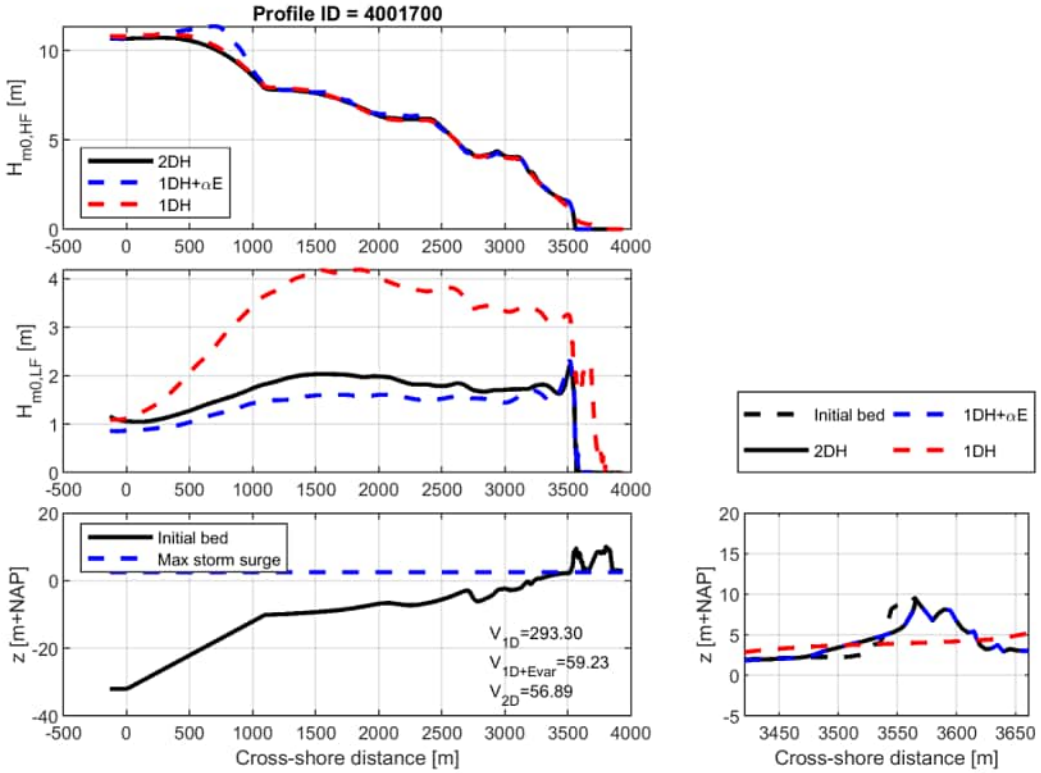

Figure 1.15: *Short-wave transformation (upper panel), infragravity transformation (second panel) and bed level (lower panel) for profile 4001700. The lower right panel shows a zoomed region of the erosion profile. The black lines show the results for a 2DH model and the blue line represents the 1DH model with a α_E of 0.3. The dashed red line shows the results with 1DH model with α_E of 0.3*

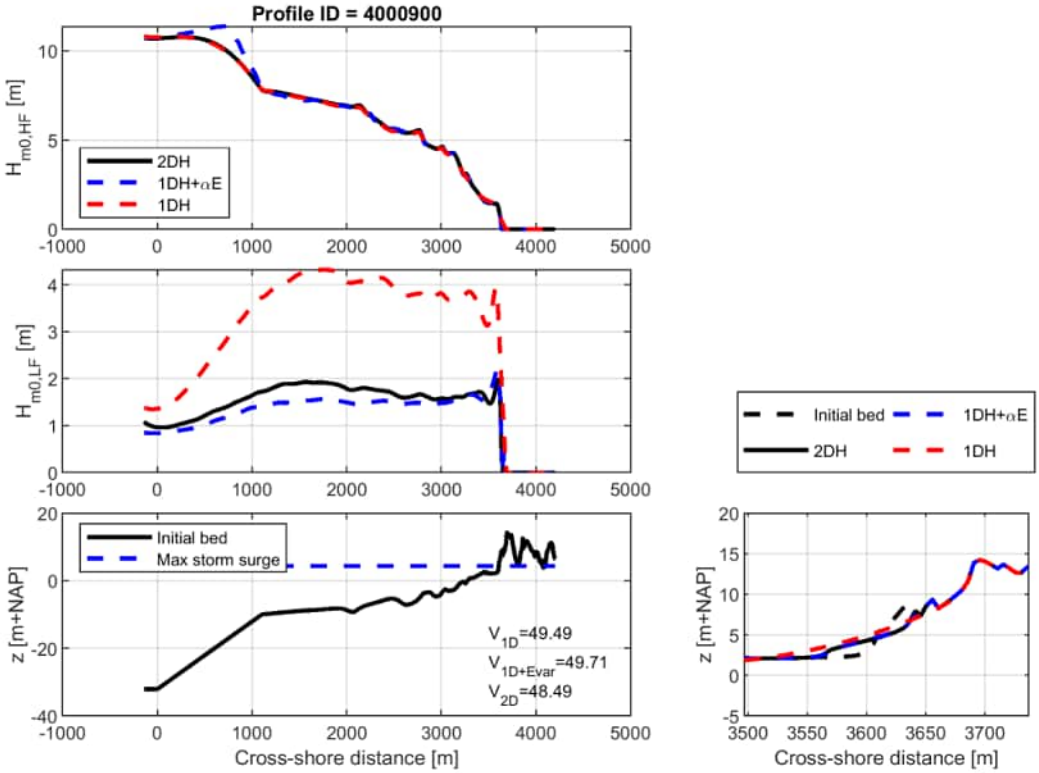

Figure 1.16: *Short-wave transformation (upper panel), infragravity transformation (second panel) and bed level (lower panel) for profile 4000900. The lower right panel shows a zoomed region of the erosion profile. The black lines show the results for a 2DH model and the blue line represents the 1DH model with a α_E of 0.3. The dashed red line shows the results with 1DH model with α_E of 0.3*

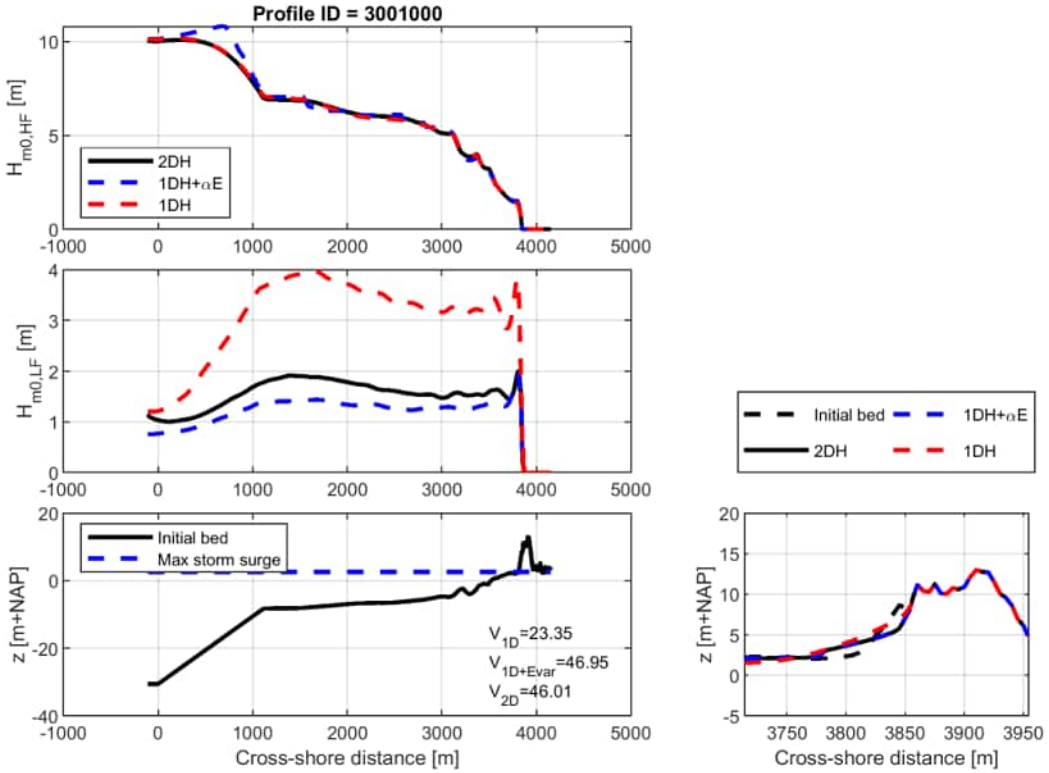

Figure 1.17: *Short-wave transformation (upper panel), infragravity transformation (second panel) and bed level (lower panel) for profile 3001000. The lower right panel shows a zoomed region of the erosion profile. The black lines show the results for a 2DH model and the blue line represents the 1DH model with a α_E of 0.3. The dashed red line shows the results with 1DH model with α_E of 0.3*

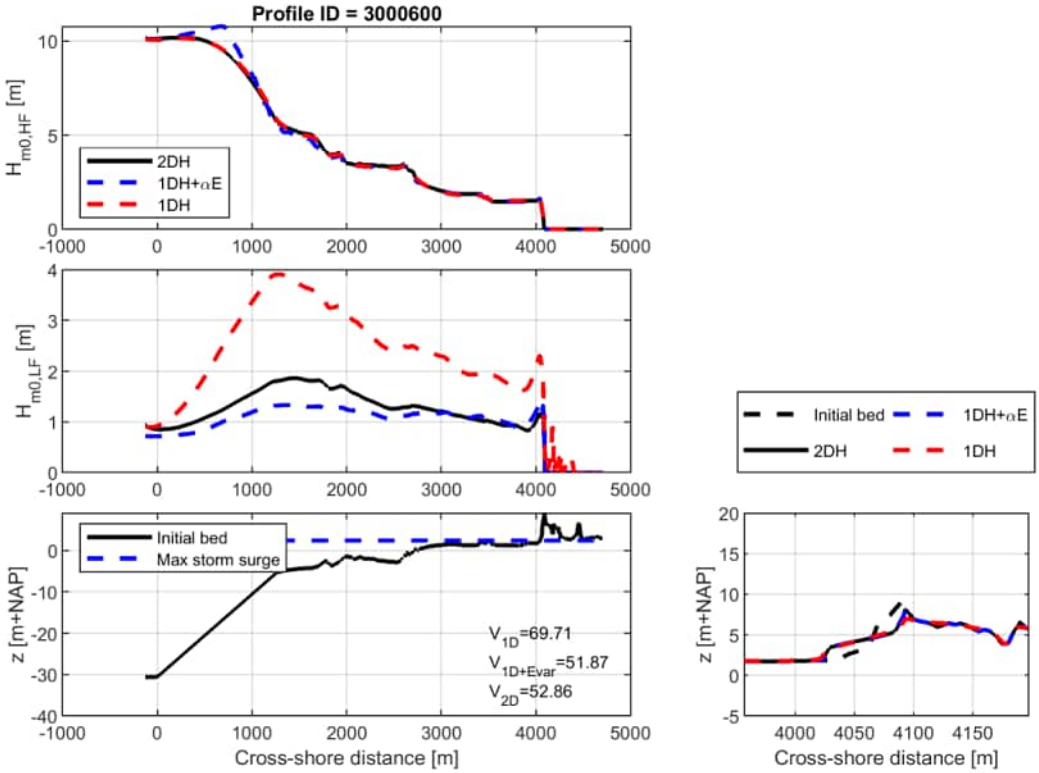

Figure 1.18: *Short-wave transformation (upper panel), infragravity transformation (second panel) and bed level (lower panel) for profile 3000600. The lower right panel shows a zoomed region of the erosion profile. The black lines show the results for a 2DH model and the blue line represents the 1DH model with a α_E of 0.3. The dashed red line shows the results with 1DH model with α_E of 0.3*

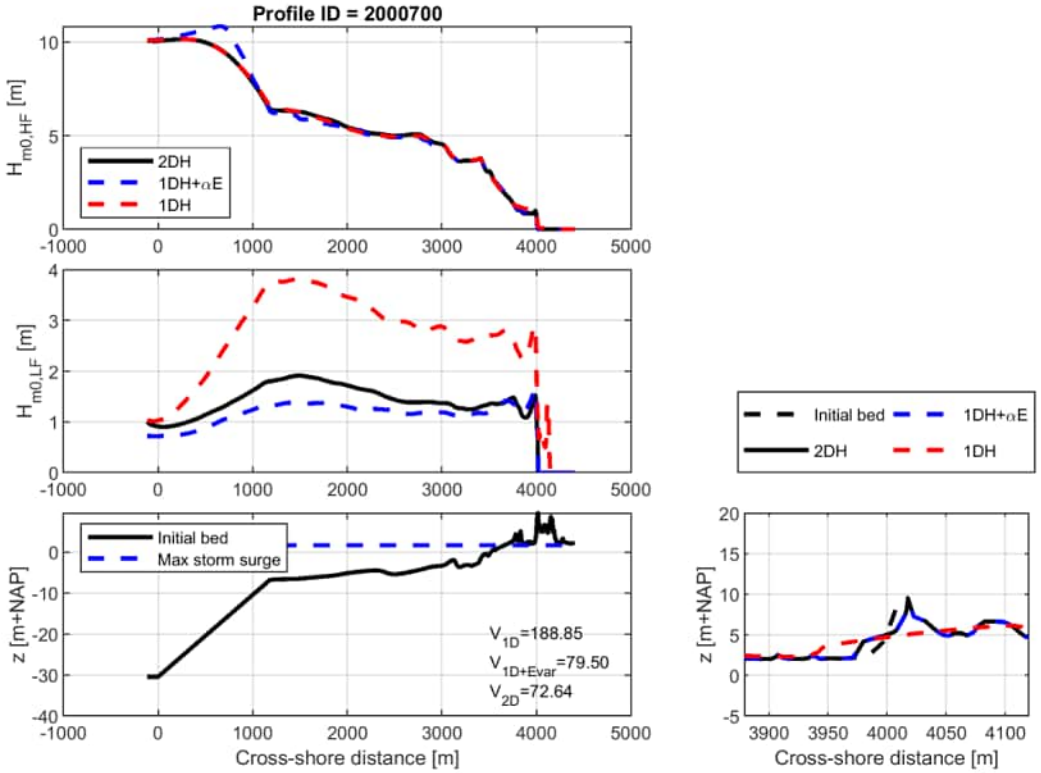

Figure 1.19: *Short-wave transformation (upper panel), infragravity transformation (second panel) and bed level (lower panel) for profile 2000700. The lower right panel shows a zoomed region of the erosion profile. The black lines show the results for a 2DH model and the blue line represents the 1DH model with a α_E of 0.3. The dashed red line shows the results with 1DH model with α_E of 0.3*

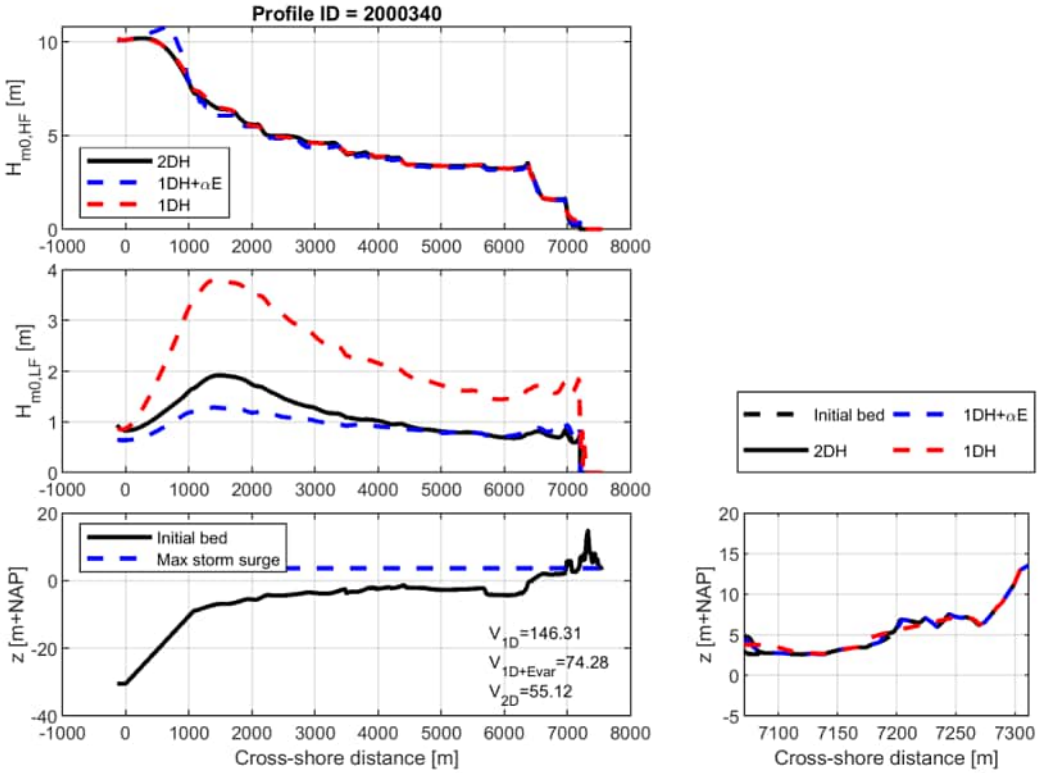

Figure 1.20: *Short-wave transformation (upper panel), infragravity transformation (second panel) and bed level (lower panel) for profile 2000340. The lower right panel shows a zoomed region of the erosion profile. The black lines show the results for a 2DH model and the blue line represents the 1DH model with a α_E of 0.3. The dashed red line shows the results with 1DH model with α_E of 0.3*

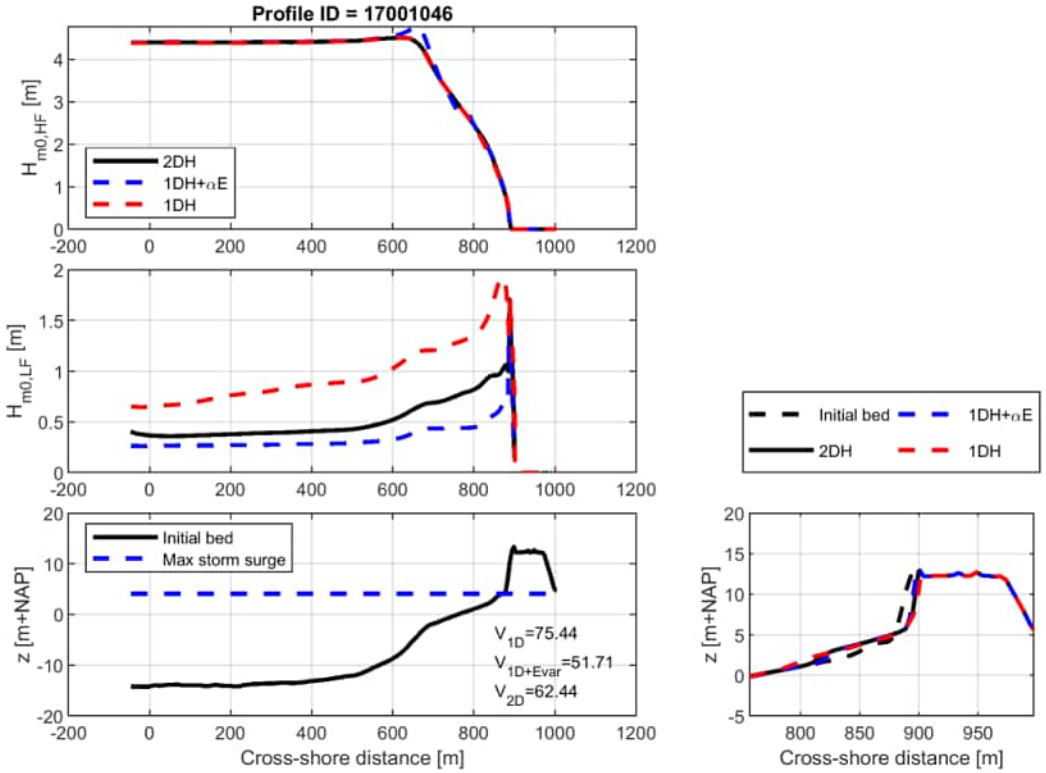

Figure 1.21: *Short-wave transformation (upper panel), infragravity transformation (second panel) and bed level (lower panel) for profile 17001046. The lower right panel shows a zoomed region of the erosion profile. The black lines show the results for a 2DH model and the blue line represents the 1DH model with a α_E of 0.3. The dashed red line shows the results with 1DH model with α_E of 0.3*

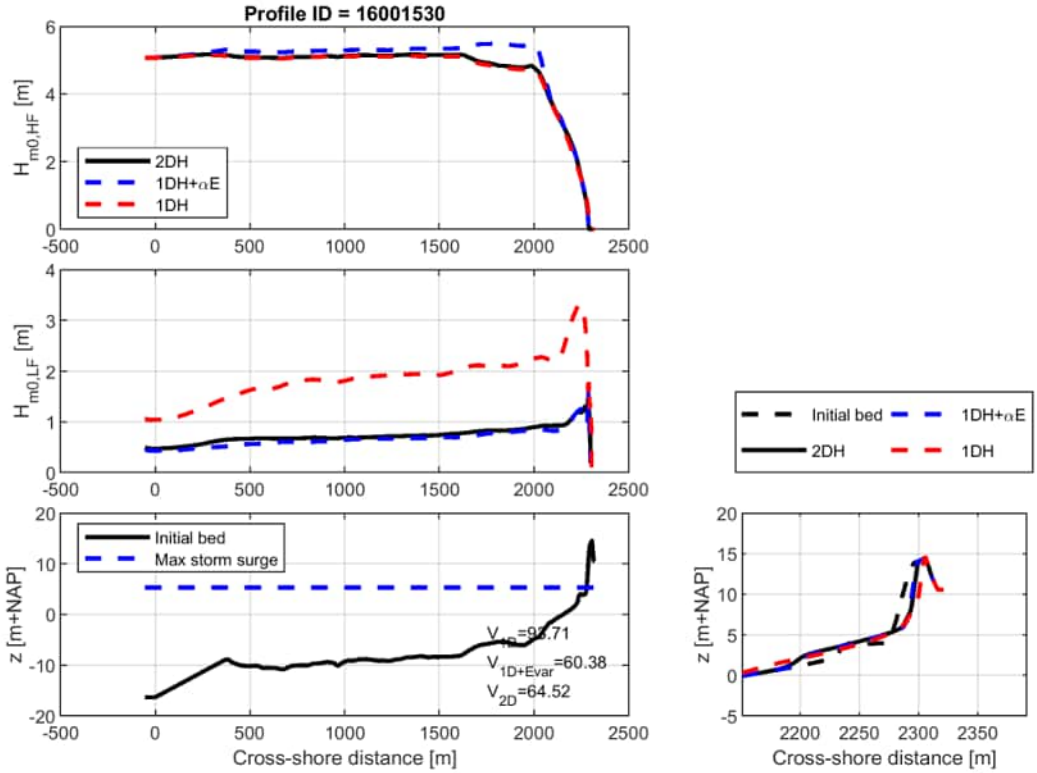

Figure 1.22: *Short-wave transformation (upper panel), infragravity transformation (second panel) and bed level (lower panel) for profile 16001530. The lower right panel shows a zoomed region of the erosion profile. The black lines show the results for a 2DH model and the blue line represents the 1DH model with a α_E of 0.3. The dashed red line shows the results with 1DH model with α_E of 0.3*

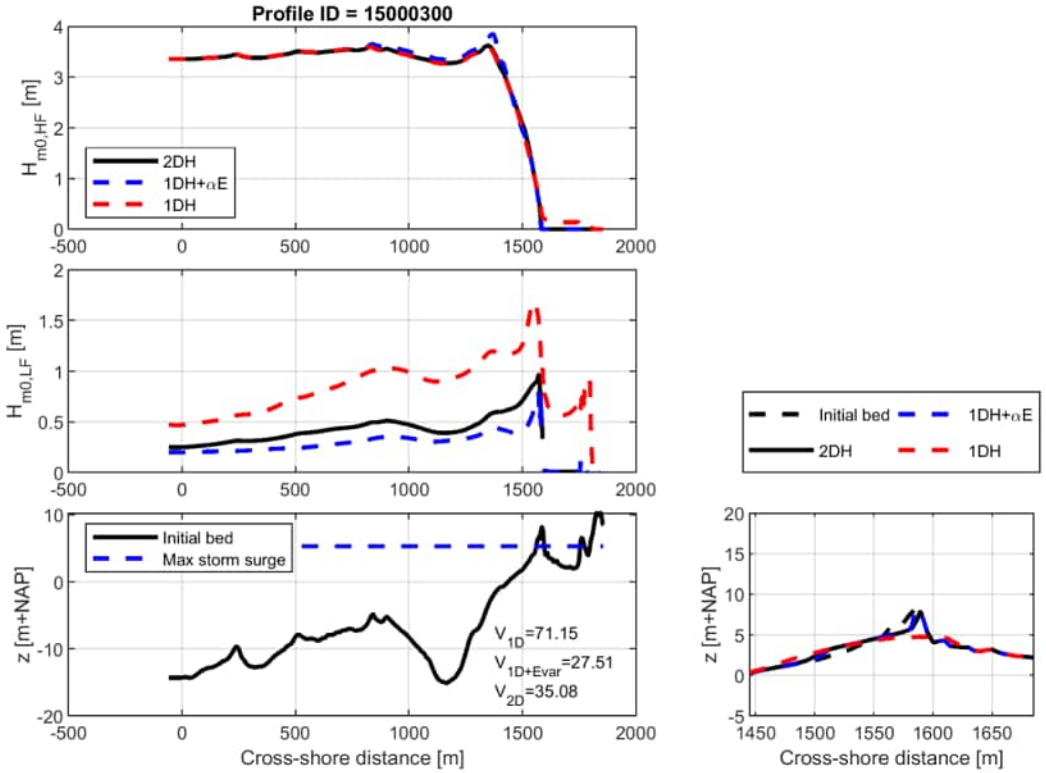

Figure 1.23: *Short-wave transformation (upper panel), infragravity transformation (second panel) and bed level (lower panel) for profile 15000300. The lower right panel shows a zoomed region of the erosion profile. The black lines show the results for a 2DH model and the blue line represents the 1DH model with a α_E of 0.3. The dashed red line shows the results with 1DH model with α_E of 0.3*

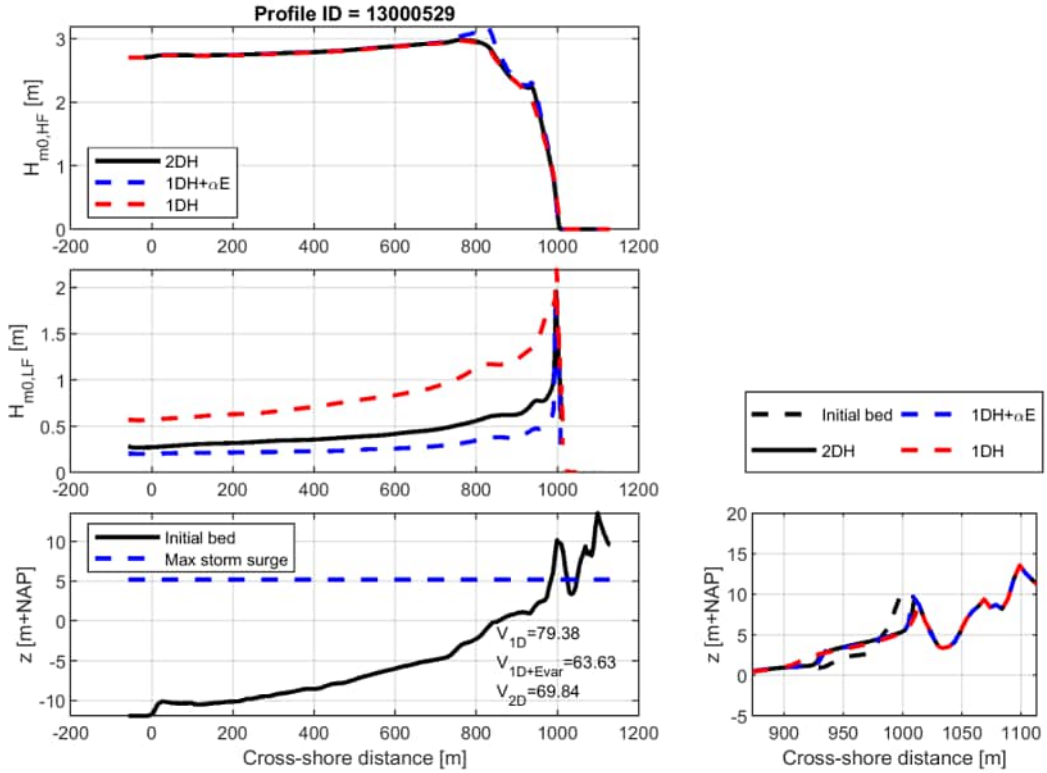

Figure 1.24: *Short-wave transformation (upper panel), infragravity transformation (second panel) and bed level (lower panel) for profile 13000529. The lower right panel shows a zoomed region of the erosion profile. The black lines show the results for a 2DH model and the blue line represents the 1DH model with a α_E of 0.3. The dashed red line shows the results with 1DH model with α_E of 0.3*

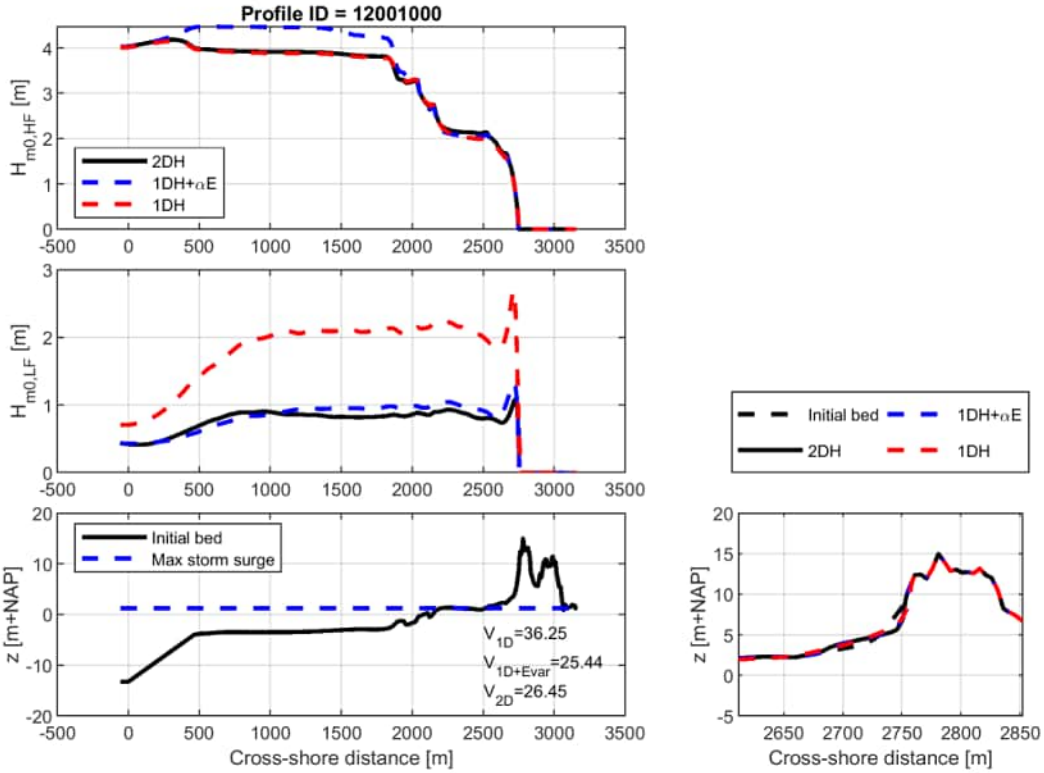

Figure 1.25: *Short-wave transformation (upper panel), infragravity transformation (second panel) and bed level (lower panel) for profile 12001000. The lower right panel shows a zoomed region of the erosion profile. The black lines show the results for a 2DH model and the blue line represents the 1DH model with a α_E of 0.3. The dashed red line shows the results with 1DH model with α_E of 0.3*

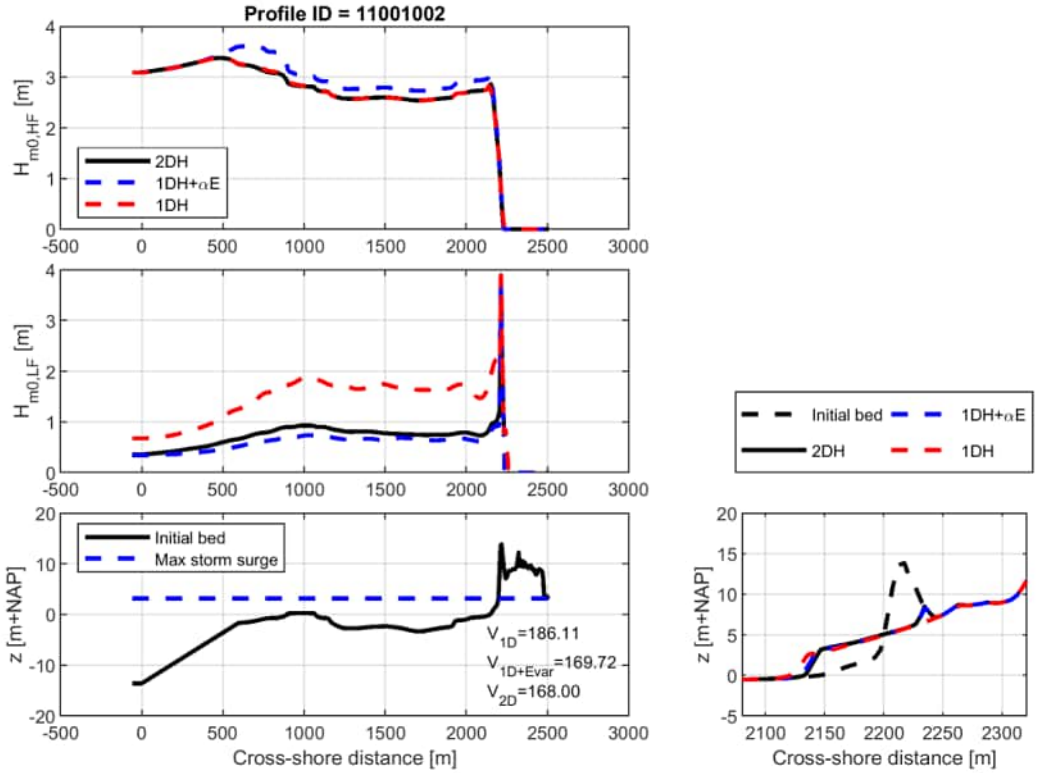

Figure 1.26: *Short-wave transformation (upper panel), infragravity transformation (second panel) and bed level (lower panel) for profile 11001002. The lower right panel shows a zoomed region of the erosion profile. The black lines show the results for a 2DH model and the blue line represents the 1DH model with a α_E of 0.3. The dashed red line shows the results with 1DH model with α_E of 0.3*

2 Morfac parameter

The following figures show the comparison of the erosion profiles for variations in the morfac with the base case.

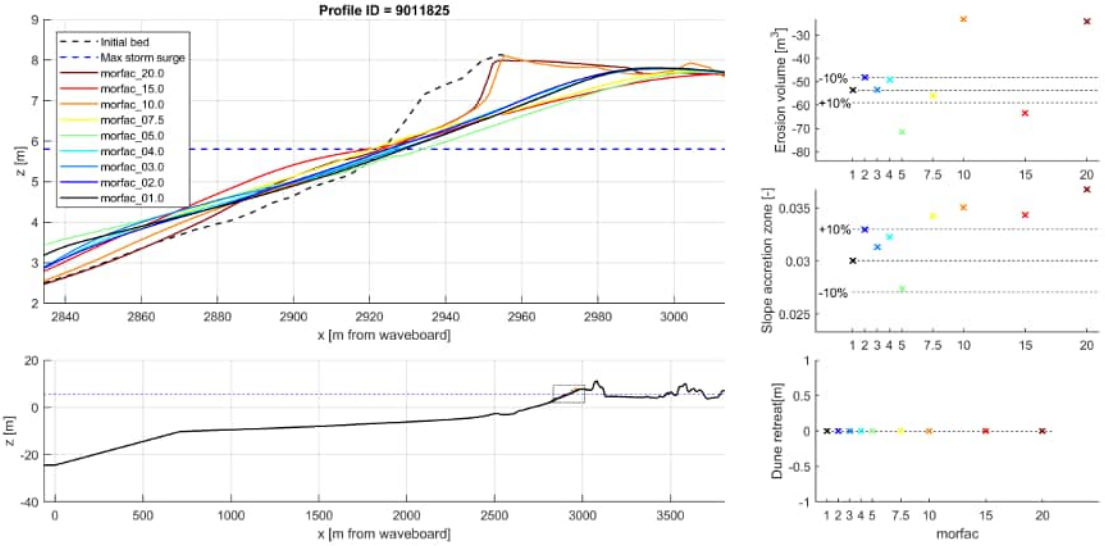

Figure 2.1: *XBeach results for profile 9011825. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

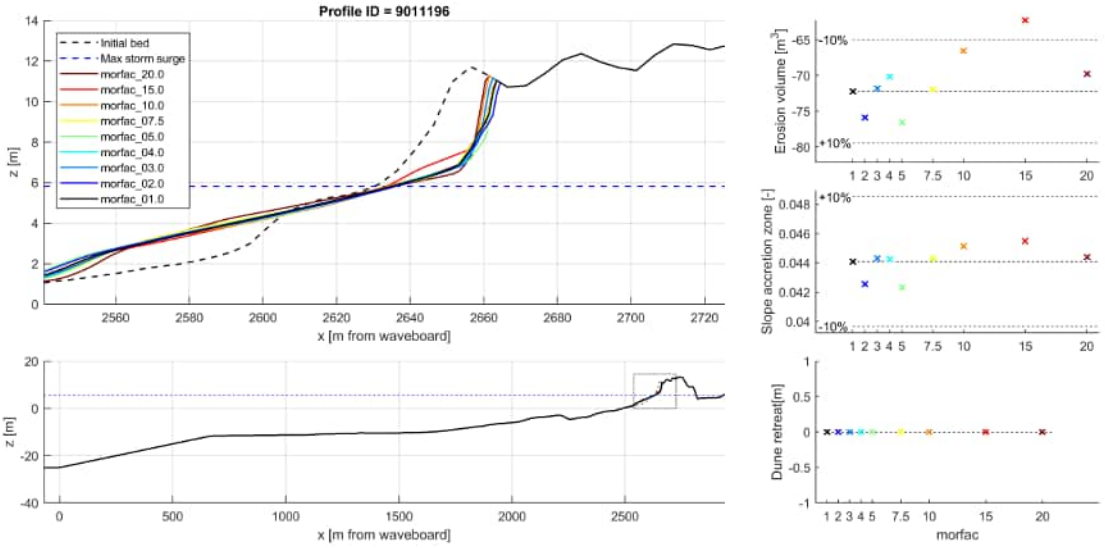

Figure 2.2: *XBeach results for profile 9011196. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

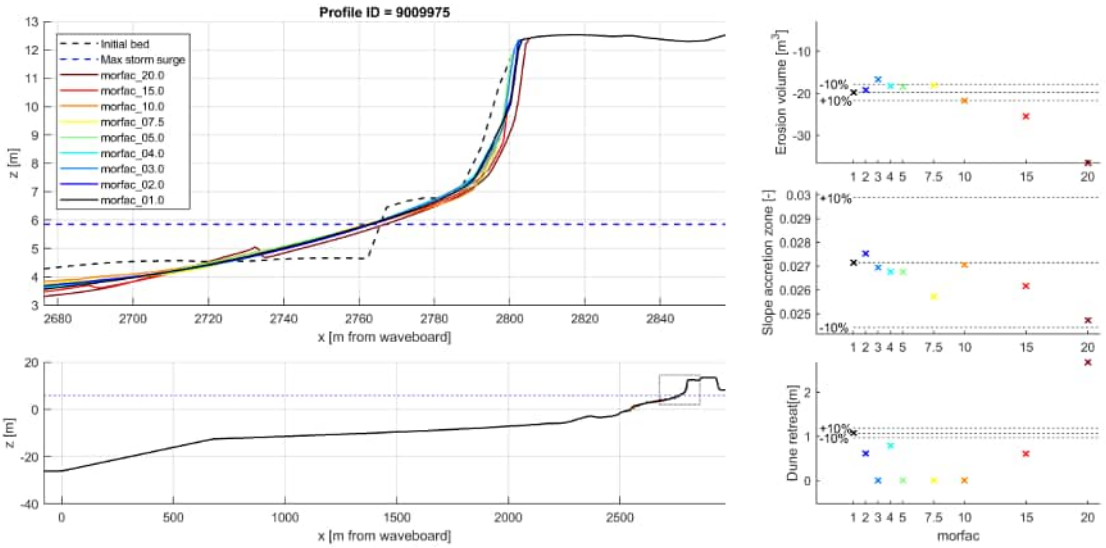

Figure 2.3: *XBeach results for profile 9009975. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

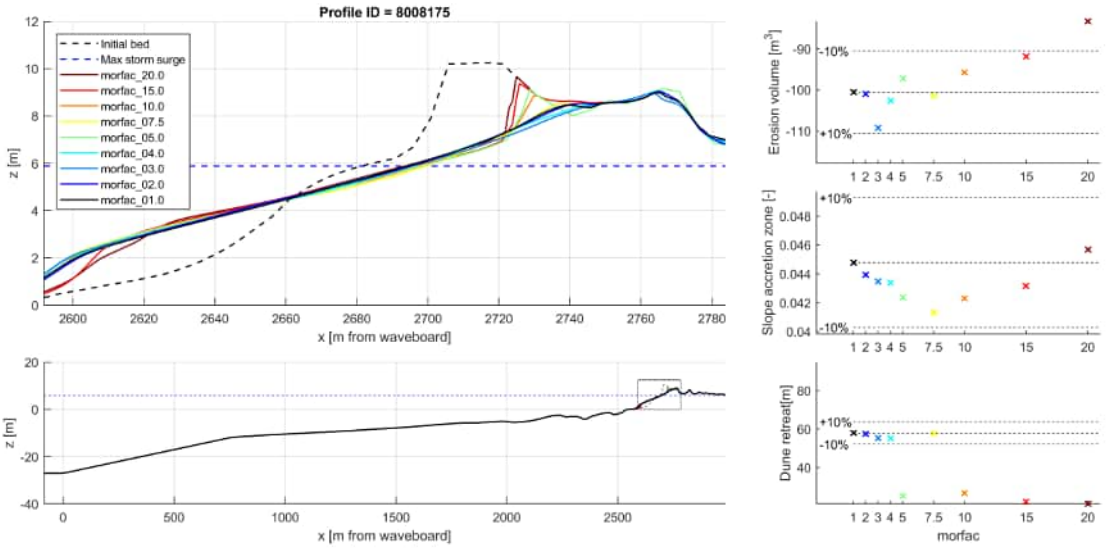

Figure 2.4: *XBeach results for profile 8008175. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

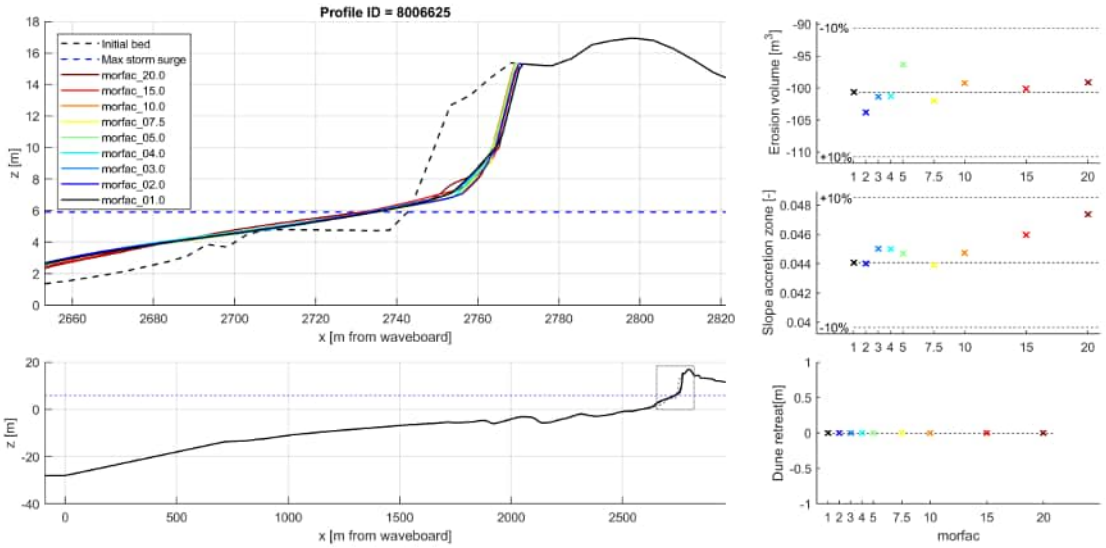

Figure 2.5: *XBeach results for profile 8006625. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

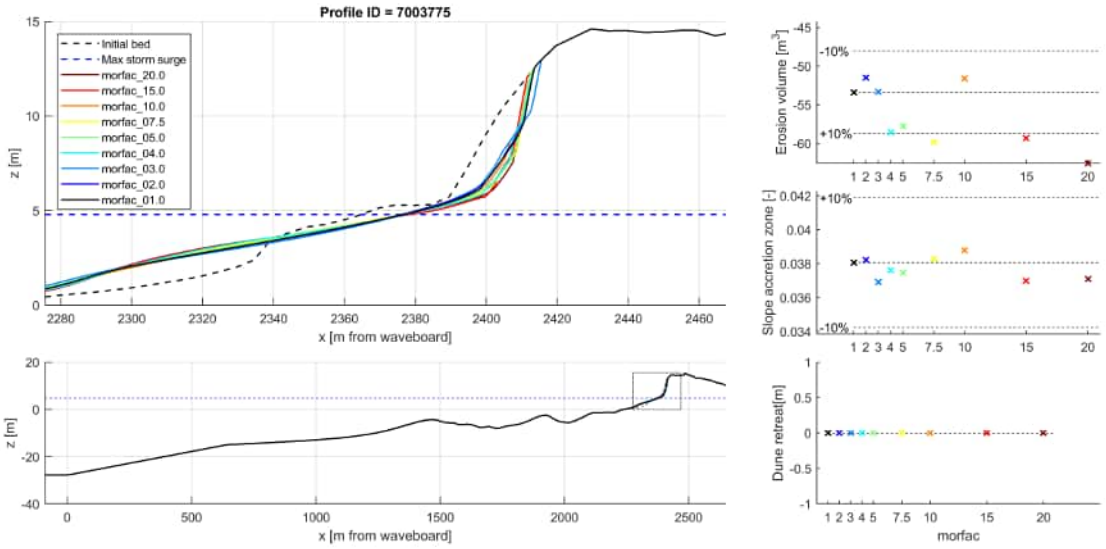

Figure 2.6: *XBeach results for profile 7003775. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

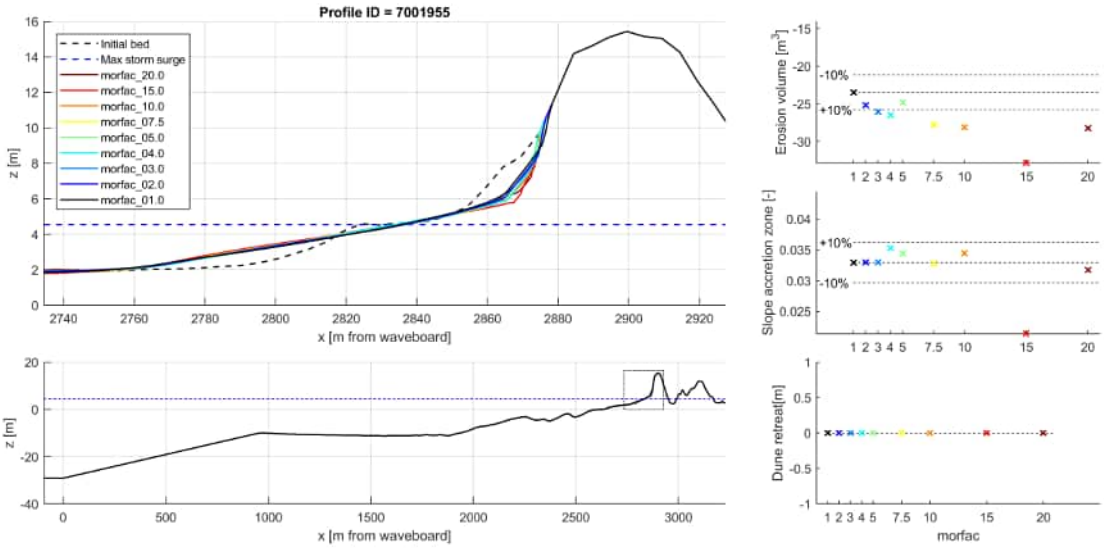

Figure 2.7: *XBeach results for profile 7001955. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

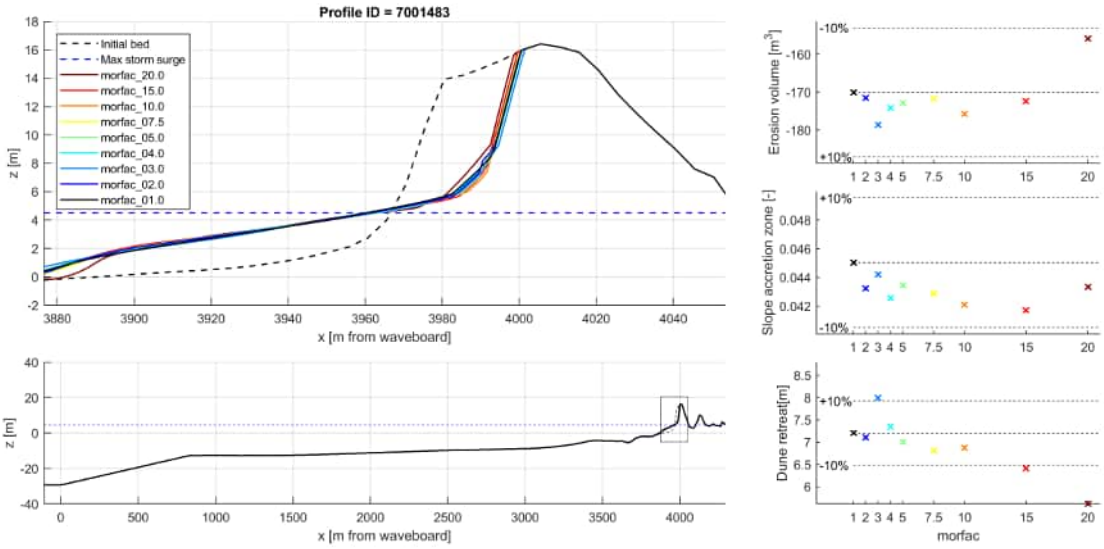

Figure 2.8: *XBeach results for profile 7001483. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

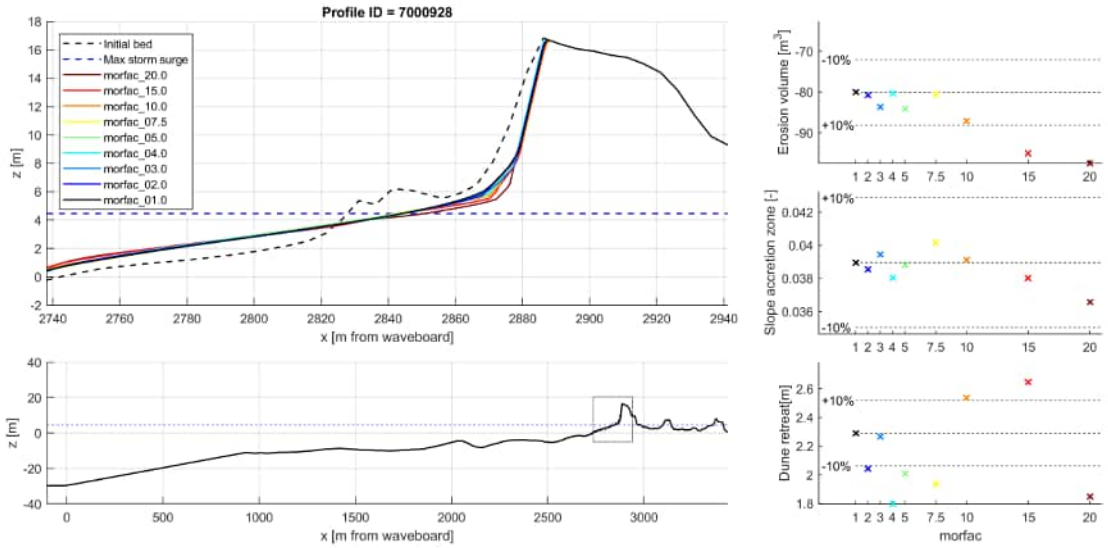

Figure 2.9: *XBeach results for profile 7000928. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

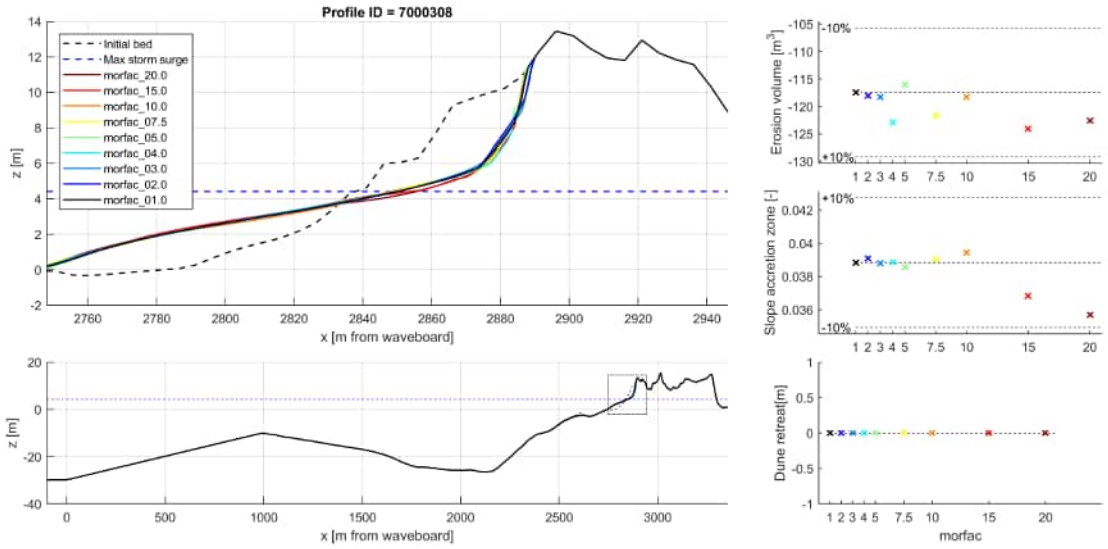

Figure 2.10: *XBeach results for profile 7000308. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

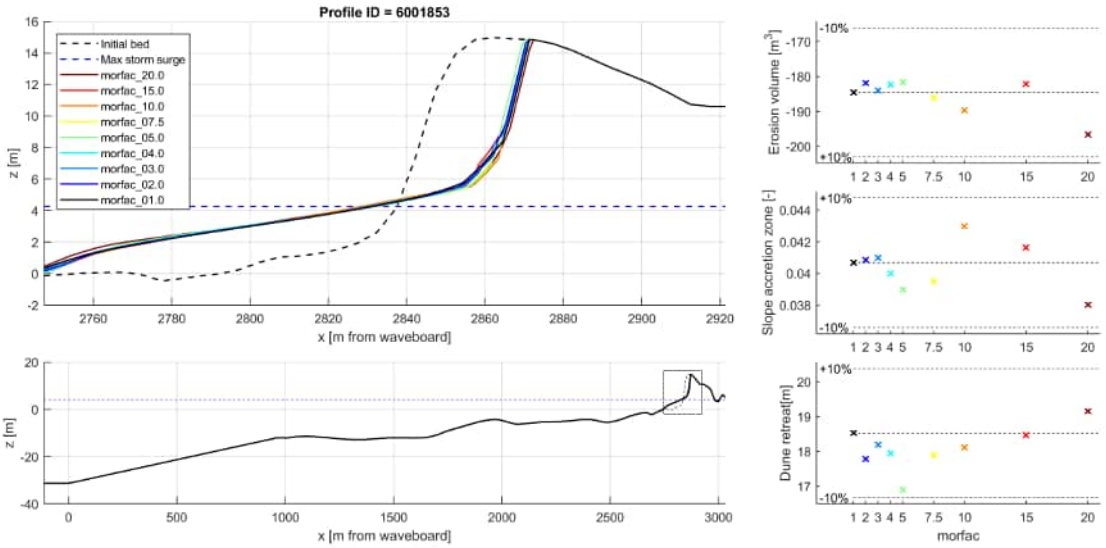

Figure 2.11: *XBeach results for profile 6001853. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

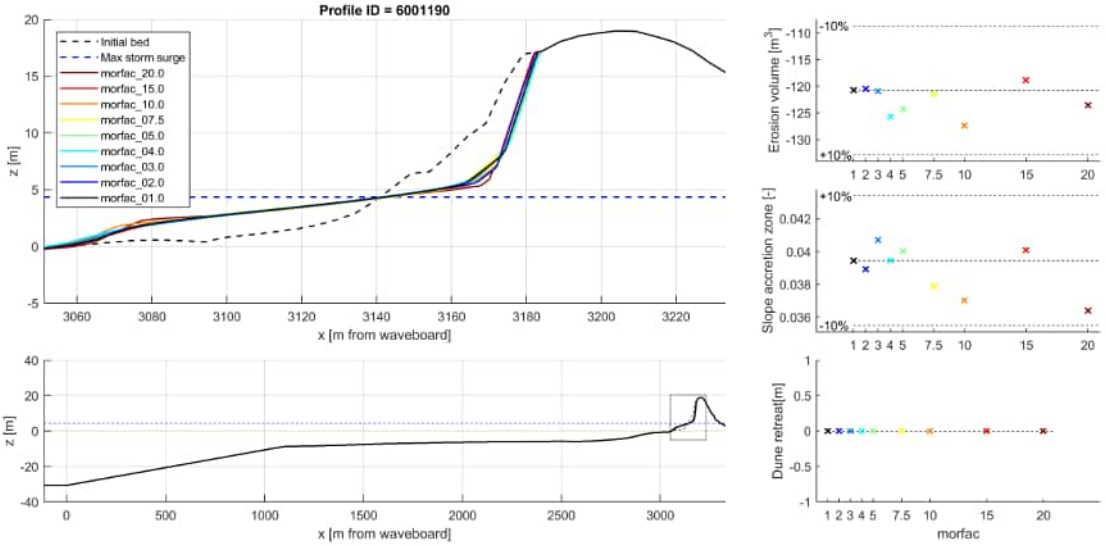

Figure 2.12: *XBeach results for profile 6001190. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

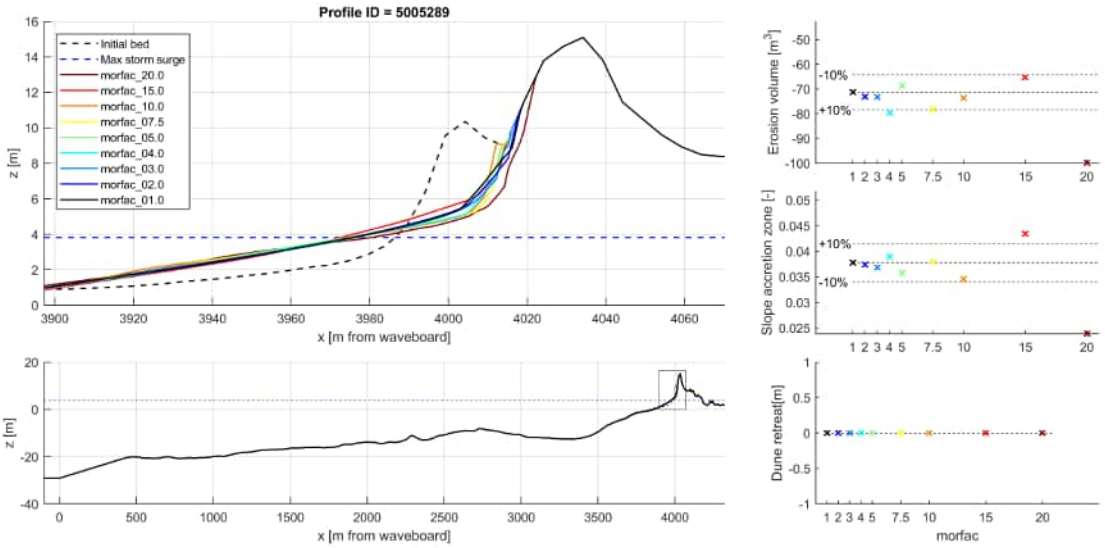

Figure 2.13: *XBeach results for profile 5005289. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

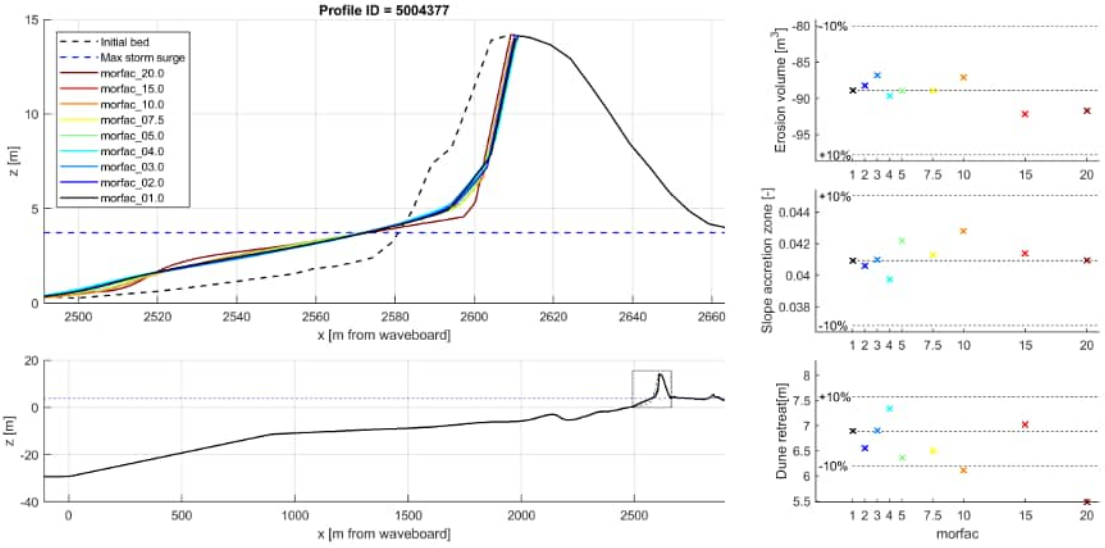

Figure 2.14: *XBeach results for profile 5004377. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

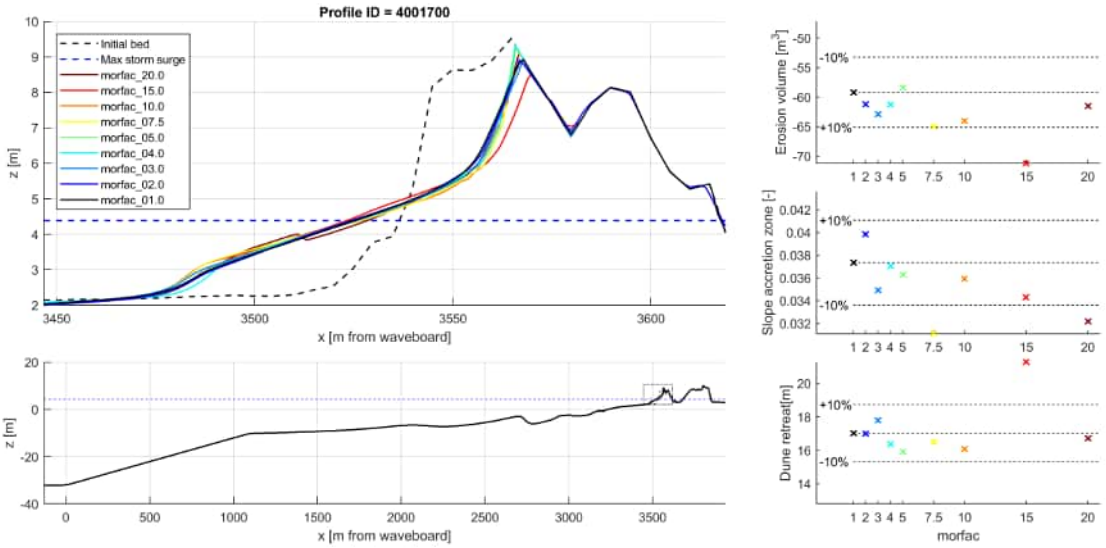

Figure 2.15: *XBeach results for profile 4001700. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

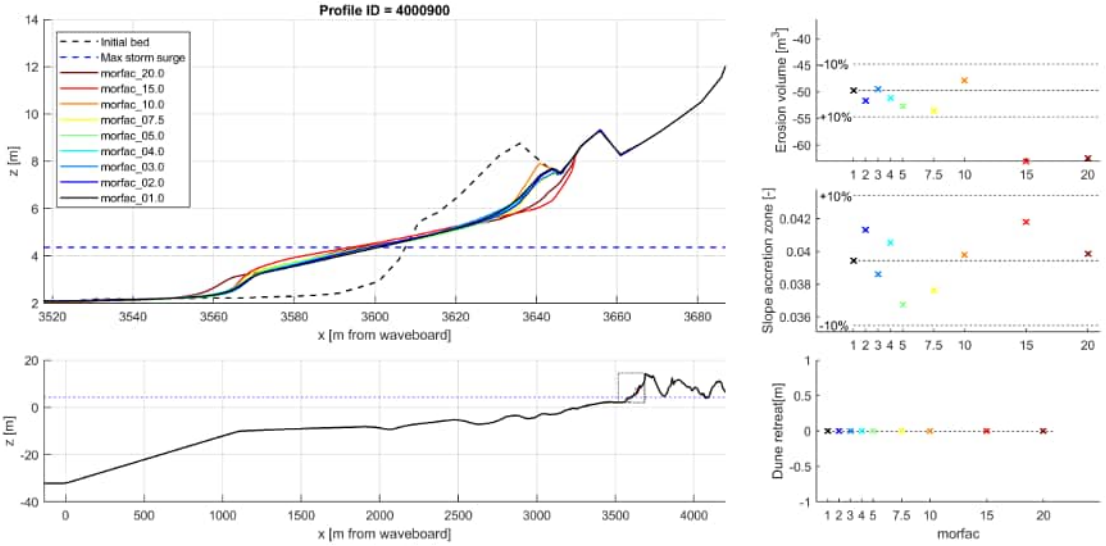

Figure 2.16: *XBeach results for profile 4000900. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

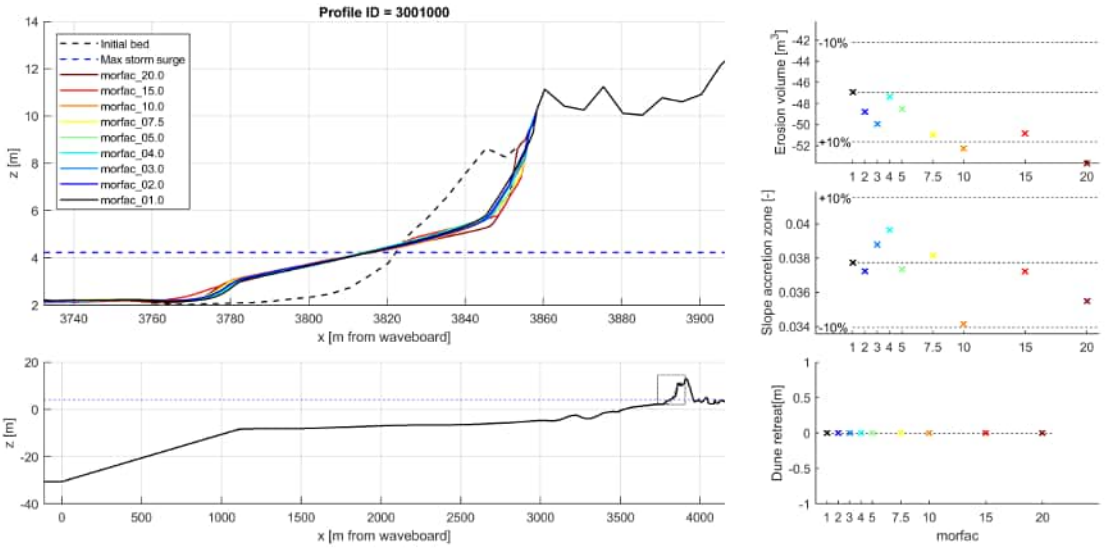

Figure 2.17: *XBeach results for profile 3001000. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

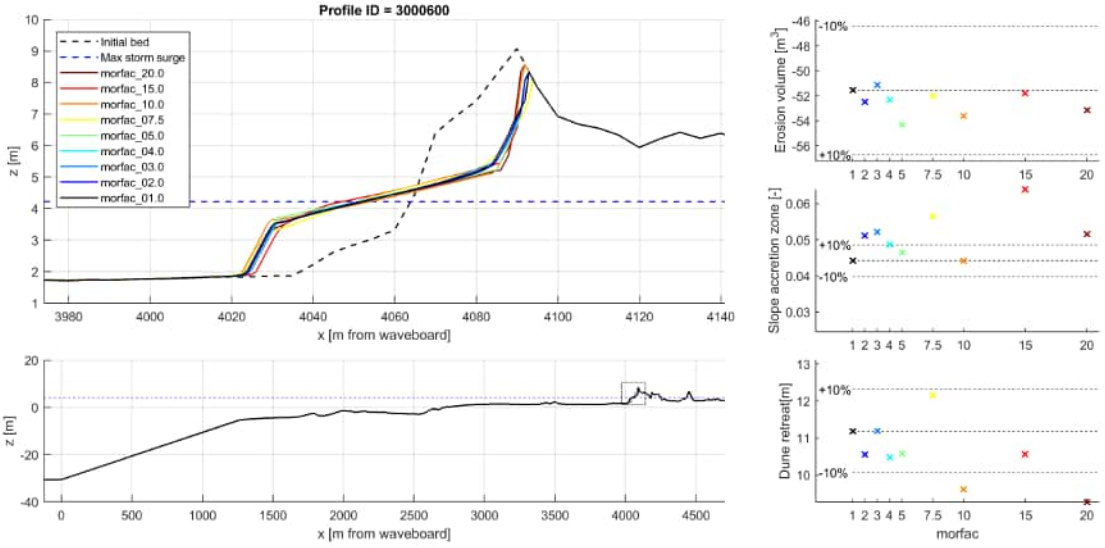

Figure 2.18: *XBeach results for profile 3000600. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

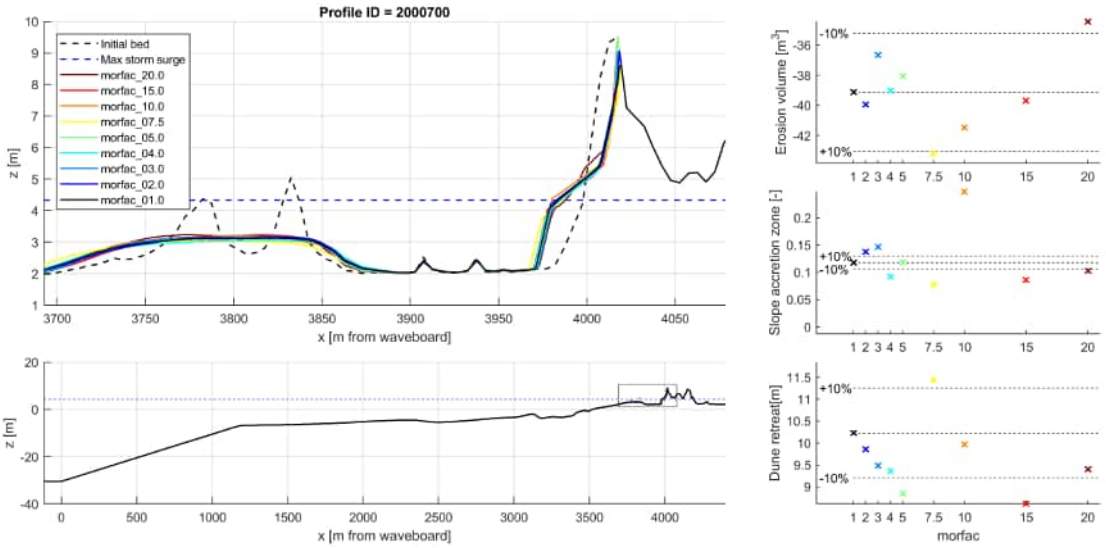

Figure 2.19: *XBeach results for profile 2000700. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

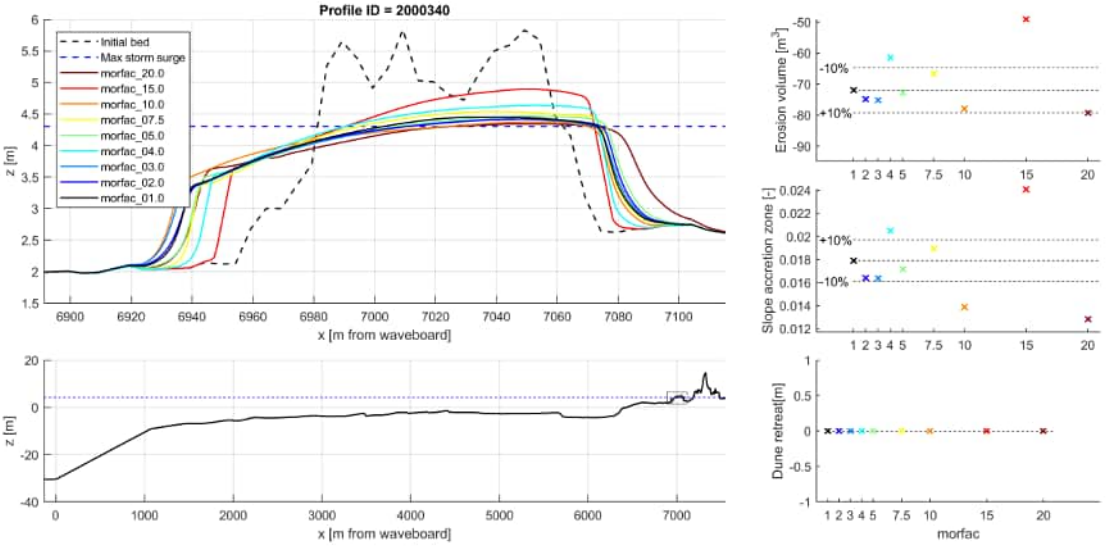

Figure 2.20: *XBeach results for profile 2000340. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

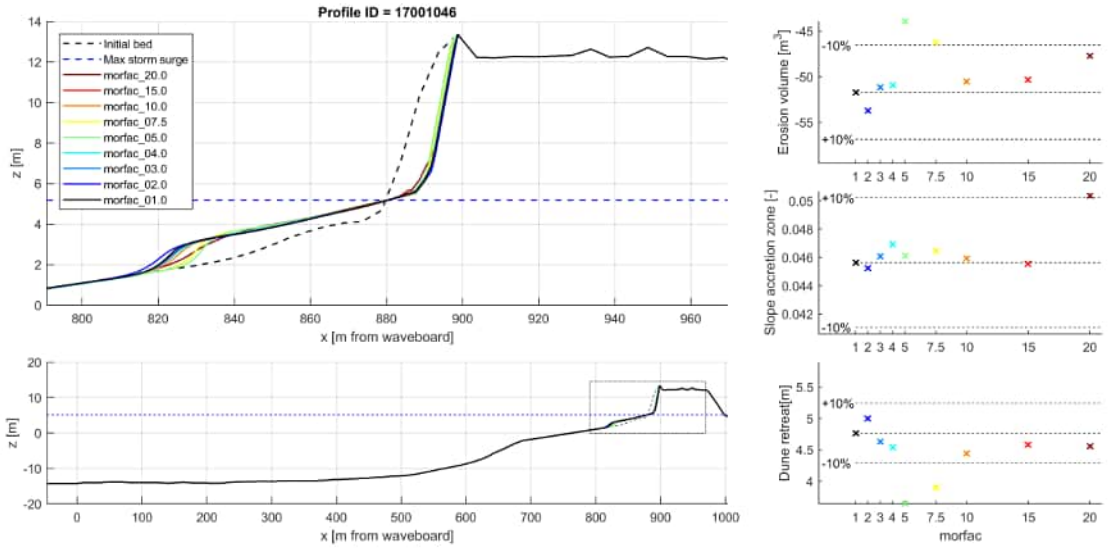

Figure 2.21: *XBeach results for profile 17001046. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

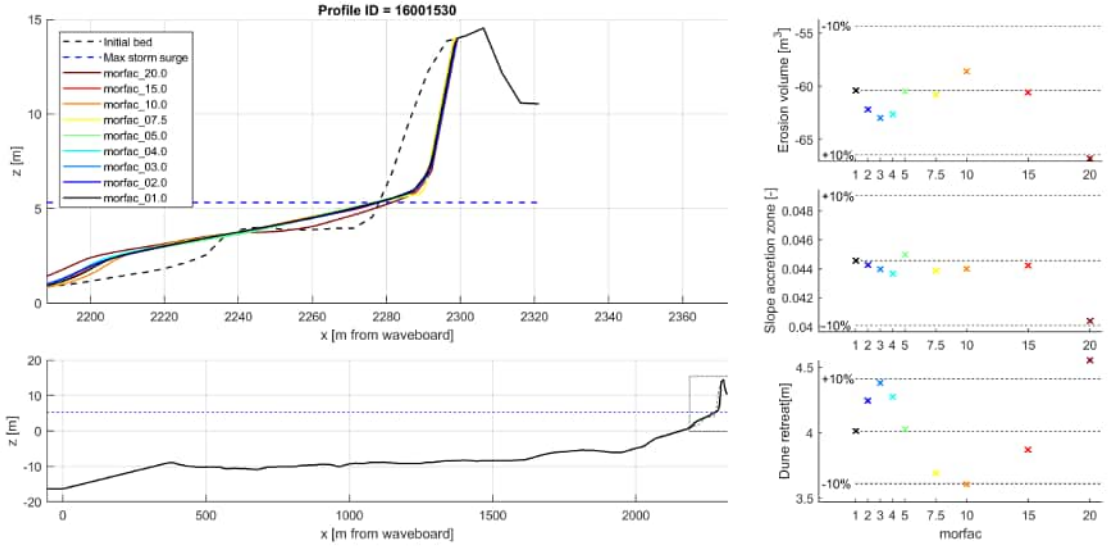

Figure 2.22: *XBeach results for profile 16001530. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

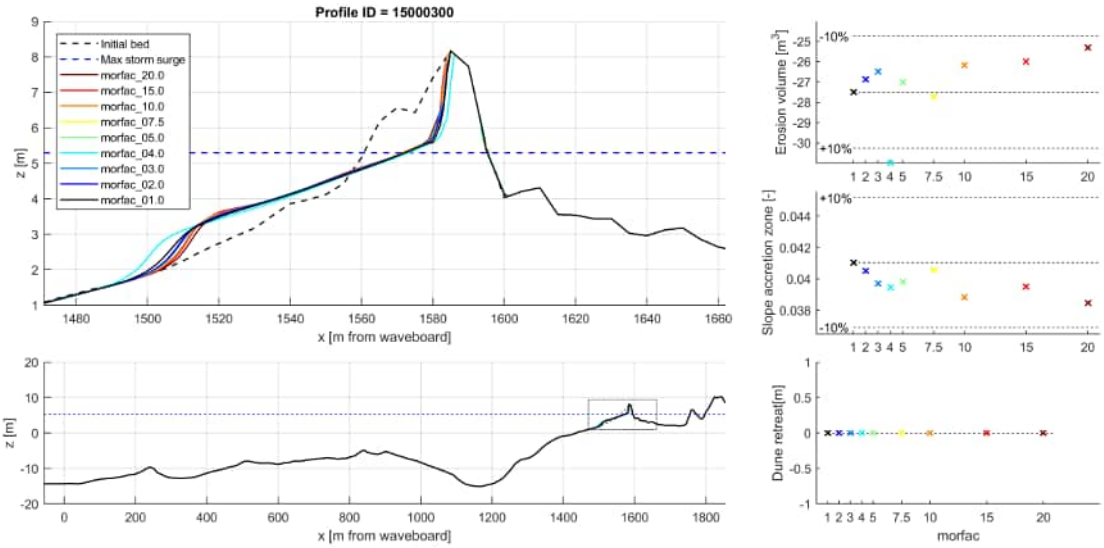

Figure 2.23: *XBeach results for profile 15000300. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

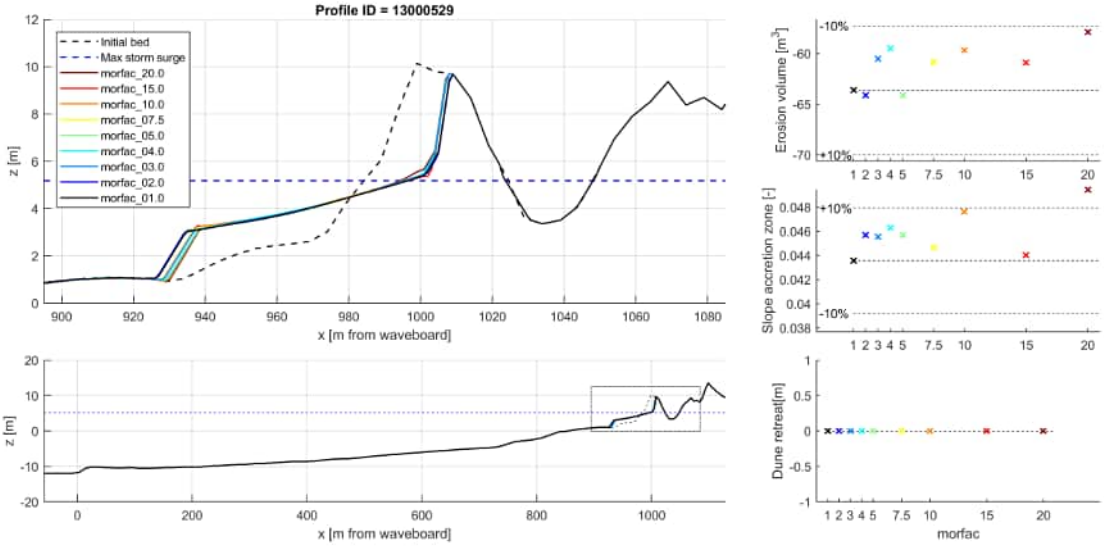

Figure 2.24: *XBeach results for profile 13000529. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

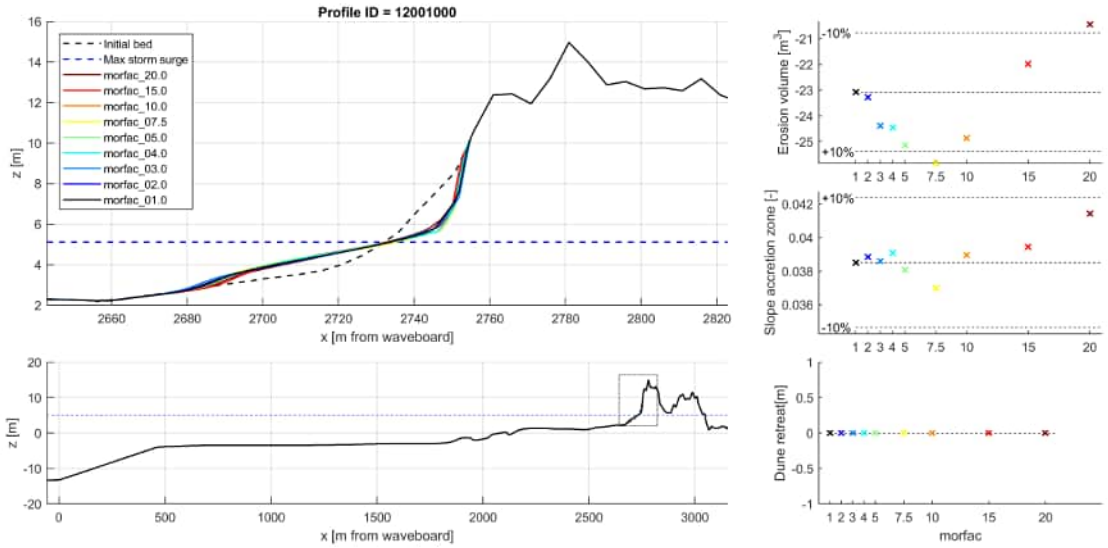

Figure 2.25: *XBeach results for profile 12001000. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

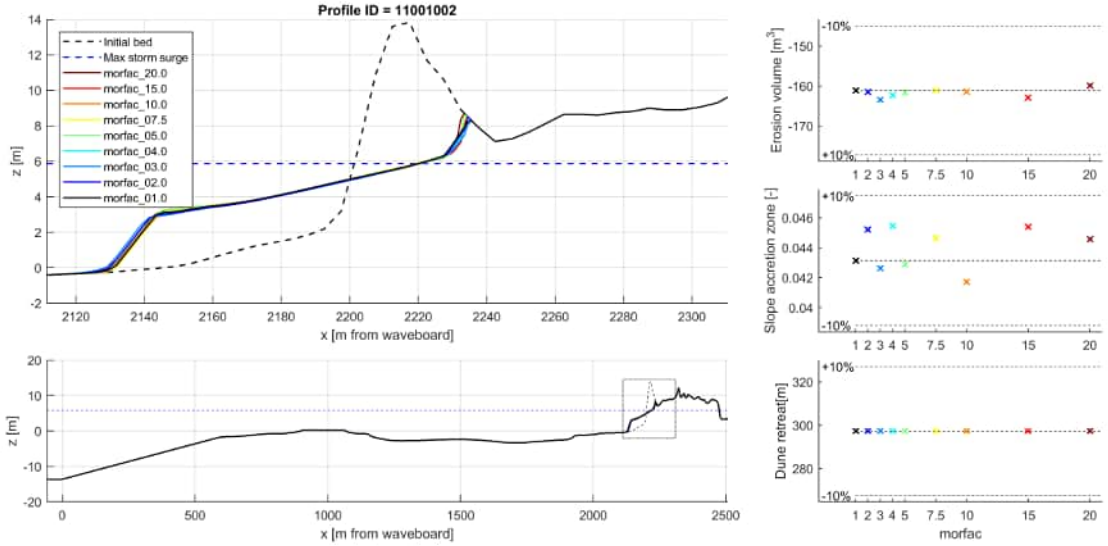

Figure 2.26: *XBeach results for profile 11001002. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

3 Grid resolution: dxmin

The following figures show the comparison of the erosion profiles for variations in the dxmin with the base case.

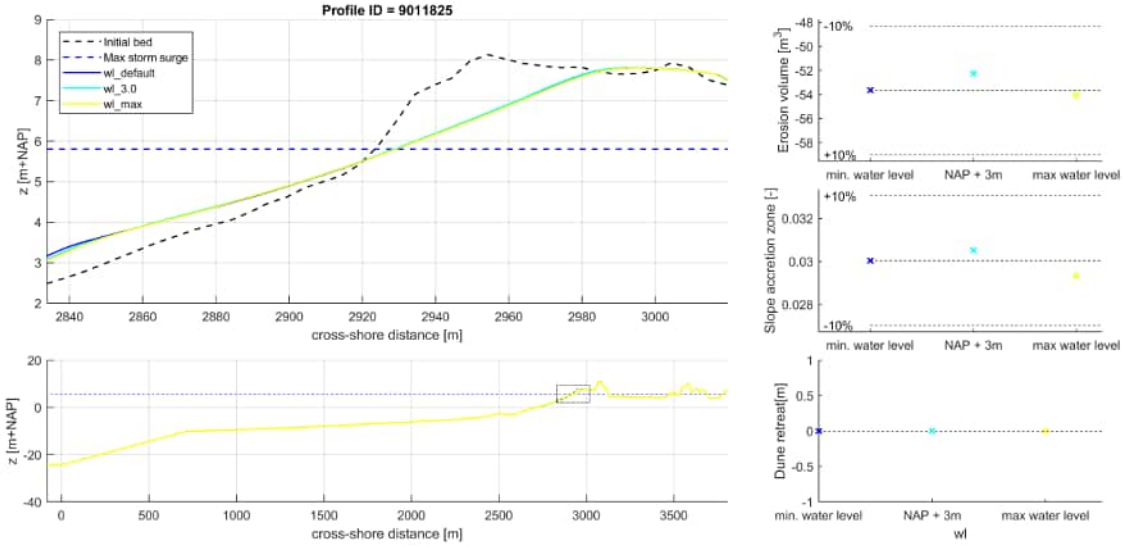

Figure 3.1: *XBeach results for profile 9011825. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

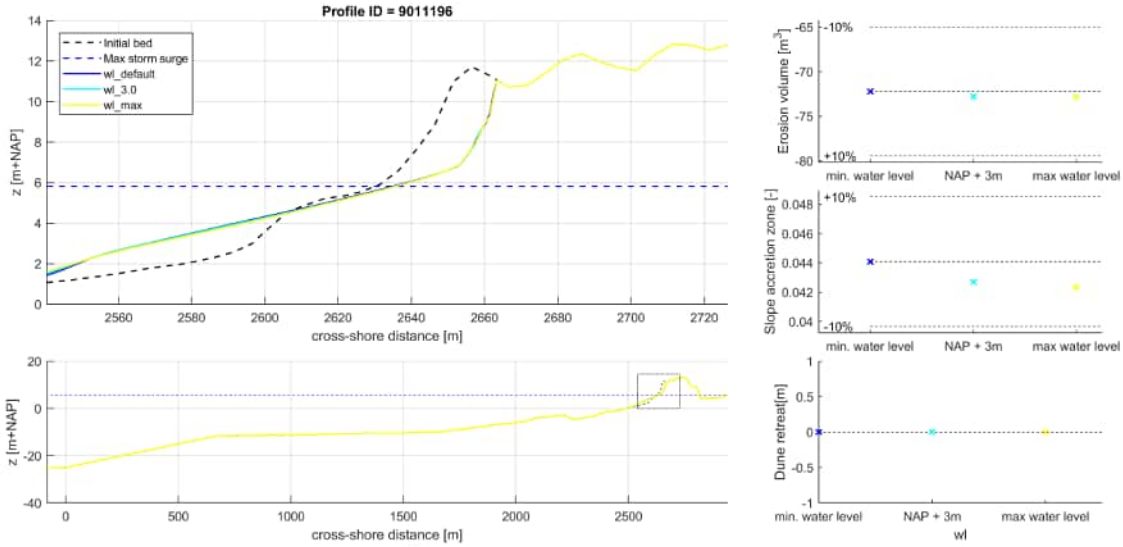

Figure 3.2: *XBeach results for profile 9011196. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

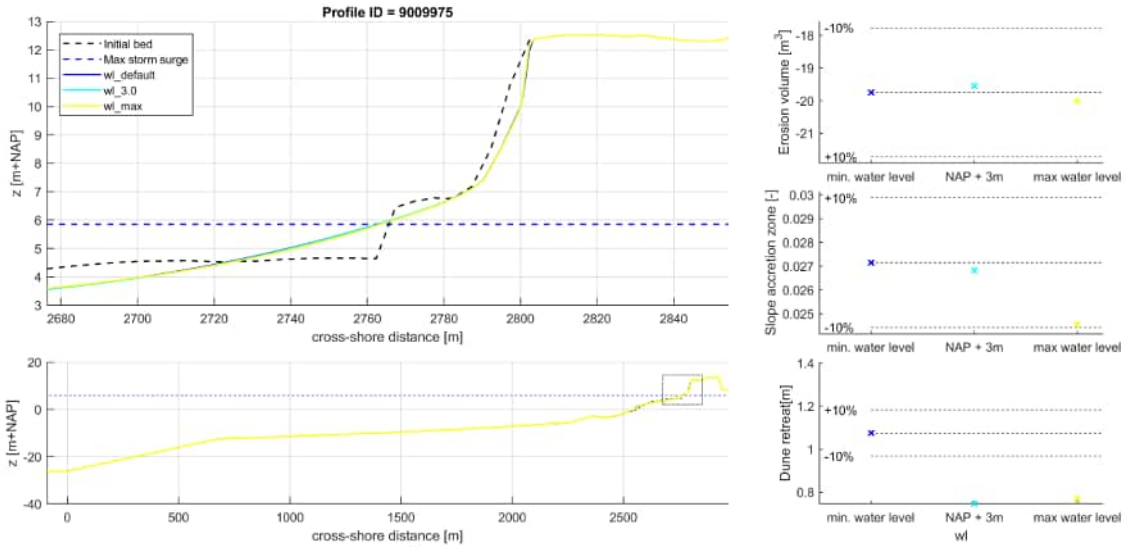

Figure 3.3: *XBeach results for profile 9009975. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

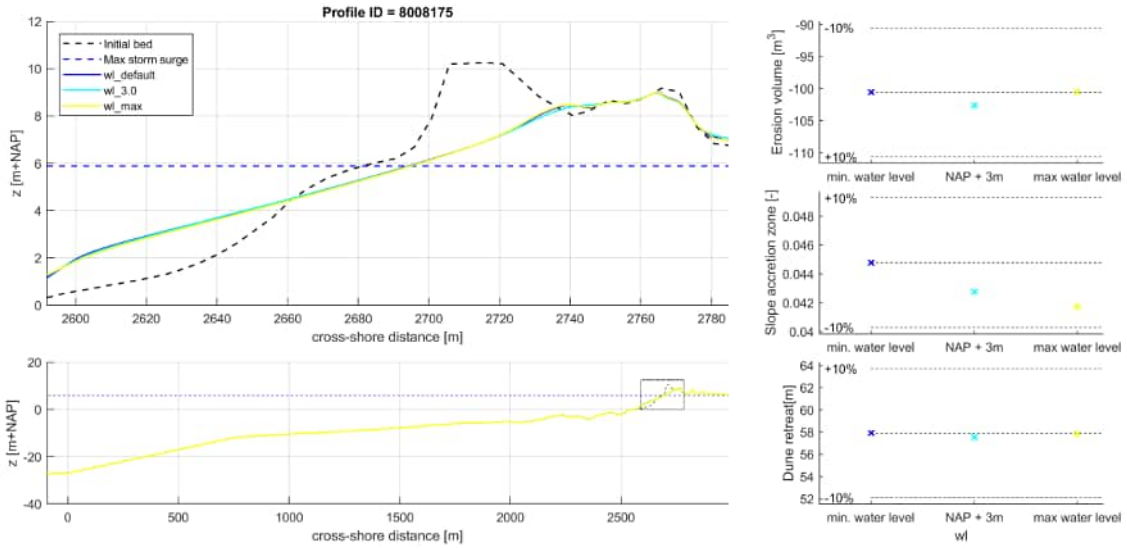

Figure 3.4: *XBeach results for profile 8008175. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

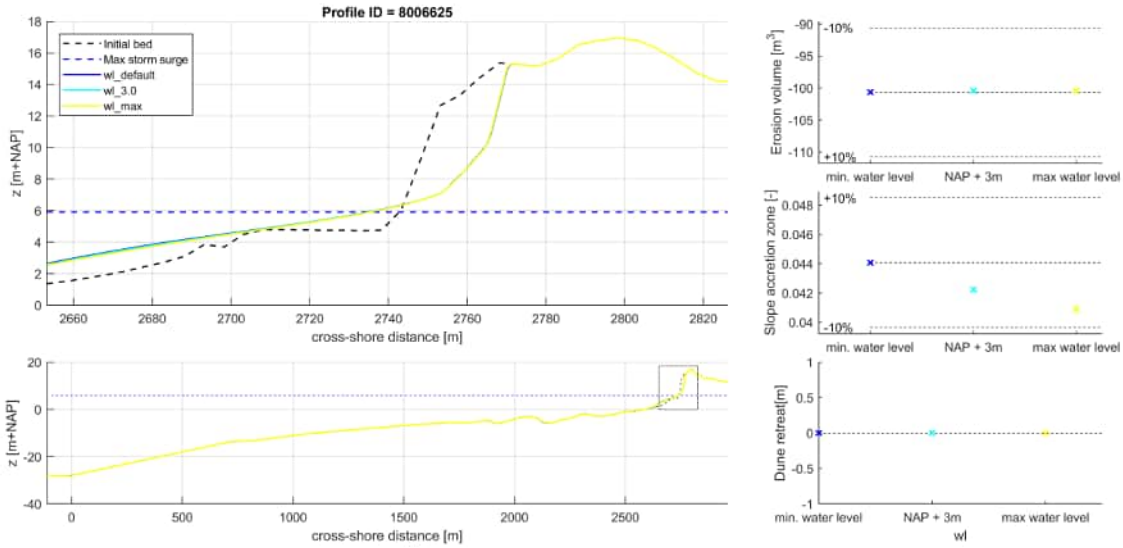

Figure 3.5: *XBeach results for profile 8006625. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

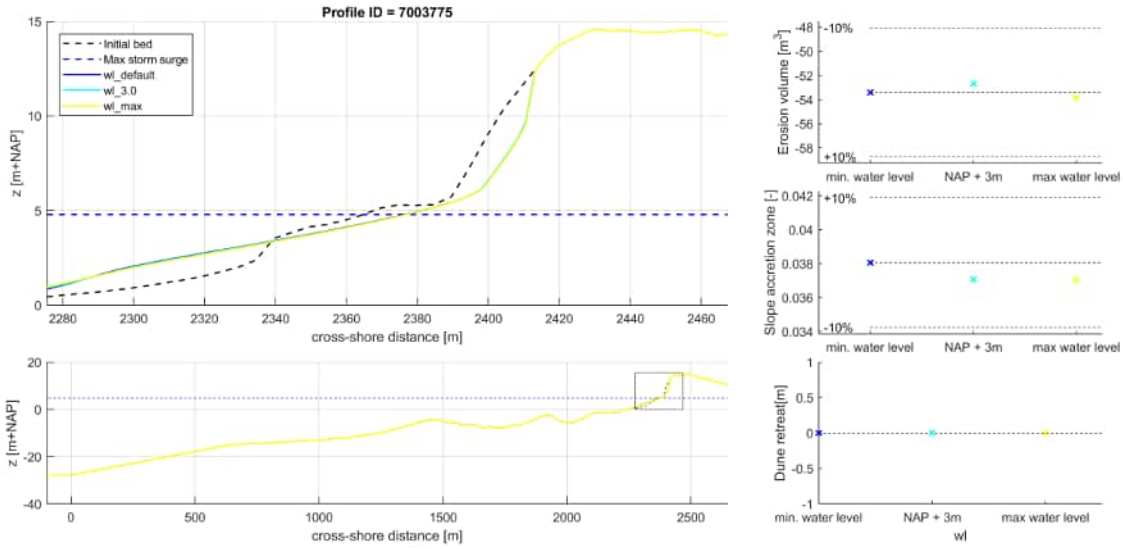

Figure 3.6: *XBeach results for profile 7003775. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

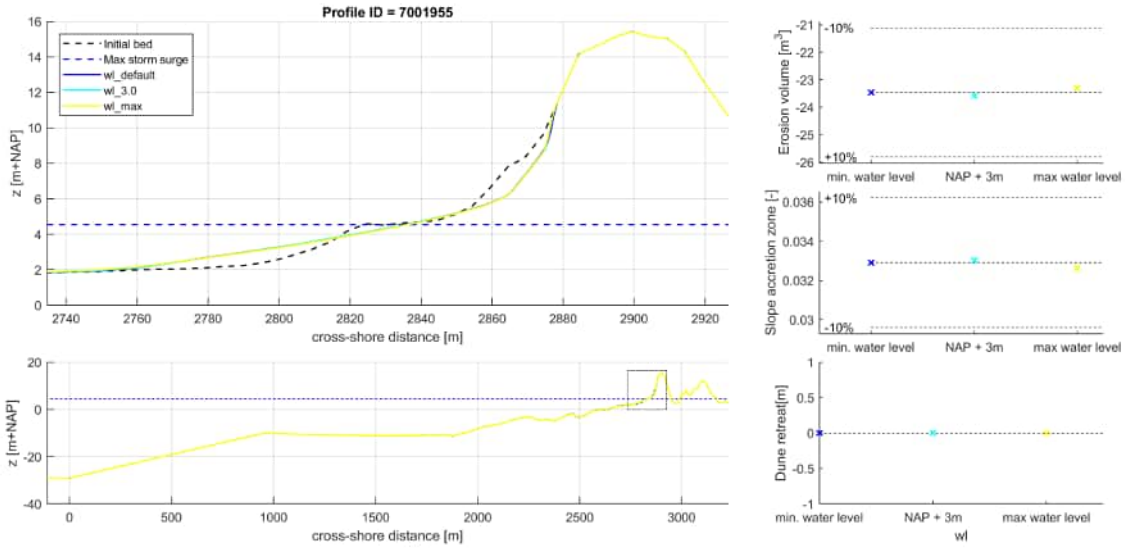

Figure 3.7: *XBeach results for profile 7001955. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

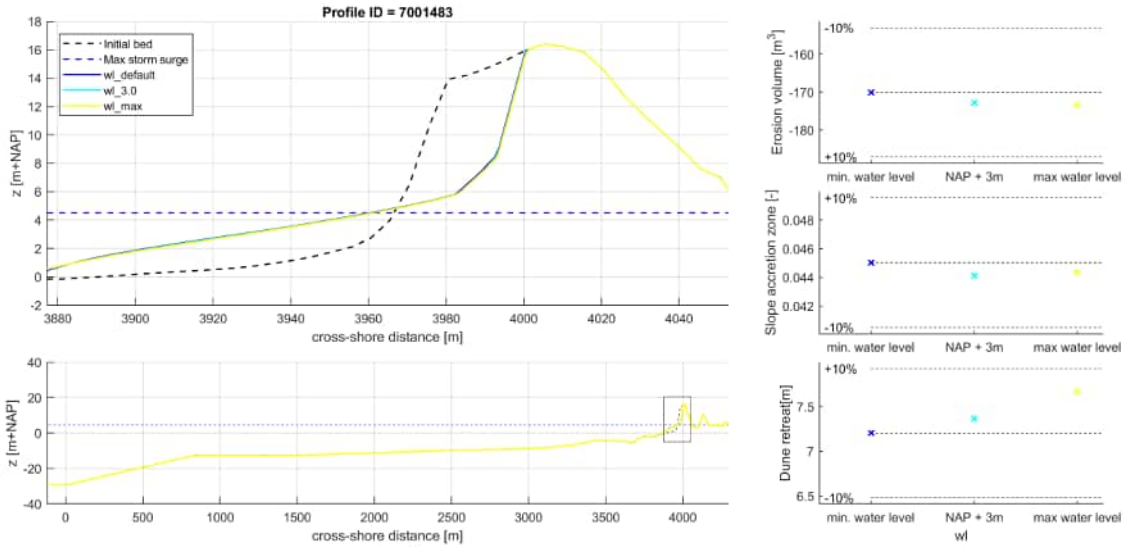

Figure 3.8: *XBeach results for profile 7001483. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

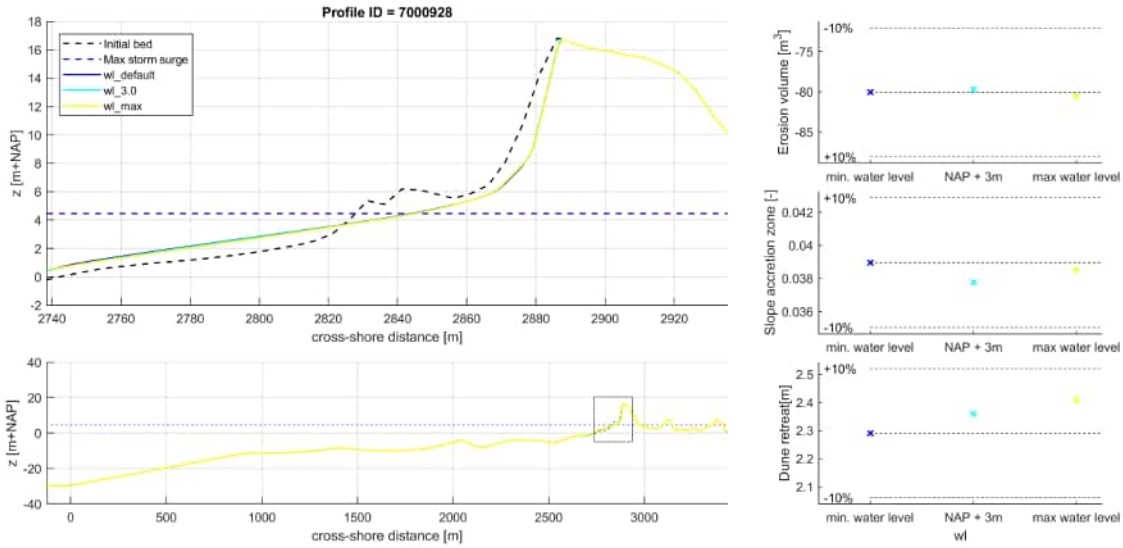

Figure 3.9: *XBeach results for profile 7000928. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

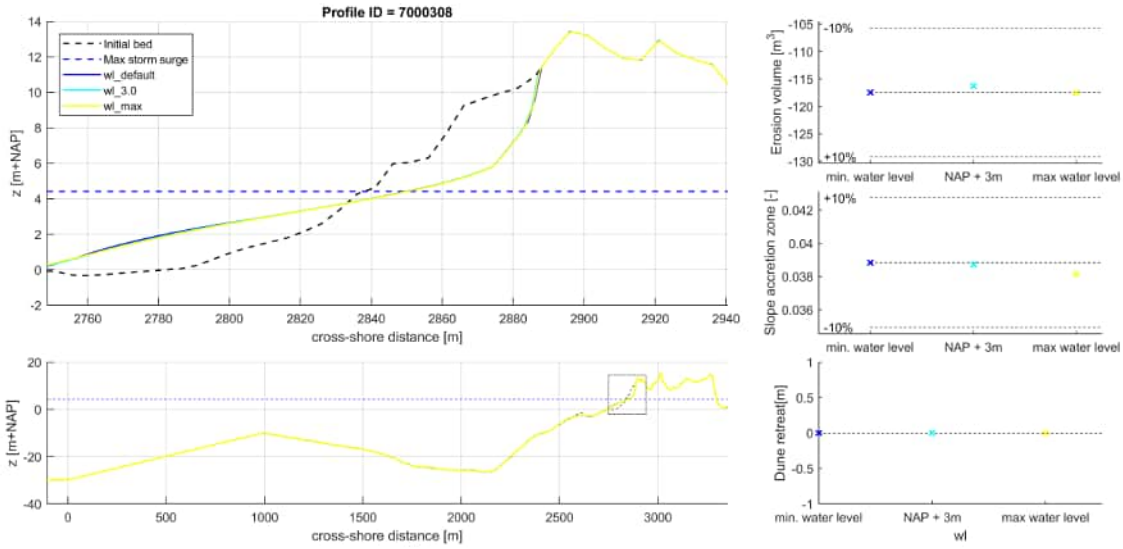

Figure 3.10: *XBeach results for profile 7000308. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

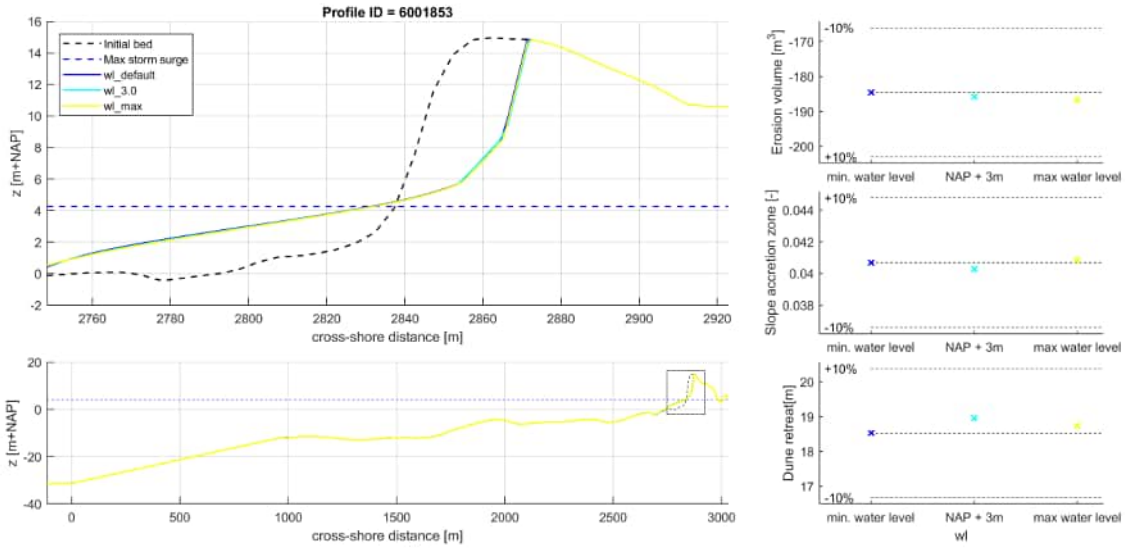

Figure 3.11: *XBeach results for profile 6001853. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

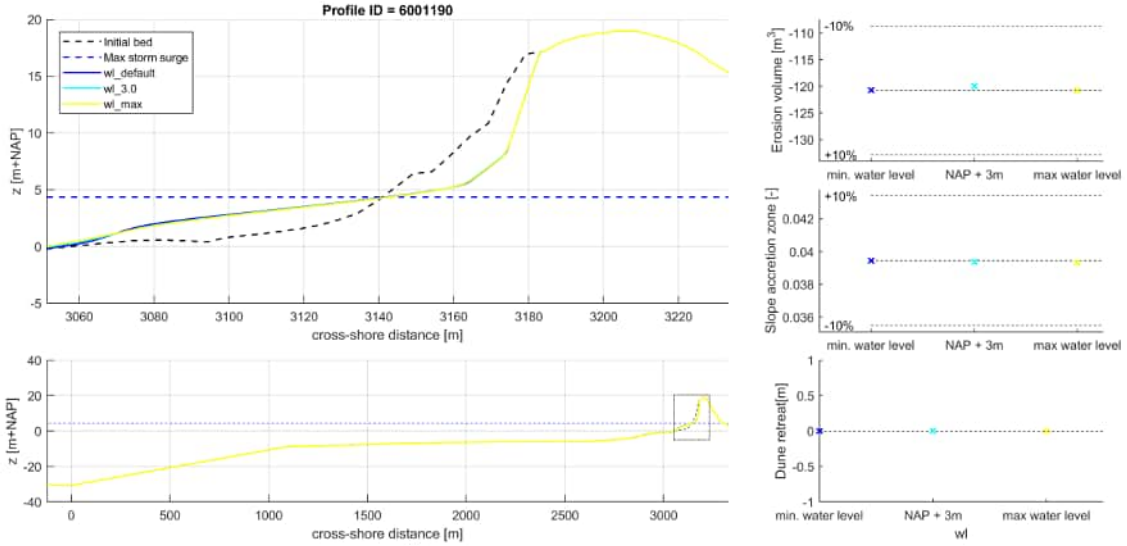

Figure 3.12: *XBeach results for profile 6001190. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

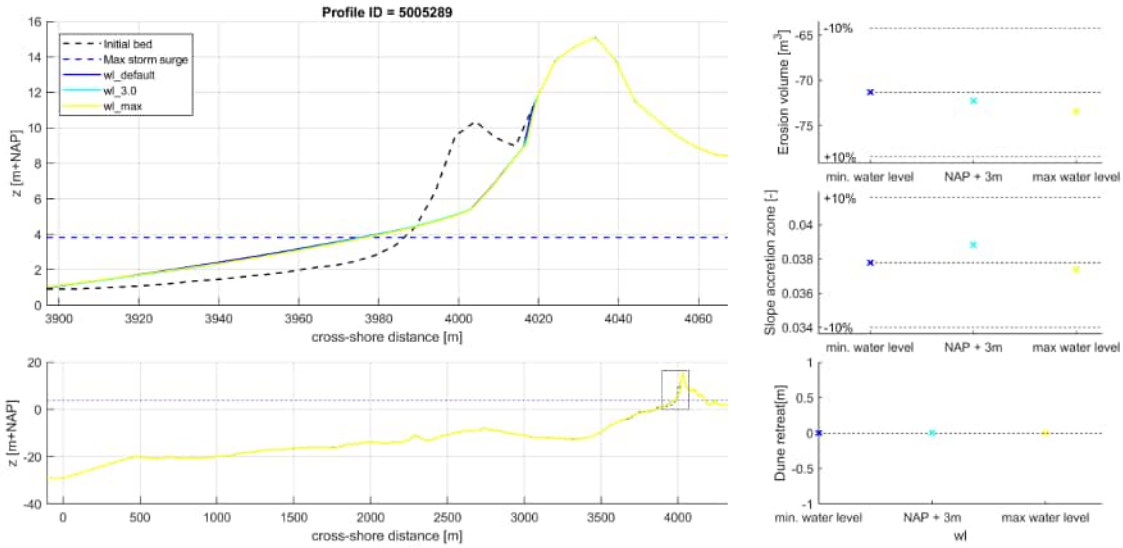

Figure 3.13: *XBeach results for profile 5005289. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

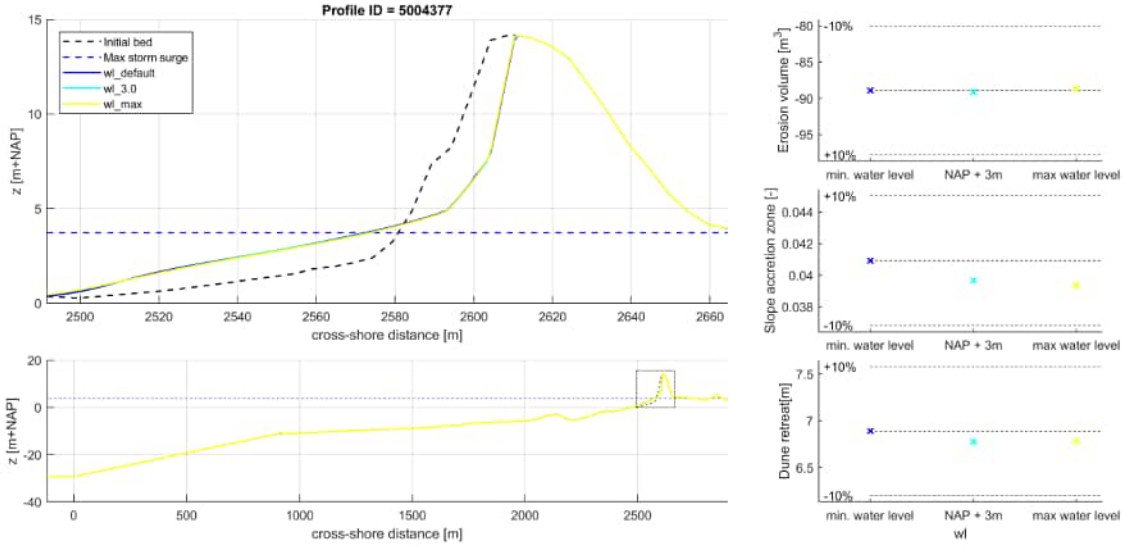

Figure 3.14: *XBeach results for profile 5004377. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

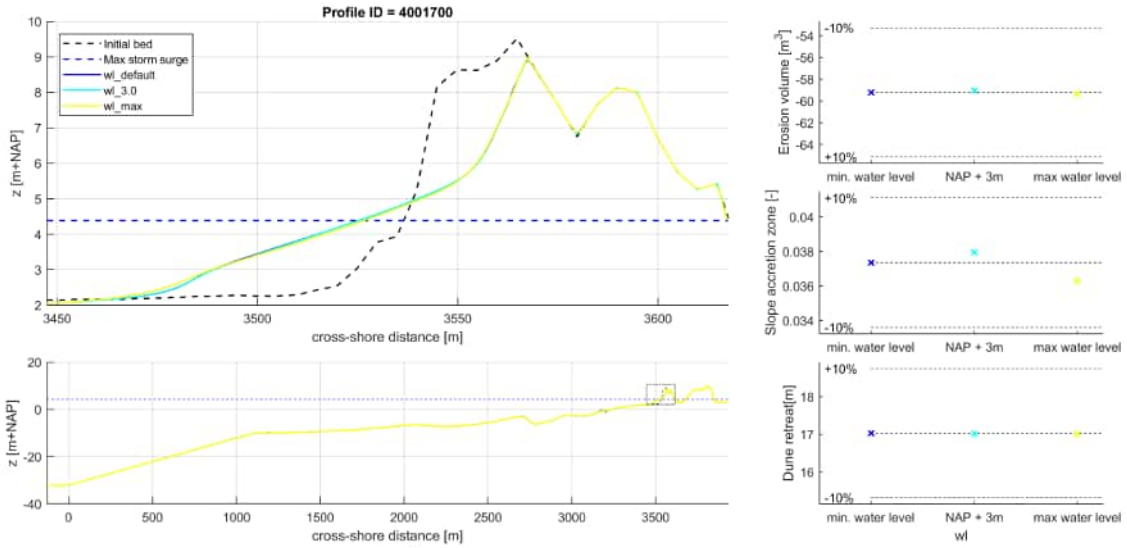

Figure 3.15: *XBeach results for profile 4001700. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

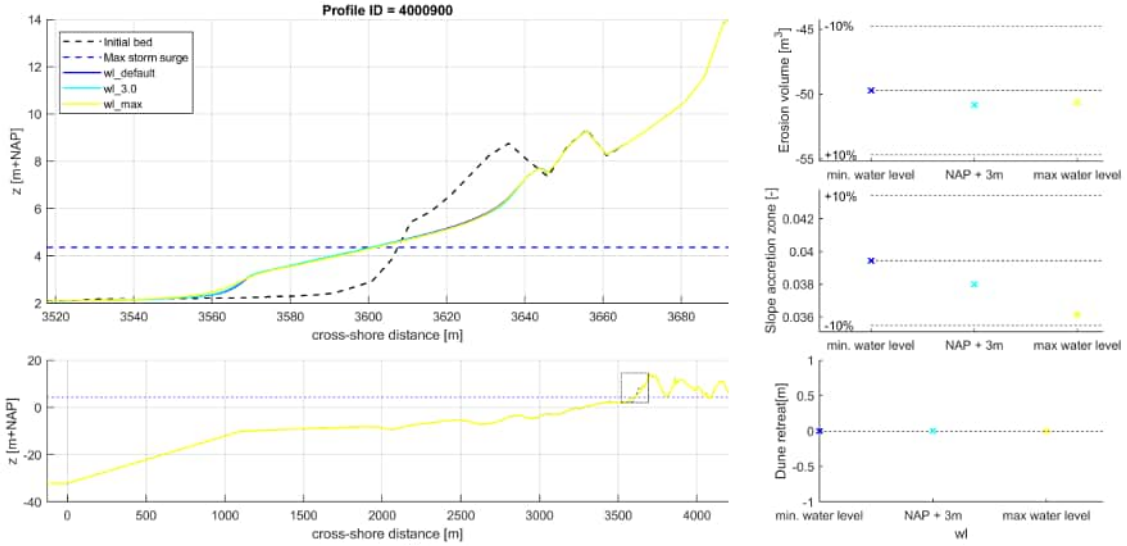

Figure 3.16: *XBeach results for profile 4000900. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

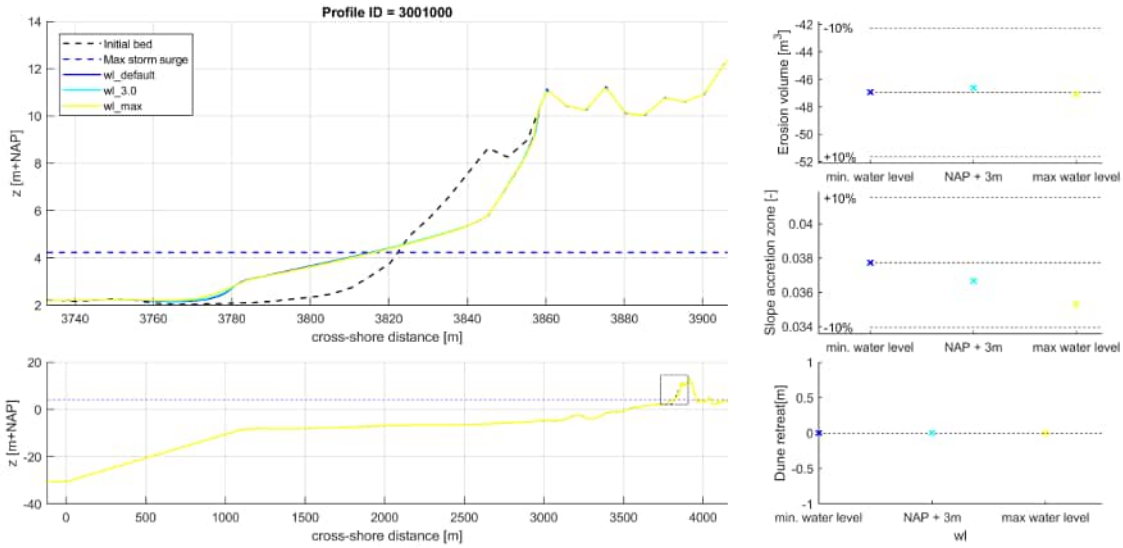

Figure 3.17: *XBeach results for profile 3001000. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

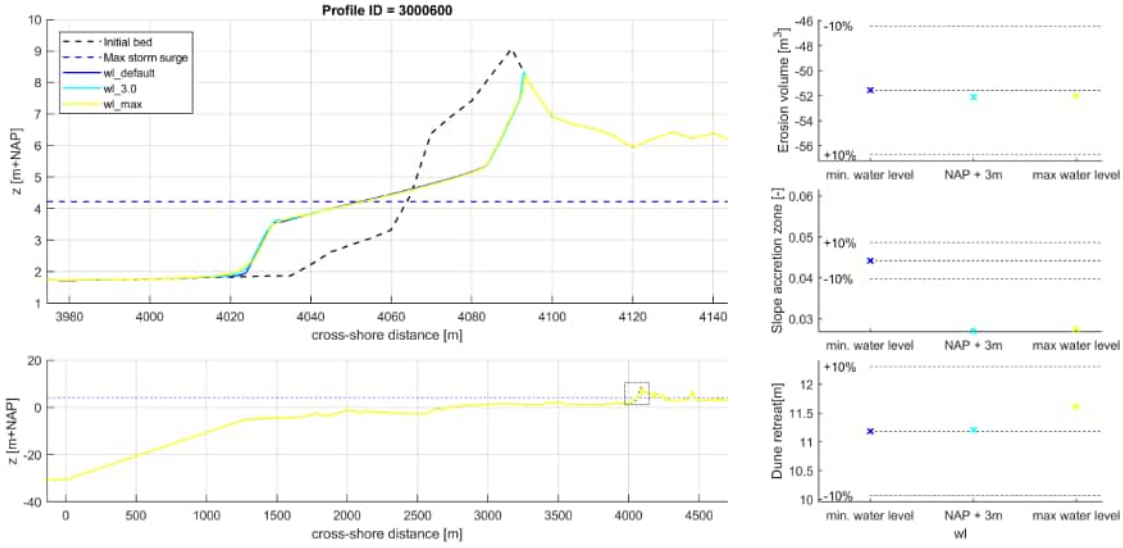

Figure 3.18: *XBeach results for profile 3000600. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

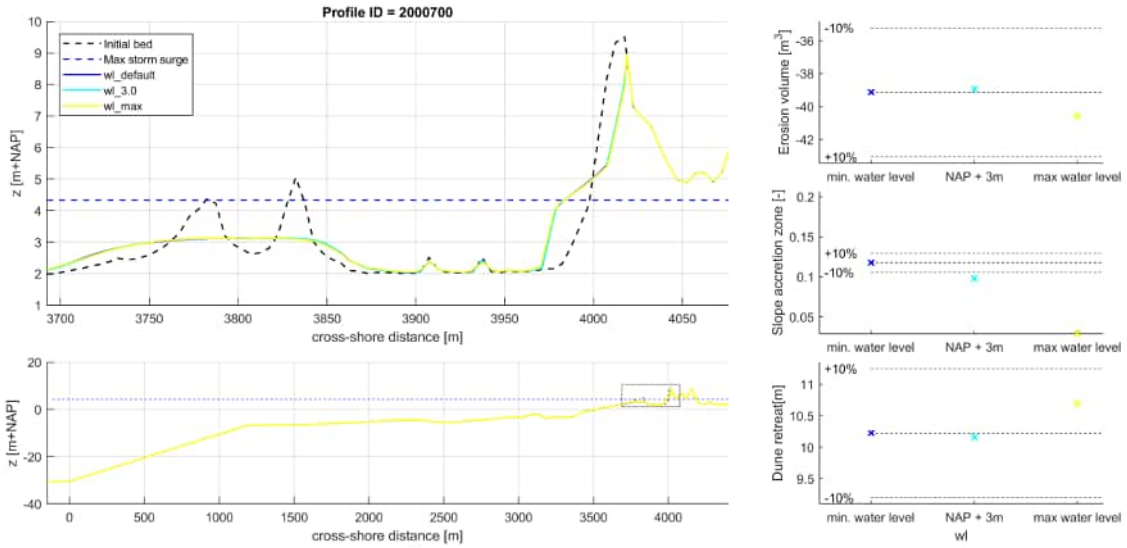

Figure 3.19: *XBeach results for profile 2000700. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

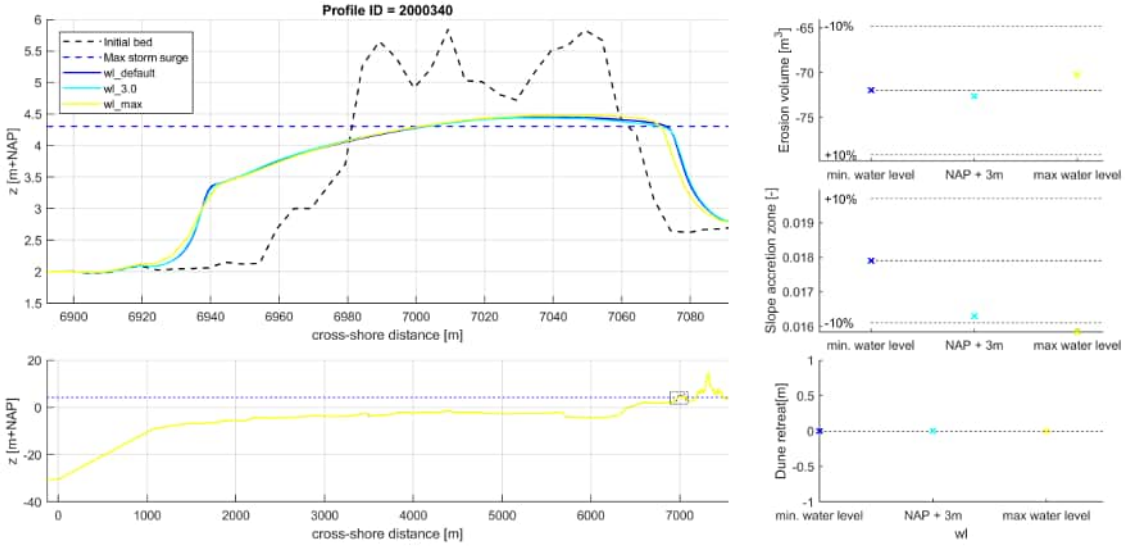

Figure 3.20: *XBeach results for profile 2000340. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

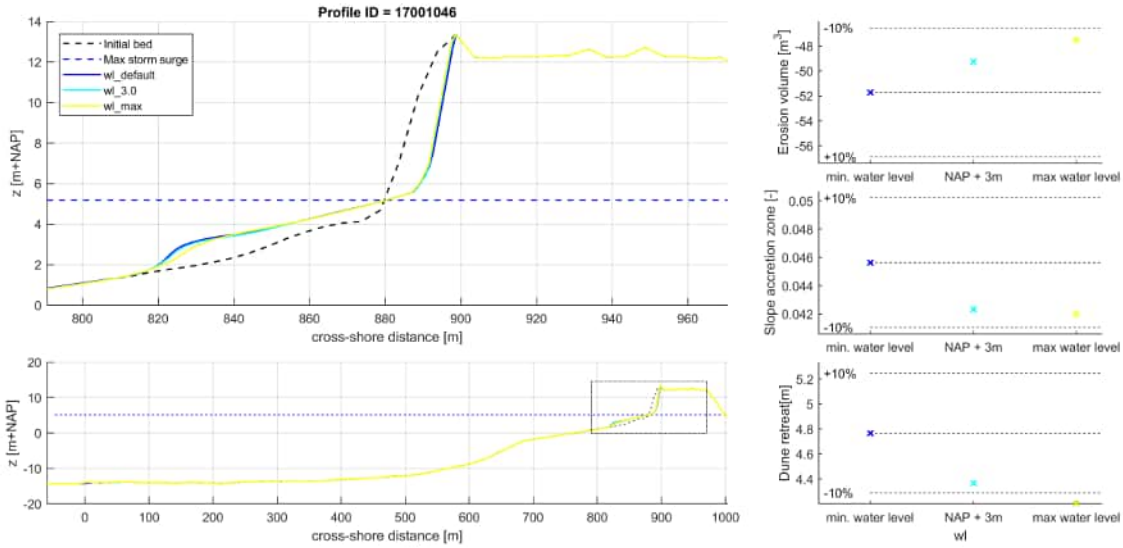

Figure 3.21: *XBeach results for profile 17001046. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

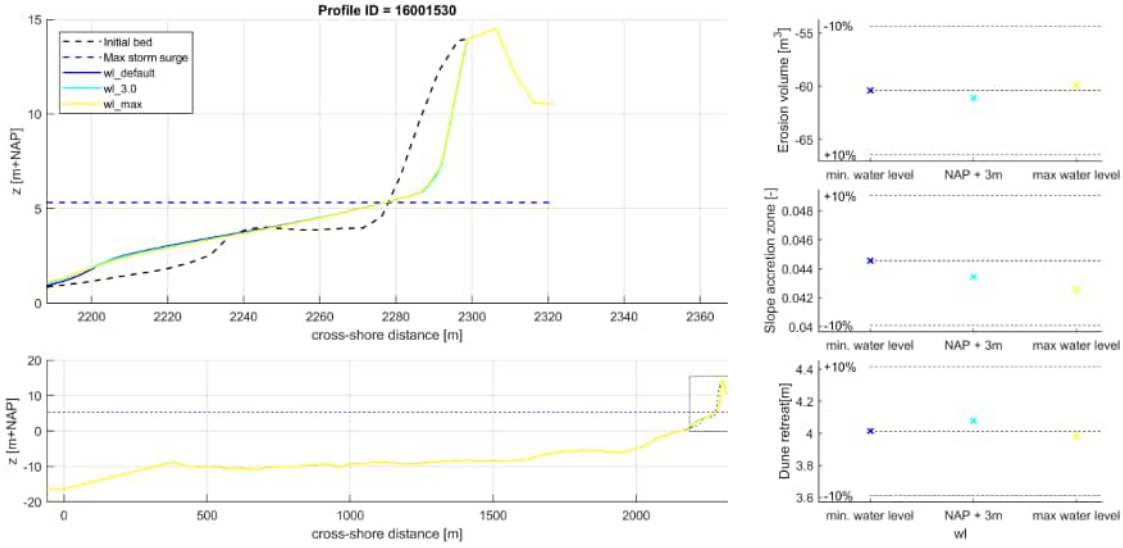

Figure 3.22: *XBeach results for profile 16001530. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

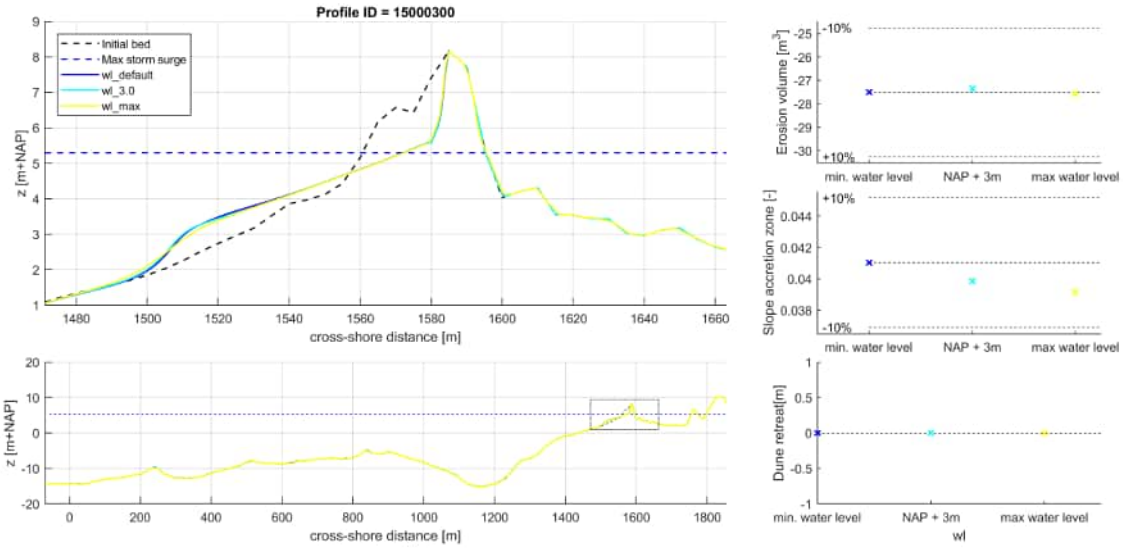

Figure 3.23: *XBeach results for profile 15000300. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

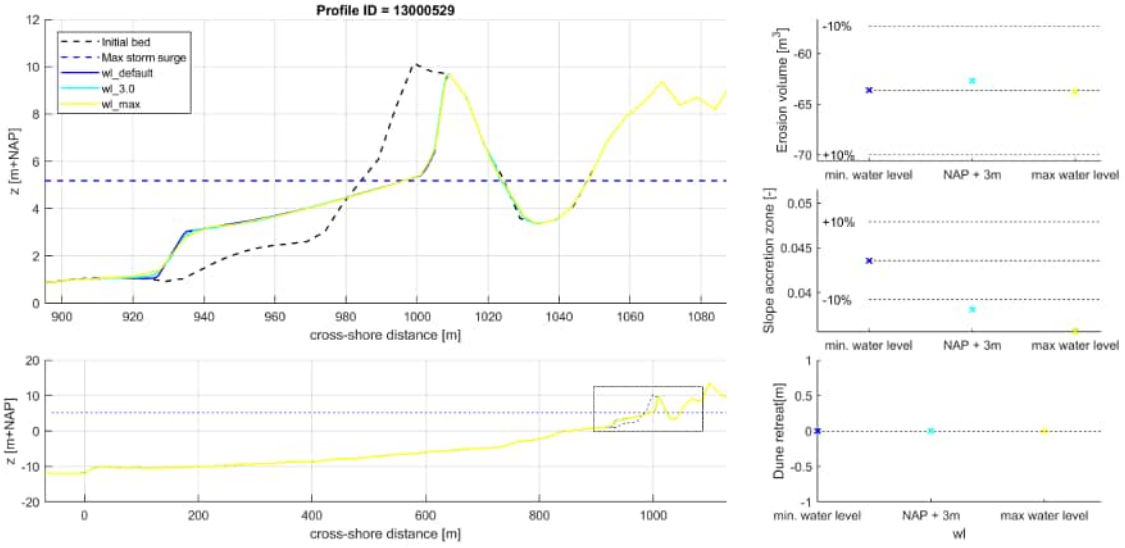

Figure 3.24: *XBeach results for profile 13000529. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

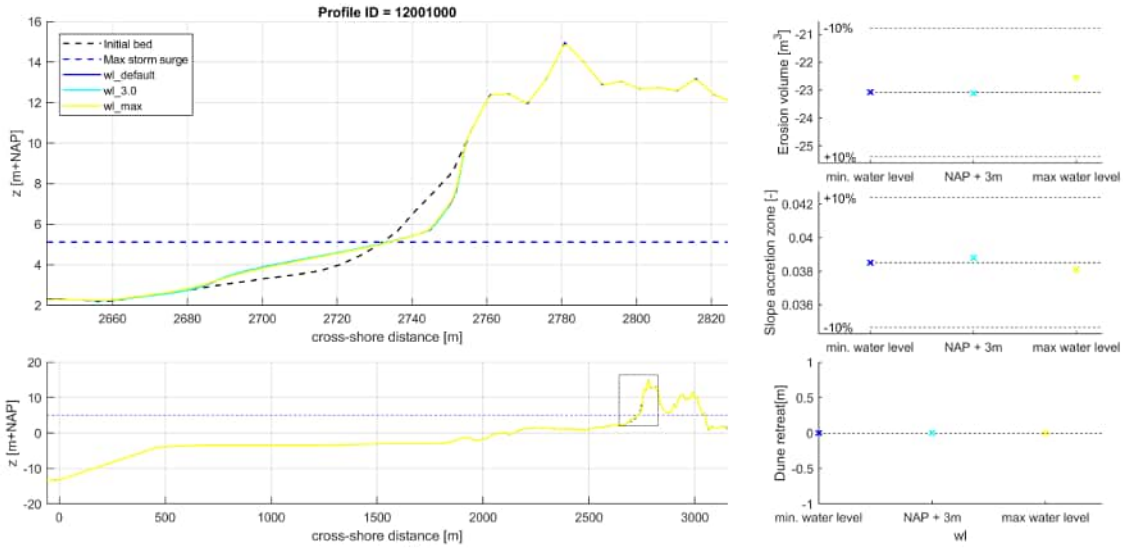

Figure 3.25: *XBeach results for profile 12001000. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

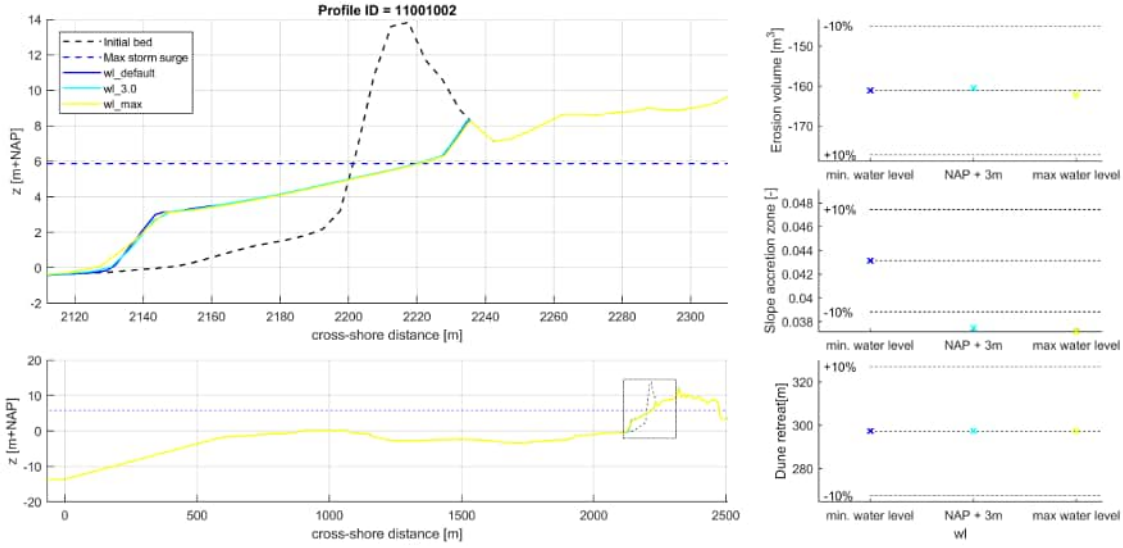

Figure 3.26: *XBeach results for profile 11001002. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

4 Grid resolution: ppwl

The following figures show the comparison of the erosion profiles for variations in the ppwl with the base case.

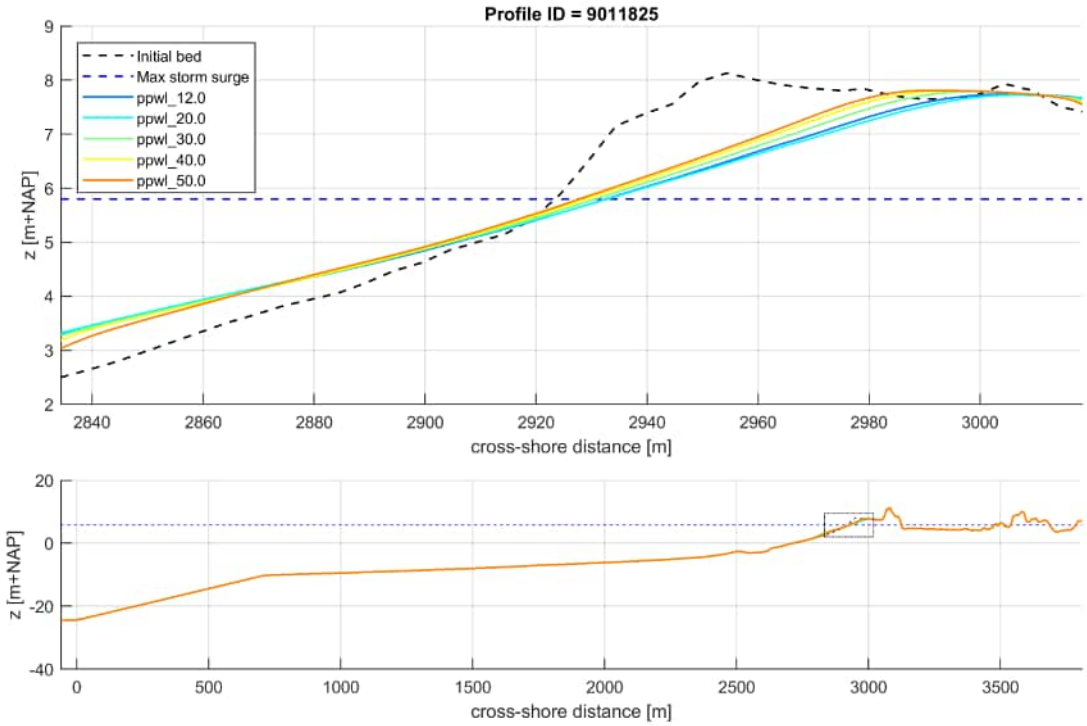

Figure 4.1: *XBeach results for profile 9011825. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

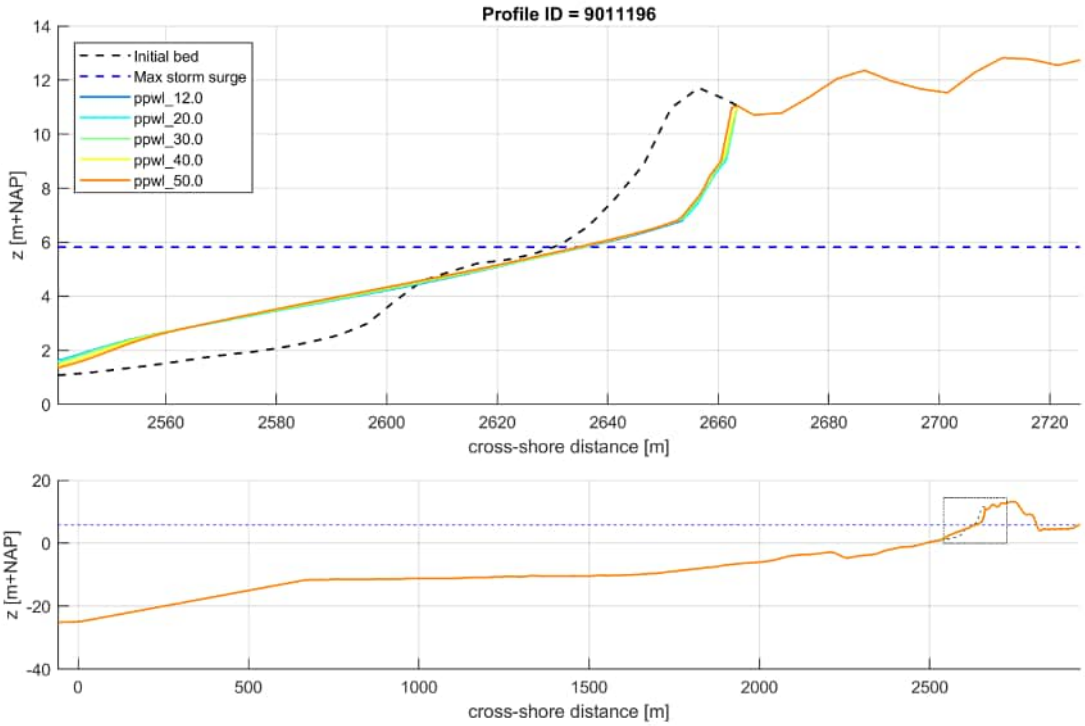

Figure 4.2: *XBeach results for profile 9011196. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

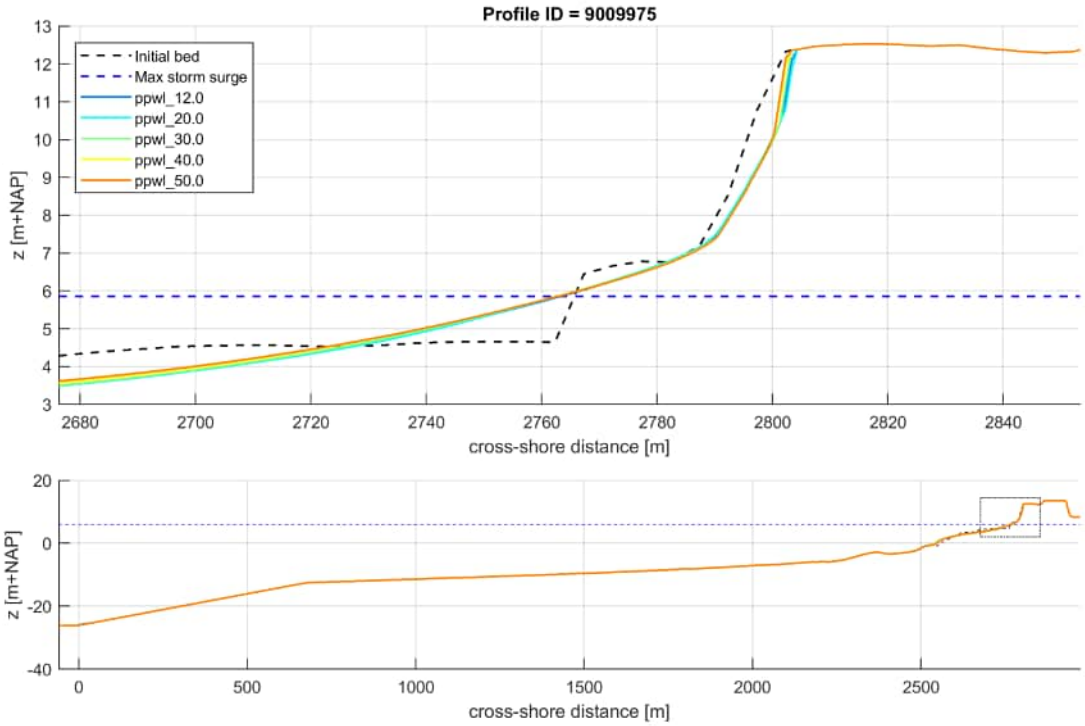

Figure 4.3: *XBeach results for profile 9009975. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

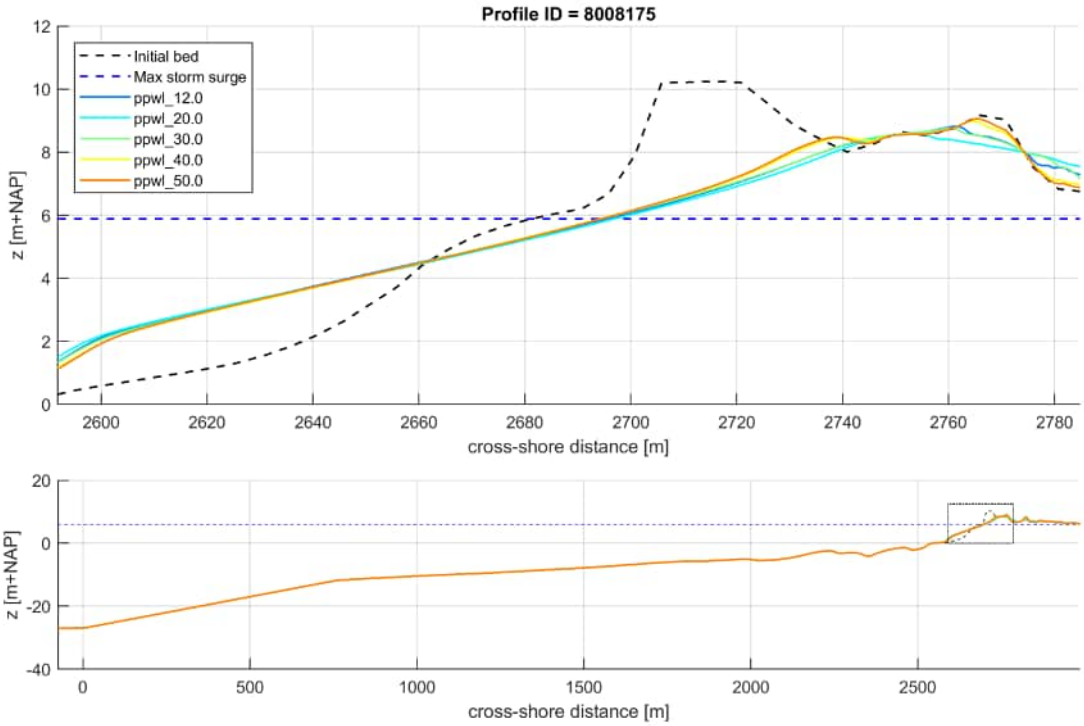

Figure 4.4: *XBeach results for profile 8008175. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

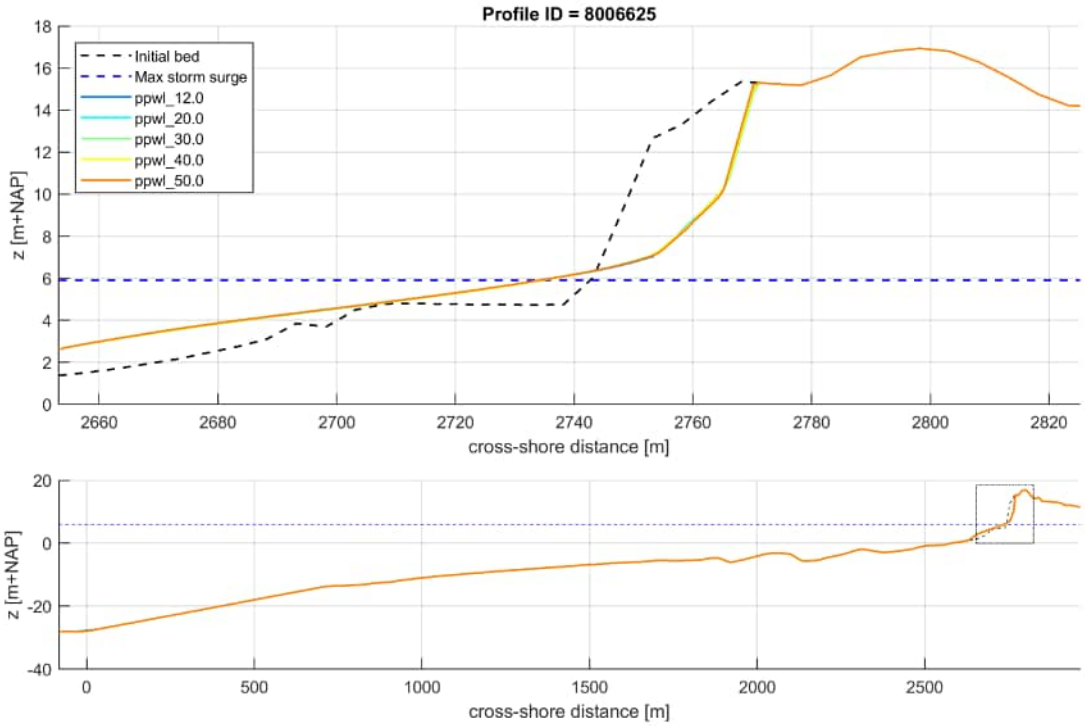

Figure 4.5: *XBeach results for profile 8006625. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

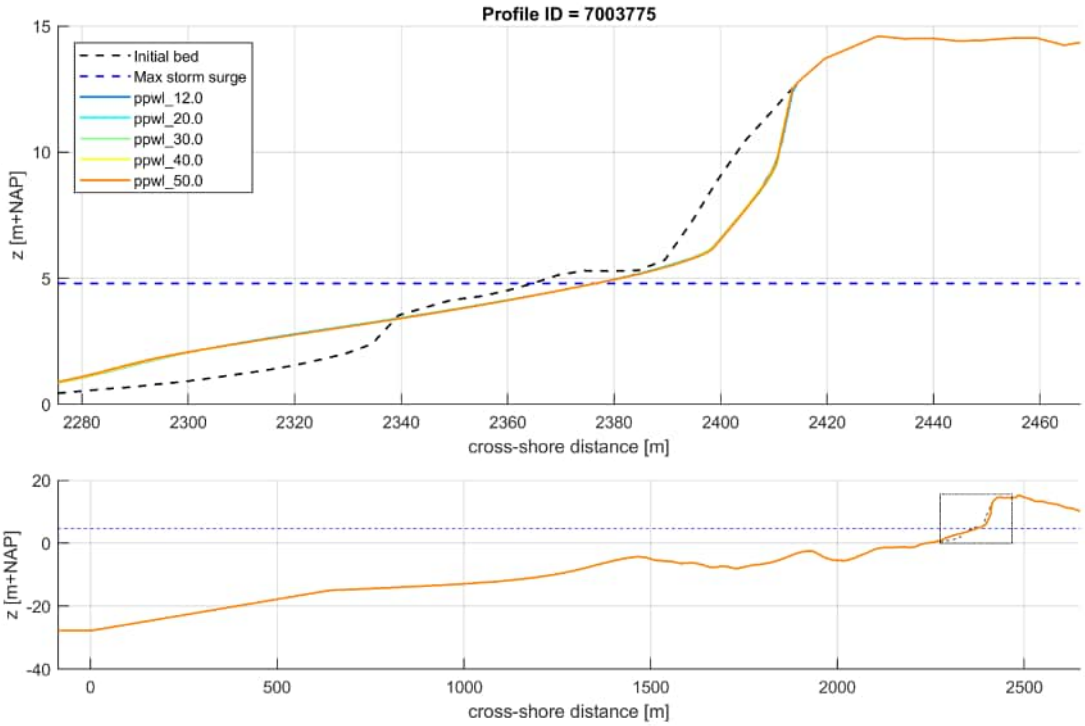

Figure 4.6: *XBeach results for profile 7003775. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

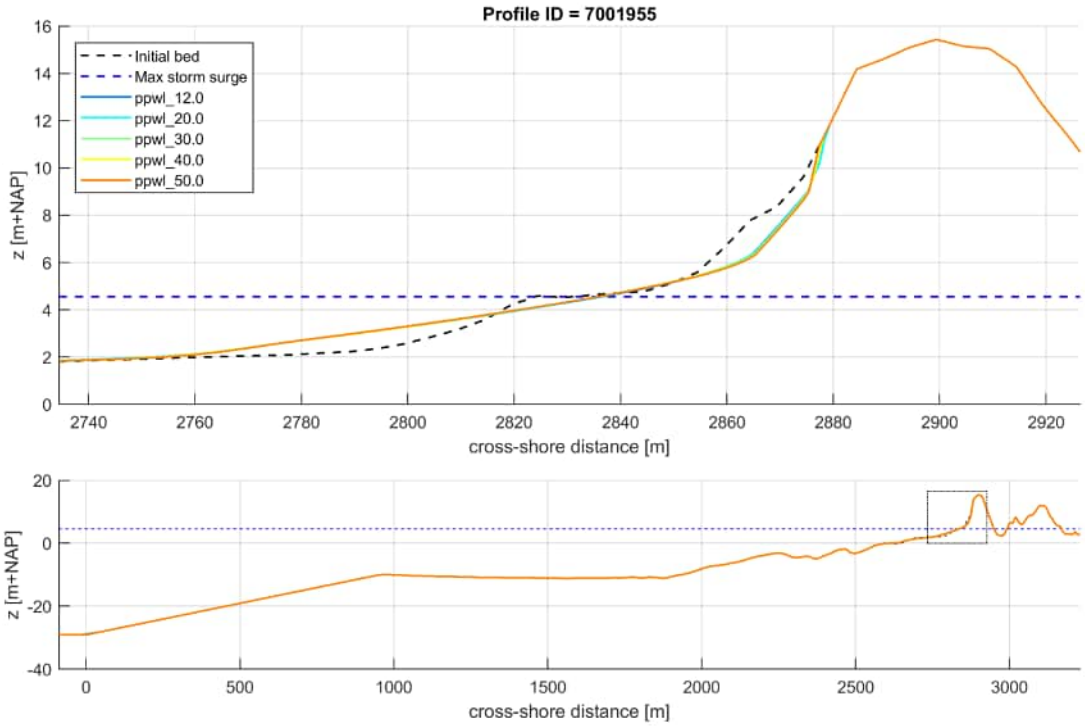

Figure 4.7: *XBeach results for profile 7001955. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

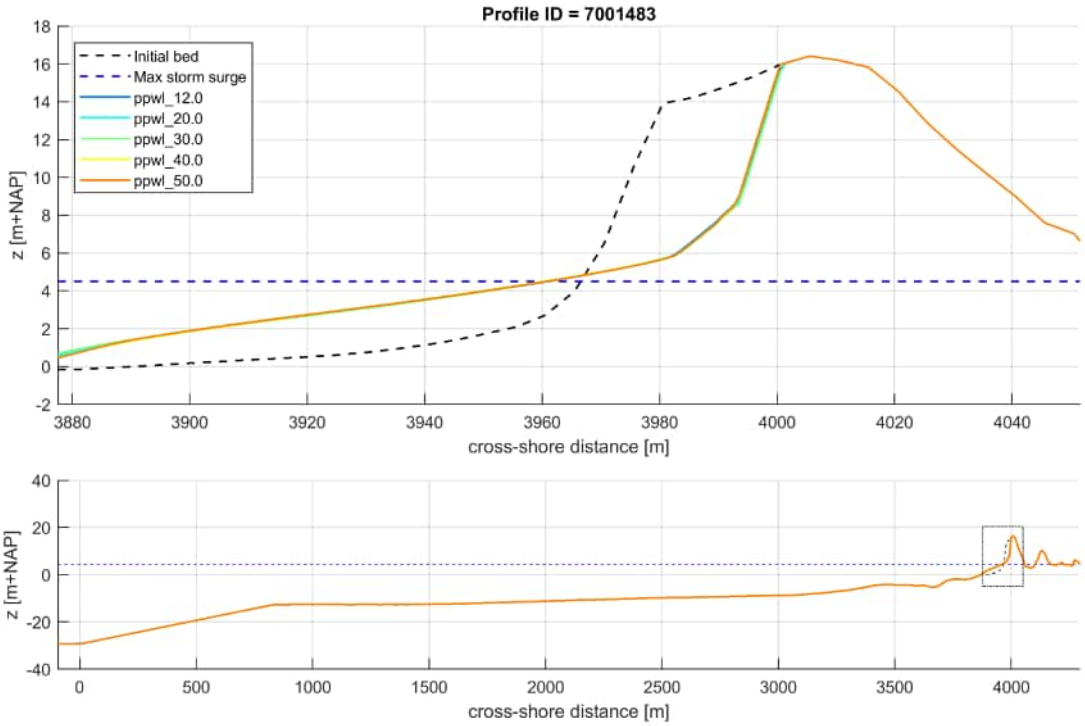

Figure 4.8: *XBeach results for profile 7001483. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

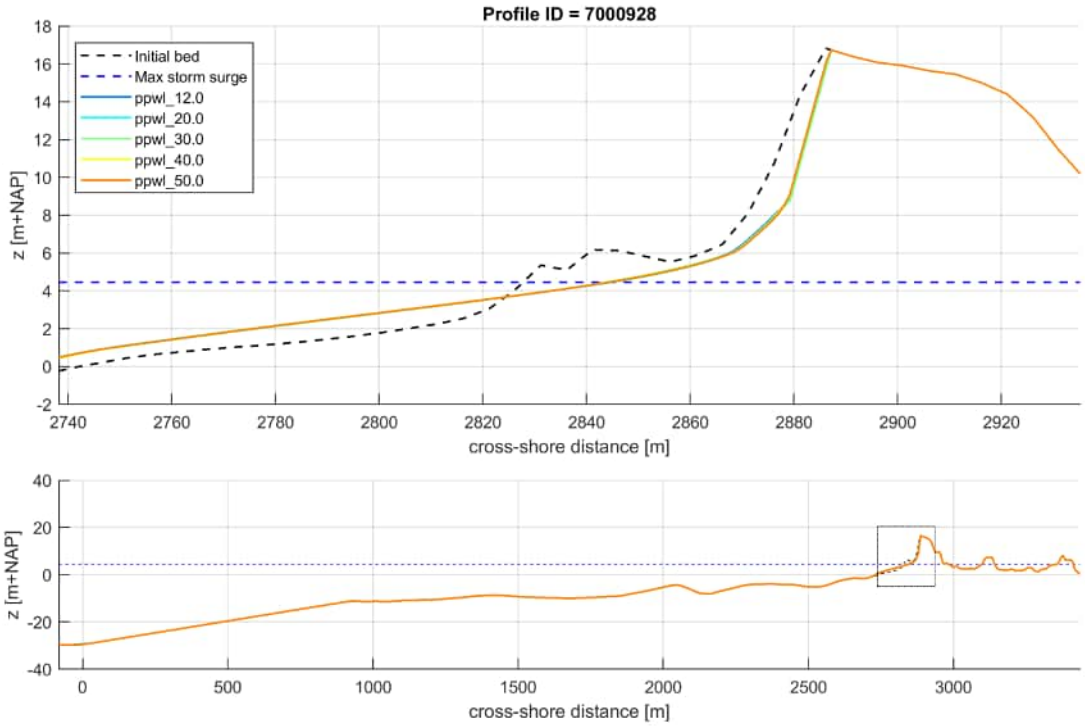

Figure 4.9: *XBeach results for profile 7000928. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

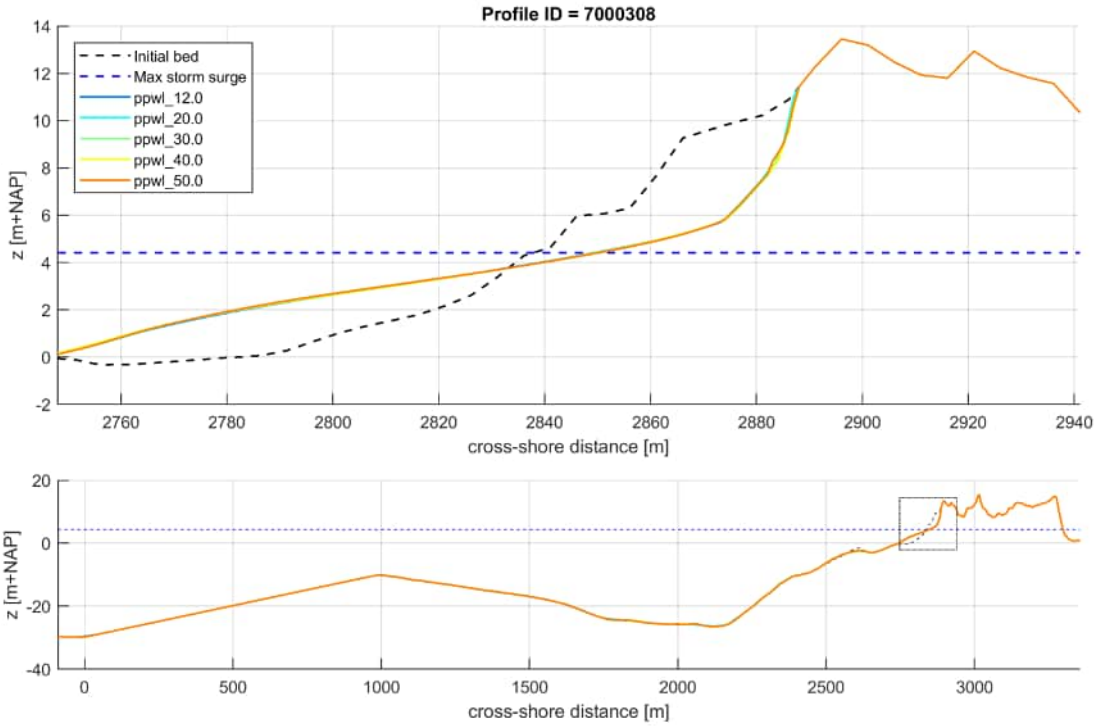

Figure 4.10: *XBeach results for profile 7000308. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

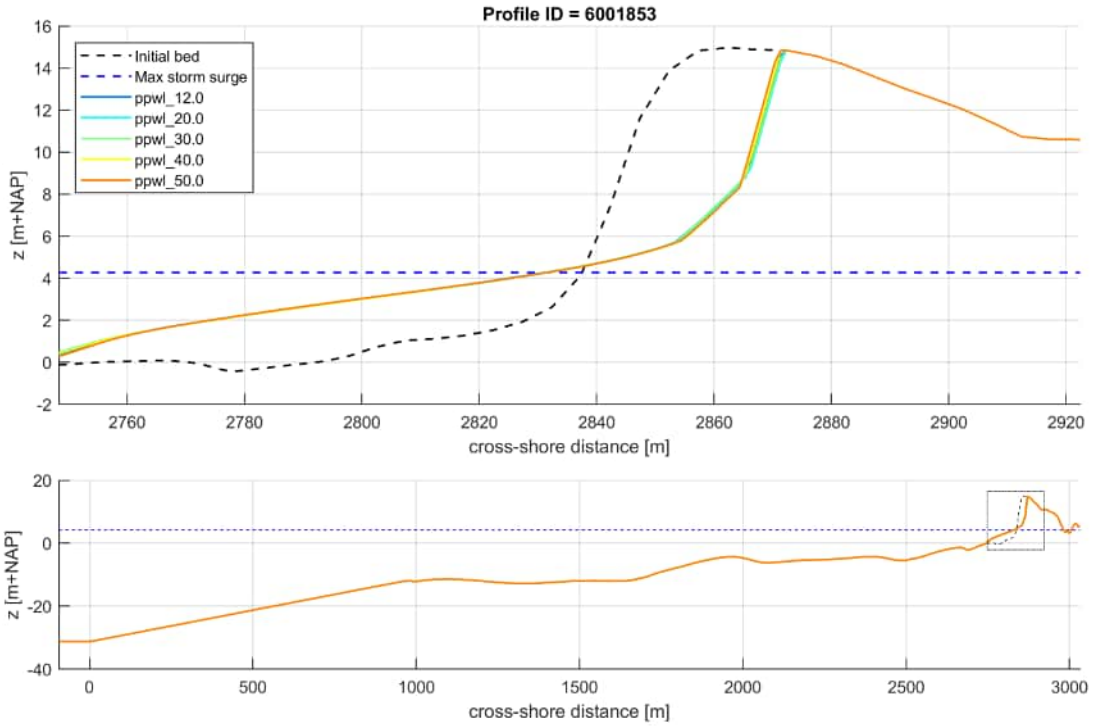

Figure 4.11: *XBeach results for profile 6001853. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

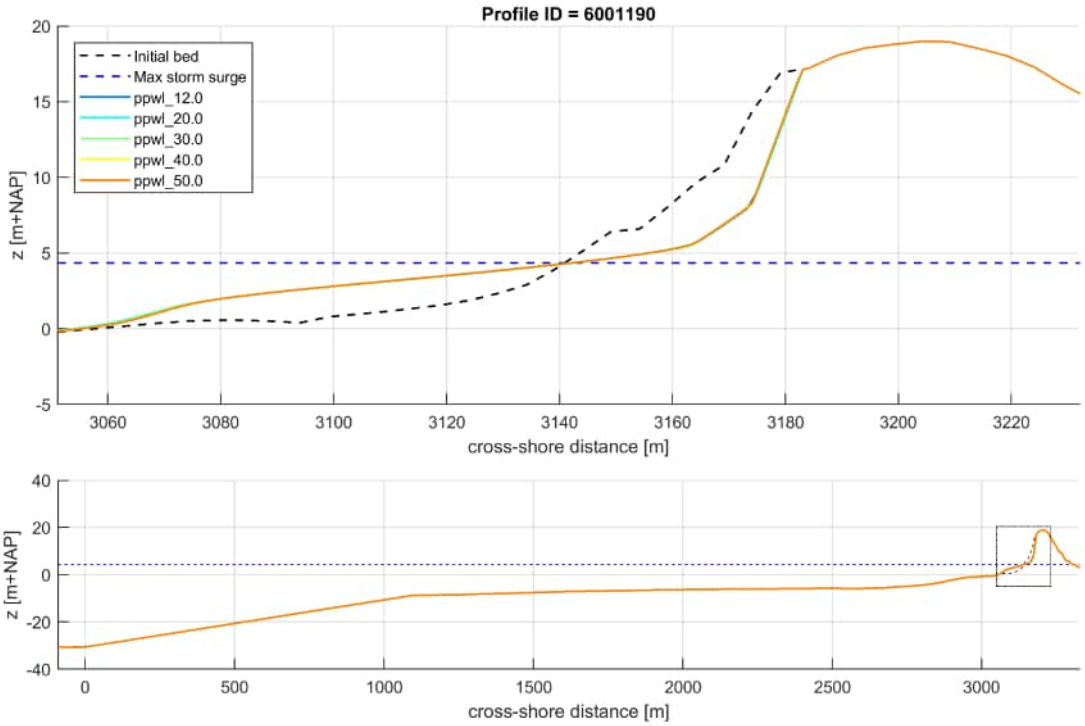

Figure 4.12: *XBeach results for profile 6001190. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

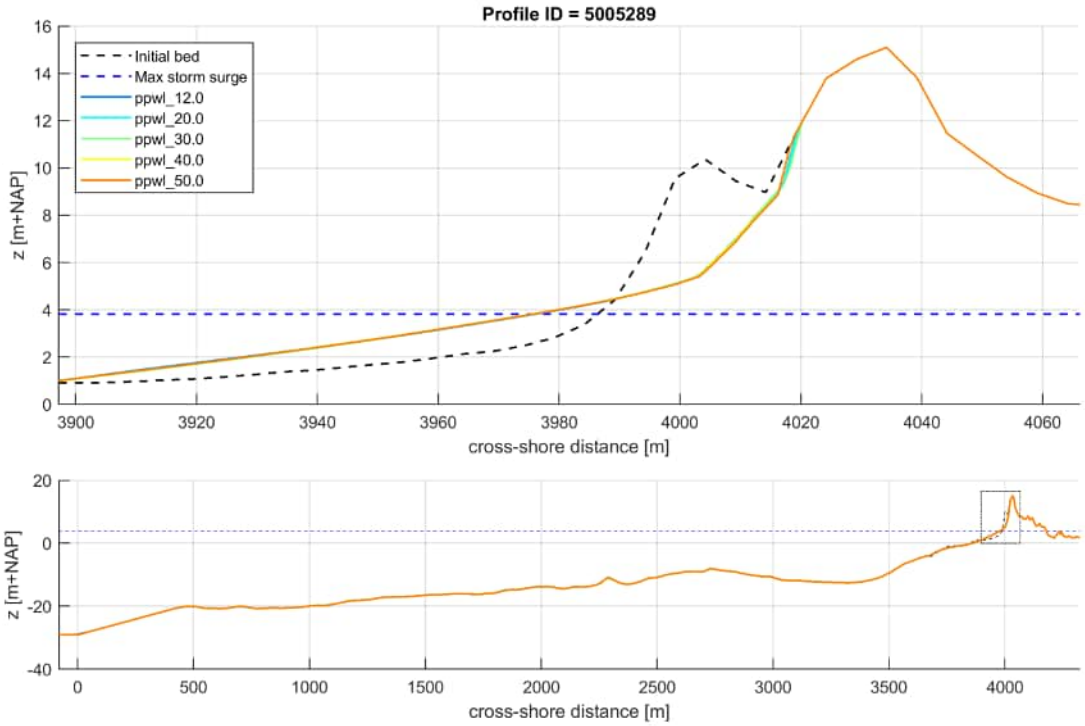

Figure 4.13: *XBeach results for profile 5005289. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

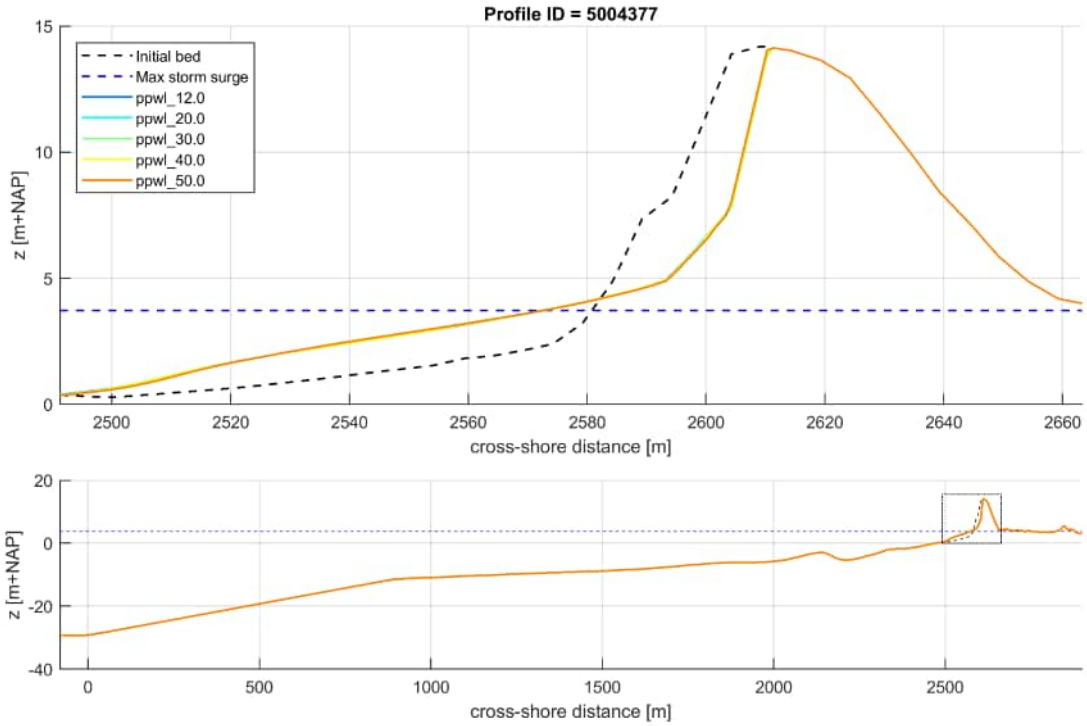

Figure 4.14: *XBeach results for profile 5004377. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

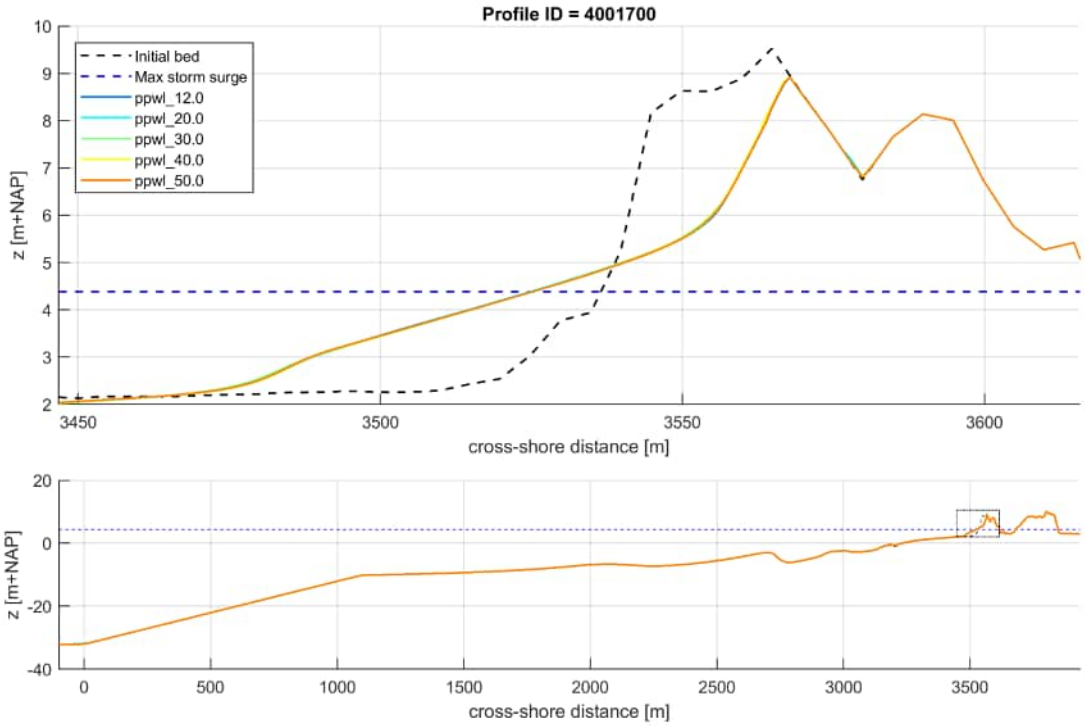

Figure 4.15: *XBeach results for profile 4001700. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

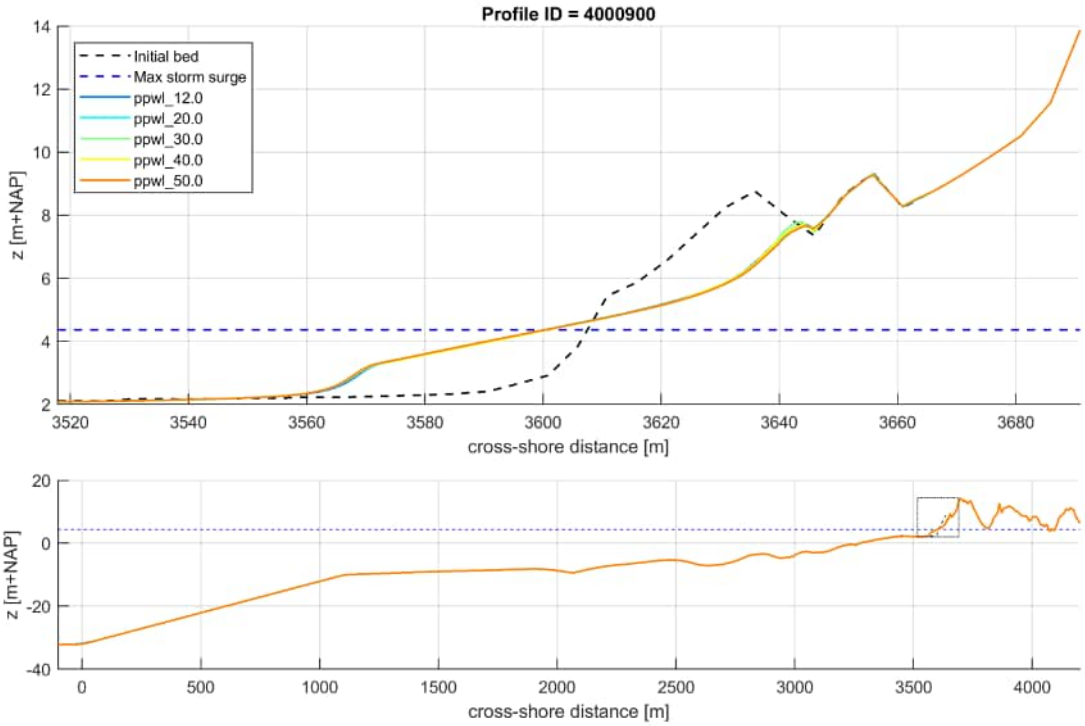

Figure 4.16: *XBeach results for profile 4000900. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

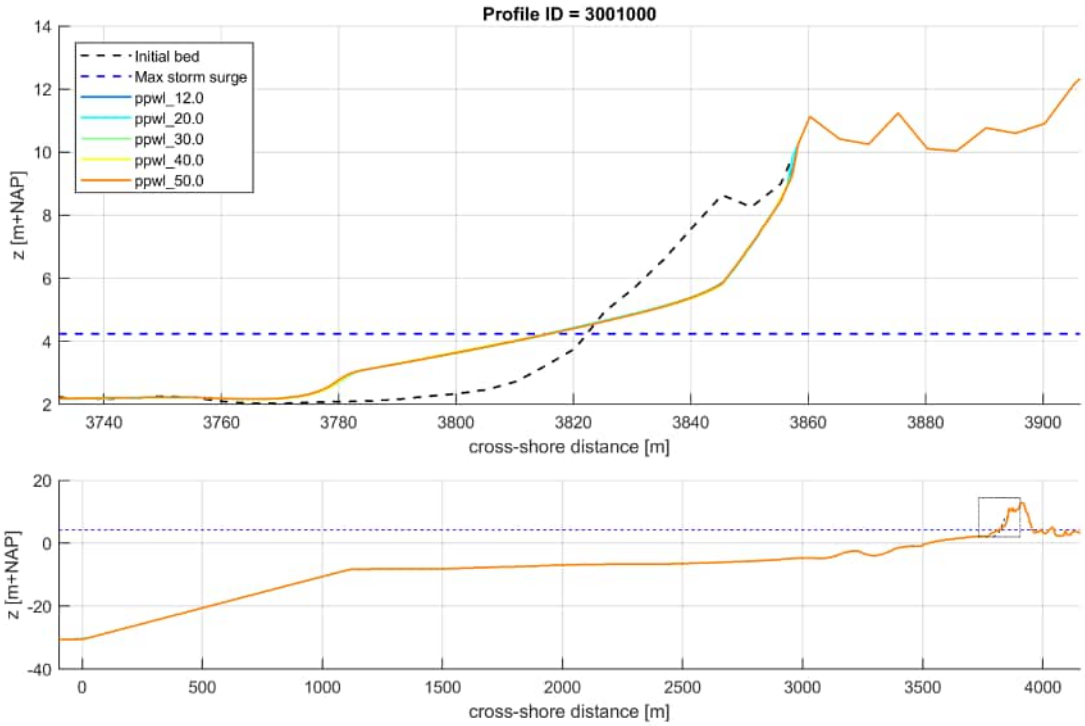

Figure 4.17: *XBeach results for profile 3001000. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

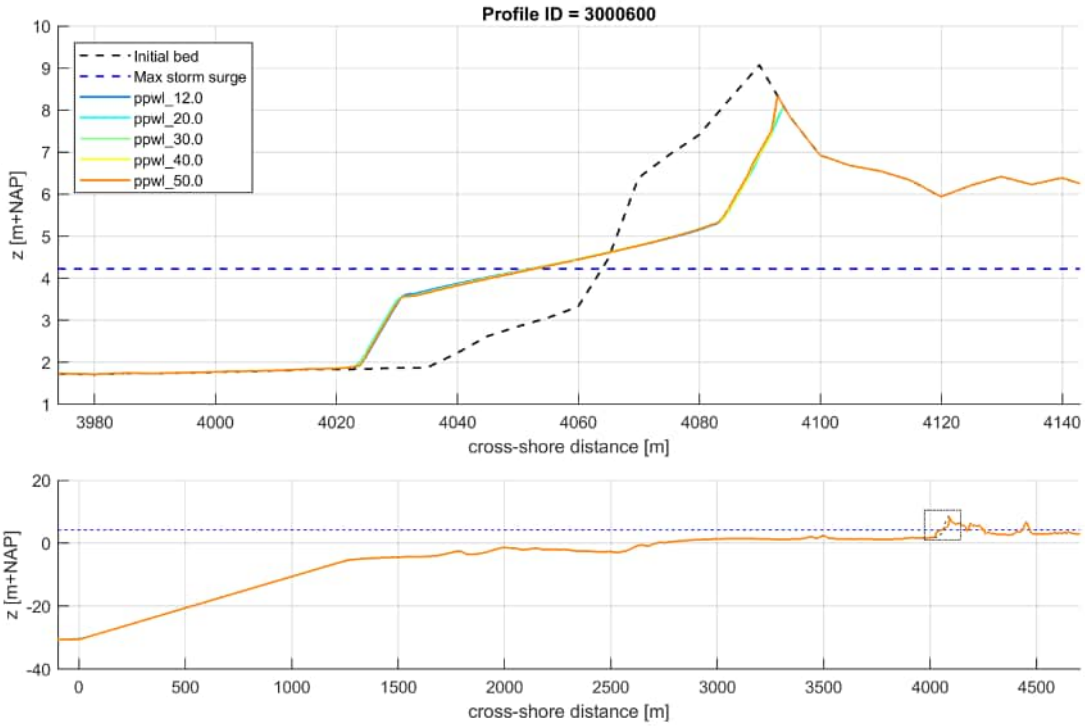

Figure 4.18: *XBeach results for profile 3000600. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

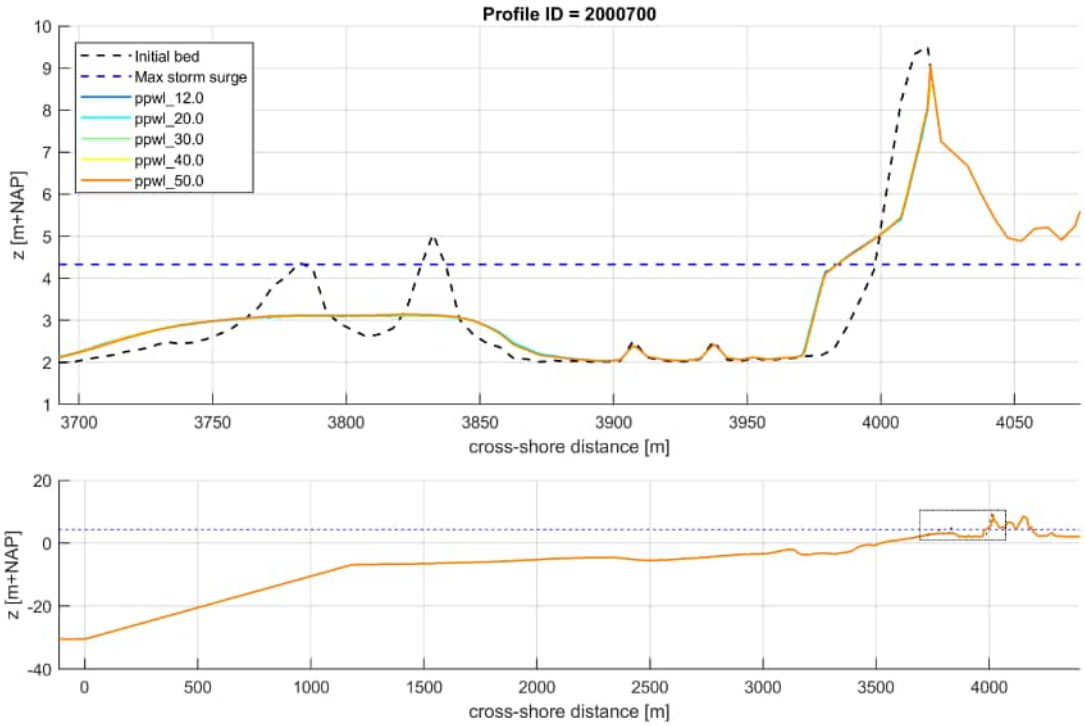

Figure 4.19: *XBeach results for profile 2000700. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

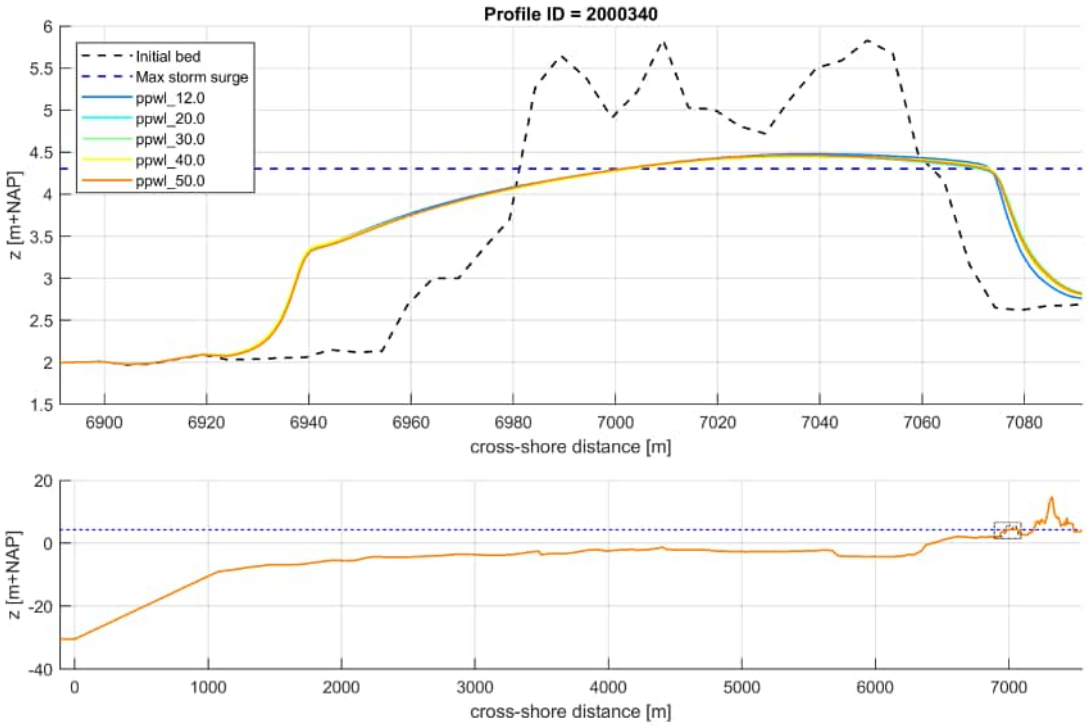

Figure 4.20: *XBeach results for profile 2000340. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

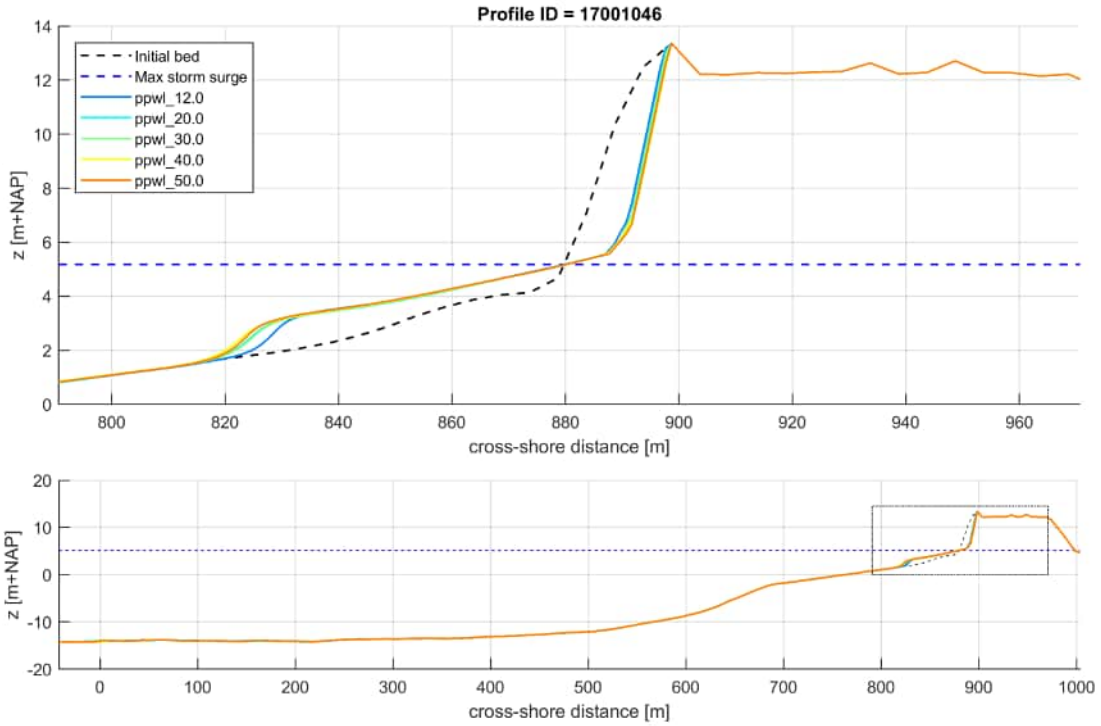

Figure 4.21: *XBeach results for profile 17001046. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

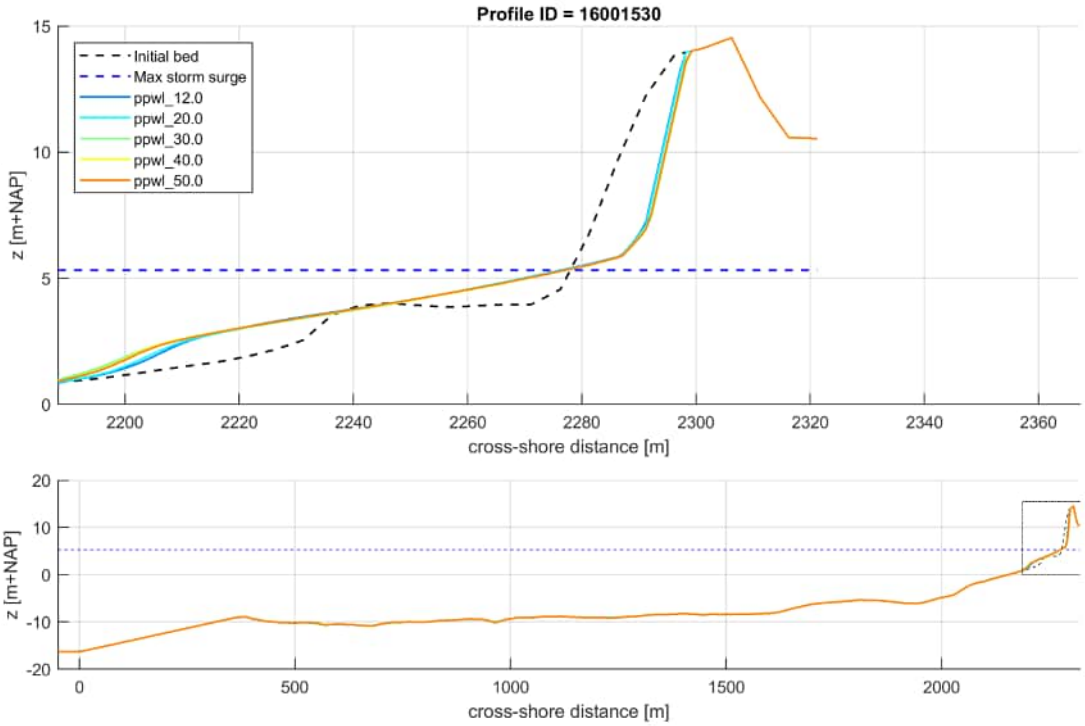

Figure 4.22: *XBeach results for profile 16001530. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

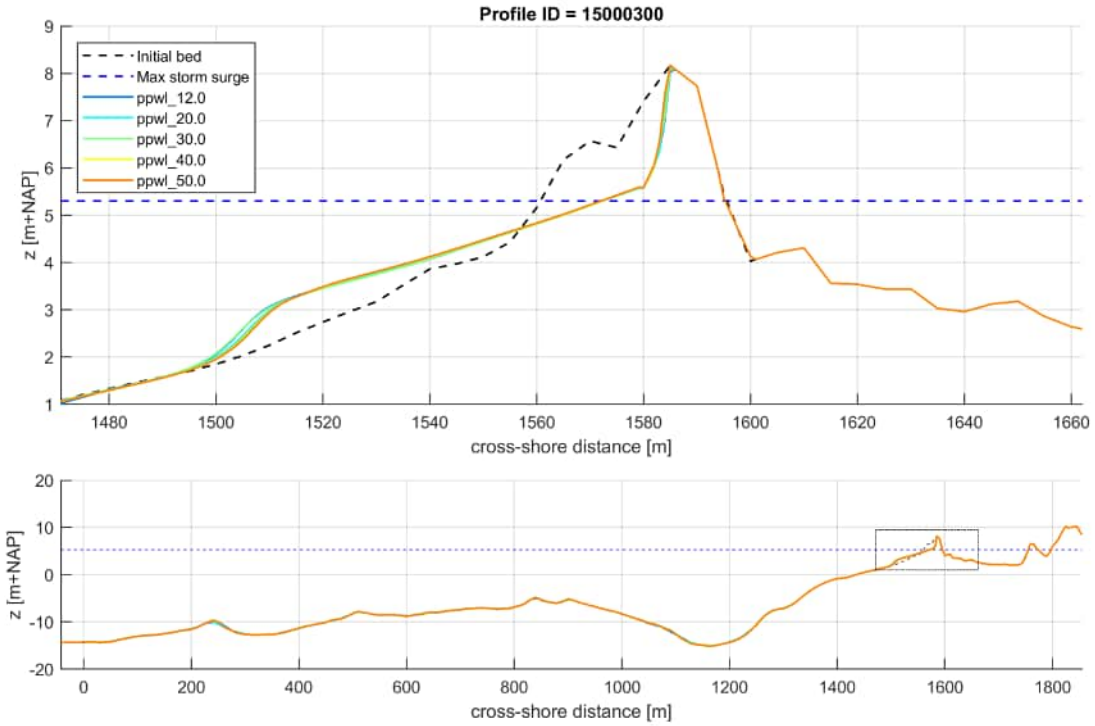

Figure 4.23: *XBeach results for profile 15000300. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

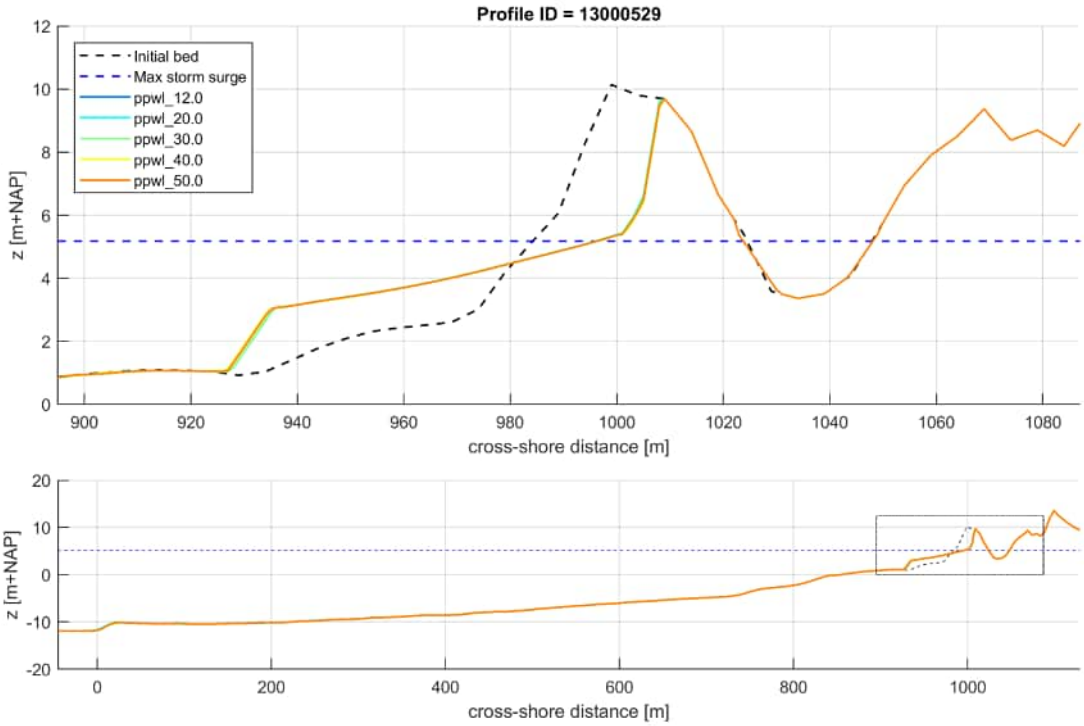

Figure 4.24: *XBeach results for profile 13000529. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

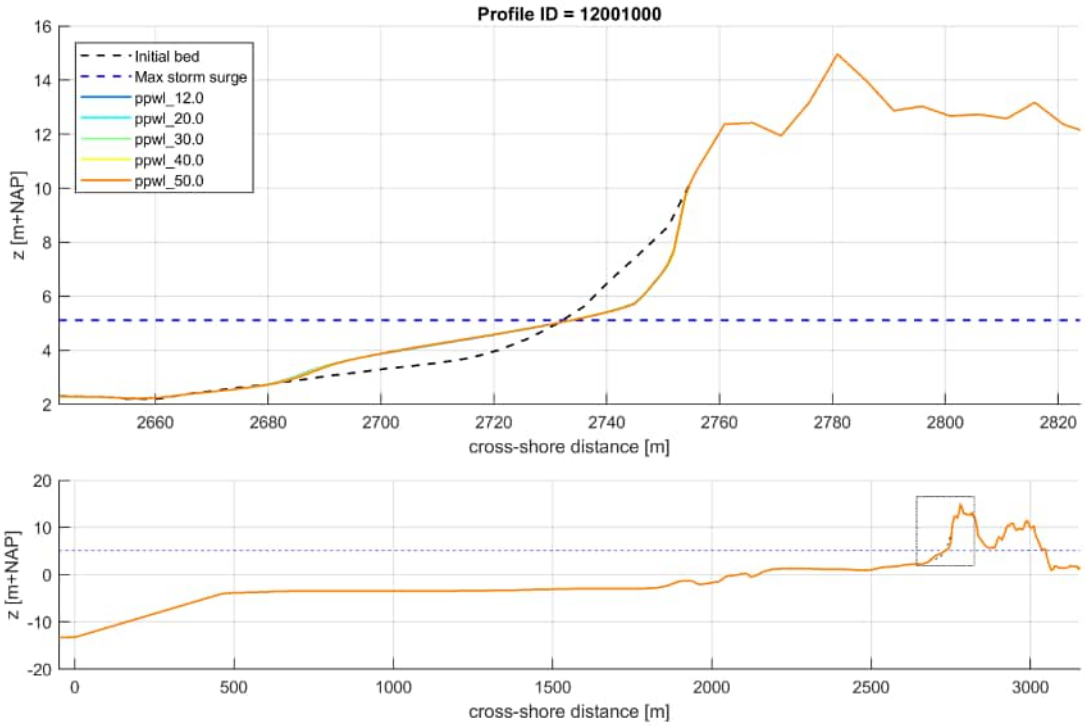

Figure 4.25: *XBeach results for profile 12001000. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

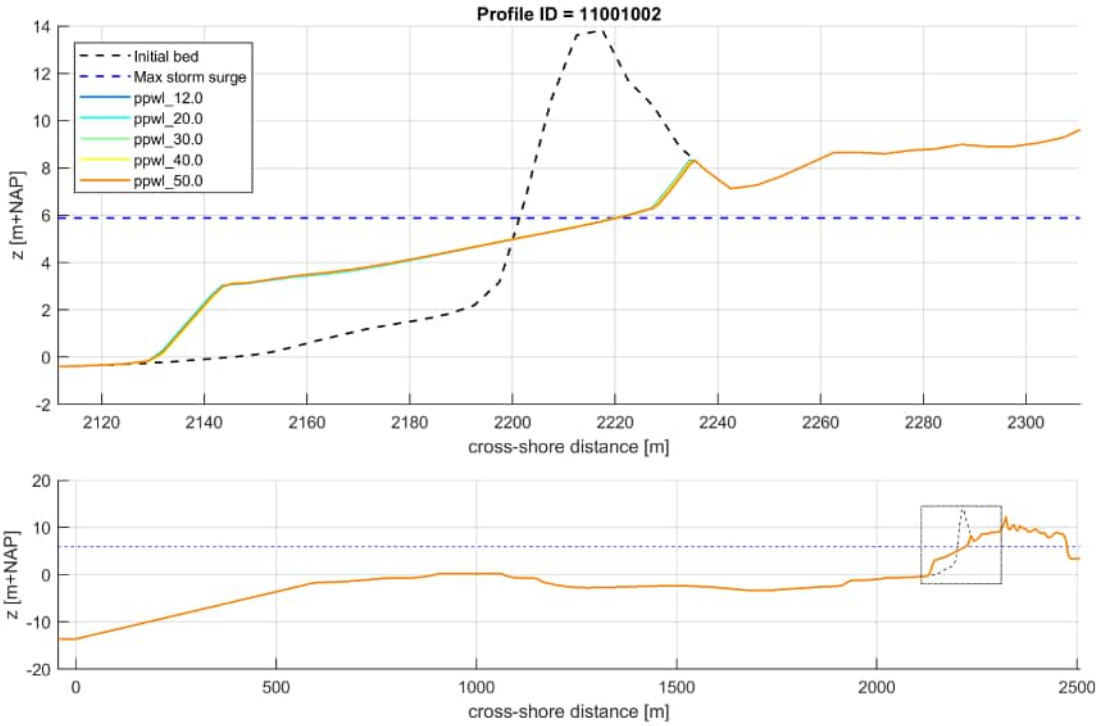

Figure 4.26: *XBeach results for profile 11001002. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

5 Time step: CFL

The following figures show the comparison of the erosion profiles for variations in the CFL condition with the base case.

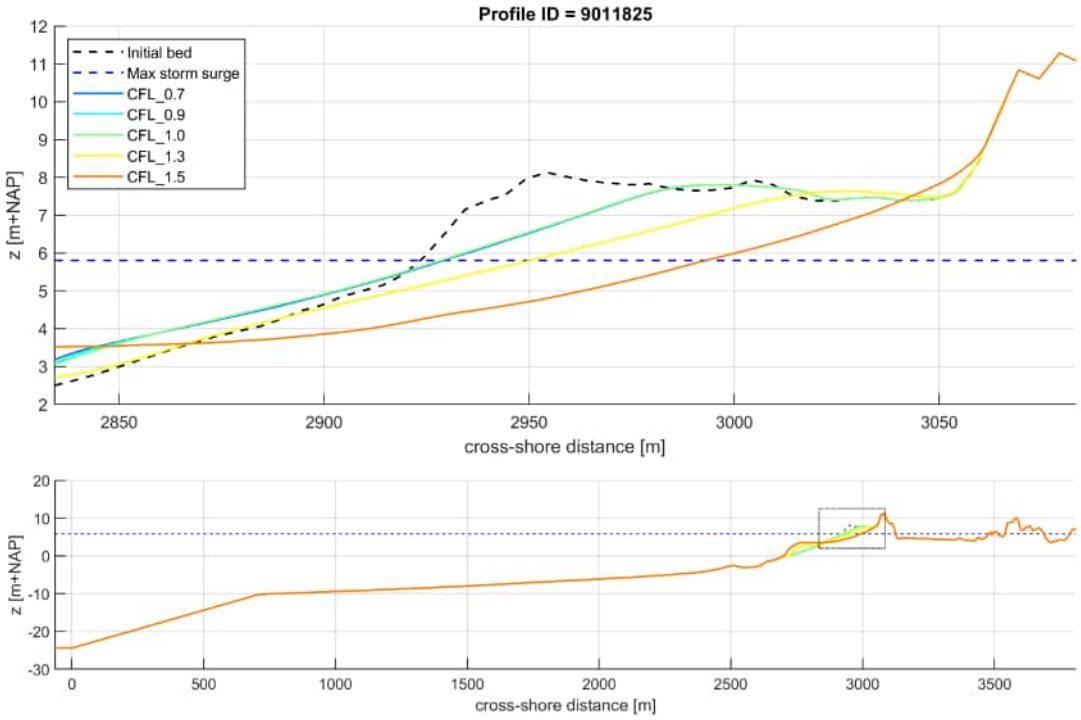

Figure 5.1: *XBeach results for profile 9011825. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

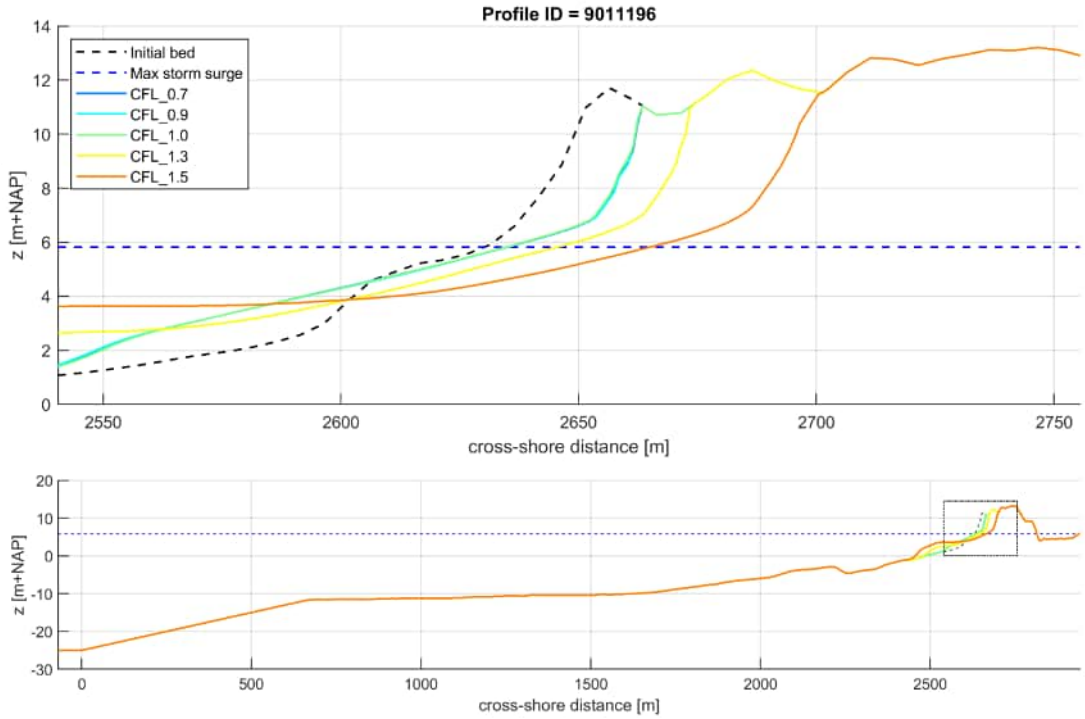

Figure 5.2: *XBeach results for profile 9011196. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

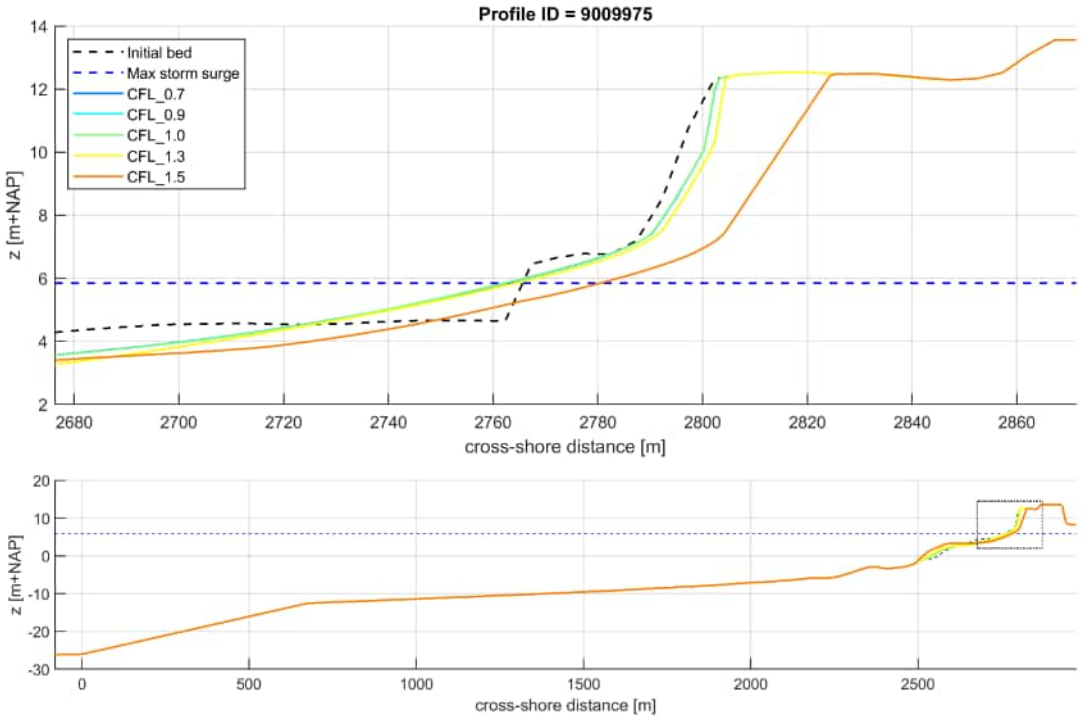

Figure 5.3: *XBeach results for profile 9009975. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

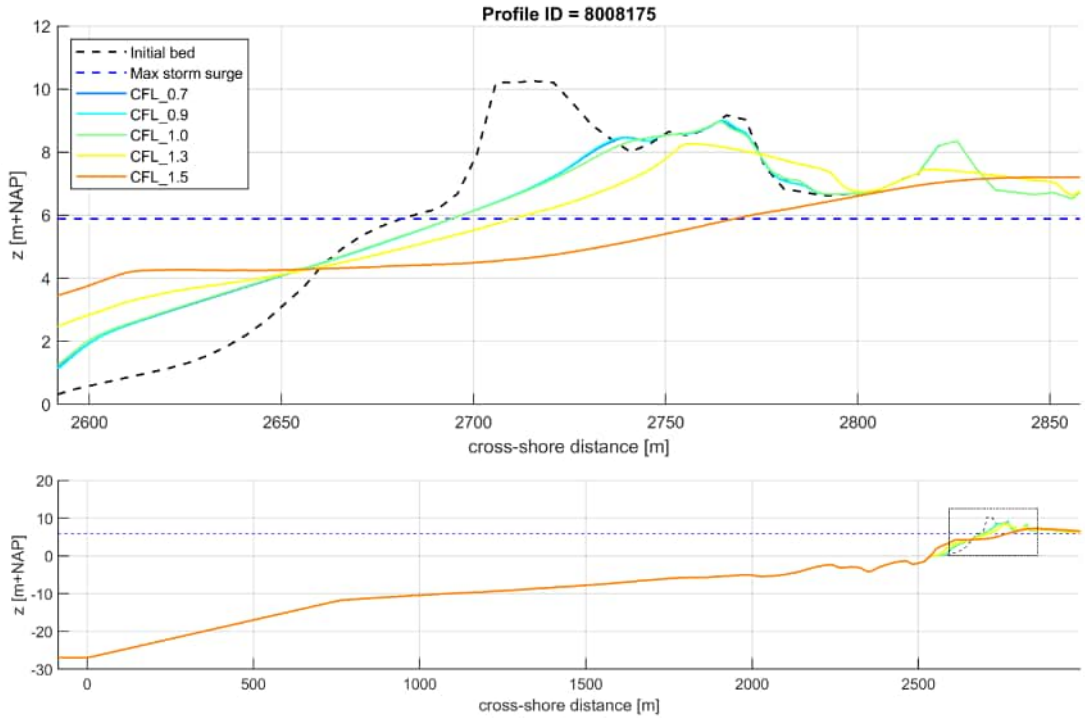

Figure 5.4: *XBeach results for profile 8008175. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

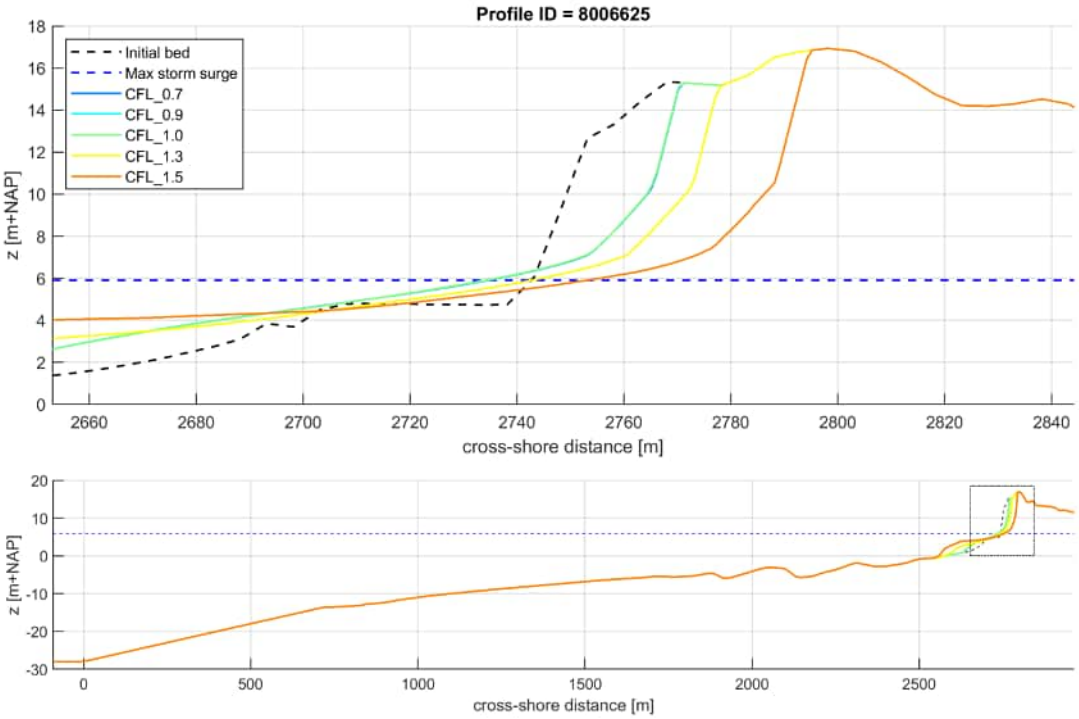

Figure 5.5: *XBeach results for profile 8006625. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

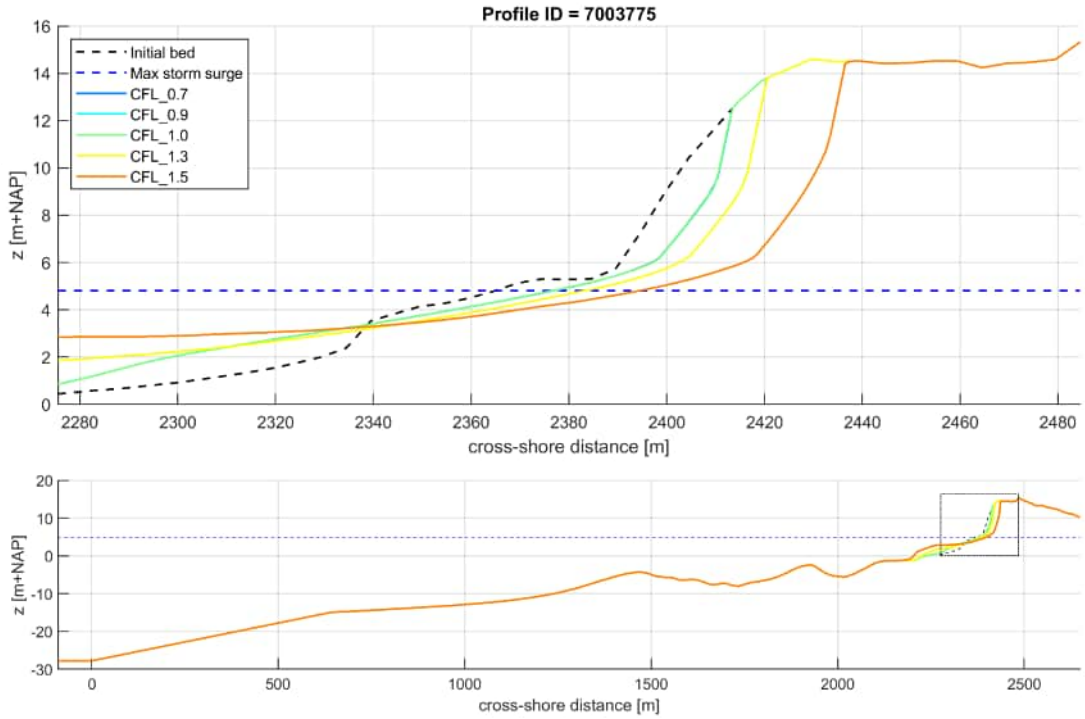

Figure 5.6: *XBeach results for profile 7003775. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

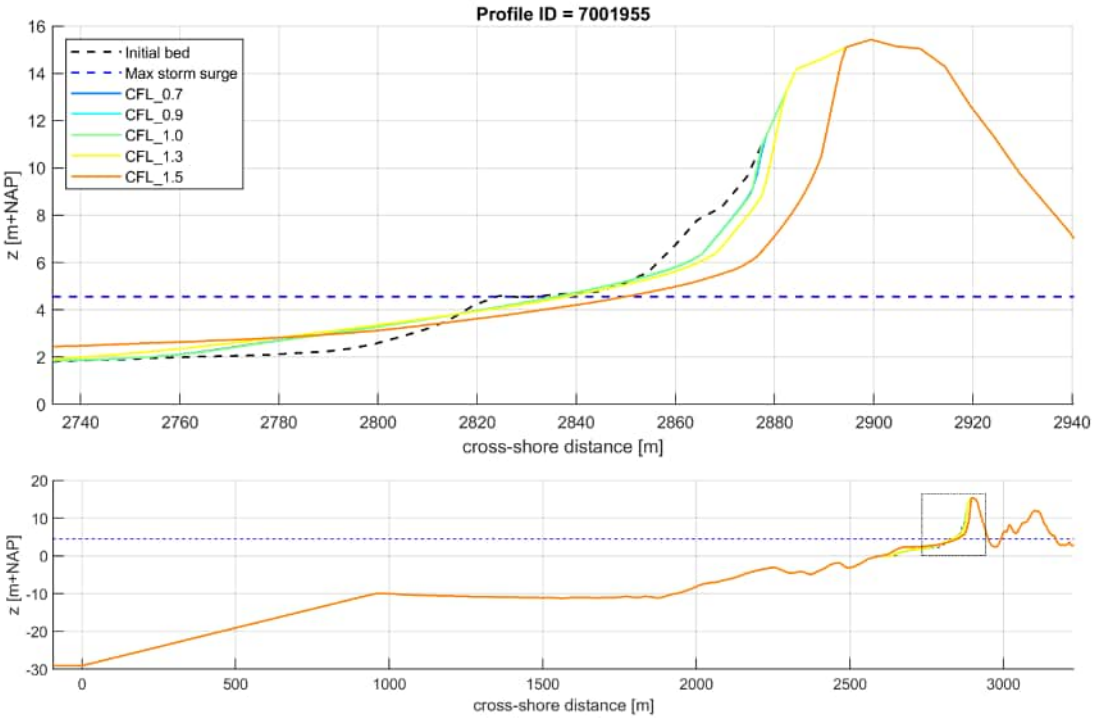

Figure 5.7: *XBeach results for profile 7001955. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

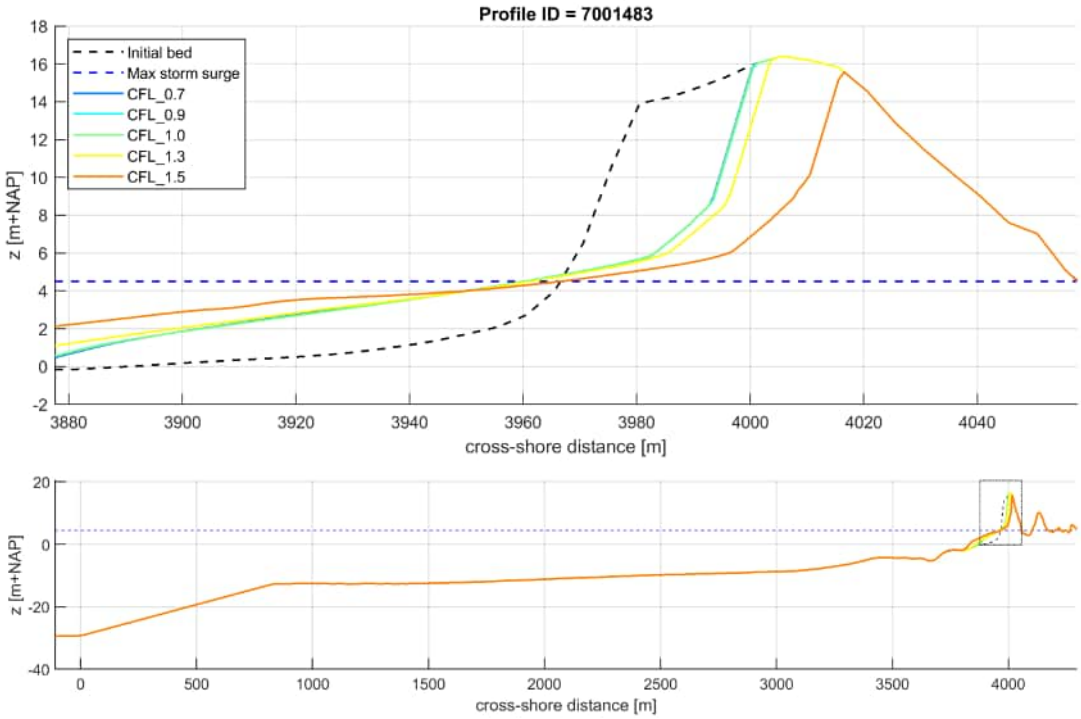

Figure 5.8: *XBeach results for profile 7001483. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

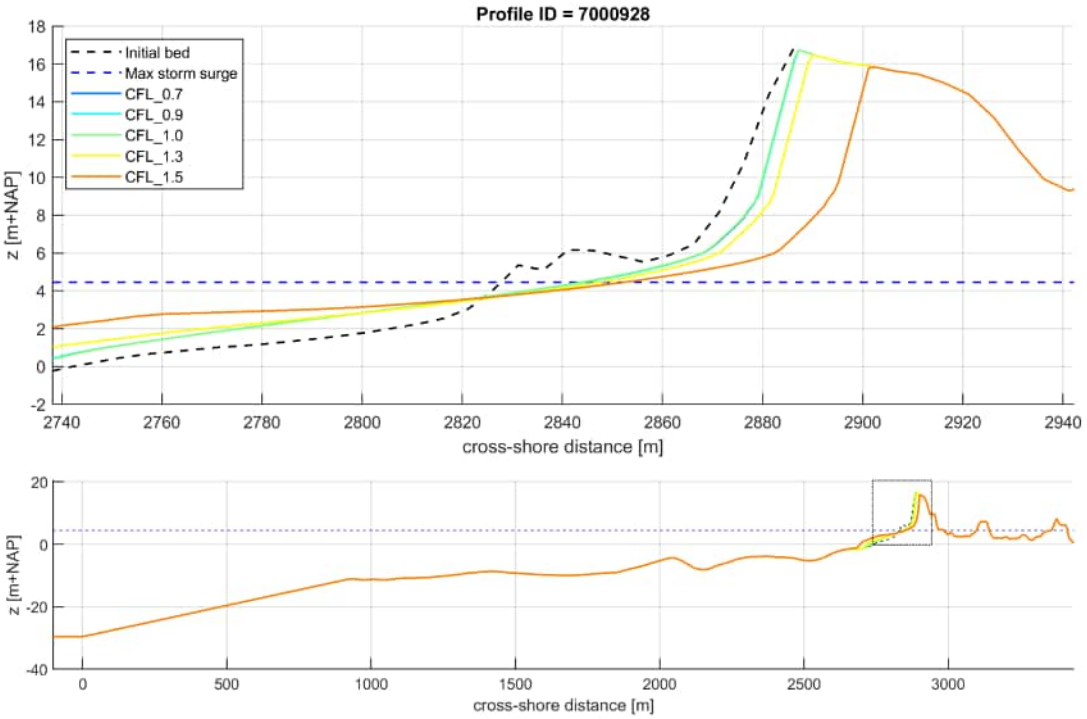

Figure 5.9: *XBeach results for profile 7000928. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

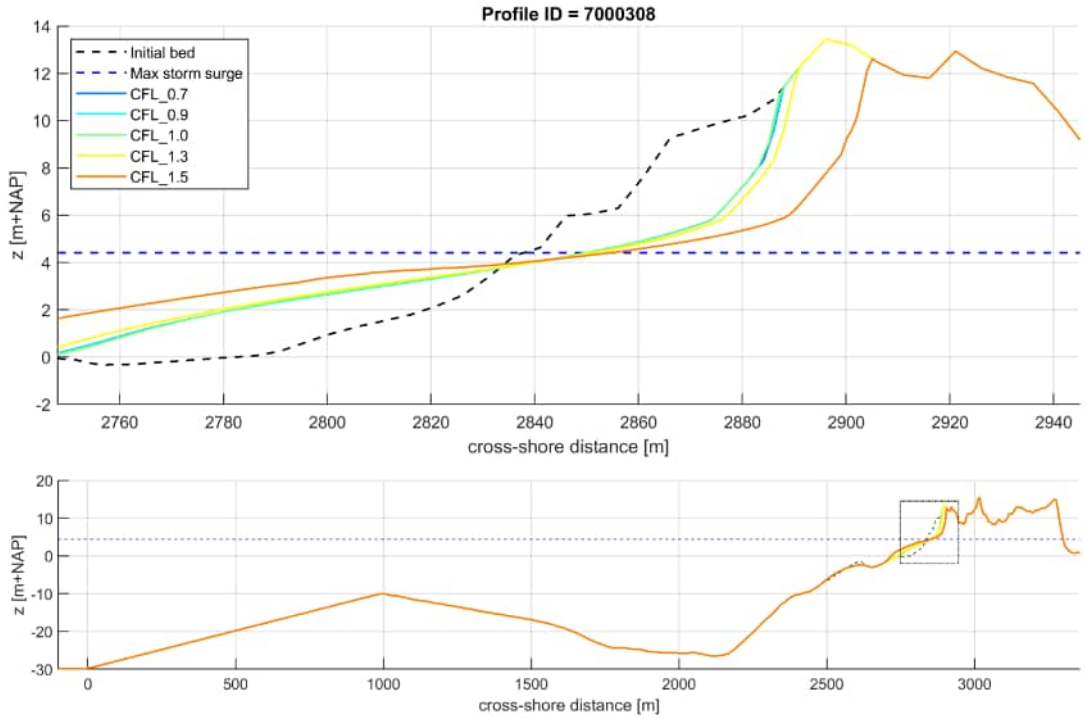

Figure 5.10: *XBeach results for profile 7000308. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

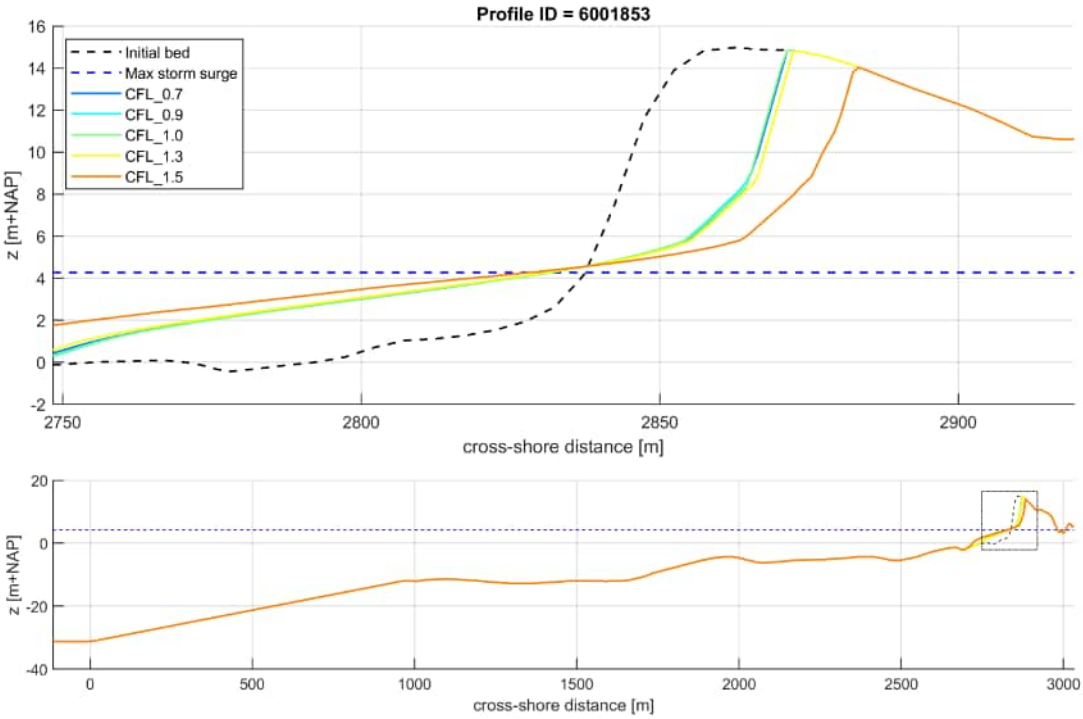

Figure 5.11: *XBeach results for profile 6001853. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

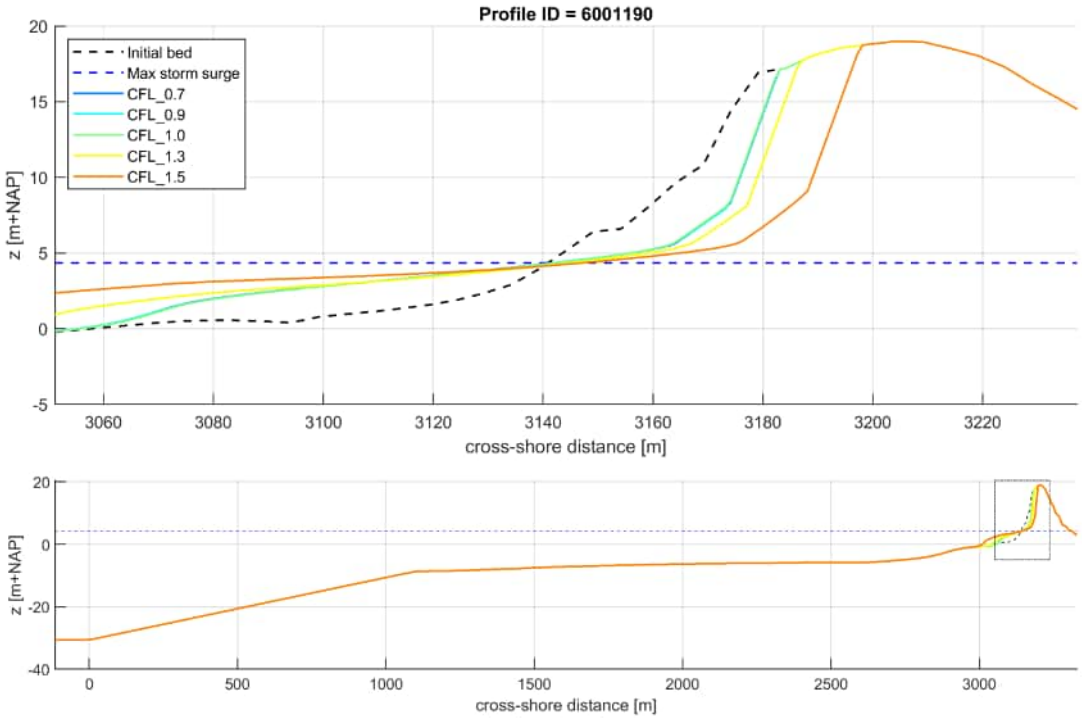

Figure 5.12: *XBeach results for profile 6001190. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

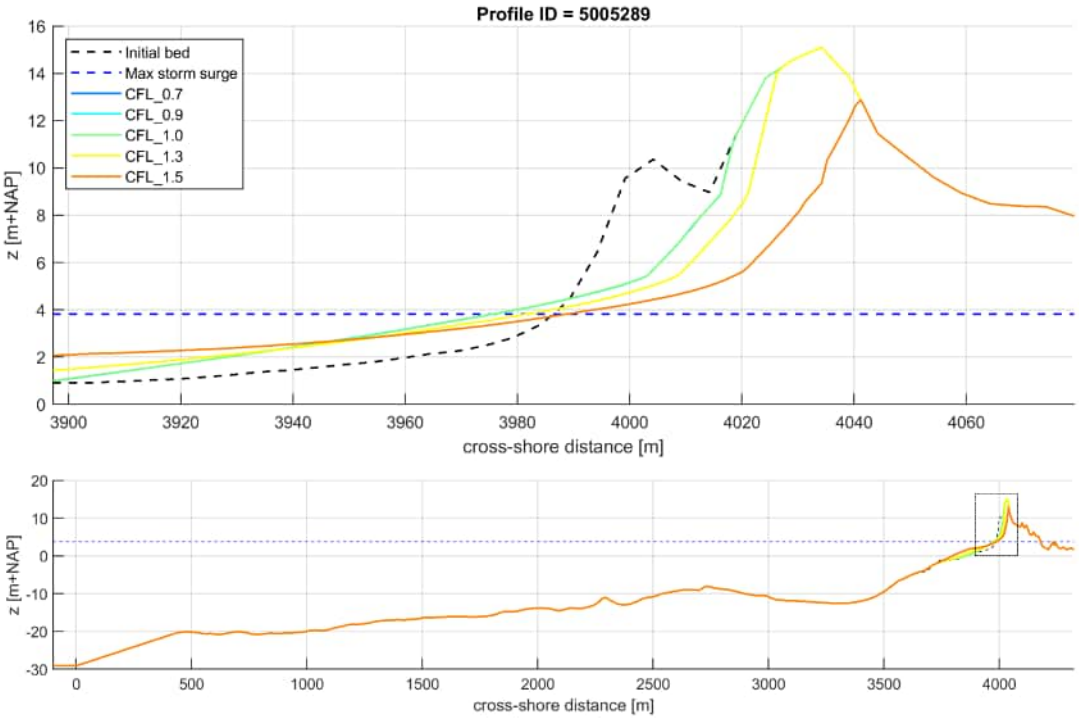

Figure 5.13: *XBeach results for profile 5005289. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

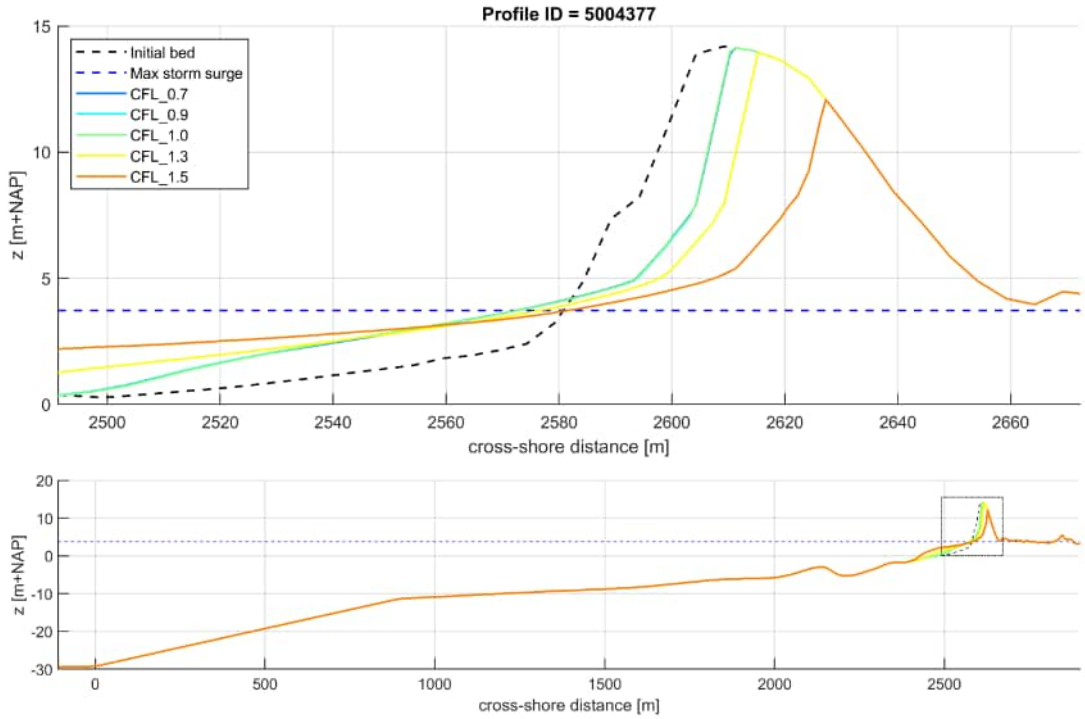

Figure 5.14: *XBeach results for profile 5004377. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

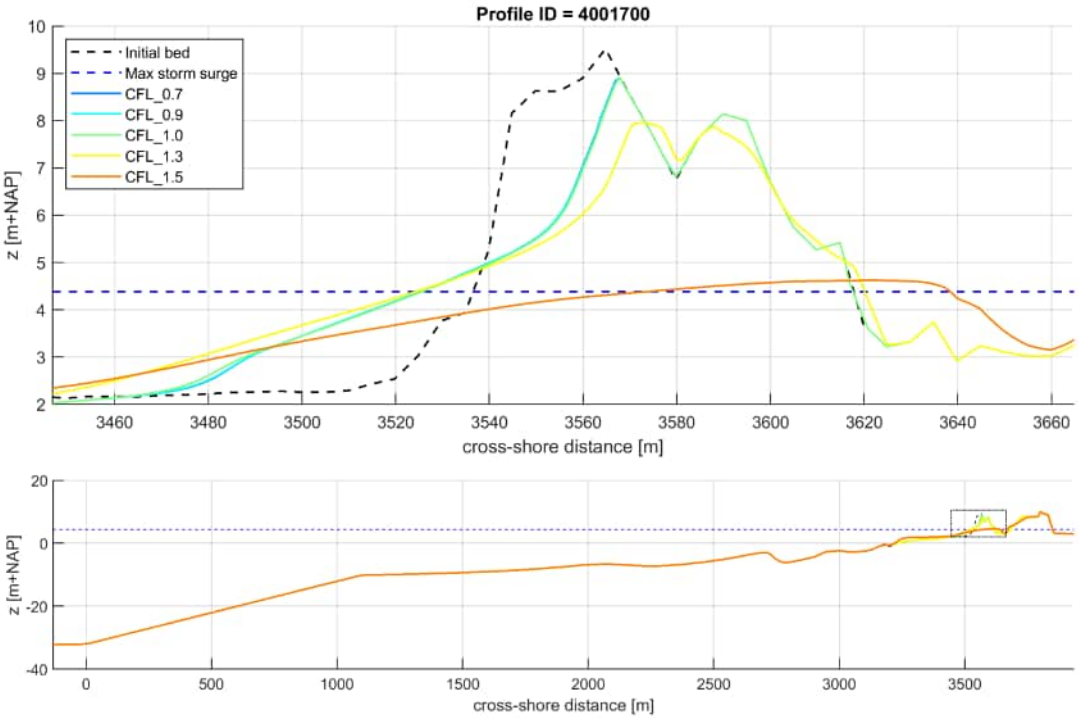

Figure 5.15: *XBeach results for profile 4001700. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

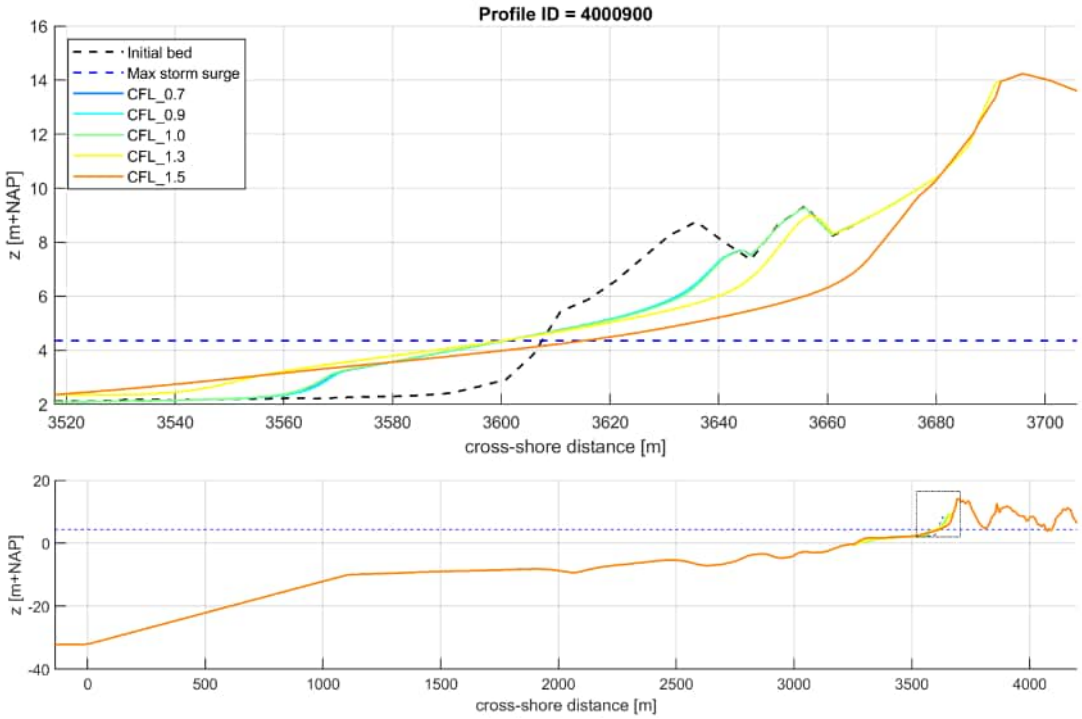

Figure 5.16: *XBeach results for profile 4000900. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

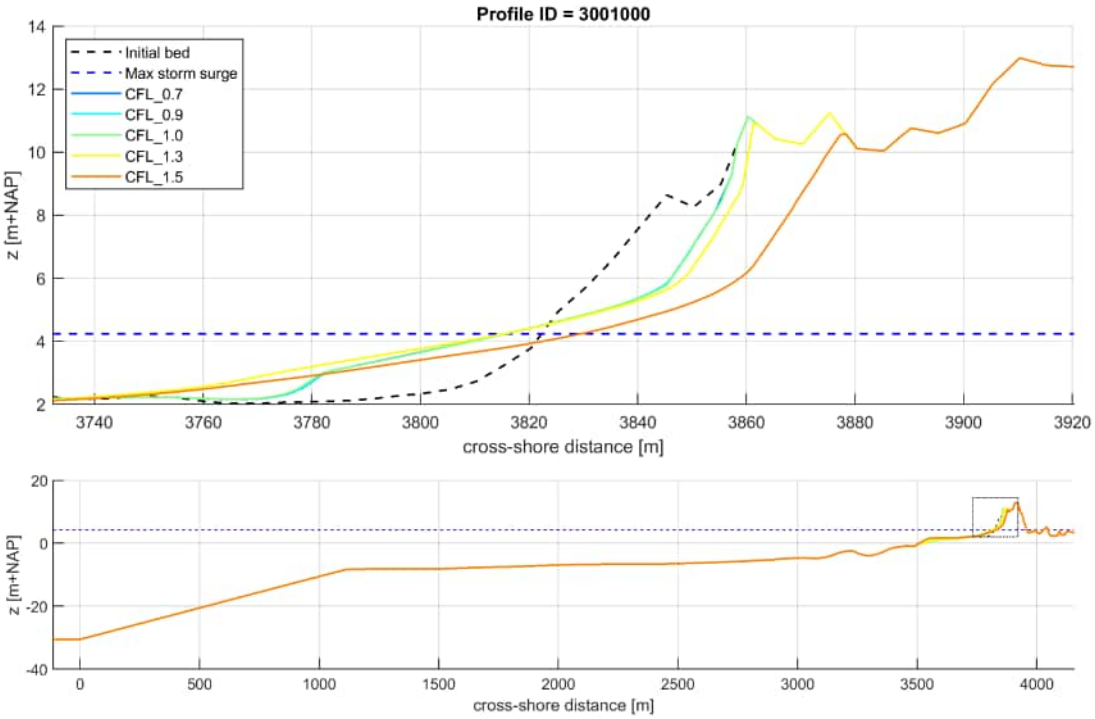

Figure 5.17: *XBeach results for profile 3001000. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

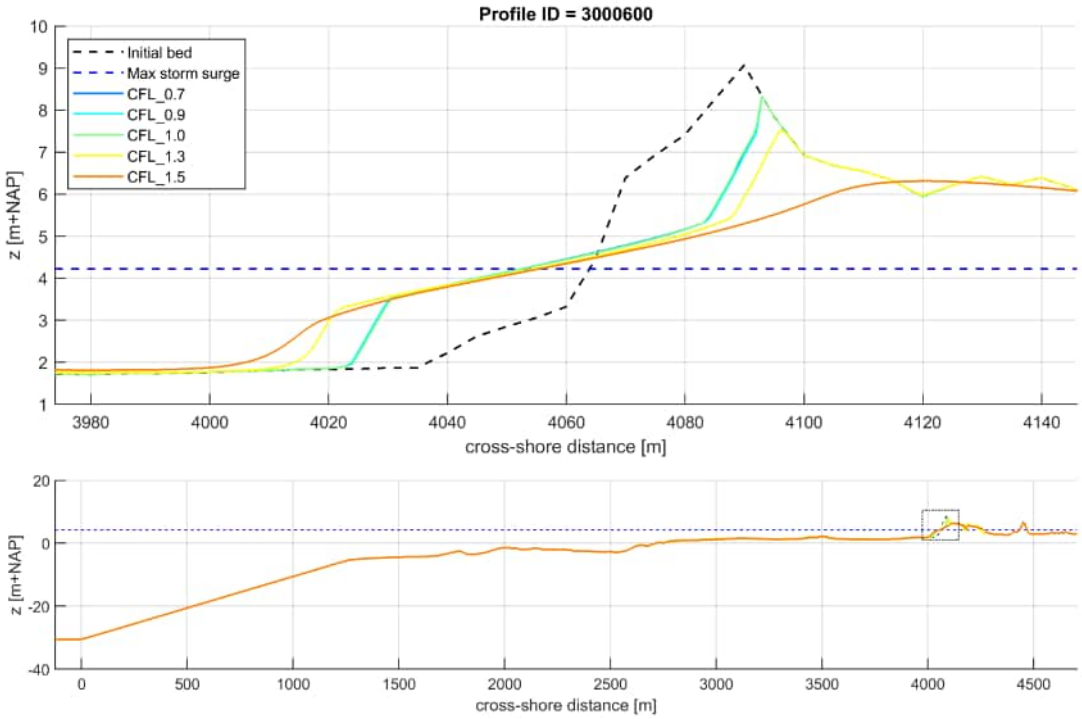

Figure 5.18: *XBeach results for profile 3000600. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

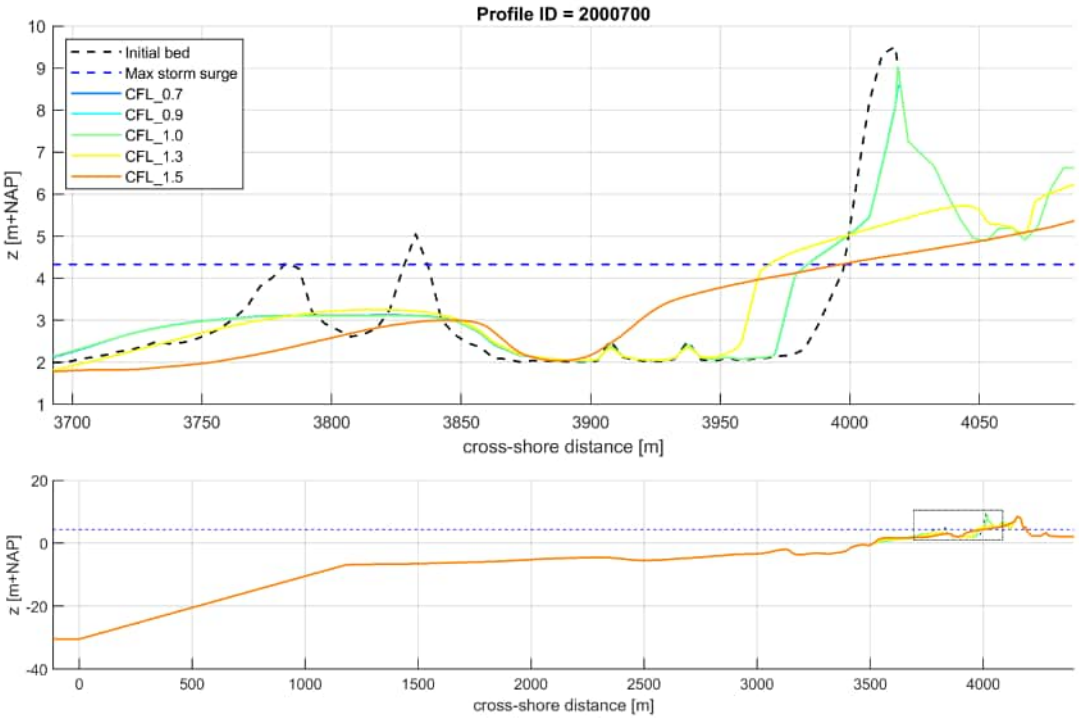

Figure 5.19: *XBeach results for profile 2000700. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

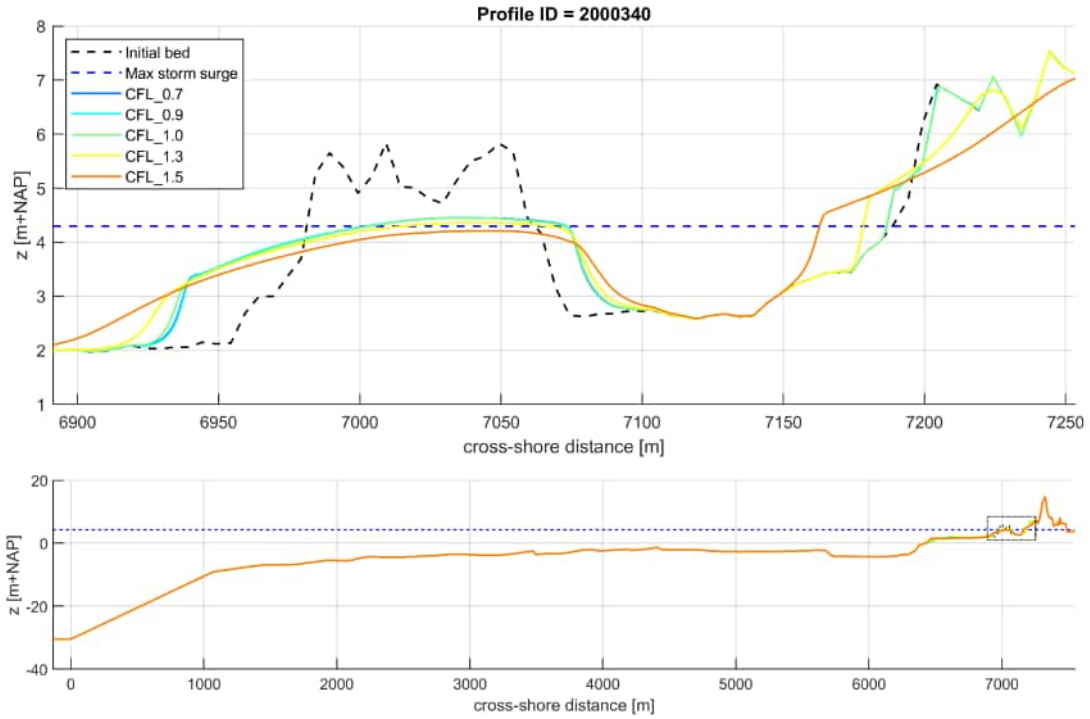

Figure 5.20: *XBeach results for profile 2000340. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

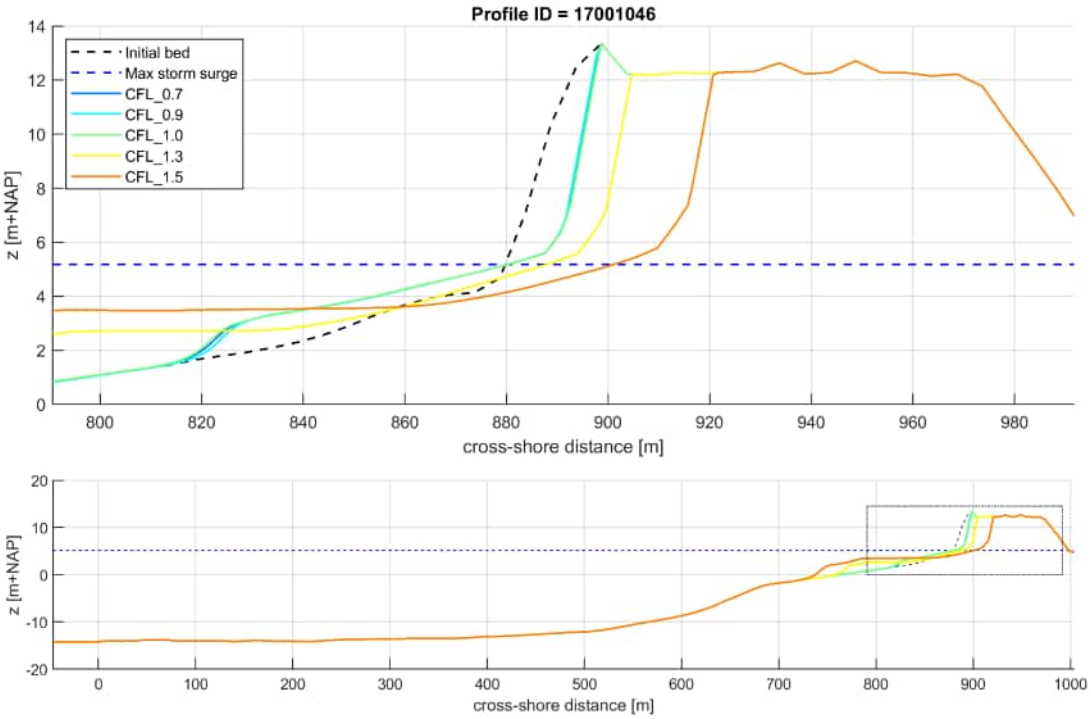

Figure 5.21: *XBeach results for profile 17001046. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

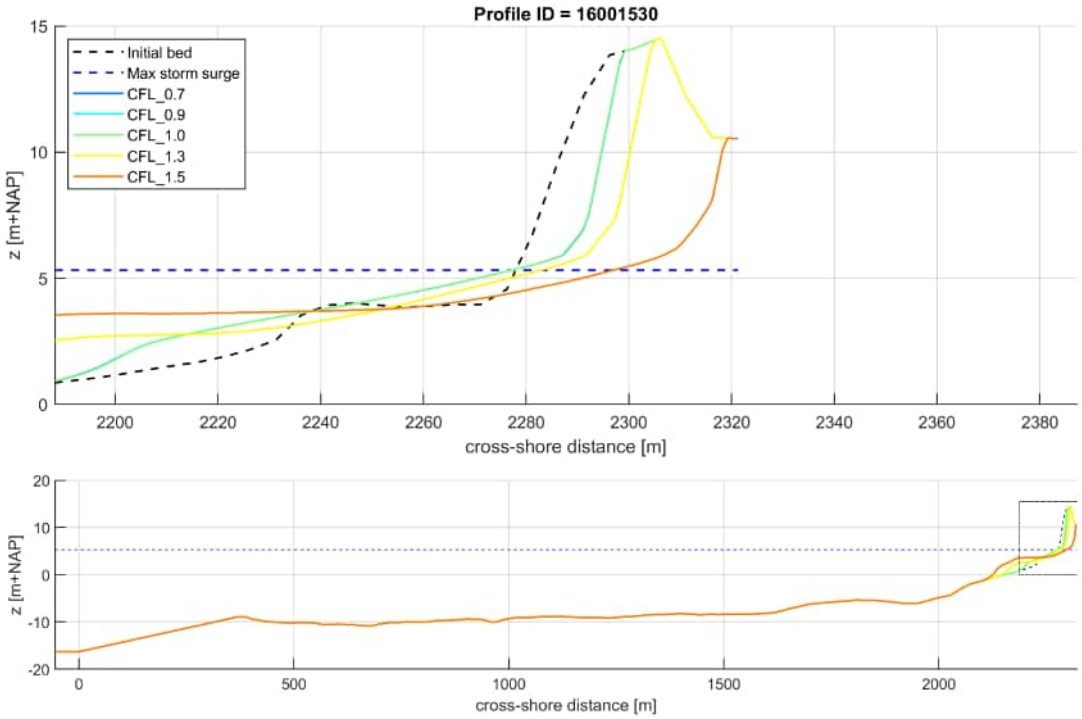

Figure 5.22: *XBeach results for profile 16001530. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

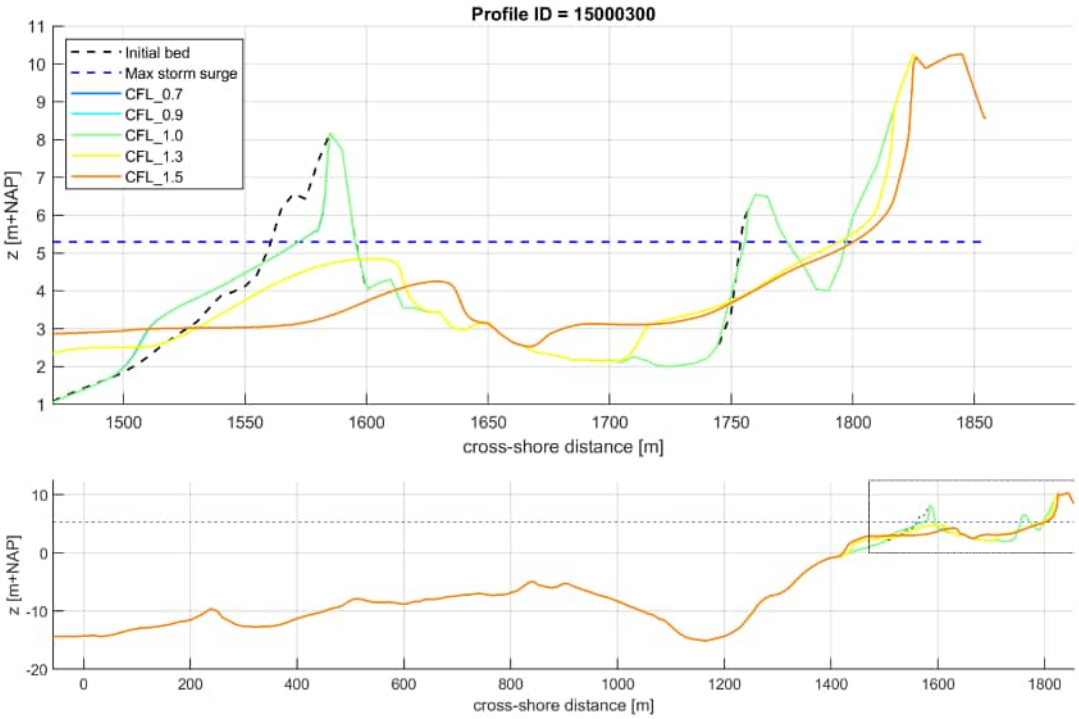

Figure 5.23: *XBeach results for profile 15000300. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

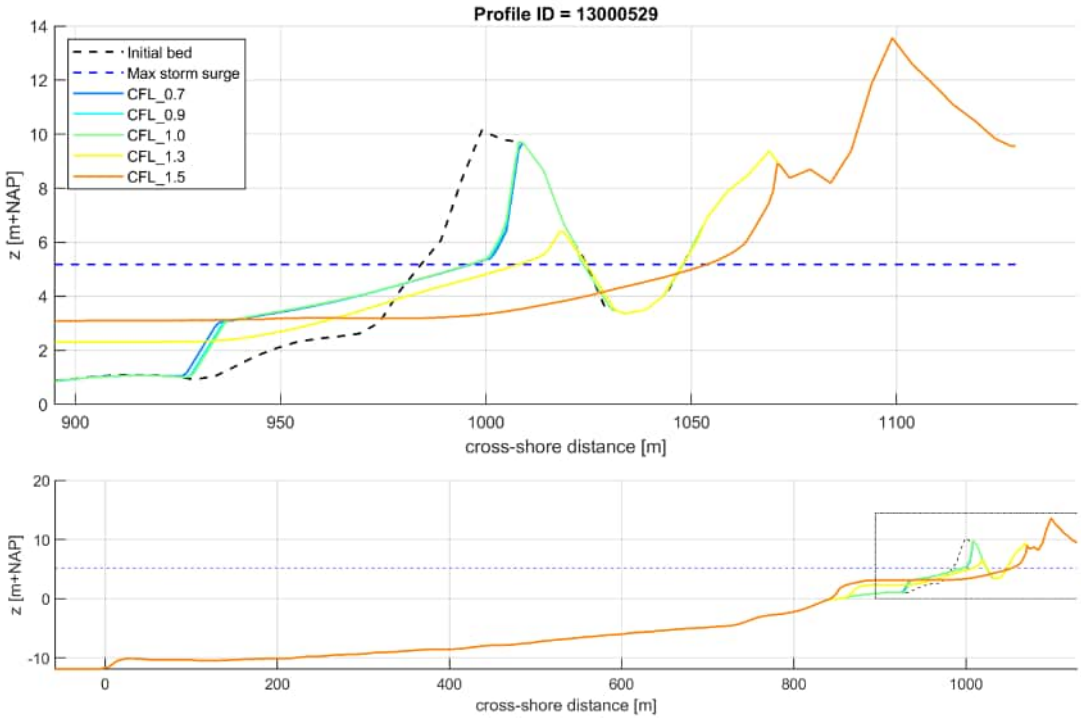

Figure 5.24: *XBeach results for profile 13000529. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

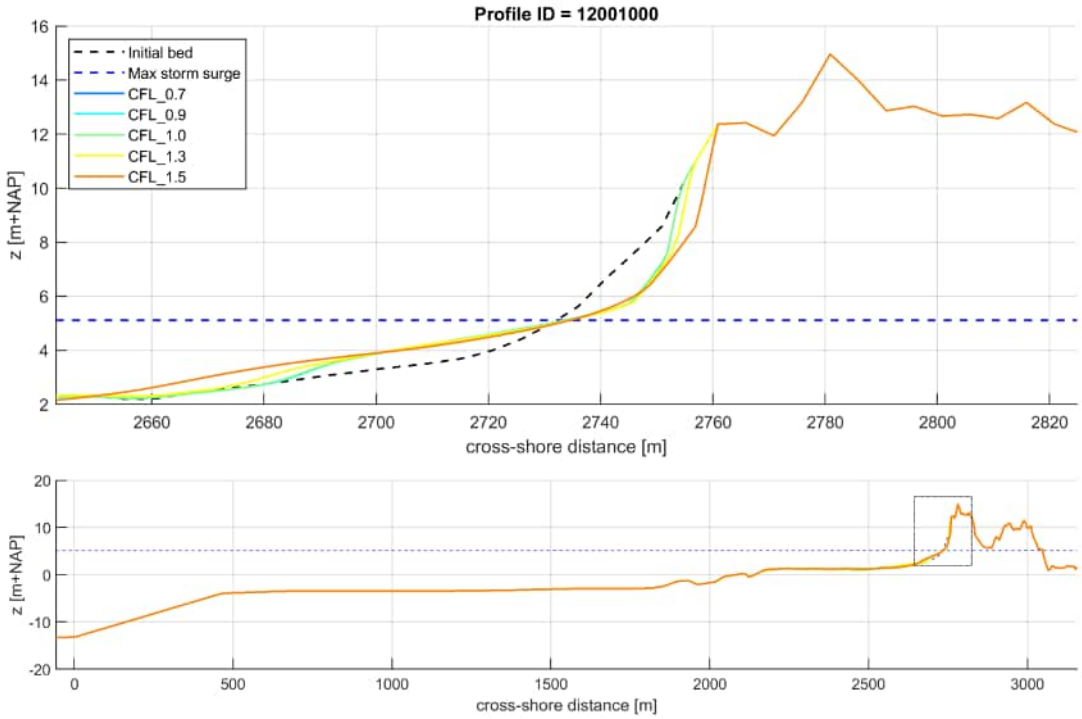

Figure 5.25: *XBeach results for profile 12001000. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

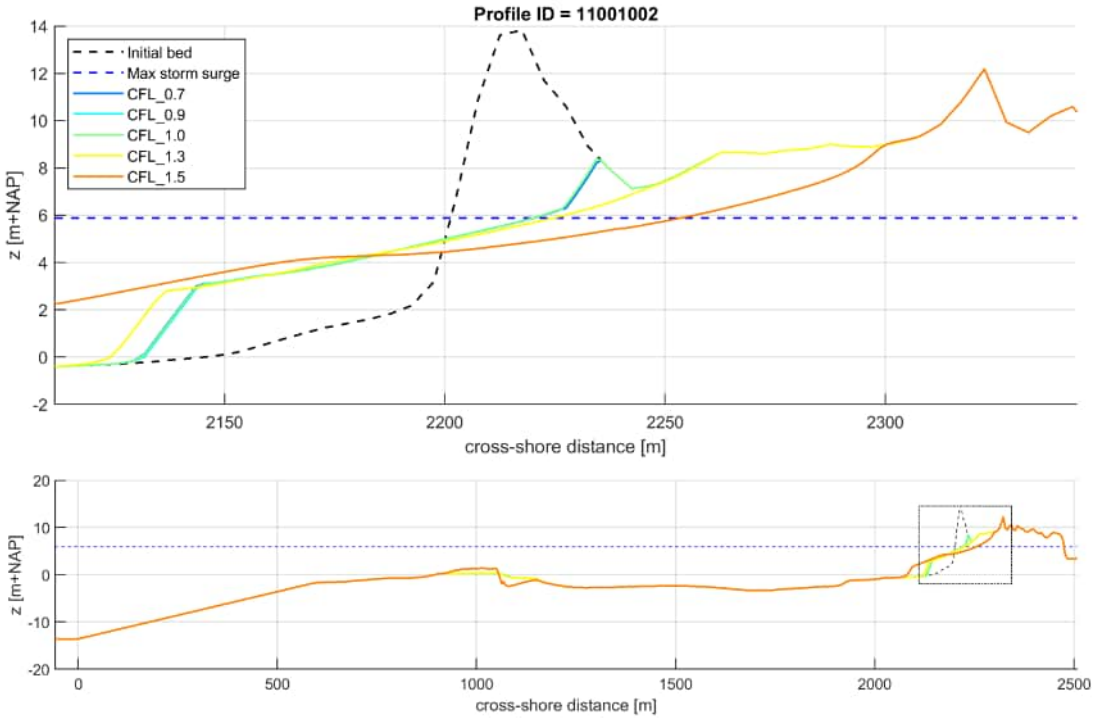

Figure 5.26: *XBeach results for profile 11001002. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

6 Combined reduction

The following figures show the comparison of the erosion profiles for the combined effect of the grid resolution, CFL condition and the morfac parameter with the base case.

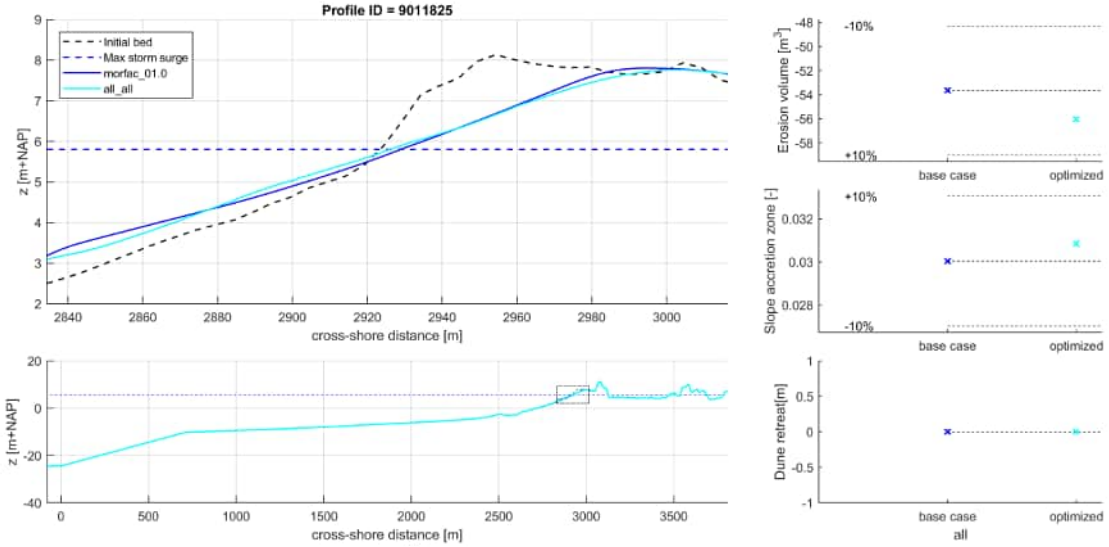

Figure 6.1: *XBeach results for profile 9011825. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

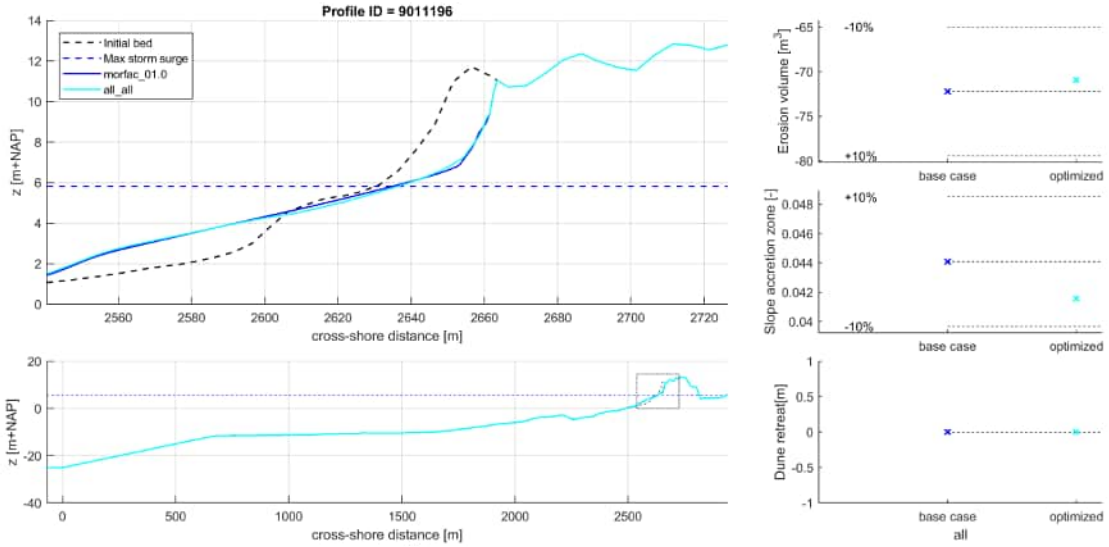

Figure 6.2: *XBeach results for profile 9011196. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

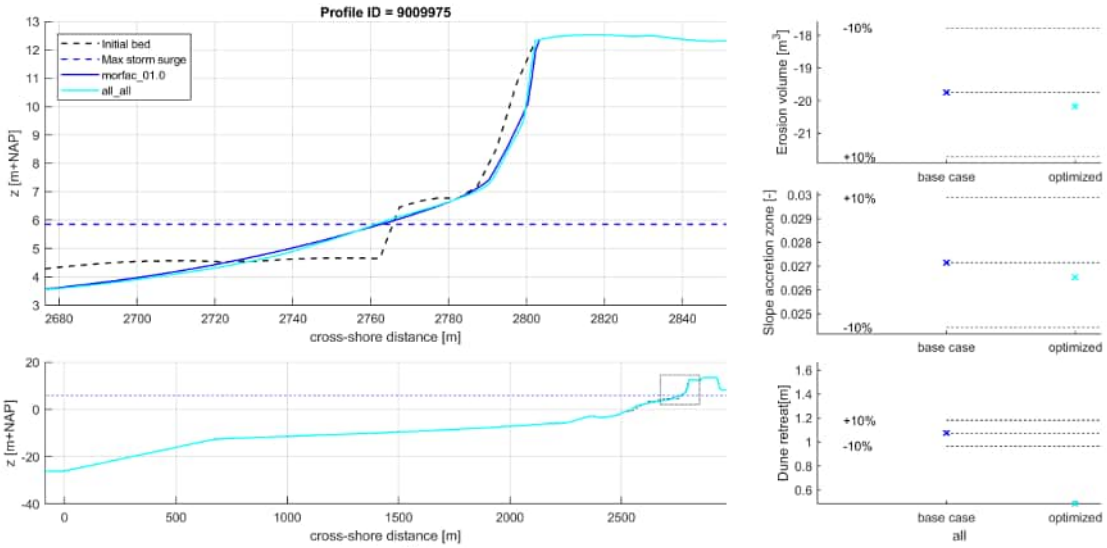

Figure 6.3: *XBeach results for profile 9009975. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

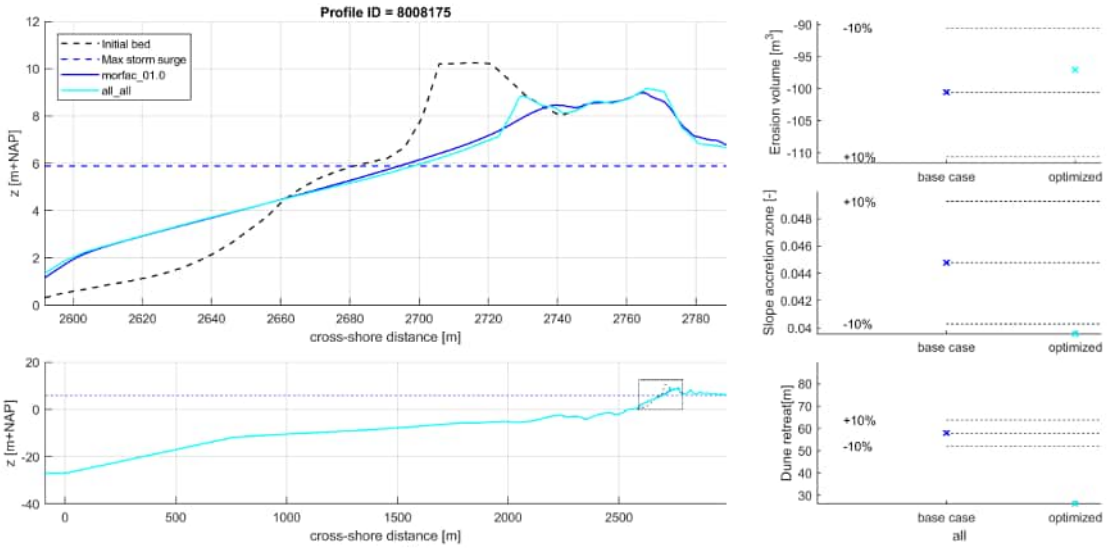

Figure 6.4: *XBeach results for profile 8008175. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

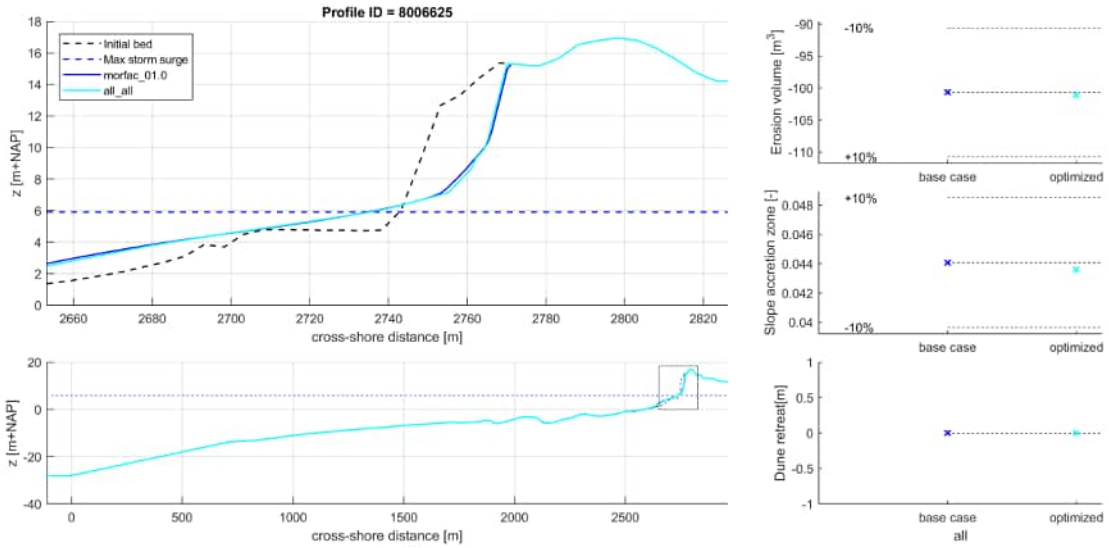

Figure 6.5: *XBeach results for profile 8006625. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

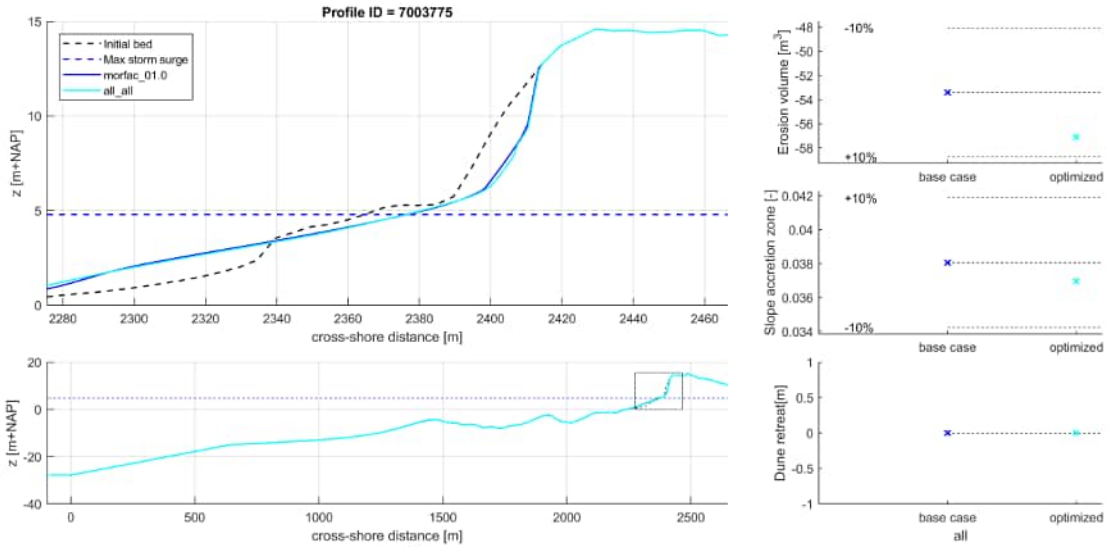

Figure 6.6: *XBeach results for profile 7003775. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

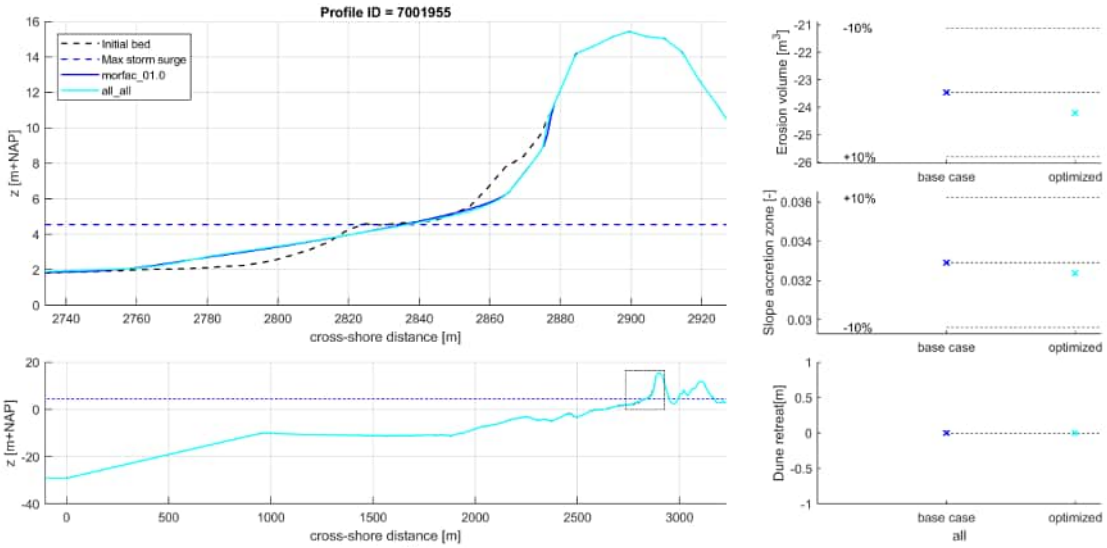

Figure 6.7: *XBeach results for profile 7001955. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

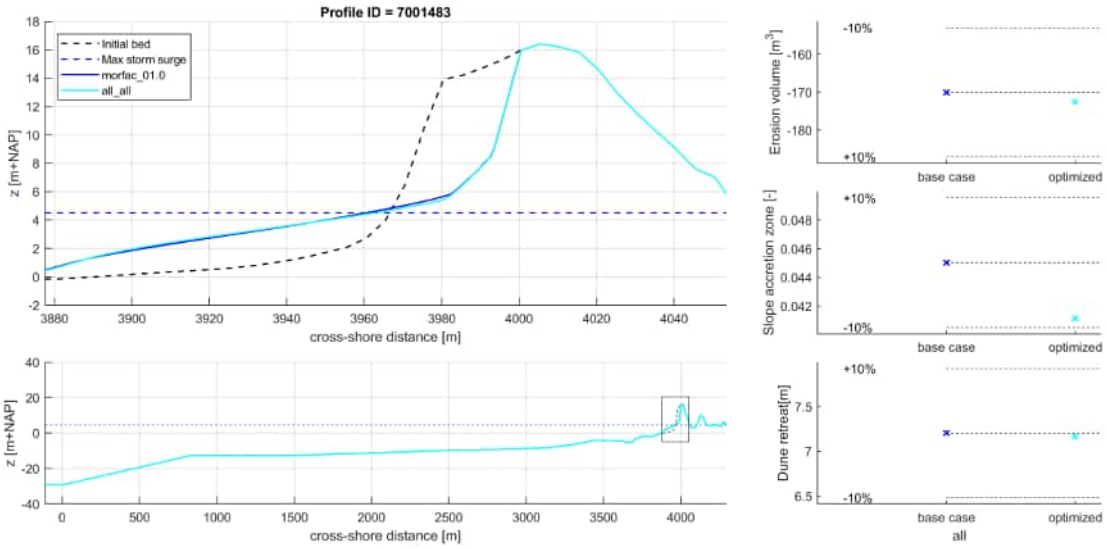

Figure 6.8: *XBeach results for profile 7001483. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

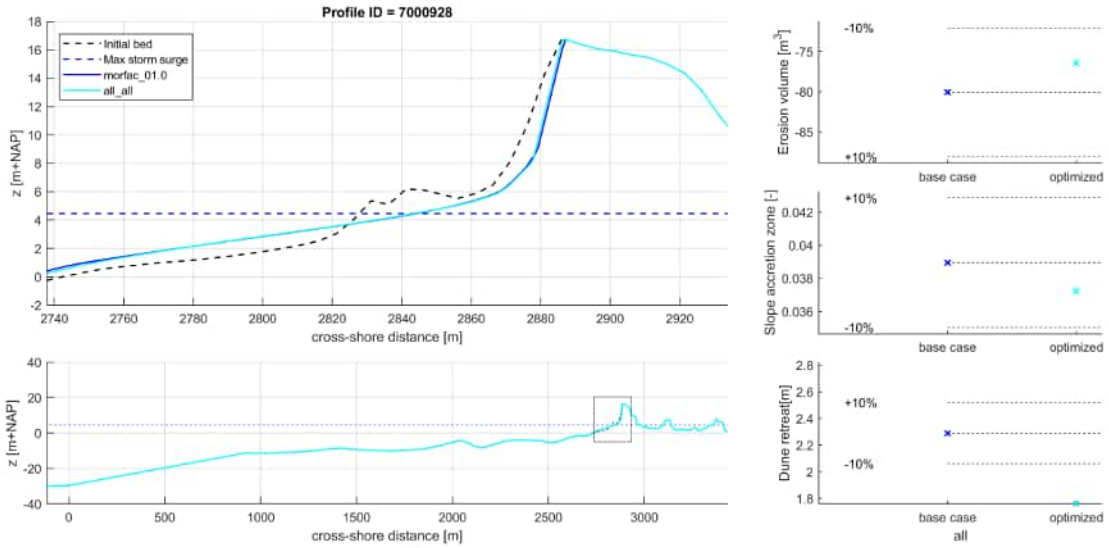

Figure 6.9: *XBeach results for profile 7000928. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

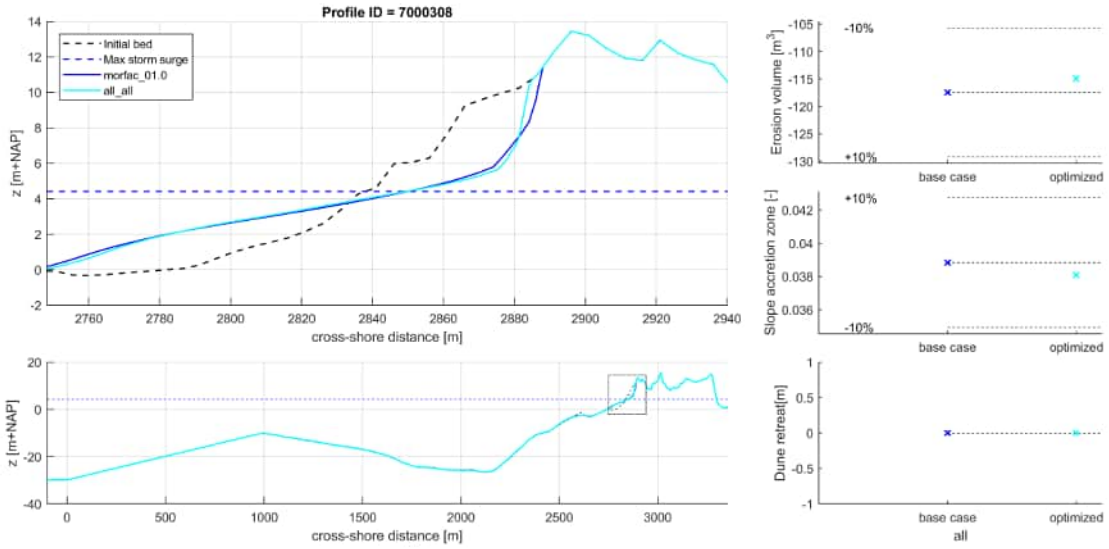

Figure 6.10: *XBeach results for profile 7000308. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

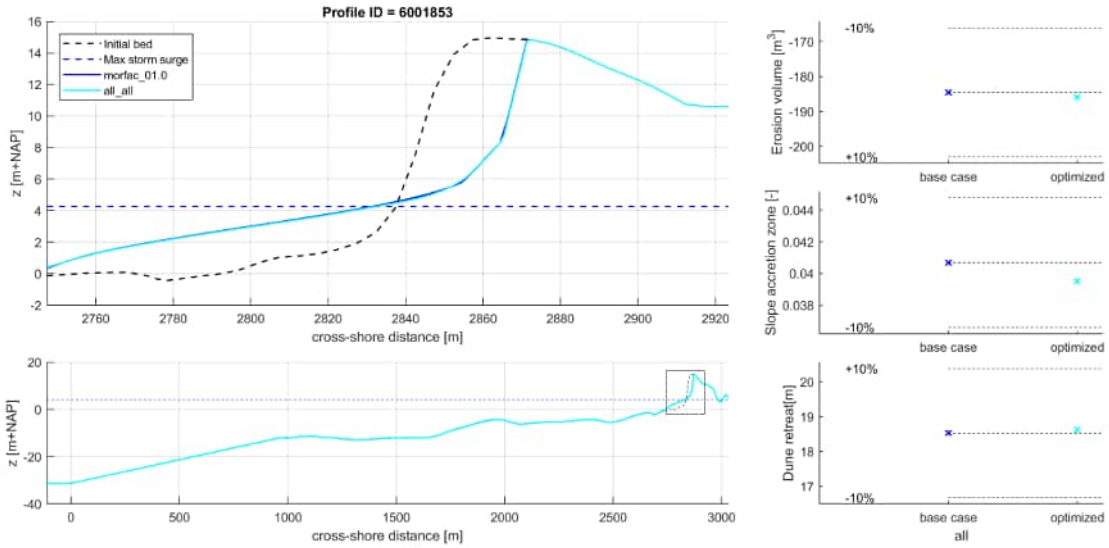

Figure 6.11: *XBeach results for profile 6001853. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

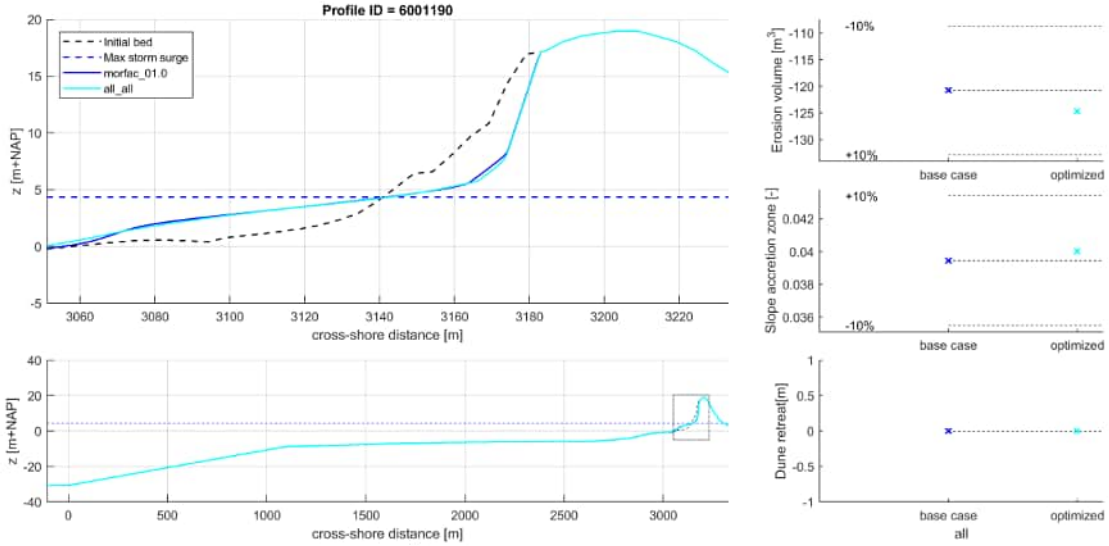

Figure 6.12: *XBeach results for profile 6001190. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

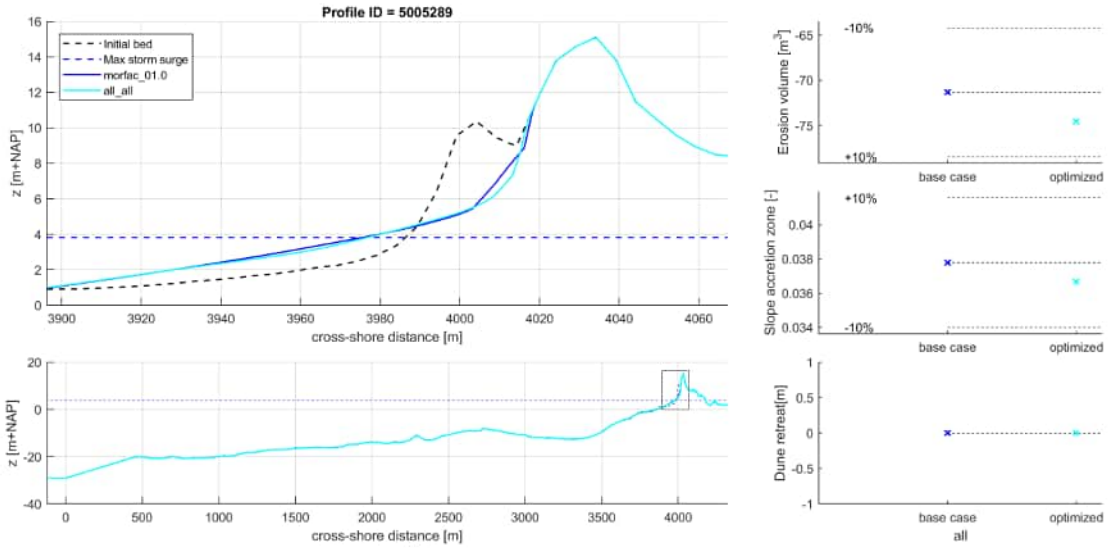

Figure 6.13: *XBeach results for profile 5005289. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

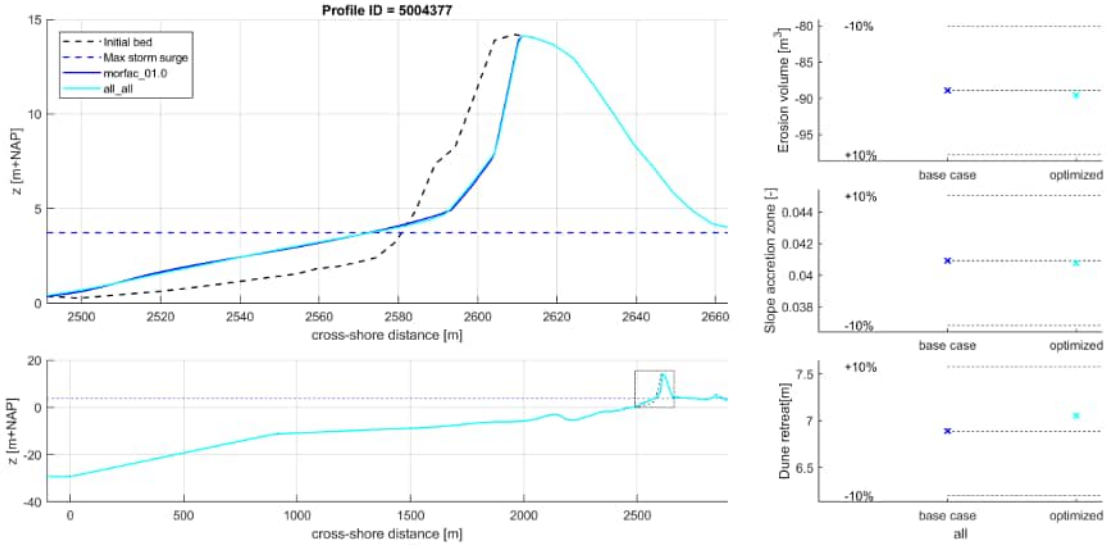

Figure 6.14: *XBeach results for profile 5004377. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

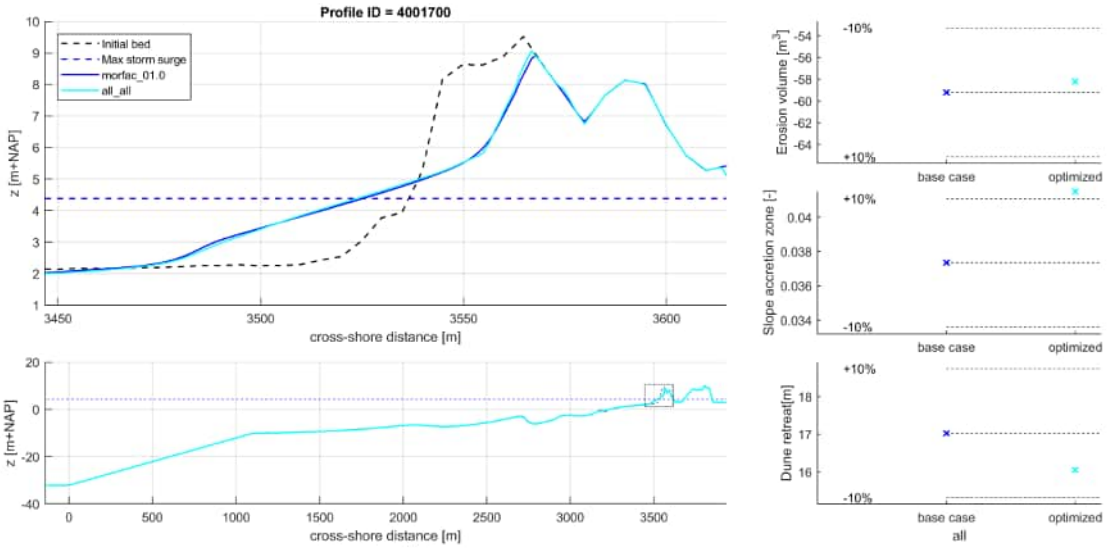

Figure 6.15: *XBeach results for profile 4001700. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

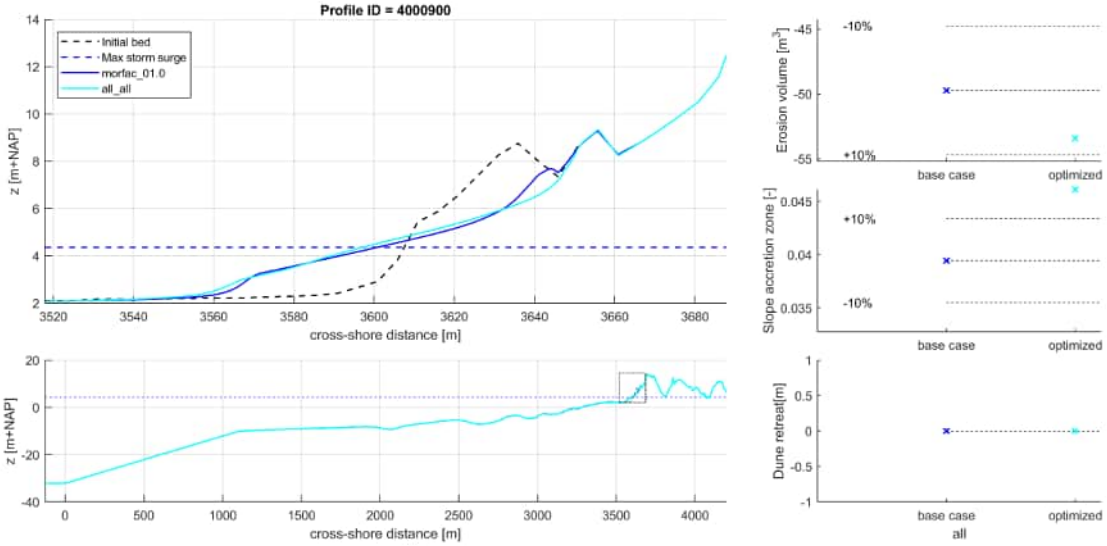

Figure 6.16: *XBeach results for profile 4000900. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

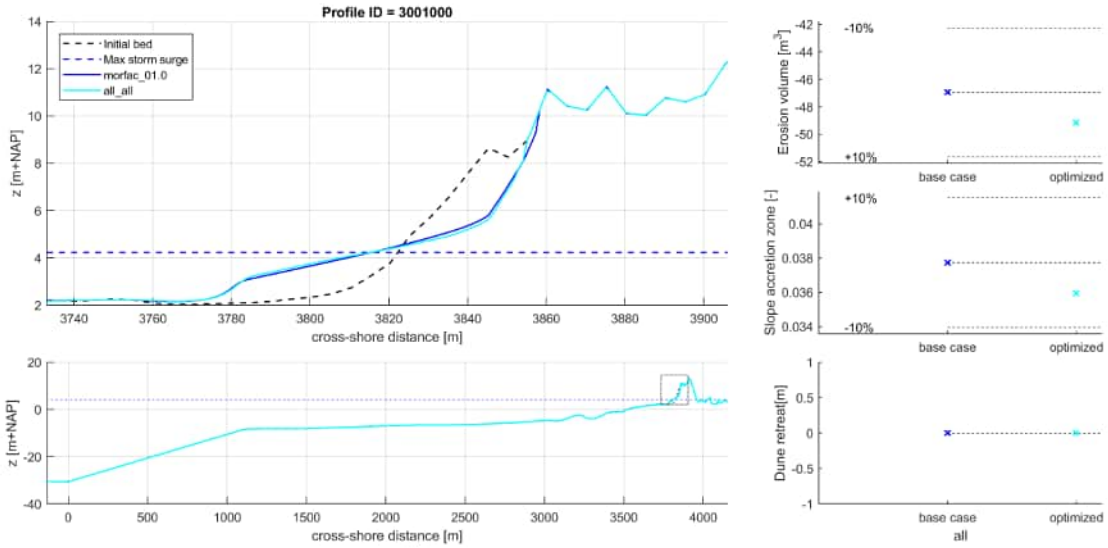

Figure 6.17: *XBeach results for profile 3001000. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

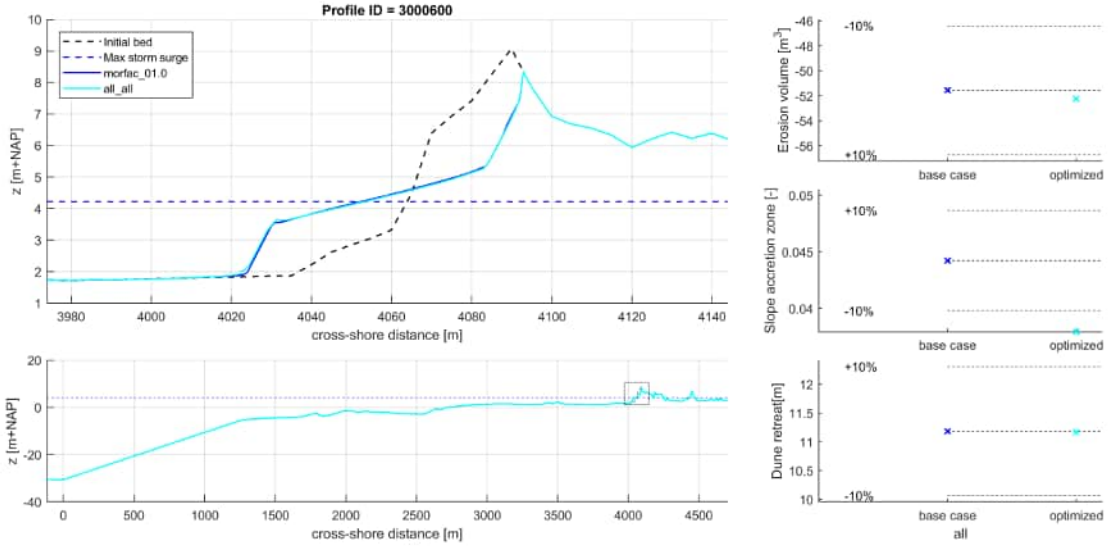

Figure 6.18: *XBeach results for profile 3000600. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

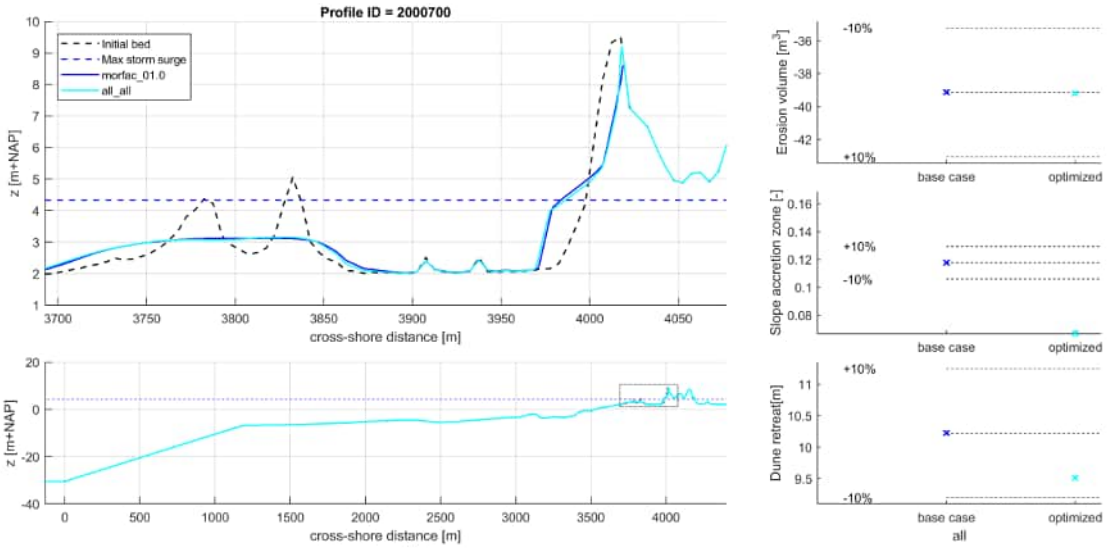

Figure 6.19: *XBeach results for profile 2000700. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

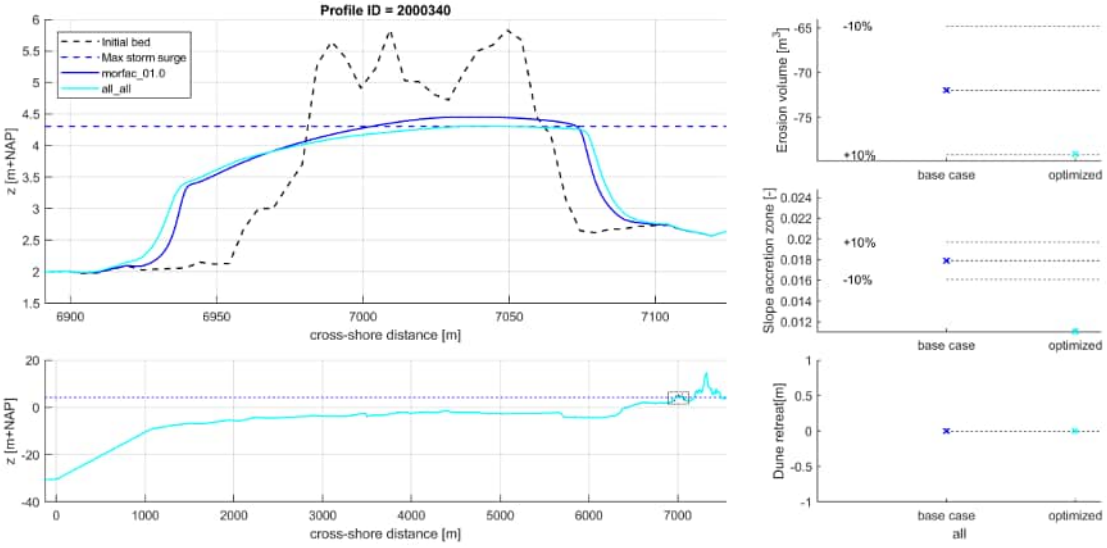

Figure 6.20: *XBeach results for profile 2000340. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

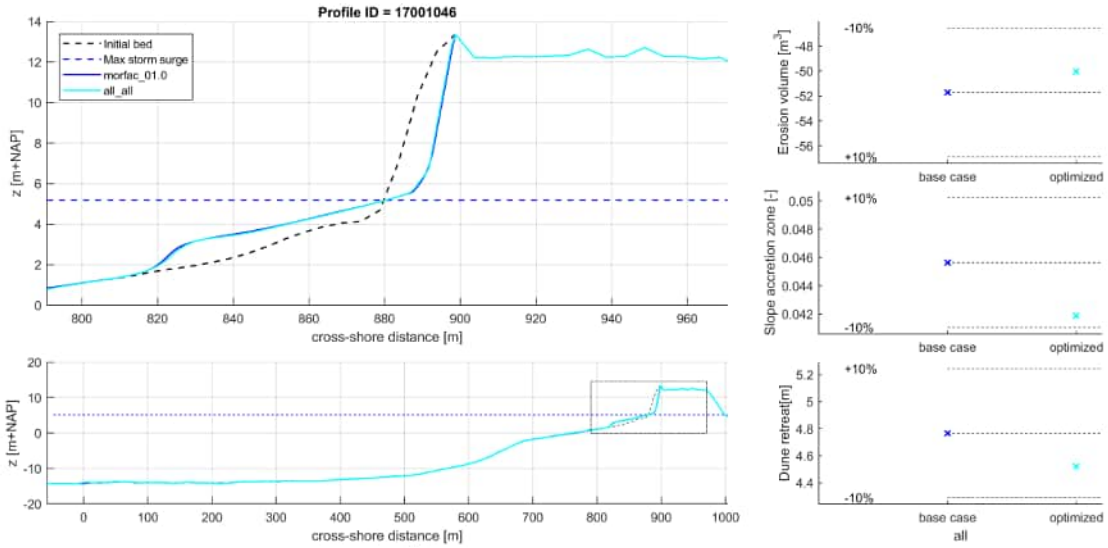

Figure 6.21: *XBeach results for profile 17001046. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

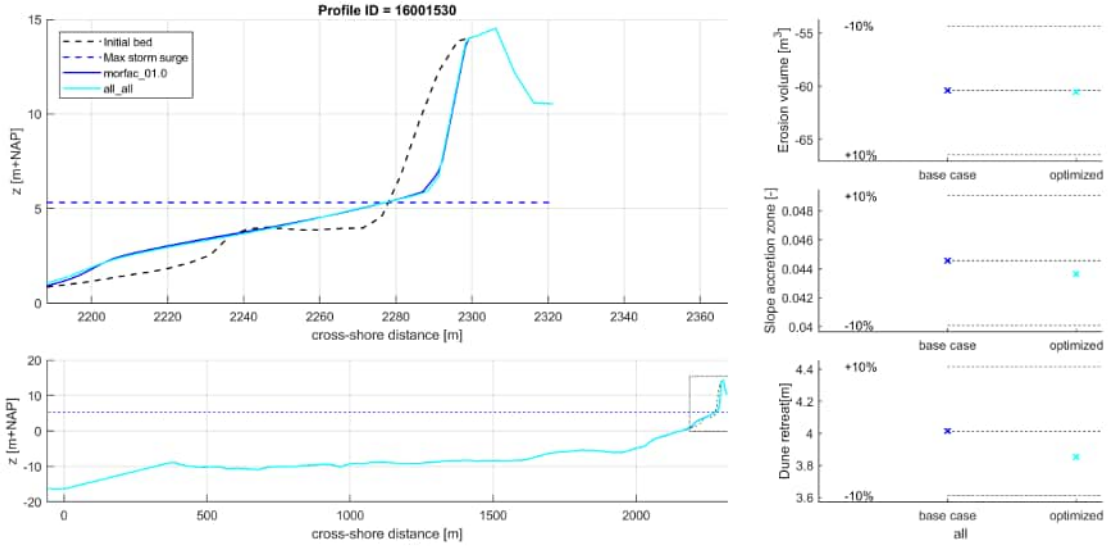

Figure 6.22: *XBeach results for profile 16001530. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

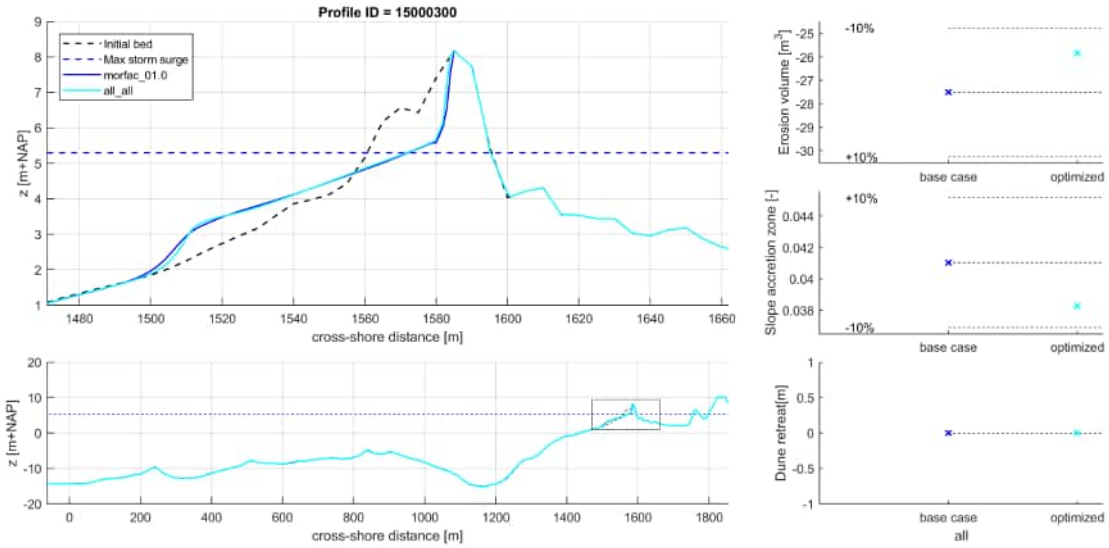

Figure 6.23: *XBeach results for profile 15000300. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

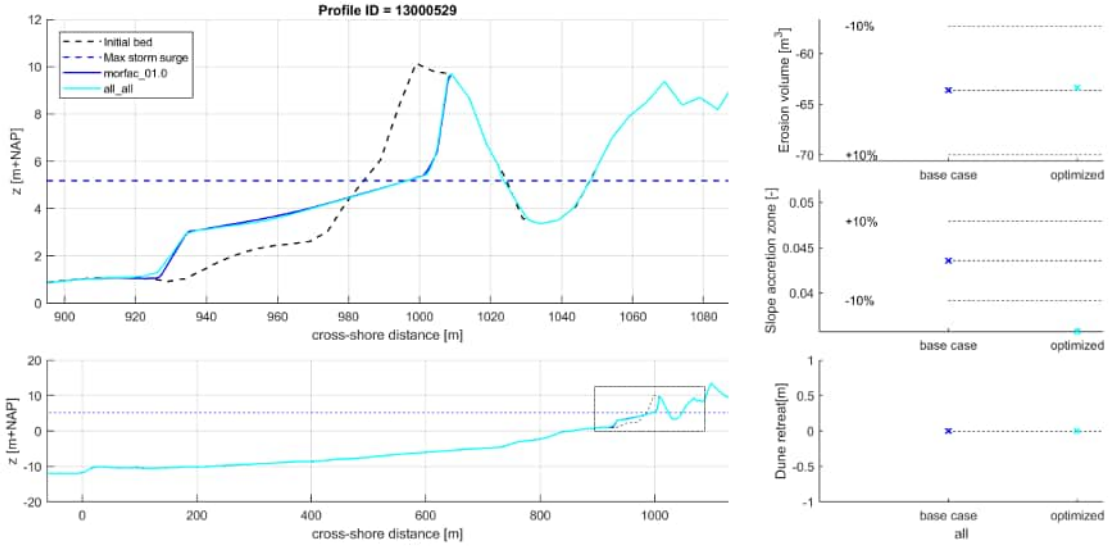

Figure 6.24: *XBeach results for profile 13000529. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

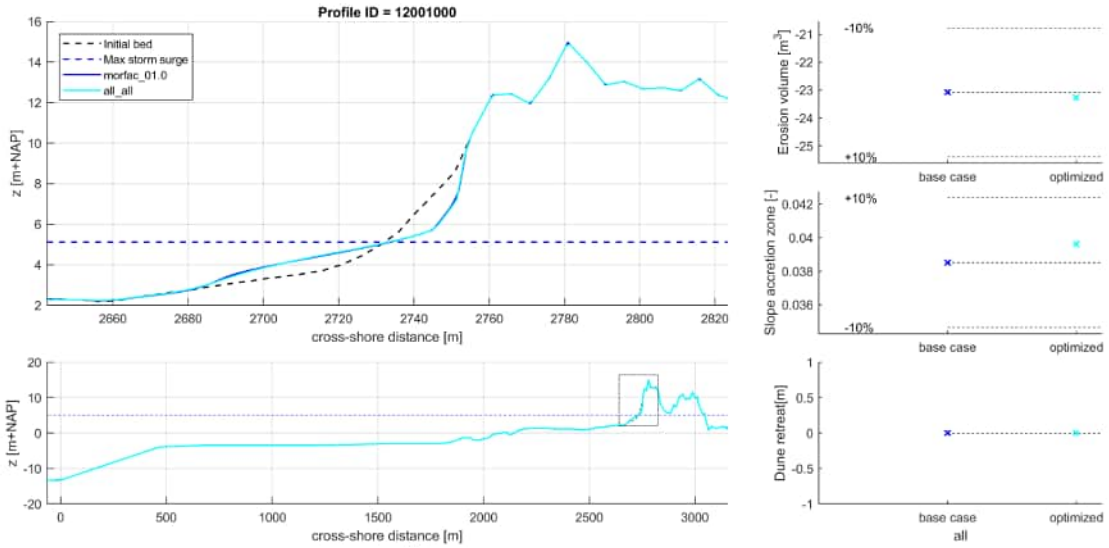

Figure 6.25: *XBeach results for profile 12001000. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*

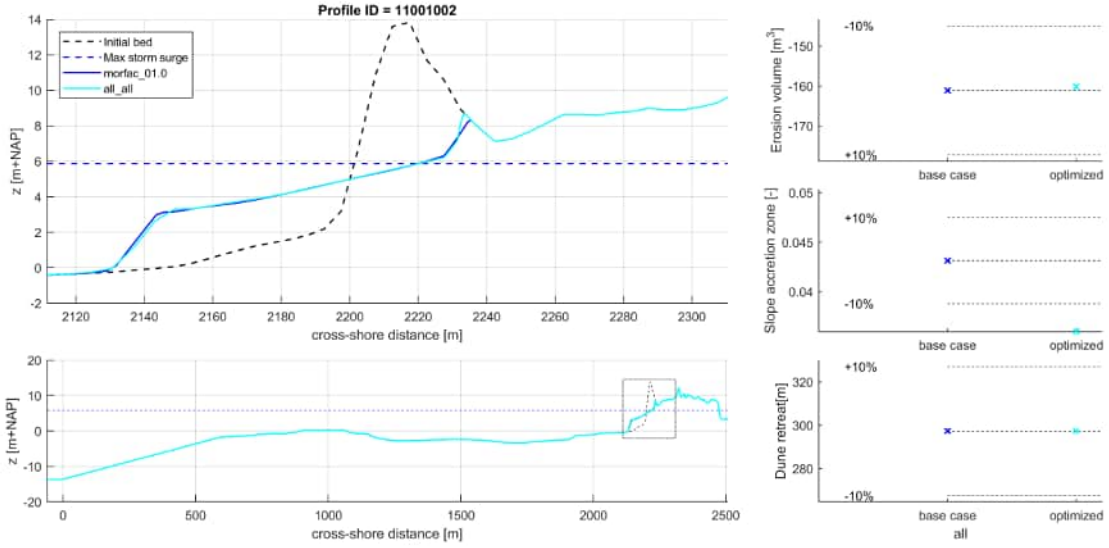

Figure 6.26: *XBeach results for profile 11001002. In the lower panel, the entire model domain is shown with the bed level in black and the maximum storm surge level in dashed blue. The small rectangle in the lower panel indicates the extend of the zoomed view which is presented in the upper panel. The different colors in the upper panel represent the bed levels at the end of the simulations*