Sensitive theoretical experiments to assess uncertainty in bedrock and beach face slopes definition

Appendix A - Supplementary data to the manuscript Ponte Lira et al. *Challenges and new strategies in assessing multidecadal shore platform sandy beach evolution from aerial imagery*

The sensitive theoretical experiments to assess the uncertainty in bedrock and beach face slopes definition was conducted estimating beach volume for two beach profiles: with a berm (BT[1]=160 m) and without a berm (BT =45m). The initial profiles consider a shore platform slope of α=0.00, beach face slope of β=0.10 and a beach volume variation of 84% between both profile configurations (Figure1).

The sensitive analysis considered shore platform slope variations of α=0.00 to α=0.05, with increments of 0.01, and beach face slope variations between β=0.06 and β=0.10, with increments of 0.02, which are within the observational range of beach profile characteristics in the study area.

Tables 1 to 3 show the volume results (in m^3/m) for simulations of beaches with β=0.10, β=0.08 and β=0.06 slopes, respectively, together with plots of the simulated beach profile configurations (Figures 2 to 4).

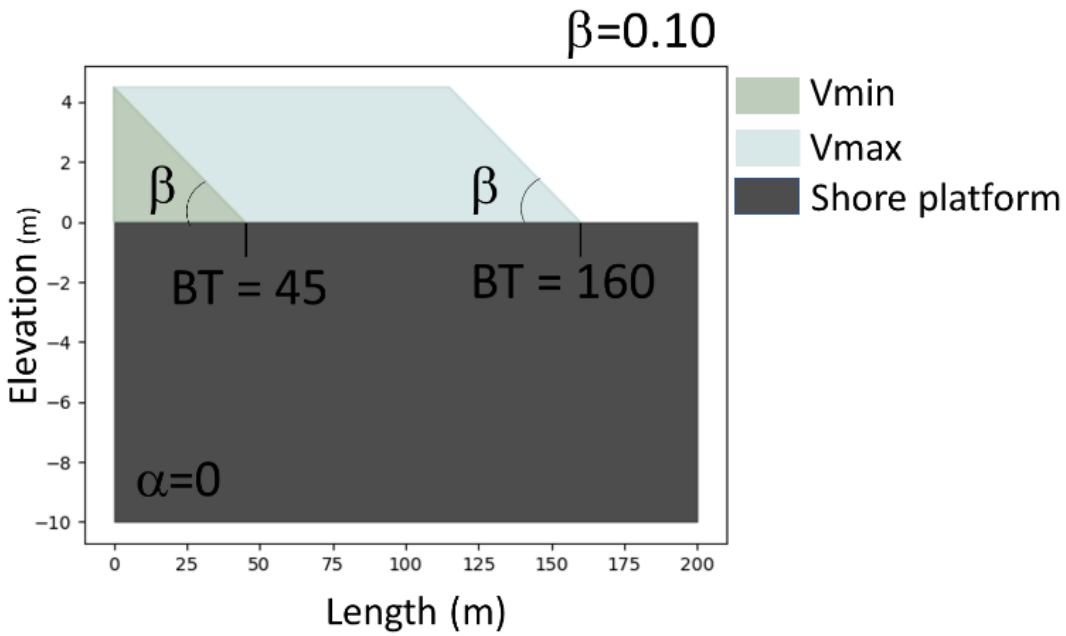

Figure 1 – Initial profiles: β=0.10 and α=0.00. Changes between both profiles is 84%.

[1] BT – beach toe

Simulation with beach slope β=0.10

Table 1. Volumes (m^3/m) and volume variations estimations for two beach profiles (with and without a berm) for a beach face slope of β = 0.10.

i	Platform slope	No-berm profile Vmin (BT=45m)	With-berm profile Vmax (BT=160m)	$Vmin_0/Vmin_i$	$Vmax_0/Vmax_i$	Relative Volume Variation
0	α = 0.00	101	619	-	-	84%
1	α = 0.01	91	662	0.90	1.07	86%
2	α = 0.02	81	680	0.80	1.10	88%
3	α = 0.03	71	672	0.70	1.09	89%
4	α = 0.04	61	638	0.60	1.03	90%
5	α = 0.05	51	579	0.50	0.94	91%

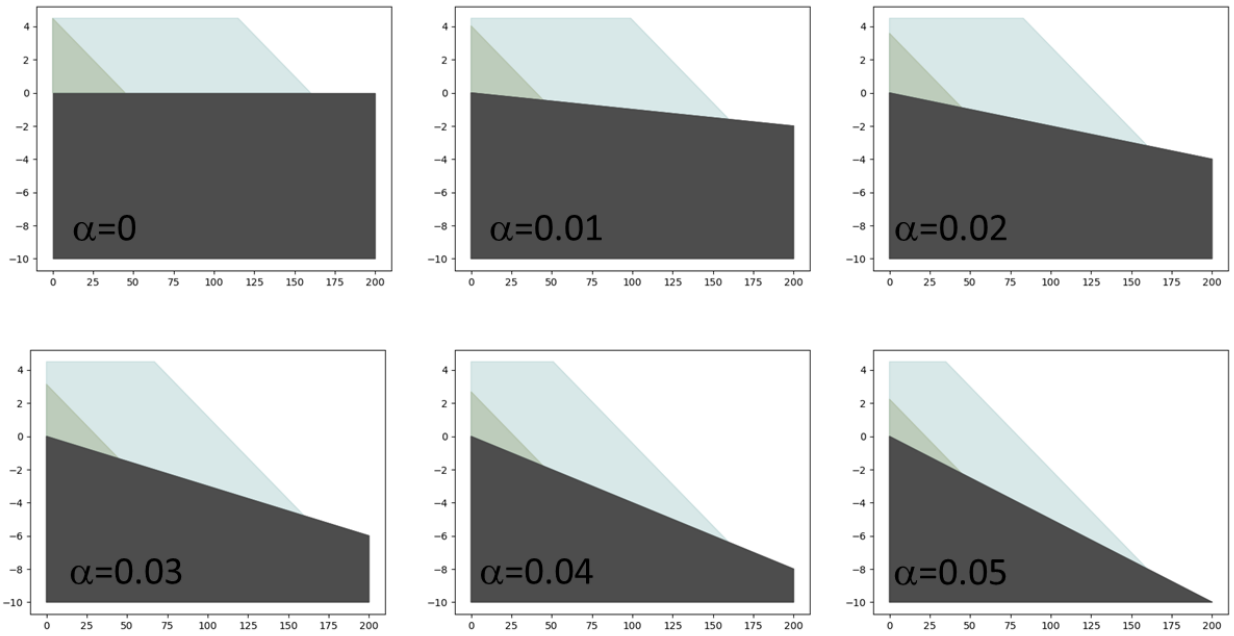

Figure 2 – Figure plots of the simulated beach profile configurations with β=0.10 for different shore platform slopes.

Simulation with beach slope β=0.08

Table 2. Volumes (m^3/m) and volume variations estimations for two beach profiles (with and without a berm) for a beach face slope of β = 0.08.

i	Platform slope	No-berm profile Vmin (BT=45m)	With-berm profile Vmax (BT=160m)	$Vmin_0/Vmin_i$	$Vmax_0/Vmax_i$	Relative Volume Variation
0	α = 0.00	81	593	-	-	86%
1	α = 0.01	71	615	0.88	1.04	88%
2	α = 0.02	61	605	0.75	1.02	90%
3	α = 0.03	51	563	0.63	0.95	91%
4	α = 0.04	41	489	0.50	0.82	92%
5	α = 0.05	30	383	0.38	0.65	92%

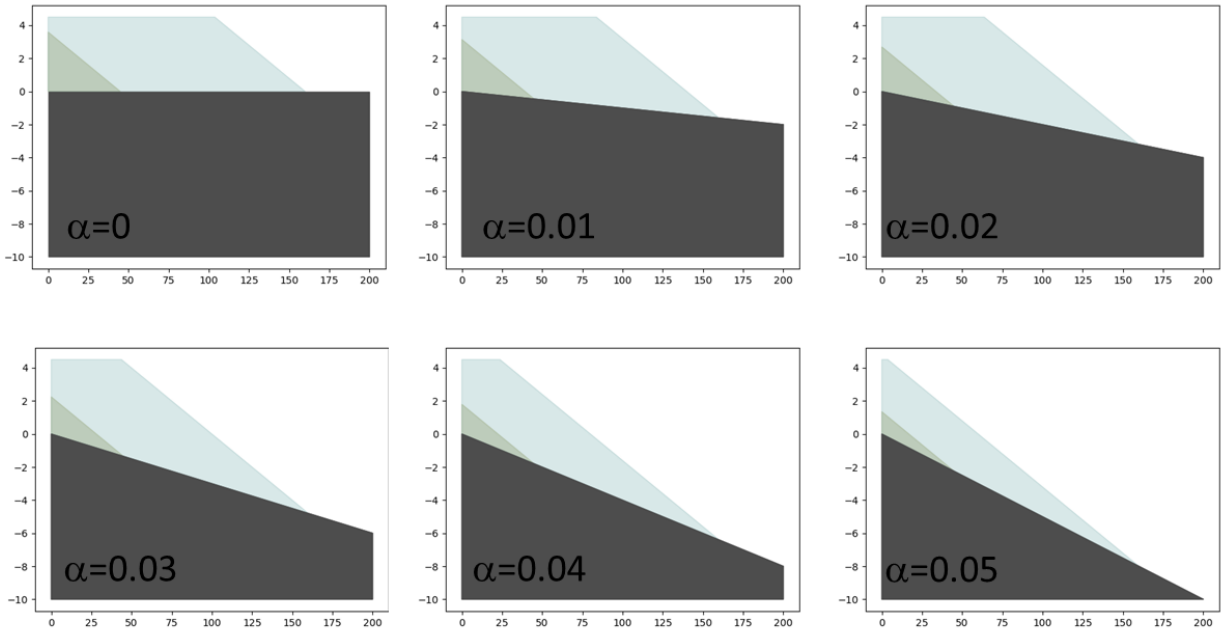

Figure 3 - Figure plots of the simulated beach profile configurations with β=0.08 for different shore platform slopes.

Simulation with beach slope β=0.06

Table 3. Volumes (m^3/m) and volume variations for two beach profiles (with and without a berm) for a beach face slope of β = 0.06.

i	Platform slope	No-berm profile Vmin (BT=45m)	With-berm profile Vmax (BT=160m)	$Vmin_0/Vmin_i$	$Vmax_0/Vmax_i$	Relative Volume Variation
0	α = 0.00	61	551	-	-	89%
1	α = 0.01	51	538	0.83	0.98	91%
2	α = 0.02	40	482	0.67	0.87	92%
3	α = 0.03	30	383	0.50	0.70	92%
4	α = 0.04	20	256	0.33	0.46	92%
5	α = 0.05	10	128	0.17	0.23	92%

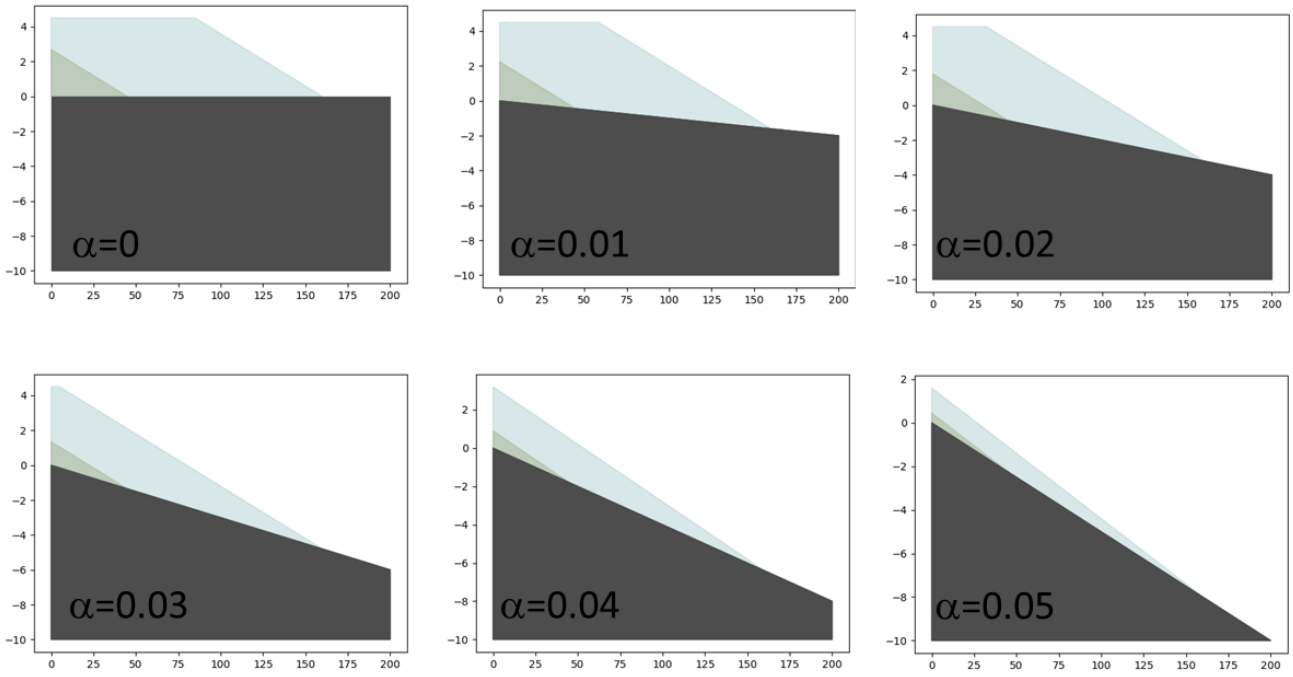

Figure 4 - Figure plots of the simulated beach profile configurations with β=0.06 for different shore platform slopes.