Delft, The Netherlands
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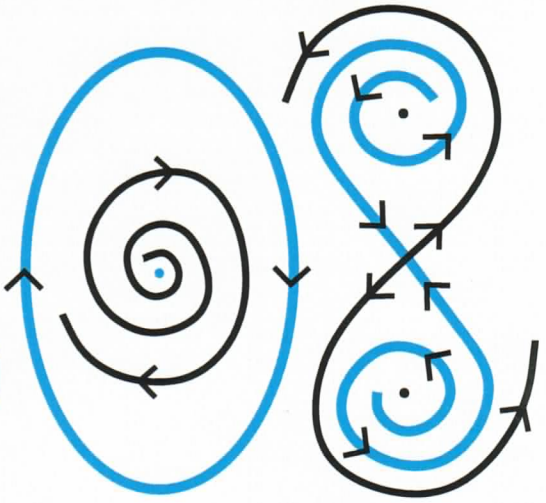
# Dynamics Days Europe 20



Book of Abstracts

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# Modelling the characteristics and dynamics of surfzone transverse sand bars observed at Noordwijk beach

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Patches of transverse sand bars have been observed in the surf zone of several beaches, spaced with a remarkable alongshore periodicity (from 20 to 200 m). A transverse bar is an elongated accumulation of sand attached to the low-tide shoreline that extends inside the surf zone with an oblique orientation. A patch of transverse bars with a wavelength of 45 m, observed during September 2002 at Noordwijk beach (the Netherlands), can be seen in Figure 1a. This plot is obtained from a 10-minute average of video images and shows a clear white signal over the bars, due to the foam created by predominant wave breaking in these shallower areas.

A morphodynamic model has been developed and analysed to gain more fundamental physical knowledge about the characteristics and the dynamics of transverse finger bars. The model describes the feedback between waves, depth-averaged currents and bed evolution, so that self-organized processes can develop. Realistic positive feedback leading to formation of bars like those observed only occurs if the stirring of sediment due to bore turbulence is included in the model. In that case, the depth-averaged sediment concentration decreases seaward across the inner surf zone, which, in combination with an offshore-directed flow over the bars, leads to accumulation of sediment in the crest areas. The model is applied to the specific wave and bathymetric conditions measured at Noordwijk. The modeled wavelength, crest orientation and growth rate are in good agreement with observations but the model overestimates the migration rates. Figure 1b shows the result obtained for the conditions measured during the event shown in Figure 1a (the modeled wavelength is 65 m). White areas correspond to the shallower regions. Both in the model and in the observations, the most favorable conditions for bar formation are obliquely incident waves of intermediate heights.

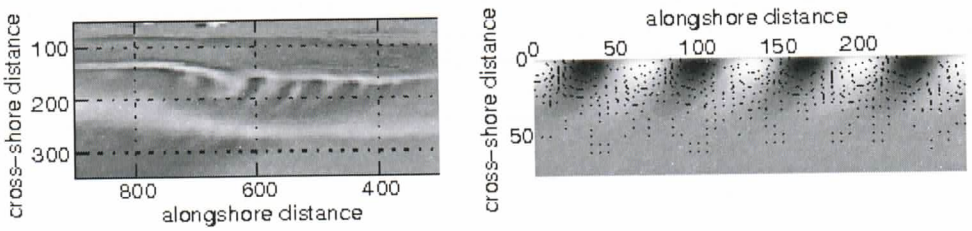


Fig.1: a) Observed transverse sand bars b) Modeled transverse sand bars