



SimpleCoast

Dealing with Coastal Risks in Small Island States – Training Session

Alessio Giardino

Ellen Quataert, Leo van Rijn, Andrew Warren, Ad Jeuken, Marjolijn Haasnoot, Ap van Dongeren, Joao Rego

With special thanks to Sofia Bettencourt, Nicolas Desramaut and the GFDRR team
Understanding Risk Forum (Venice, May 16 – 20 2016)

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Deltares – general introduction

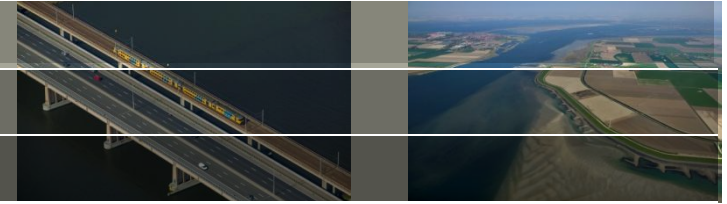
- Deltares is an **independent research institute** for delta technology, incorporating advanced expertise on water, soil and subsurface issues.
- About 850 employees
- Research (50%) and consultancy (50%)
- NONPROFIT ORGANIZATION



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The mission



Enabling Delta Life

Deltares provides innovative solutions that make living and working in deltas, coastal areas and river basins safe, clean and sustainable



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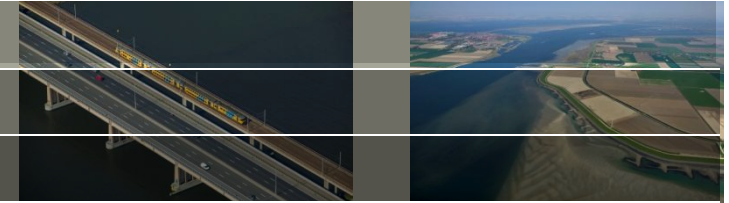


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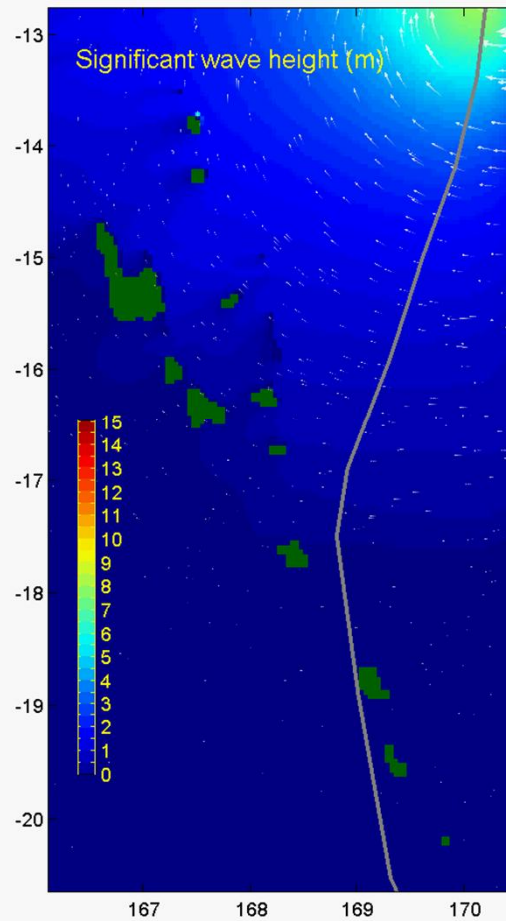
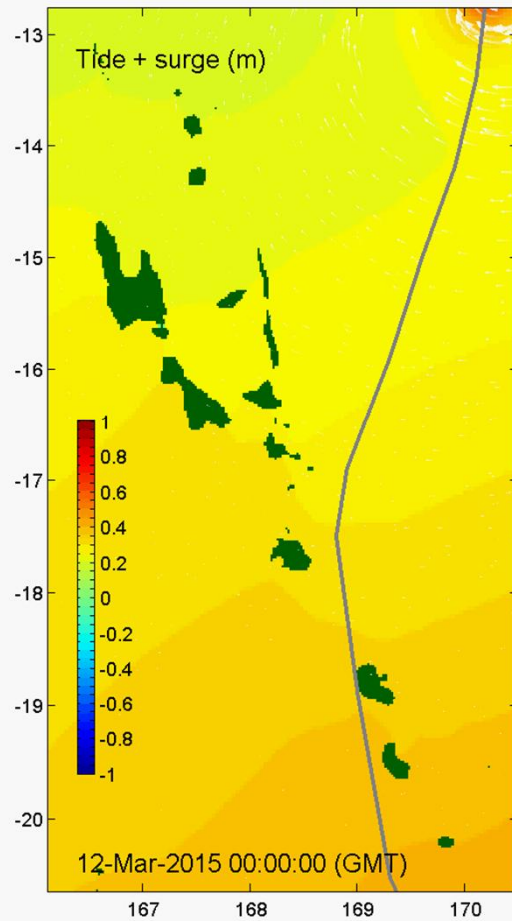
Some of our projects in the coastal sector



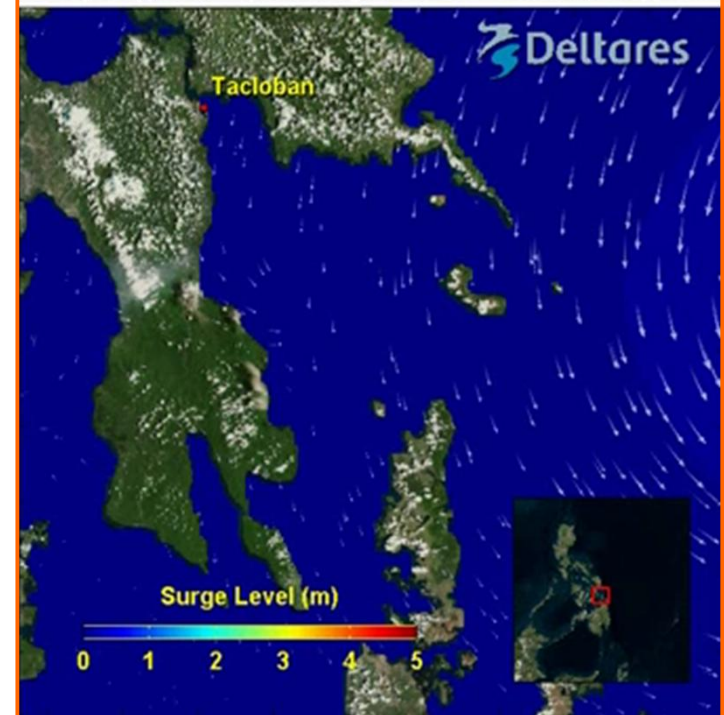
Open software



Cyclone Pam over Vanuatu



Super Typhoon Haiyan making landfall near Tacloban, Philippines



Physical models

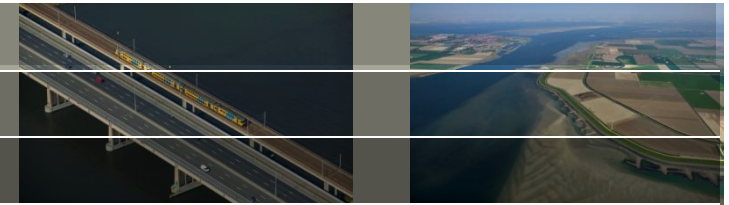


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Programme of the session



14:00 – 14:30 General Introduction to SimpleCoast

**14:30 – 16:30 Dealing with uncertainties in coastal management.
Interactive serious game session**

16:30 – 16:45 Coffee/tea break

16:45 – 17:15 Flooding on low-elevation reef-lined coasts

**17.15 – 17.45 Other technologies for small island communities:
storm-surge early warning systems, design tools, *etc.***

17.45 – 18:00 Final discussions / feedback from the audience



General introduction to SimpleCoast

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Do you notice any similarity in those pictures?



Aruba



Sao Tome

Common challenges



Denis Island, Seichelles



Tubbataha Reefs Natural Park, Philippines



Kiribati

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... when you are lucky



... when you are less lucky

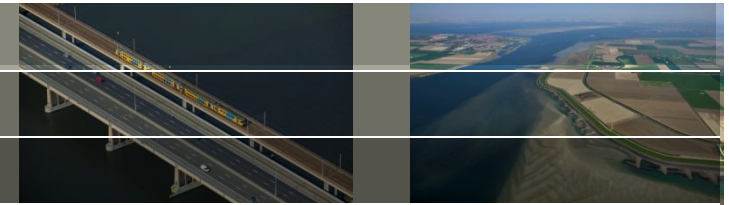
Knowledge fragmentation

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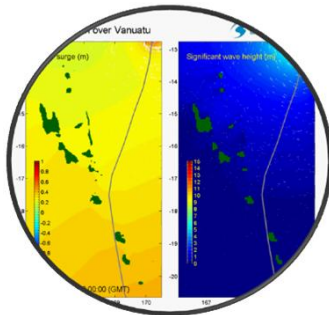


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What is SimpleCoast?



Common challenges



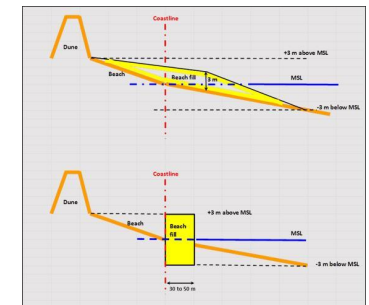
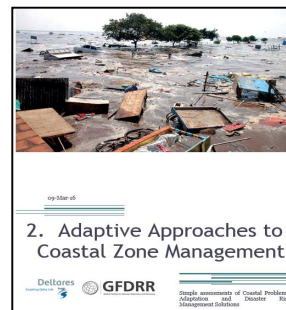
Knowledge fragmentation



Possible synergy for similar solutions

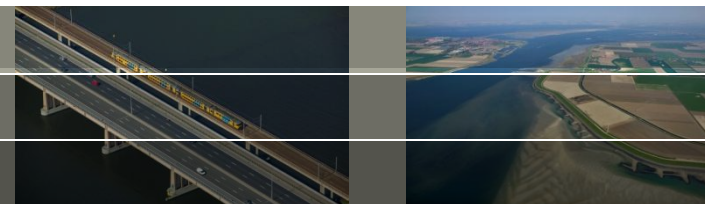
Knowledge sharing platform for simple assessment of problems and solution:

- Website
- Knowledge notes
- Free tools and tutorials
- Trainings



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For whom?



- Local practitioners
- Government officials and national leaders in Small Island States
- Regional organizations
- NGOs working on the ground in Small Island States to build resilience
- Specialists at the World Bank, other MDBs and UN and bilateral partners



In close cooperation with SISRI



GFDRR
Global Facility for Disaster Reduction and Recovery



Search

ABOUT

WHAT WE DO

WHERE WE WORK

PUBLICATIONS

NEWS & EVENTS

DONORS

Small Island States Resilience Initiative



The Small Islands States Resilience Initiative (SISRI) is a global program launched by the World Bank in September 2014, in response to calls by Small Island States for greater and more effective support to build their resilience to climate change and disaster risk.

SISRI seeks to bring together experiences from Disaster Risk Management and climate resilience to help reduce fragmentation of the financial landscape, provide technical assistance to overcome capacity challenges in fiduciary and technical aspects of investments, and assist Small Island States in accessing scaled up and more efficient financing for resilience.

To support the initiative and share experiences, a global team specialized in the needs of Small Island States has been established, spanning multiple technical disciplines and regions.

SISRI's main building blocks are shown below.



Contact: Sofia Bettencourt (sbettencourt@worldbank.org) and Habiba Gitay (hgitay@worldbank.org)

AT A GLANCE

SISRI is a global partnership through the World Bank and GFDRR to support Small Island States in reducing climate and disaster risks.

[SISRI Page](#)

[SISRI in Images](#)

[SISRI Operations](#)

[SISRI Thematic Group members](#)

[LinkedIn](#)

[Publications](#)

• [SimpleCoast Online Manual](#)

[Other](#)

• [What is SISRI?](#)

[Media](#)

[Knowledge Notes](#)

• [Building Resilience through Social Protection](#)
• [Managing Population Retreat from At-Risk Areas](#)

[Upcoming Events](#)

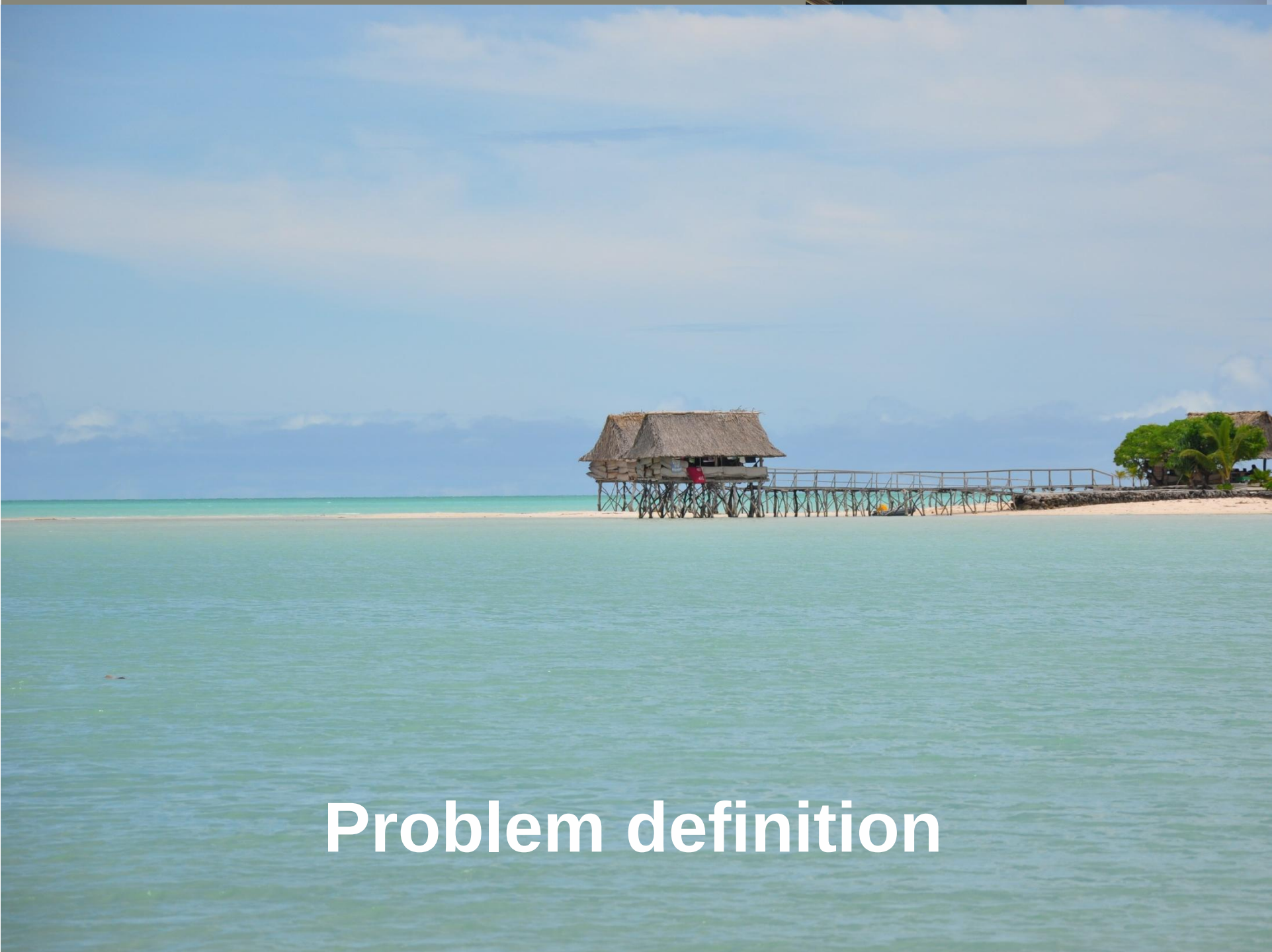
• [Special session at the Understanding Risk Forum, May 16-17, Venice](#)
• [SimpleCoast training at the Understanding Risk Forum, May 16-17, Venice](#)

[External Resources](#)

• [Key data for SIDS \(WDis\)](#)
• [Relevant literature](#)



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Problem definition

But what is actually the problem? Importance of problem definition

The dynamic response of reef islands to sea-level rise: Evidence from multi-decadal analysis of island change in the Central Pacific

Arthur P. Webb^a, Paul S. Kench^{b,*}

^a Pacific Islands Applied Geoscience Commission, SOPAC, Fiji

^b School of Environment, The University of Auckland, Private Bag 92019, Auckland, New Zealand

ARTICLE INFO

Article history:

Received 22 February 2010

Accepted 13 May 2010

Available online xxx

Keywords:

Atoll island

sea-level rise

erosion

island migration

Pacific Ocean

ABSTRACT

Low-lying atoll islands are widely perceived to erode in response to measured and future sea-level rise. Using historical aerial photography and satellite images this study presents the first quantitative analysis of physical changes in 27 atoll islands in the central Pacific over a 19 to 61 yr period. This period of analysis corresponds with instrumental records that show a rate of sea-level rise of 2.0 mm yr^{-1} in the Pacific. Results show that 86% of islands remained stable (43%) or increased in area (43%) over the timeframe of analysis. Largest decadal rates of increase in island area range between 0.1 to 5.6 ha. Only 14% of study islands exhibited a net reduction in island area. Despite small net changes in area, islands exhibited larger gross changes. This was expressed as changes in the planform configuration and position of islands on reef platforms. Modes of island change included: ocean shoreline displacement toward the lagoon; lagoon shoreline progradation; and, extension of the ends of elongate islands. Collectively these adjustments represent net lagoonward migration of islands in 65% of cases. Results contradict existing paradigms of island response and have significant implications for the consideration of island stability under ongoing sea-level rise in the central Pacific. First, islands are geomorphologically persistent features on atoll reef platforms and can increase in island area despite sea-level change. Second, islands are dynamic landforms that undergo a range of physical adjustments in responses to changing boundary conditions, of which sea level is just one factor. Third, erosion of island shorelines must be reconsidered in the context of physical adjustments of the entire island shoreline as erosion may be balanced by progradation on other sectors of shorelines. Results indicate that the style and magnitude of geomorphic change will vary between islands. Therefore, island nations must place a high priority on resolving the precise styles and rates of change that will occur over the next century and reconsider the implications for adaption.

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Subsidence?

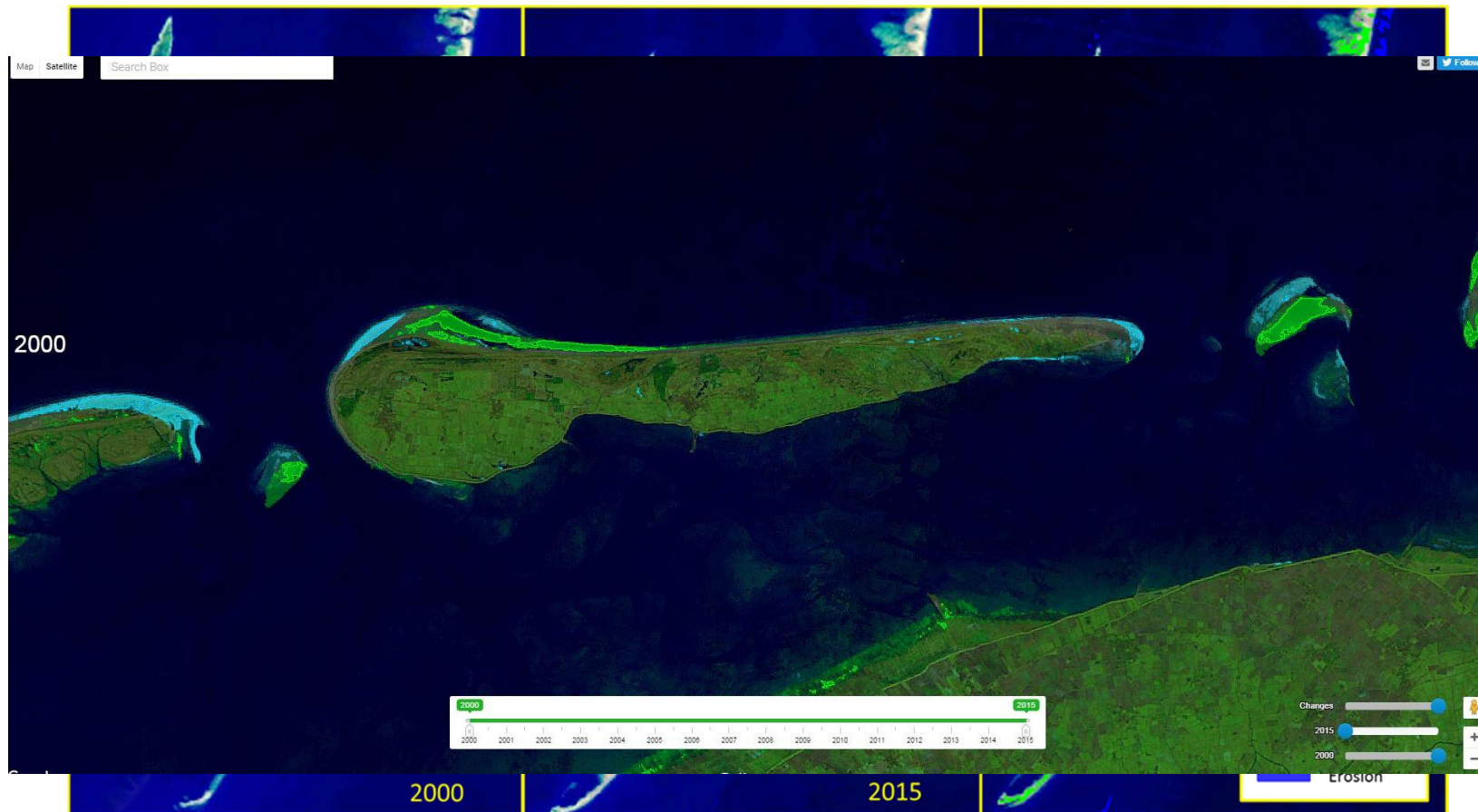
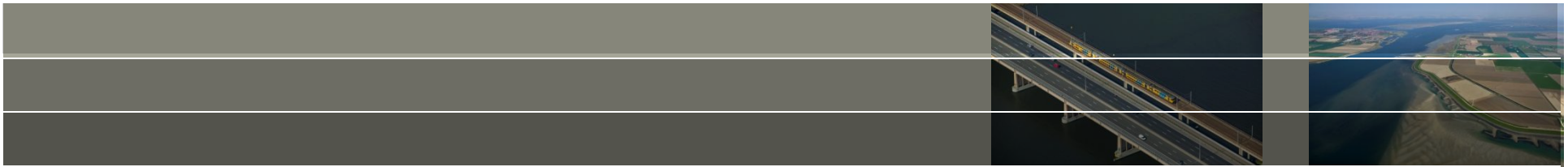
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Sand mining from the beach



Morphodynamics
Morphodynamics
Ameland - Coastal erosion app (Deltares)
Chandeleur Islands - Coastal erosion app (Deltares)

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Other forms of man-made erosion: navigation channel trapping sediment transport

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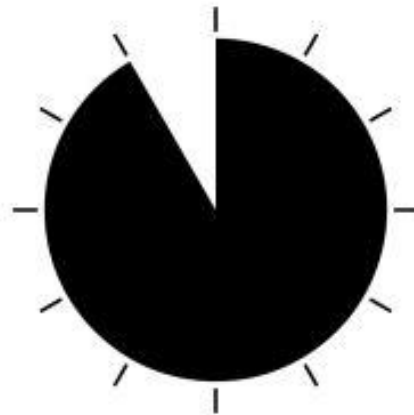


Sub-optimal spatial planning

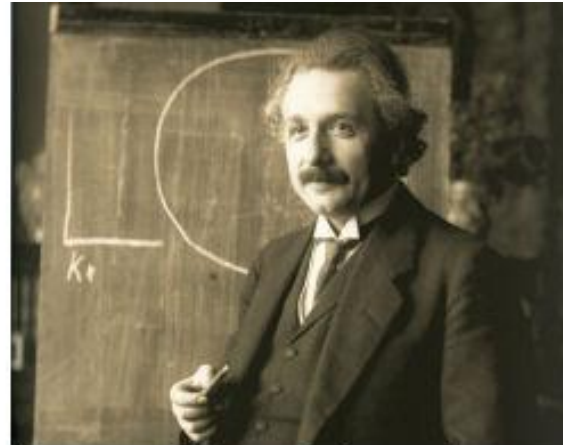
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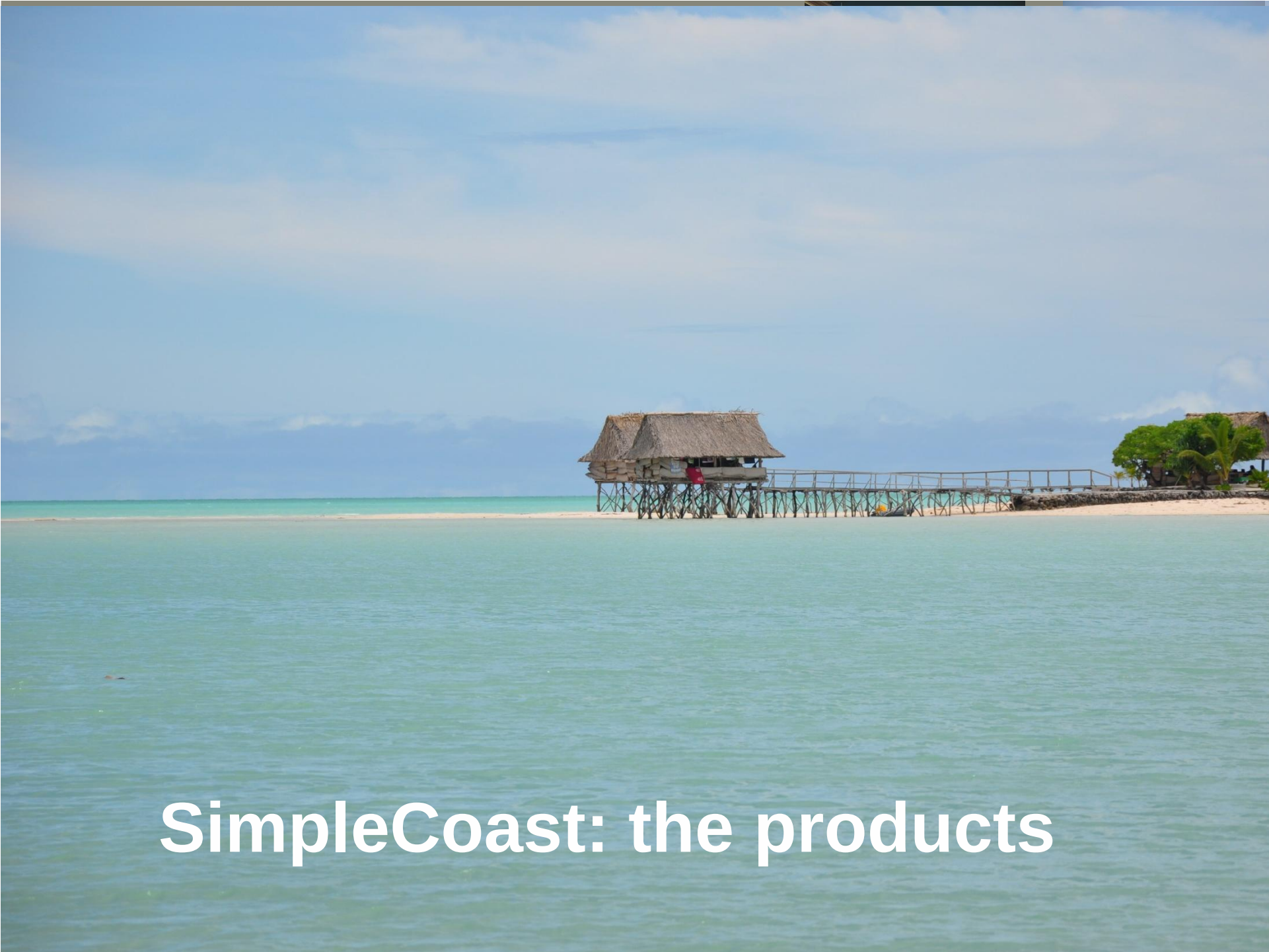


55 Minutes



Albert Einstein

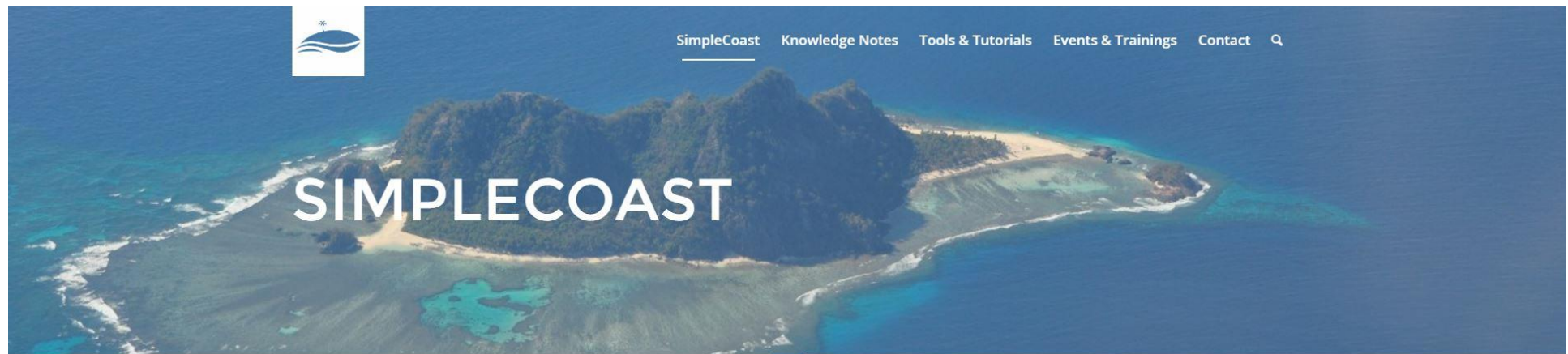
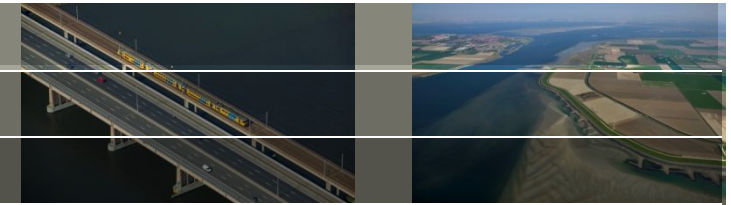
“If I had one hour to save the world I would spend fifty-five minutes defining the problem and only five minutes defining the solution”



SimpleCoast: the products

The website

<http://www.simplecoast.com/>

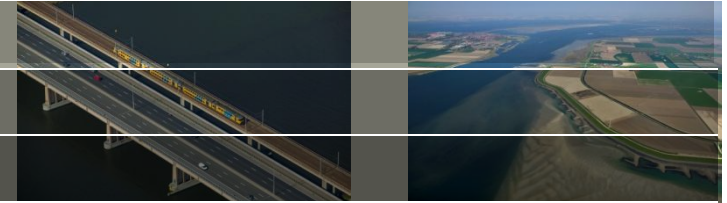


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Knowledge notes



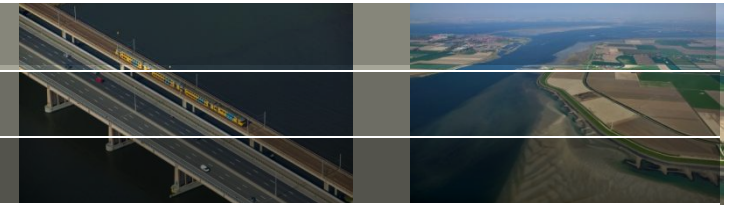
Notes of about 15 – 20 pages on the following topics

- Adaptive Approaches to Coastal Zone Management
- Coastal Processes and Problems
- Data Collection and Monitoring
- Coastal Adaptation Solutions

“Simple and Practical”



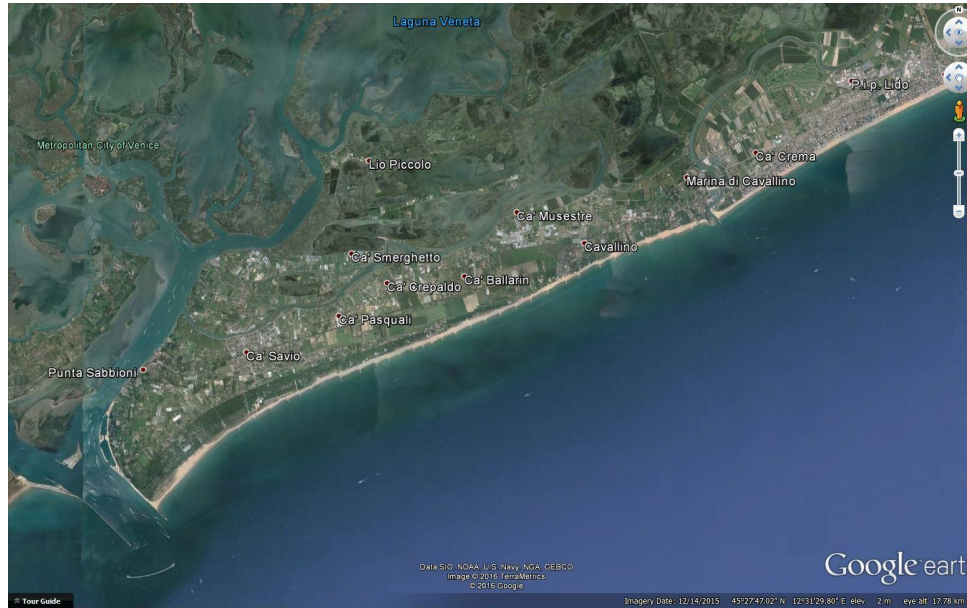
Tools and Tutorials



Tools + tutorials (1 for each tool) including practical examples and applications

Title	Description
Adaptive Coastal Zone Management	Adaptation pathways generator
Flooding	Computation of flood level due storm surge, wave setup and wave runup
Wave parameters	Computation of basic wave parameters
Wave models	Computation of wave height in cross-shore direction
Sediment parameters	Computation basic sediment parameters
Littoral	Computation of net annual longshore sediment transport
Dune-beach erosion	Computation of dune and beach erosion volume during a storm event
Beach nourishments	Computation of a life-time of a beach nourishment
Armour	Computation of dimensions of rocks, stones and concrete elements for coastal protections
River flow and transport	Computation of river flow and sand transport in a river cross-section
Scour	Computation of scour depth near structures
Nature-based flood defenses	Effect of wave attenuation of nature-based flood defences
Coral reefs	Assessment of flooding on low-elevation reef-lined coasts

Example: compute life-time of a nourishment



Venice – Marina di Cavallino

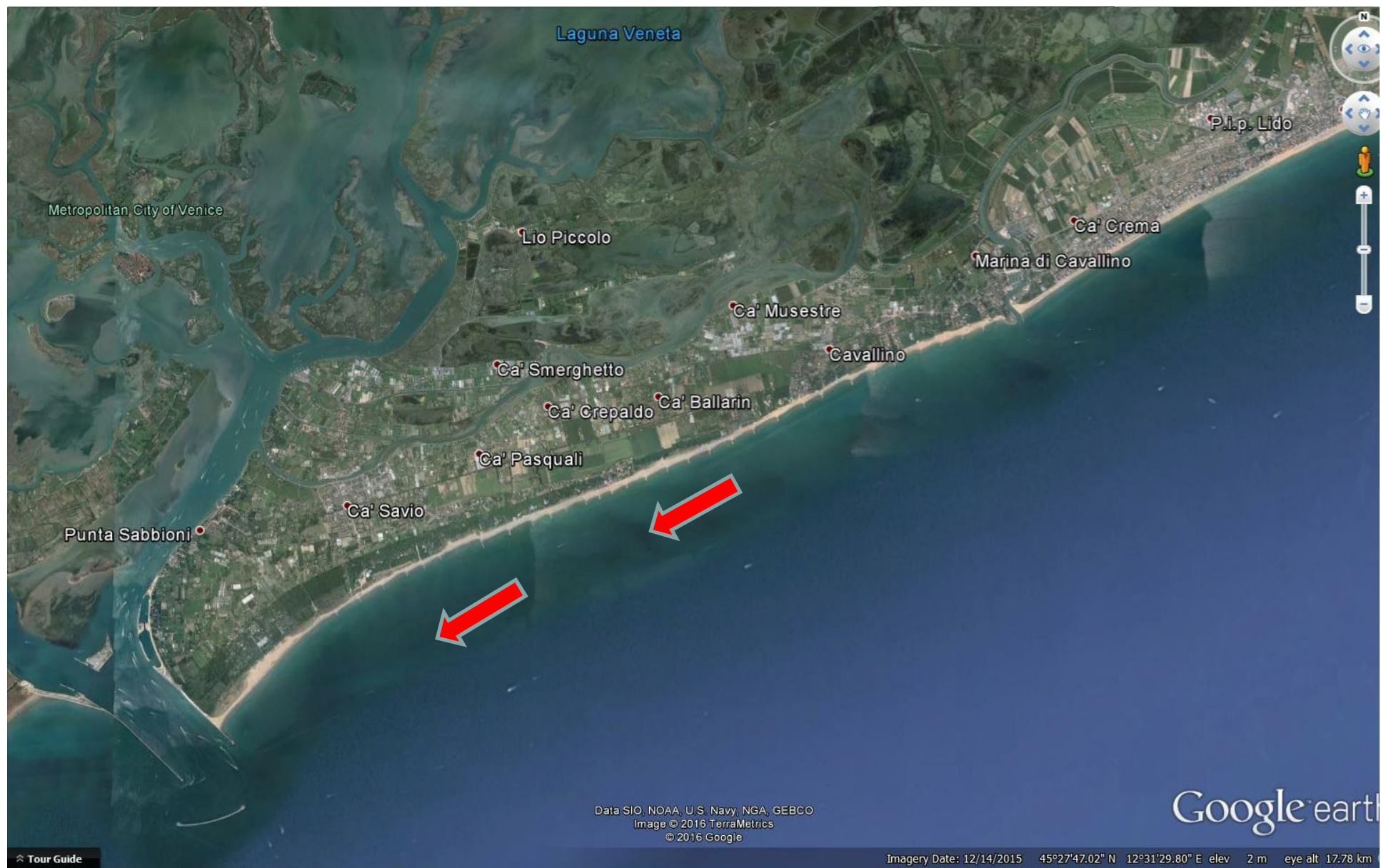
Physical setting:

Tidal range spring tide ≈ 1.1 m

Alongshore sediment transport $\approx 150,000$ m³/year

Average wave height at breaking ≈ 1 m

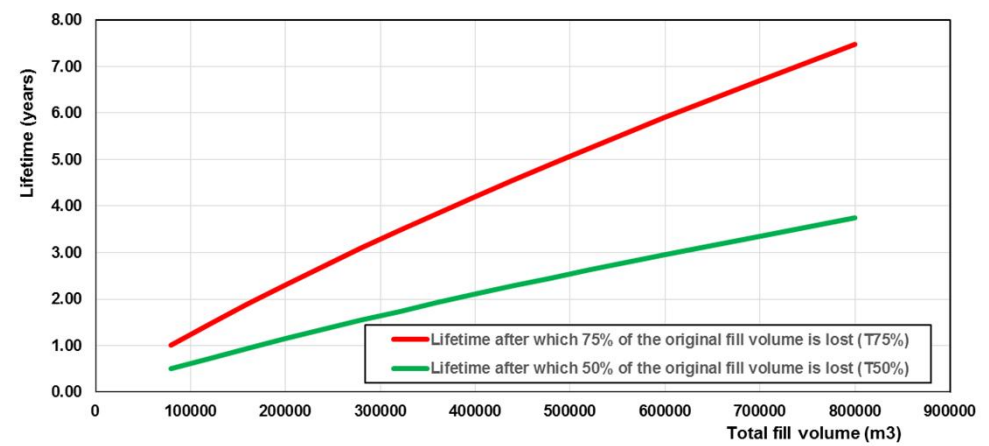
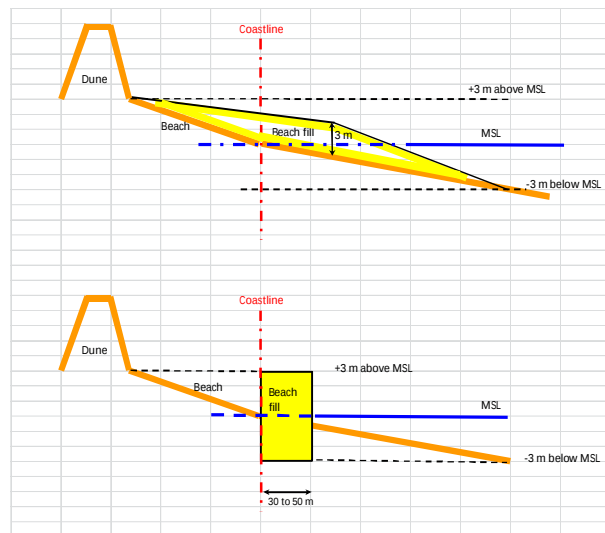
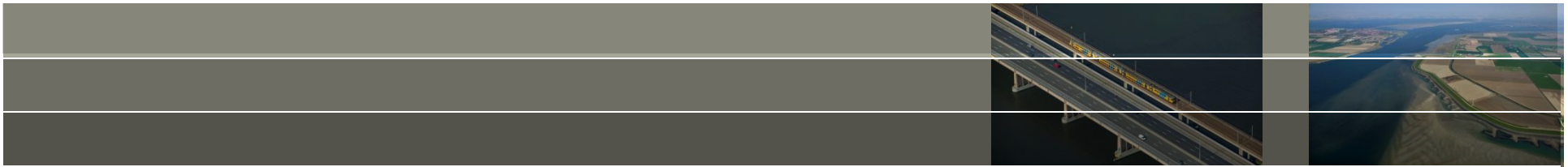
Sediment size ≈ 0.15 mm



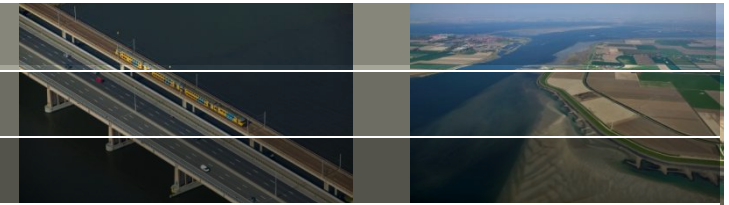
Is the coastline at Cavallino eroding or accreting?
What is the direction of natural alongshore transport?

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Trainings



Coastal Protection and Adaptive Coastal Management - training Session:
São Tomé and Príncipe
12-16 February 2016.

General programme

- General theory on coastal processes with examples from São Tomé
- Field work and data collection (Praia Melão)
- Data analysis
- Numerical modeling by mean of simple tools
- Serious game session: “Adaptive coastal management in small islands”
- Project presentations (in groups)



Get in touch – exchange of experience



[SimpleCoast](#) [Knowledge Notes](#) [Tools & Tutorials](#) [Events & Trainings](#) [Contact](#) [Q](#)

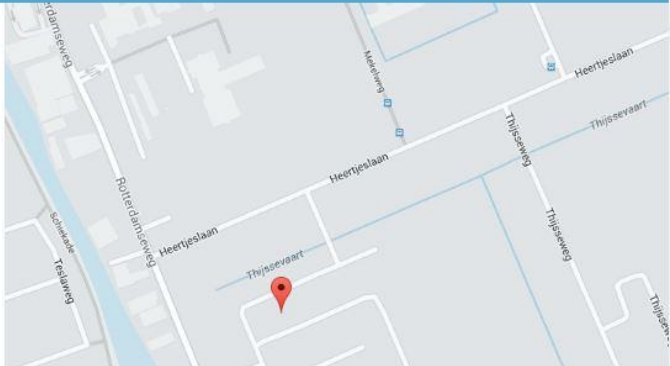
GET IN TOUCH

Contact Details

Name *

E-Mail *

Message *

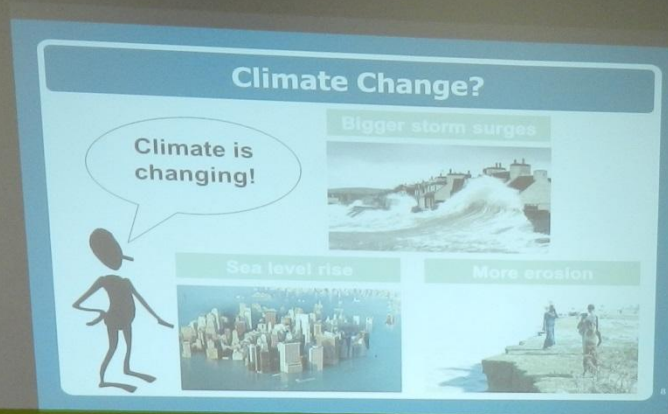


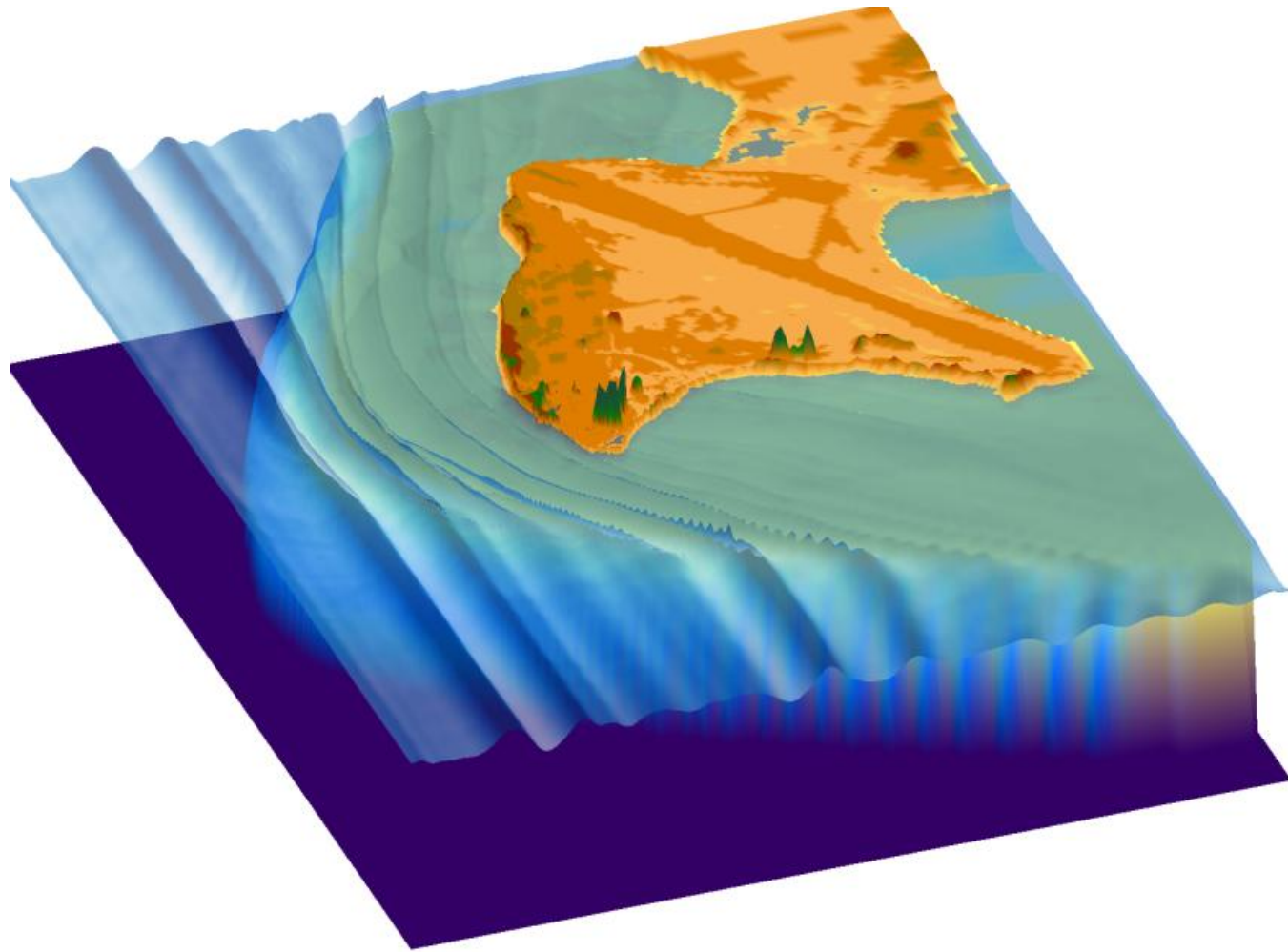
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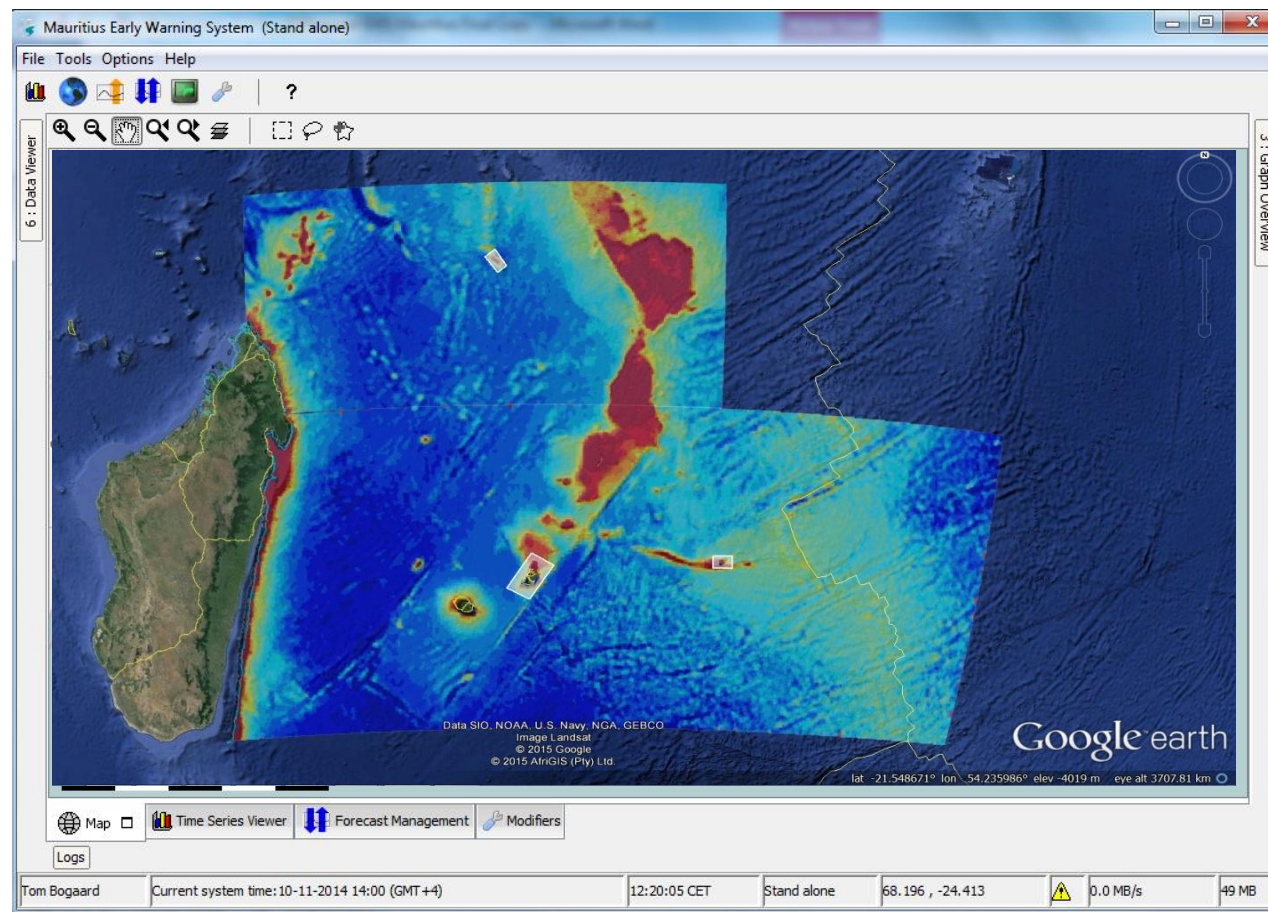
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Dealing with uncertainties in coastal management. Interactive serious game session





Assessment of flooding on low-elevation reef-lined coasts



Early Warning Systems for Small Islands

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Why?

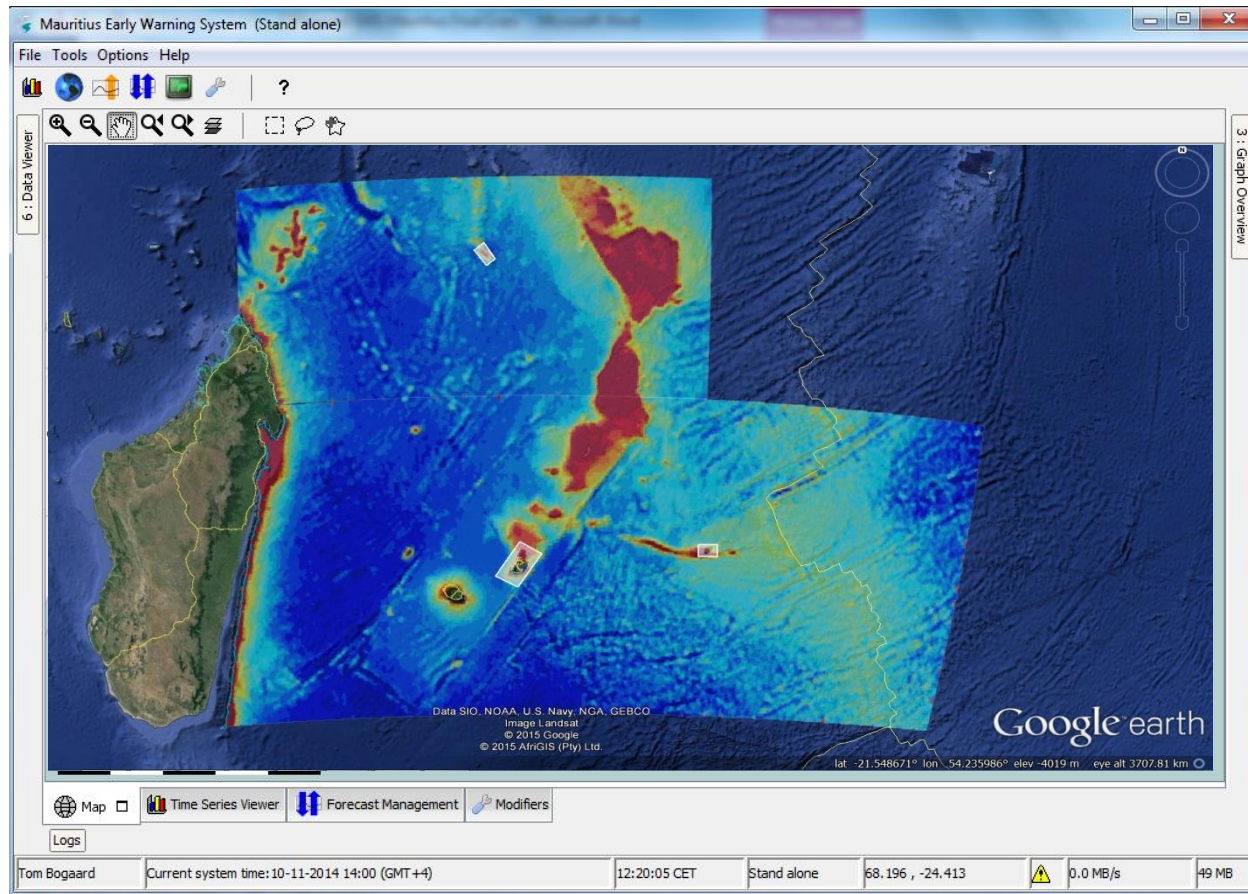
- Storm and hurricane induced surges are a continuous threat to coastal areas across the globe, and are likely to increase due to climate change.
- Investment in the coastal zone will increase the risks in the coastal zone.

What?

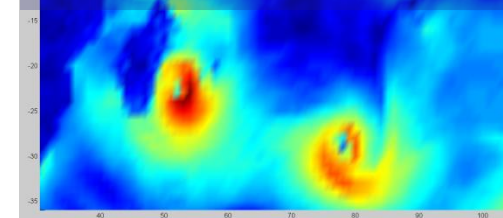
Numerical tide-surge models can be applied to

- 1) assess the impacts and effectiveness of proposed coastal flood protection, before any events occur, and
- 2) provide timely and reliable early warnings before a storm landfall, based on wind and pressure forecasts.

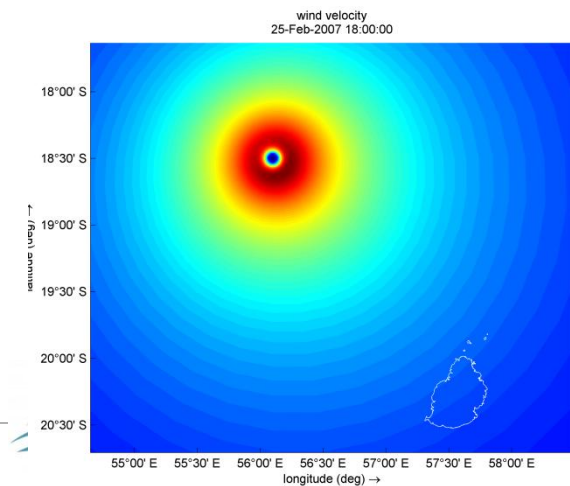
The Mauritius Early Warning System project



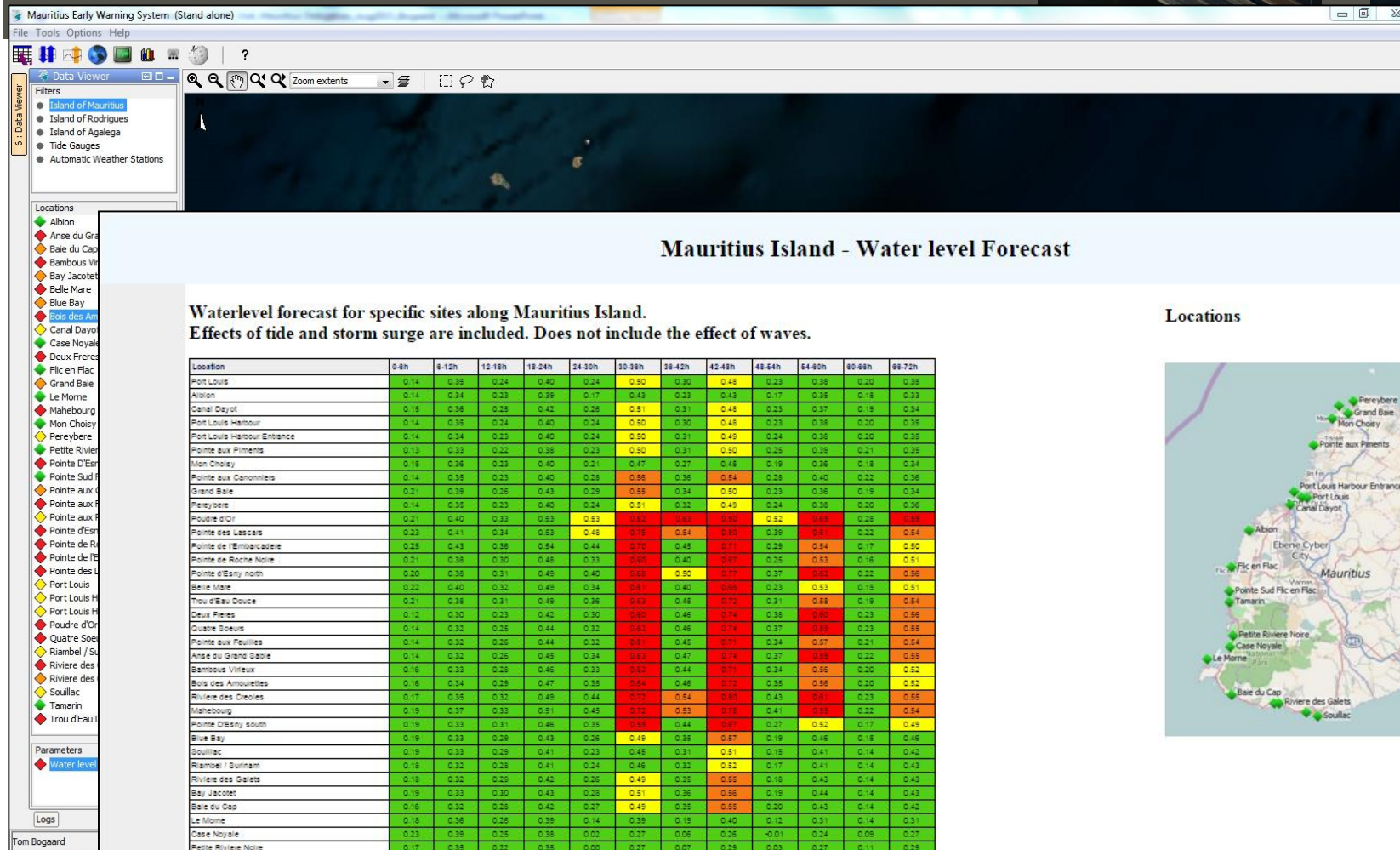
Overall wind and pressure
from NOAA/GFS



Cyclone winds & pressure
based on cyclone
parameter specified
(Holland's model) merged
with the global results



The Mauritius Early Warning System project



Locations

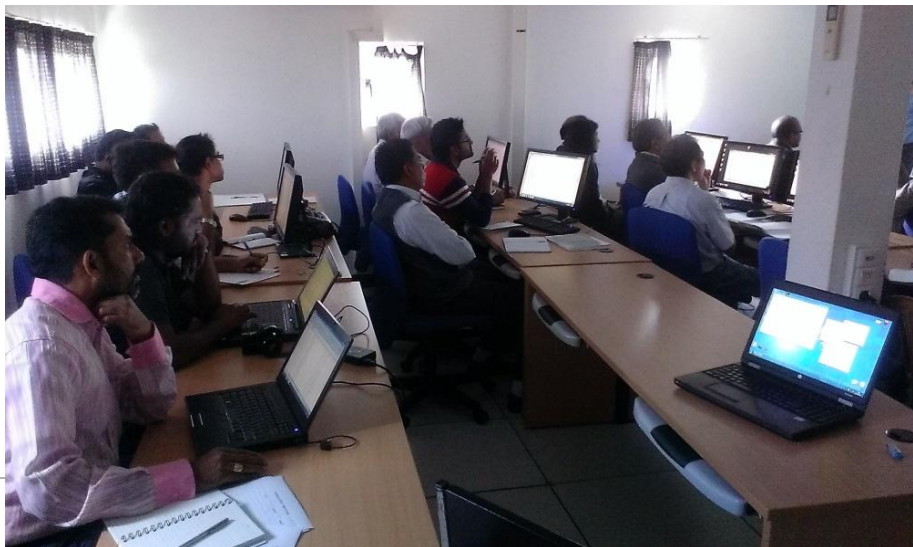


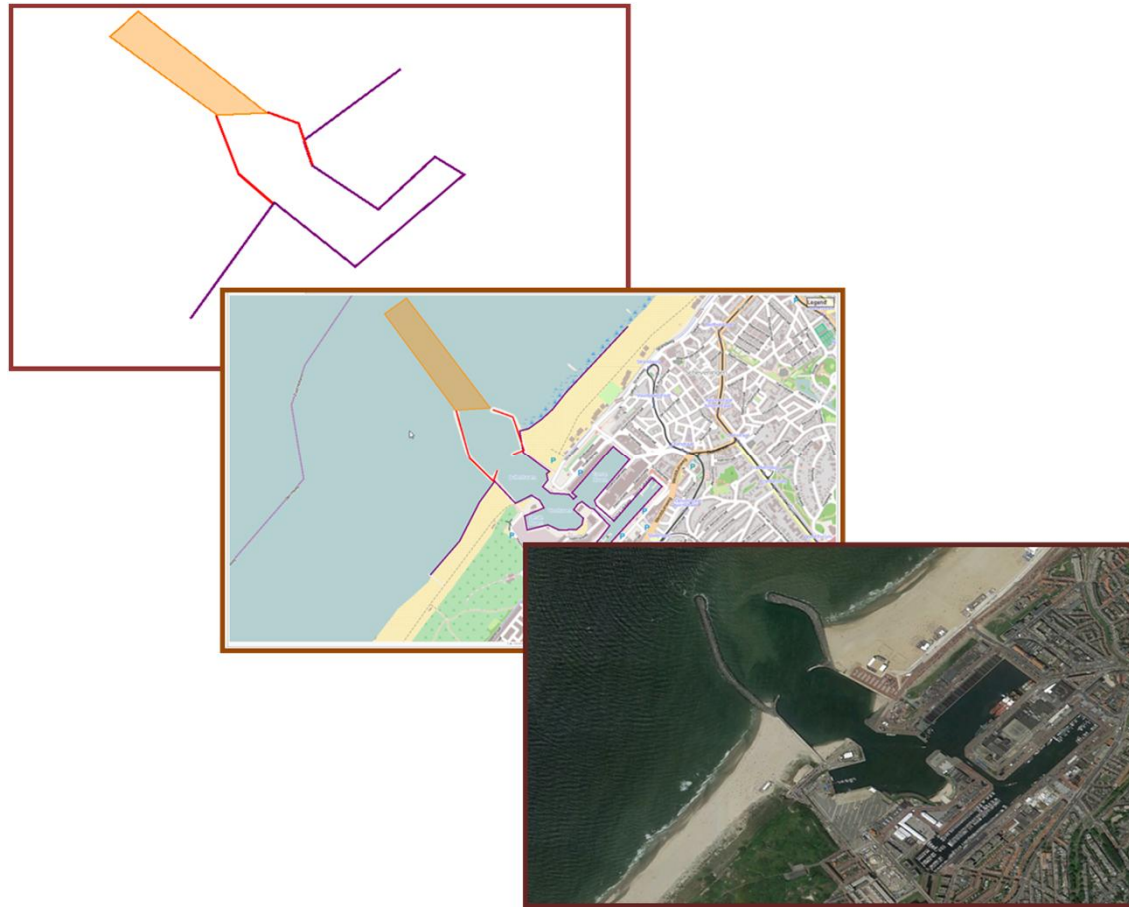
HTML bulletin issued every forecast, one for each island, for easy dissemination / interpretation between Mauritian organizations

The Mauritius Early Warning System project



Several weeks' training in Mauritius by Deltares specialists,
also a two-week workshops to Mauritian staff, in Delft

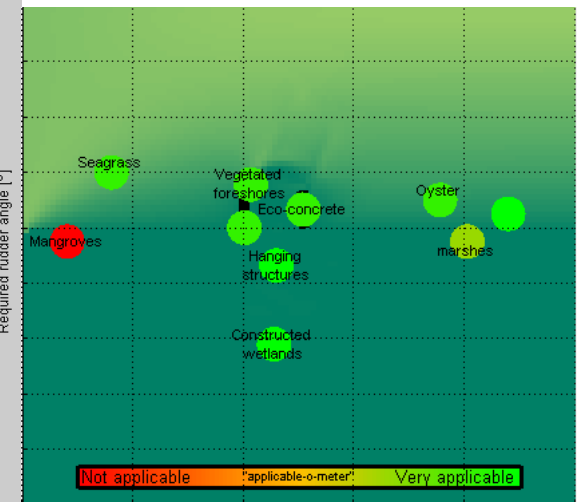
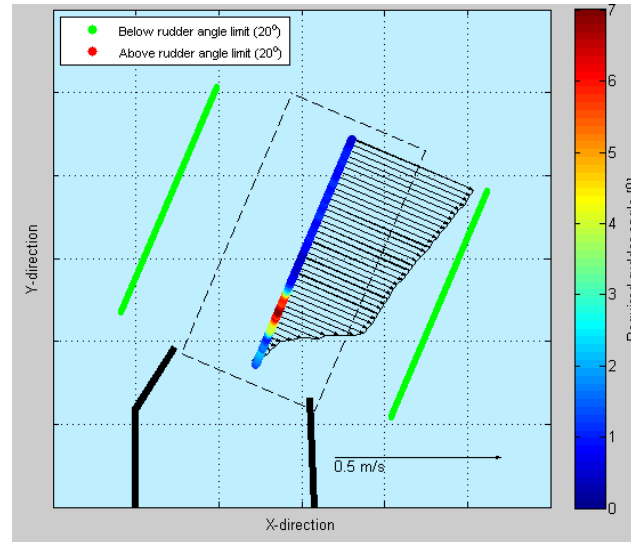
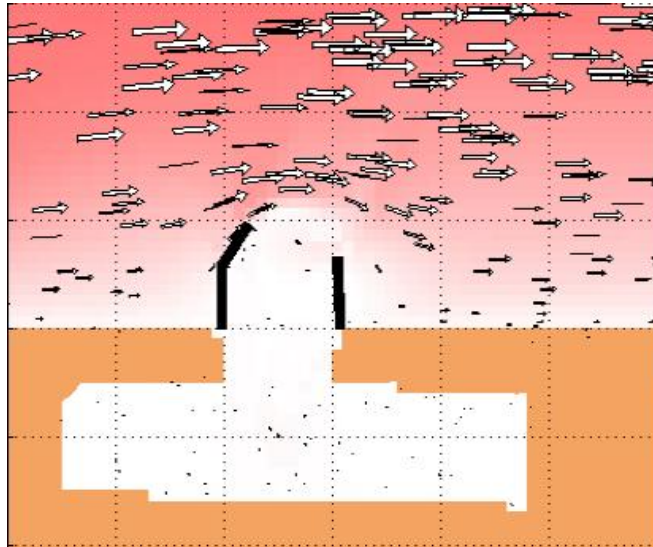
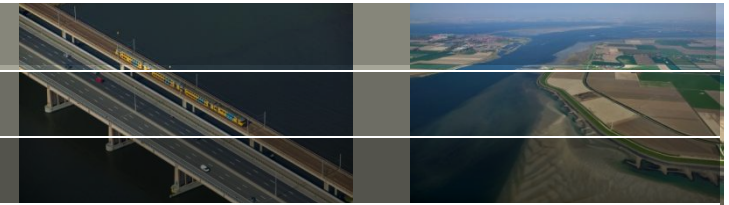




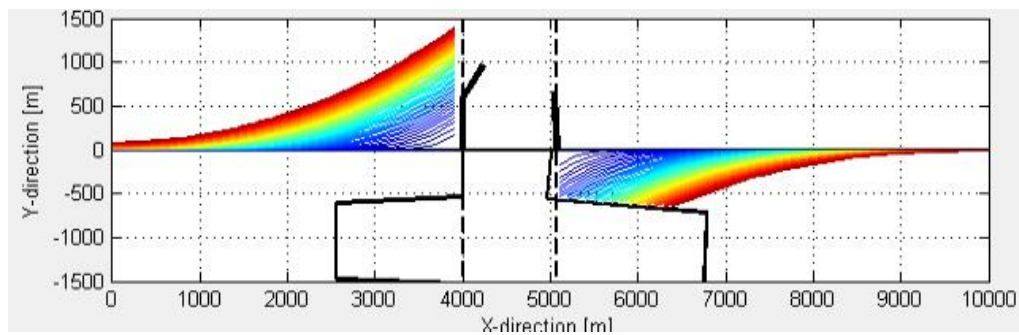
Coastal design support tools

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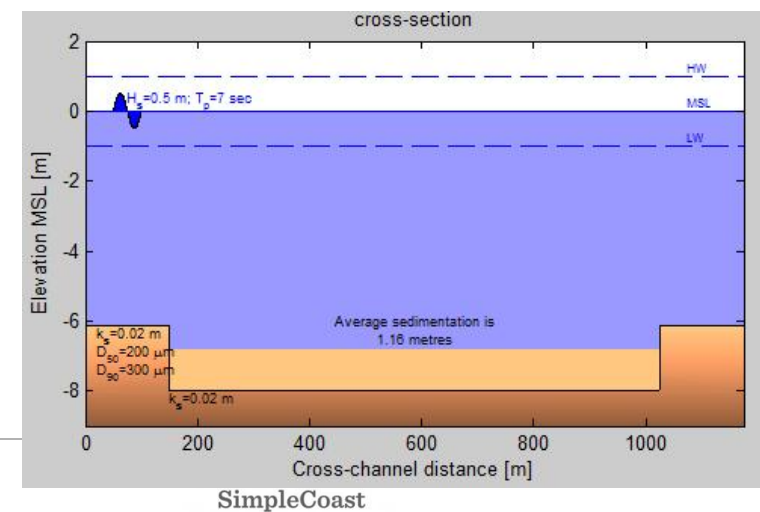
Example/screeshots



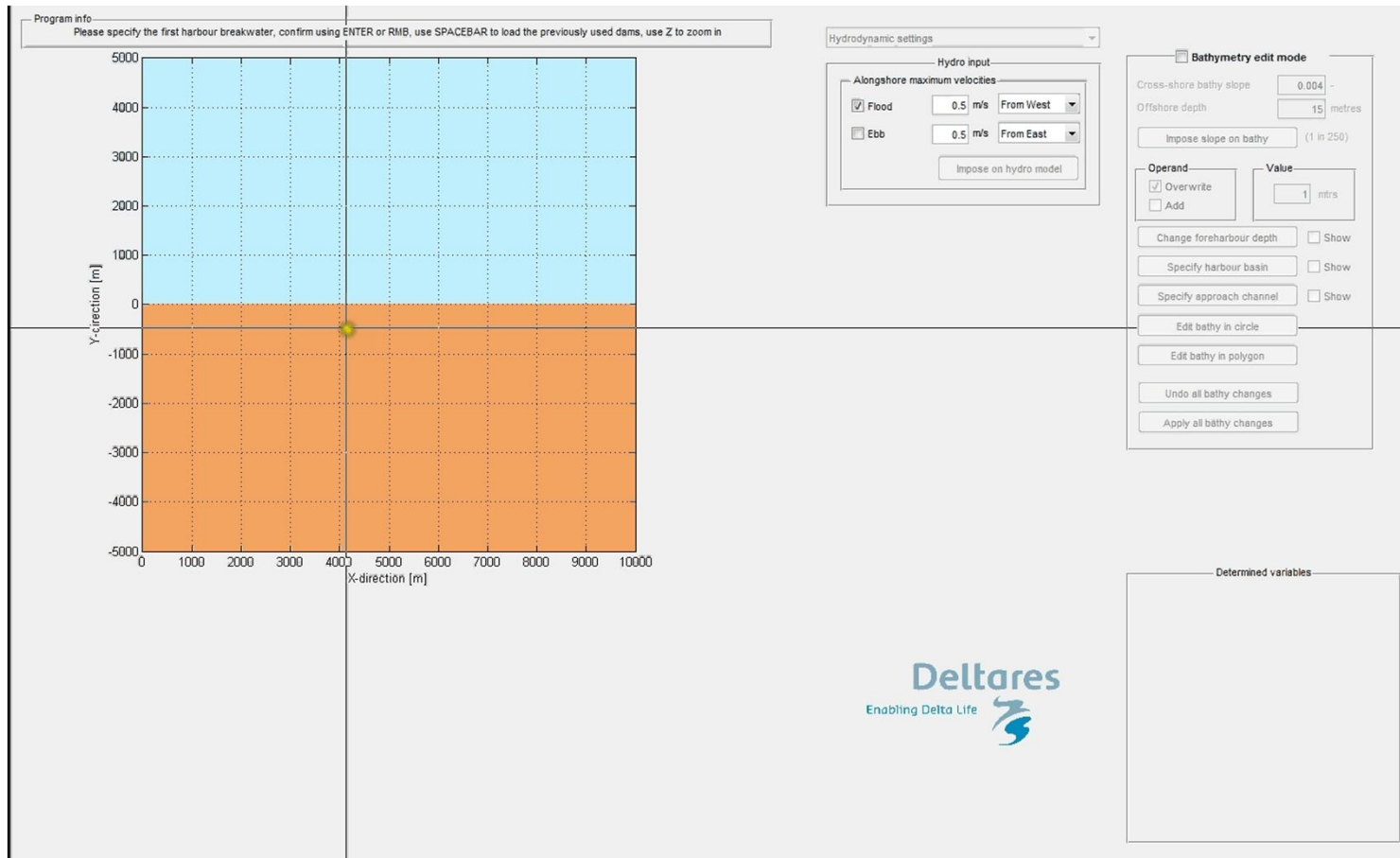
Coastline evolution



Channel sedimentation



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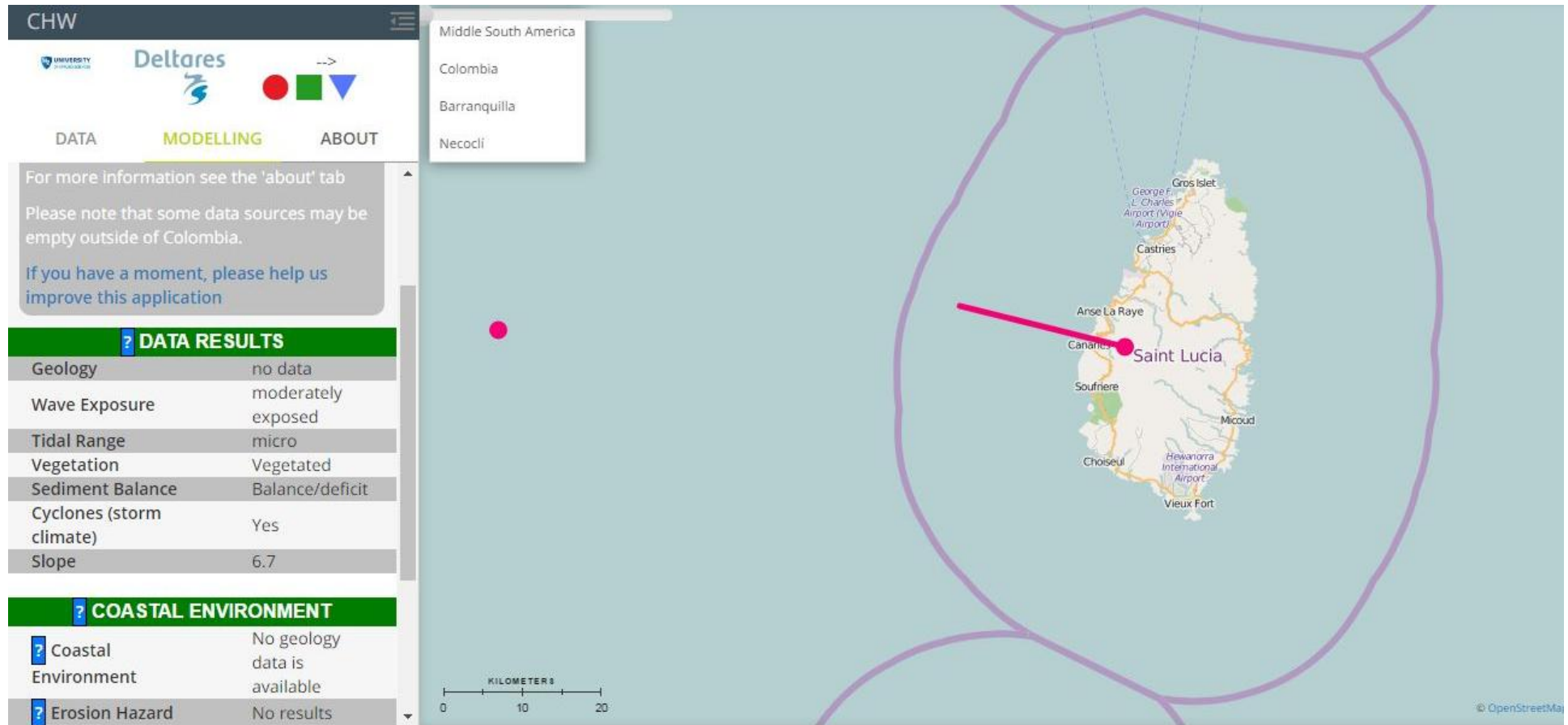
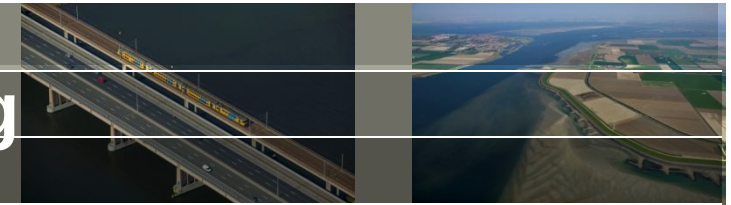
Coastal design support tools for small islands

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Open data & Online modelling



Coastal hazard wheel system

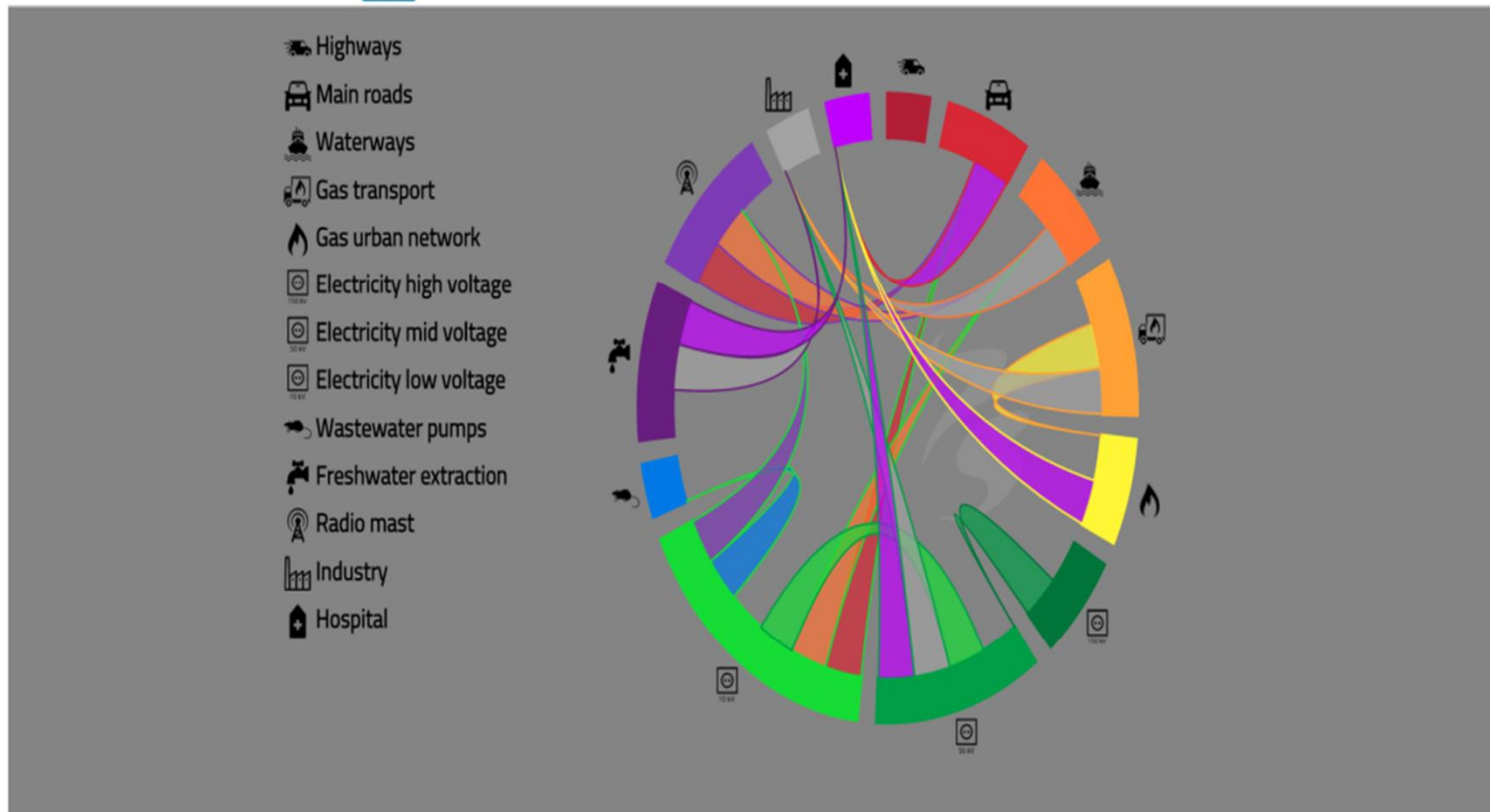


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Circle (Deltares)



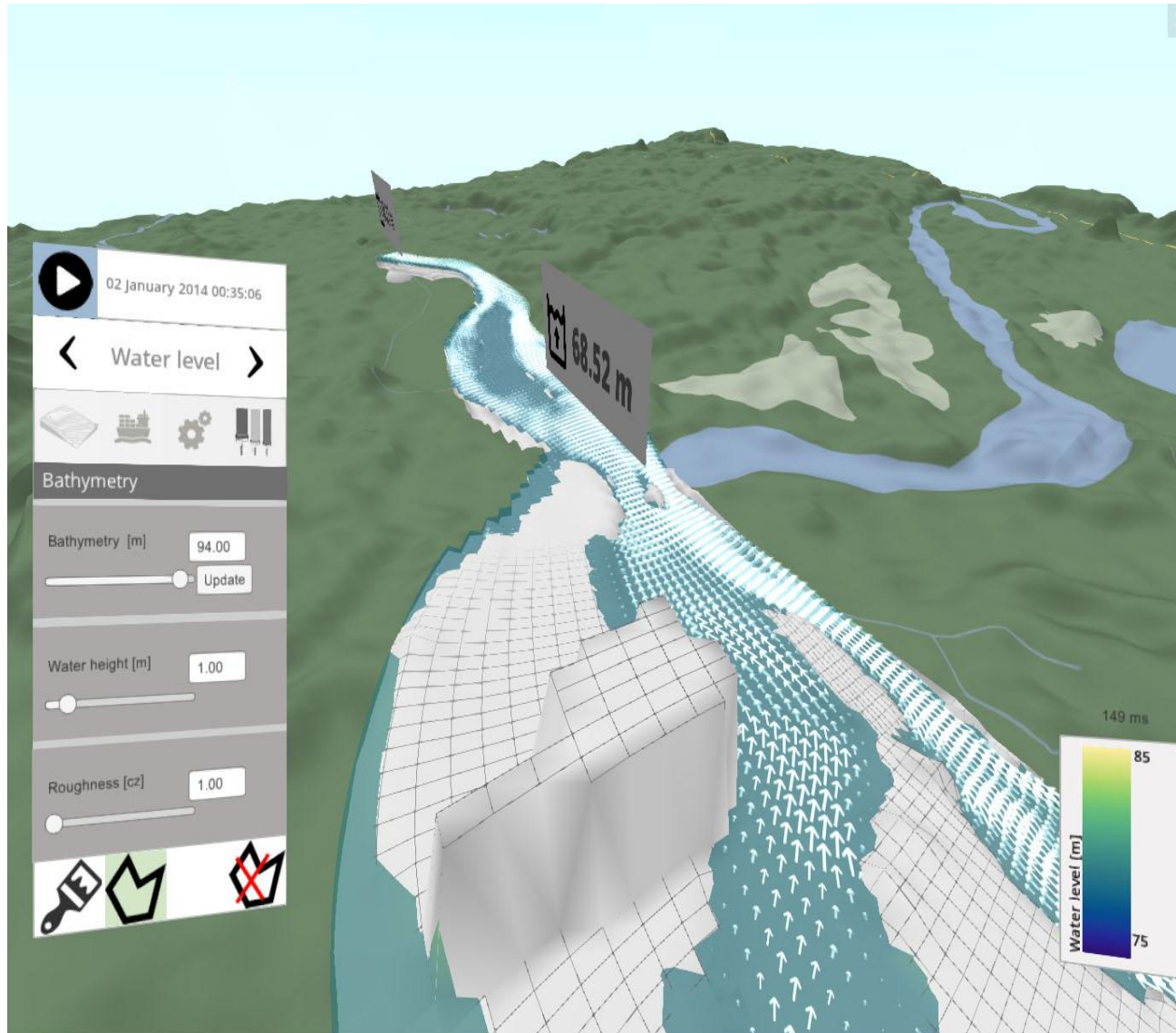
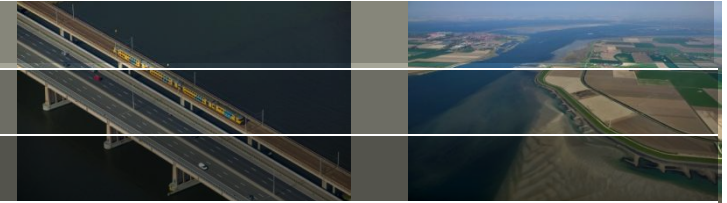
Circle - Critical Infrastructure: Relations and Consequences for Life and Environment



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Enabling Delta Life

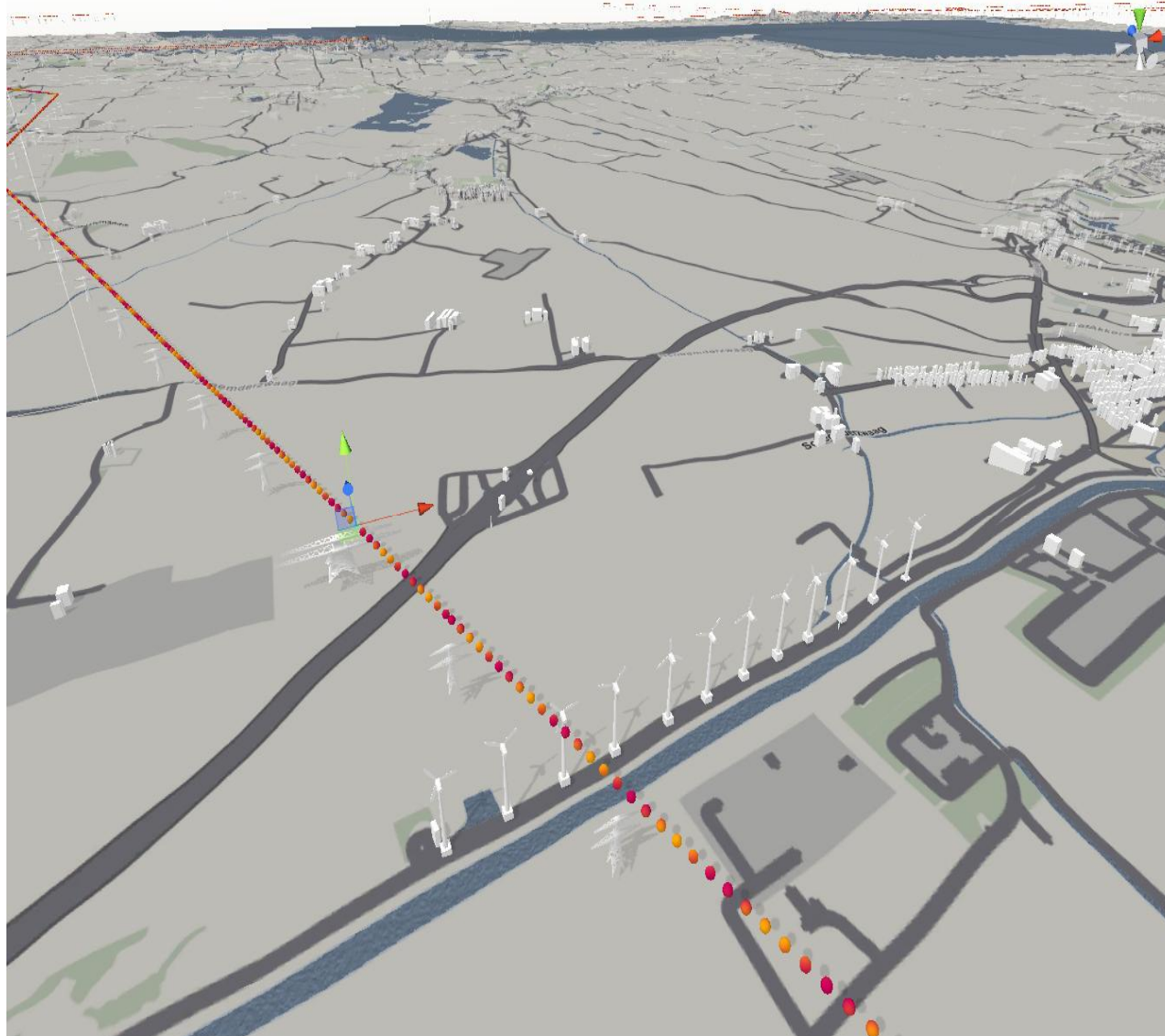
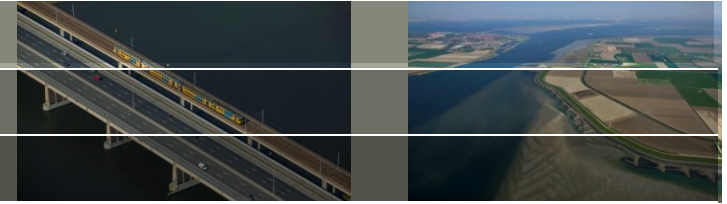


Circle (Deltares)



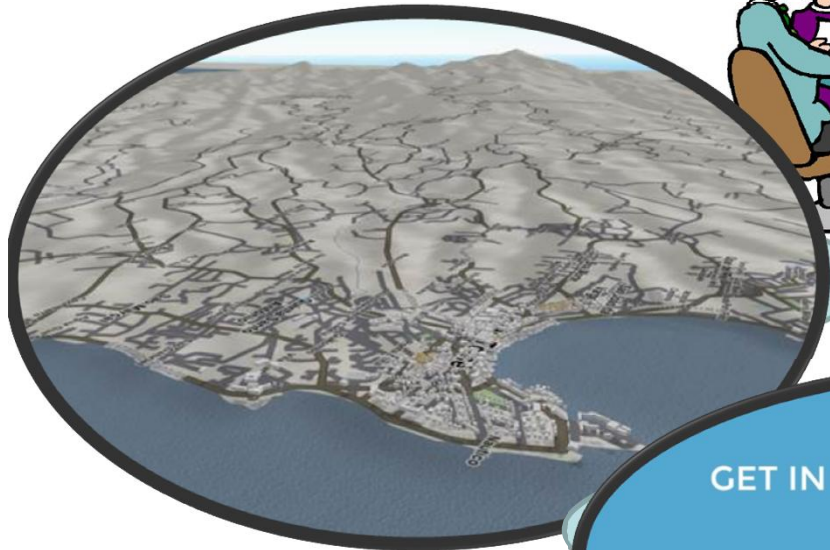
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Circle (Deltares)



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Discussion and feedback from the audience: the next steps



GET IN TOUCH

Contact Details

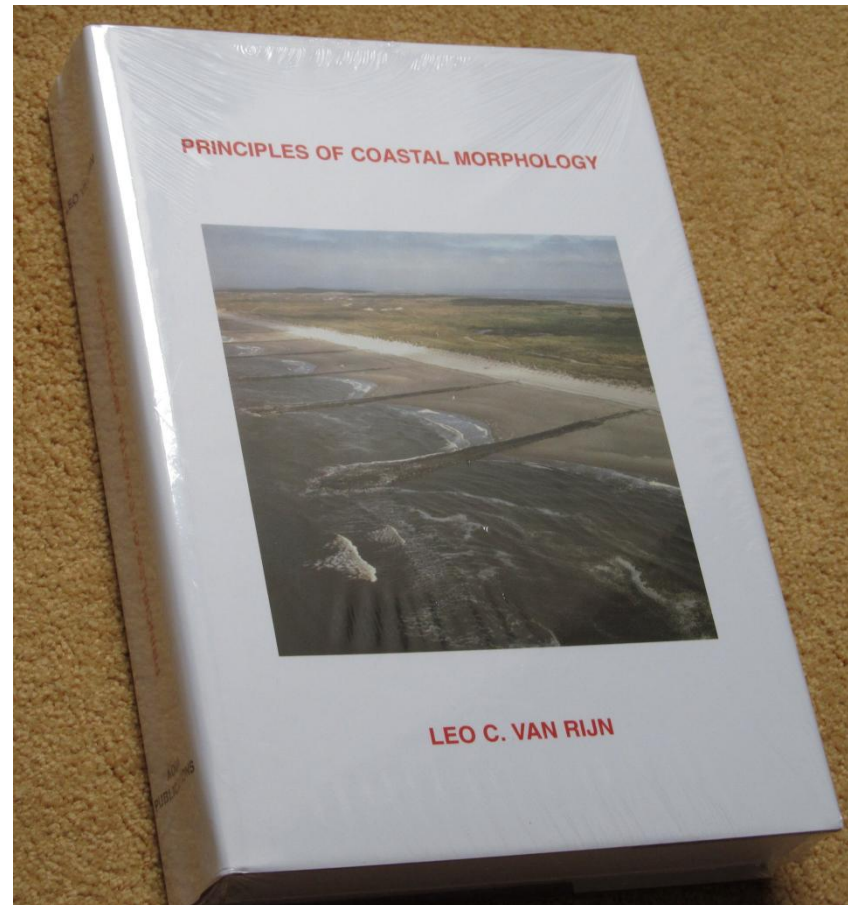
Form fields for contact details, including a name field and an email field.



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Deltares



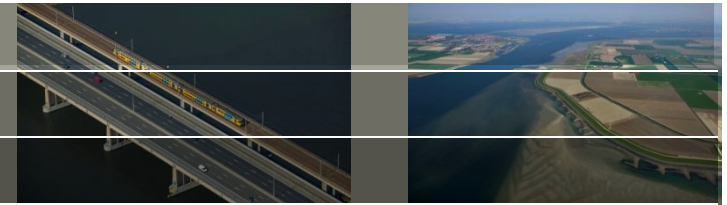
30 copies available for the most motivated students!

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Acknowledgments



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**“Is there anyone
who can watch without fascination the struggle for
supremacy between land and sea?”**

(Bascom, 1964)

THANK YOU

Alessio.giardino@deltares.nl

