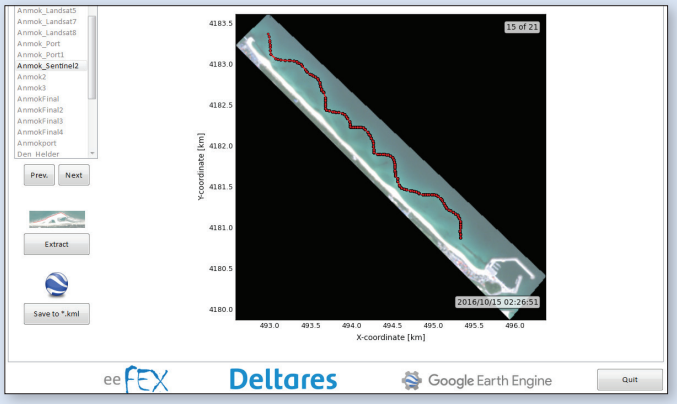
EROSION ON THE KOREAN EAST COAST: FROM UNDERSTANDING TO PRACTICE

Coastal erosion is a serious issue for many beaches on the east coast of South Korea, threatening the coastal infrastructure and communities. Despite the fact that the processes driving coastal erosion were often not well understood, many structures have been built on the east coast in recent decades. These structures do not always mitigate the erosion effectively.



The ee-FEX (Earth Engine-Feature Extraction) tool for detecting sandbars on Anmok beach using satellite imagery,

As part of a research project launched by the Korean government to better understand and mitigate coastal erosion, the Korean Institute of Ocean Science and Technology (KIOST) and Deltares set up a three-year research (2015-2018) alliance with the aim of developing a state-of-the-art numerical modelling framework to help the Korean coastal engineering community to assess and mitigate coastal erosion processes. Capacity building for Korean coastal engineers is also a crucial component of the project. Anmok beach was selected as a representative case study to test and improve the framework.

The east coast of Korea is a complex system with strong temporal variations in the wave climate, typhoons, migrating crescentic sandbars in the nearshore and many human interventions. The time scales of these processes range from hours (individual storms, for example) to decades (large-scale coastline reorientation due to changing wave climates and human interventions, for instance). The modelling framework developed therefore consists of numerical models covering these relevant time scales (in other words, XBeach, Delft3D and UNIBEST-CL+).

In the project we improved and extended standard practice with state-of-the-art knowledge and tools by, among other things:

- including the effects of infragravity waves and beach states (in other words, bars and cusps) to make better predictions of storm erosion, wave run-up and wave overtopping at storm time scales;
- developing tools to combine bathymetric surveys with observations from satellite imagery in order to quantify decade-scale sandbar dynamics;
- designing an approach to explore the effects of climate change on the wave climate and large-scale coastline reorientation;
- assessing the effectiveness of coastal interventions in mitigating coastal erosion at different time scales (including uncertainties).

The modelling framework has been transferred to KIOST in the form of modelling software and tools, guidelines, scientific publications and reports. Furthermore, KIOST staff members visited Deltares for several months for capacity-building activities in the form of on-the-job training, regular project meetings and the joint preparation of papers. The findings of the project have also been disseminated to the wider coastal engineering community in the form of open source software tools, papers and seven Master theses. The next steps include capacity-building for the wider Korean engineering community and application to other cases on the Korean east coast with the intention of not only better understanding the causes of the coastal erosion but also producing more effective measures for erosion control.

Contact
Wiebe de Boer, wiebe.deboer@deltares.nl, t +31 (0)6 4691 1209

Further reading:
http://coastaldynamics2017.dk/onewebmedia/014_DeBoer_Wiebe.pdf