

Safer shipping by predicting sand wave behaviour

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Dutch researcher Joris van den Berg has developed a mathematical model to predict the movement of sand waves.

Sand waves are formed by an interaction between the tidal current and sand. They are larger than sand ripples on the beach but smaller than sandbanks. Sand waves largely determine the shape of the sea floor in the southern part of the North Sea. A good predictive computer model would be a valuable tool for shipping and designers of offshore infrastructures.

The mathematical equations describing the behaviour of sand waves have been known for some time. Yet suitable equations alone are not enough to predict their behaviour; the equations also need to be solved reliably. To date, no practical methods were available for solving these equations, especially for larger sand waves.

First of all, Van den Berg simplified the equations considerably. This made it much easier to find solutions and hence to predict sand wave behaviour. The result was a tool that could quickly predict the effect of interventions such as dredging. This model was used successfully to determine the recovery of sand waves after dredging of a trench for the new high-voltage cable from the Netherlands to England.

Subsequently, Van den Berg developed efficient calculation methods to solve the original equations. In the end this resulted in a mathematical model that will possibly enable studies on the interaction between sand

waves and sand banks in the future.

Predicting the growth and movement of these waves is vitally important for the safety of shipping and the design of offshore infrastructure, such as pipelines, cables and platforms.

Sand waves develop in loose sand on the bottom of shallow seas. This loose sand is transported by tidal currents, giving rise to wave patterns. These patterns disrupt the tidal flow and result in more sand being pushed on to the slope. Eventually, sand waves can reach a height of five to eight metres and due to the current they can continuously move and change shape.

Source: NWO

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