Coastal Sediment 2019
Primary Topic: Inlets and Navigation Channels
Secondary Topic: Beaches

ABSTRACT

ASSESSMENT OF THE EFFECT OF SHOREFACE NOURISHMENTS USING AUTONOMOUS BAR BEHAVIOR

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1. Motivation

For normal sized nourishments (not mega) it is cheapest do nourishments at the shoreface. Under severe storm surges dune erosion can occur, leading to an unacceptable risk. Shoreface nourishments can be designed to prevent dune erosion, and the focus on this work is to find out how. Vital for any assessment of the effect of any coastal protection is to be able to assess the net effect, i.e the effect of the coastal protection where the autonomous behavior is extracted.

2. Method

3 coastal stretches are selected for the analysis of the autonomous behavior; they are all within 45 km of a nearly straight eroding sandy barrier coast. The northern most (transect 5350) is completely naturally behaving without any human interventions. The southernmost (transect 5760) has been completely naturally behaving for many years without any human interventions. The last years shoreface nourishments has been carried out. The middle stretch (transect 5450) has been impacted by regular nourishments. The stretches are being surveyed annually. The surveylines ranges from approximately 15 m depth to the dunes. The longshore distance between the transects are approximately 1 km.

The profile for each transect is plotted in a time stack graph for the period 1957 to 2017. For each profile the bars are shown with a thick coloured solid line. The rest of each profile is shown with a solid black line if shoreface nourishment has been carried out, and a dashed line if beach nourishments have been carried out.

For each transect crosshore position of the bar(s) is determined and it is analyzed whether there is a trend/cyclicity in the bar(s) position and other indicators. The analysis will be supplemented in the autumn and winter 2018-19 with local surveys, where transects are spaced 200m longshore, and are surveyed several time a year. The local surveys are project specific survey that has a project limited timespan of relatively few years.

The observed trends or the lack of such is used to define the autonomous behavior, which later on is used analyzing the net effect of shoreface. The net effect of nourishments will be compared with similar analysis of shoreface nourishments in Germany and the Netherland. Based on the findings, upscaling to other coastal areas will be explored and guideline will be produced at the end of the project.

3. Results

In figure 1 a time stack of a transect for each coastal stretch are presented with arrows indicating bar movement. It is clearly seen that the bars all moves offshore and in the same direction in average. Figure 1 is also showing that the trends are not linear, and varies both with time and space. Table 1 shows the derived offshore migration, lifetime and speed for each defined bar before shoreface nourishments took place.

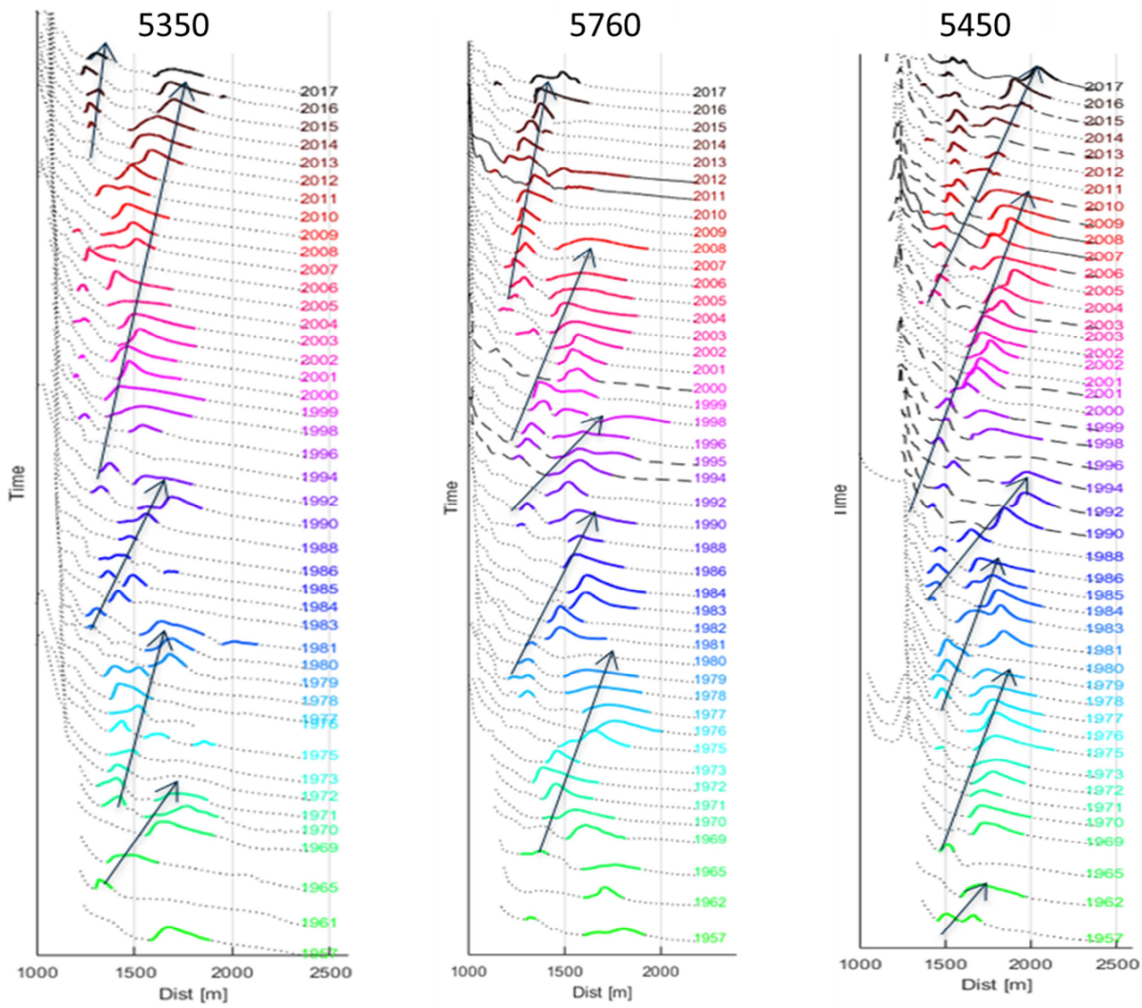

Figure 1: Time stack of profiles

From table 1 it is seen that in the area with no nourishments the offshore migration distance is shorter than the other two areas, which is mainly because of bar 2, which moved significantly shorter than the rest of the bars. The lifetime is approximately the same for all bars, while the migration speed for the area without nourishments is lower than the two other areas.

Table 1: Derived bar morphology parameters

	No nourishments Line 5350			Some beach nourishments Line 5760			Many beach nourishments Line 5450		
	Offshore migration [m]	Lifetime [years]	Speed [m/year]	Offshore migration [m]	Lifetime [years]	Speed [m/year]	Offshore migration [m]	Lifetime [years]	Speed [m/year]
Bar 1	708	10	71	708	14	51	667	14	48
Bar 2	375	12	31	833	12	69	541	10	54
Bar 3	750	12	63	875	8	109	958	11	87
Bar 4	833	26	32	791	13	61	1167	20	58
Mean	667	15	49	802	12	73	833	14	62

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