Supporting coastal management from space.

強靭性 革新 伝統

UNDERSTANDING RISK GLOBAL FORUM 2024

TRADITION • INNOVATION • RESILIENCE

Speakers:

Martin Jones

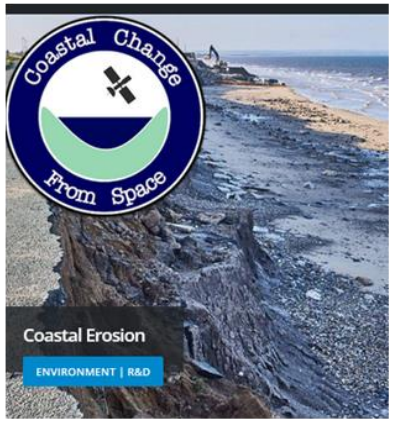
FIMarEST, CMarSci,

IHO Cat A Hydrographer

https://coastalerosion.co.uk

Logos:

What ARGANS brings to support coastal planning



International partners

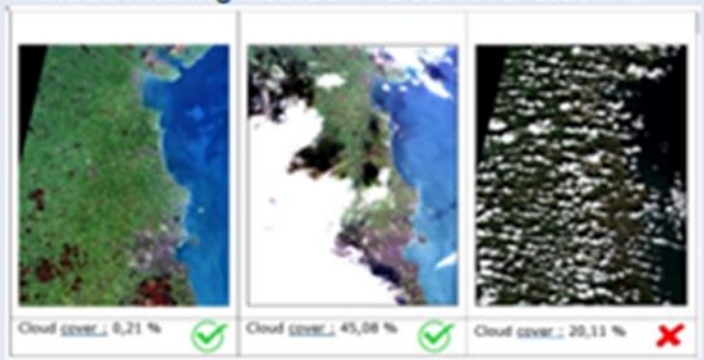
A national capability

- Based on an EC project the GB coast was mapped.

Satellite Derived Shoreline process

1. Preprocessing

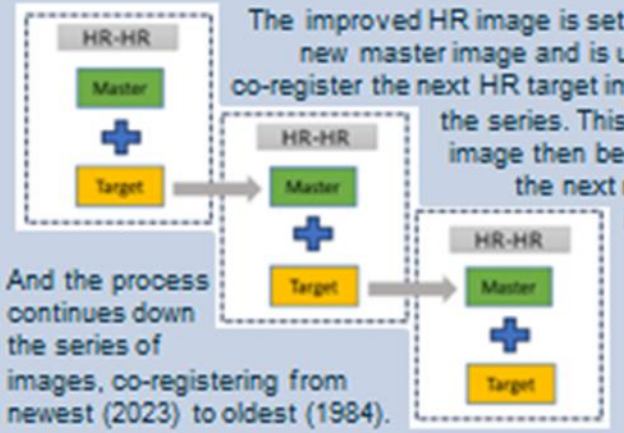
Ensuring all suitable satellite images are collected.
Cloud filtering method – Percent over coastline.



2. Geolocation

Tie points generated for the Master and 1 Target image. Spatial shifts are calculated for each tie point then applied to target image increasing its positional accuracy: ± 2m
These are filtered based on pixel value similarity to ensure only reliable shifts between the two images are applied.
(Yellow = accepted and Red = failed)

3. Co-registration



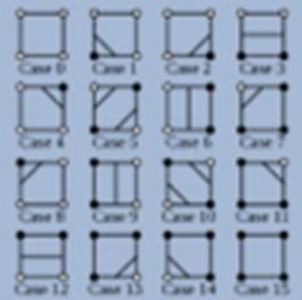
The improved HR image is set as the new master image and is used to co-register the next HR target image in the series. This target image then becomes the next master image.

And the process continues down the series of images, co-registering from newest (2023) to oldest (1984).

4. The Waterline Processor

Generation of vector waterlines per satellite image.

(a) GDAL Marching Squares Algorithm:
Allows for interpixel line delineation generating smoother more accurate waterlines.



(b) Adaptive Thresholding:
While testing BNDVI, GNDVI and NDVI, the range is narrowed to remove noise. This allows for the best index to be identified and used on a per site/AOI basis.

(c) Quality Control Metrics:
Waterlines are graded based on structural properties which allow for a more vigorous visual analysis to be carried out, ensuring only very accurate waterlines are passed through to The Shoreline Processor.

QC	
0-20	V. Low Con.
20-40	Low Con.
40-60	Fair Con.
60-80	High Con.
80-100	V. High Con.

5. The Shoreline Processor

The waterlines are converted into theoretical shorelines using auxiliary data collected on slope, tide height, mean sea level height, and the land-sea bearing at the sensing time. The shift direction is perpendicular to the waterline, determined by the direction to closest point of a 100m buffer to avoid any shifts overlapping. These can then be used to create a time series.

Improved coastal erosion & flood risk assessments for areas prone to climate change adversity

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Himeji+

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2:00 pm to 6:00 pm

Room 404

Speakers:

Martin Jones

Professor Kwasi Appeaning Addo

Anne-Laure Beck

Debashish Paul Shuvra

Mathijs van Ledden

Dzung Huy Nguyen

Logos:

ARGANS

UNIVERSITY OF GHANA

WACA West Africa Coastal Areas Management Program

Monitoring Coastal Trends in Ghana

ARGANS

British Geological Survey

THE WORLD BANK
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indra

ACECoR

RESILIENT COASTLINES RESILIENT COMMUNITIES
Annual Report 2020

WACA
WORLD BANK GROUP

ARUA-CD

AKENTEN APPIAH-MENKA UNIVERSITY
of Skills Training and Entrepreneurial Development

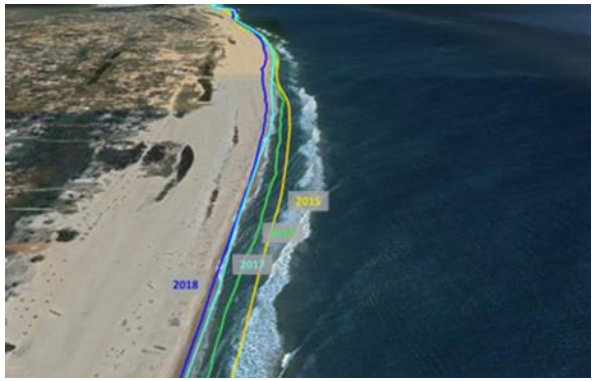
What can be done: A differentiation between:

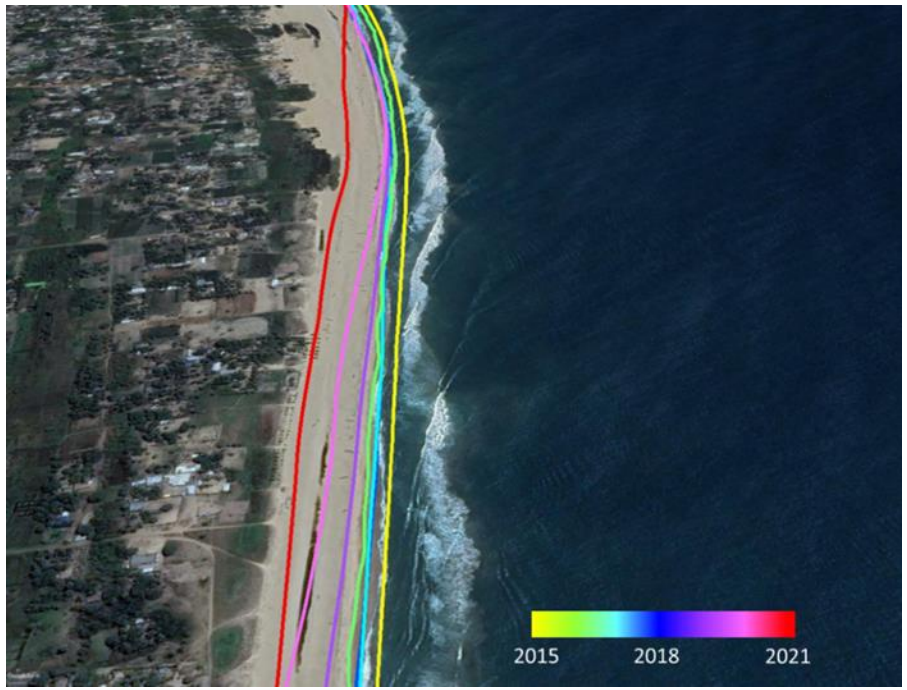
- Natural Causes of erosion and manmade induced causes.
- Seasonal changes and long term structural erosion.

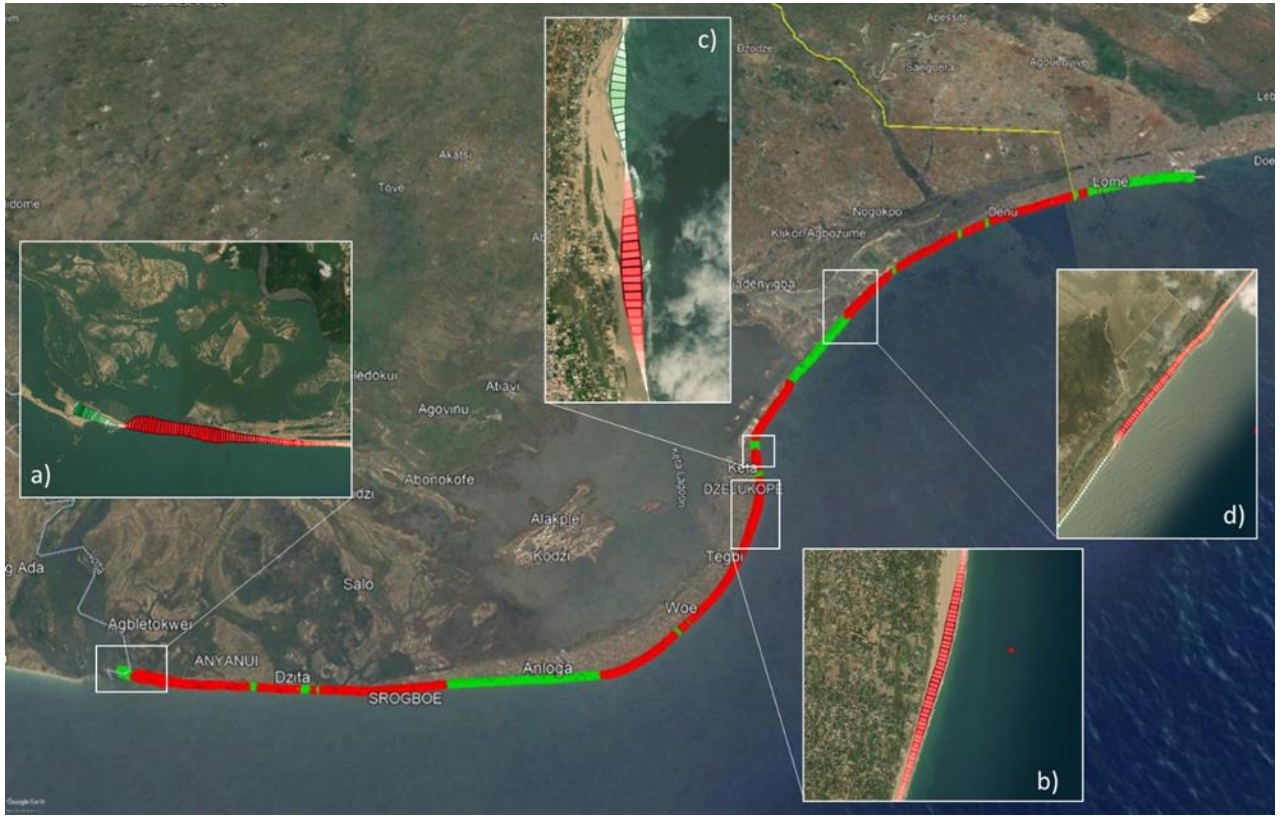
How we do that?

- By delivering a large data set that has both high temporal resolution and time range (1980-2020)

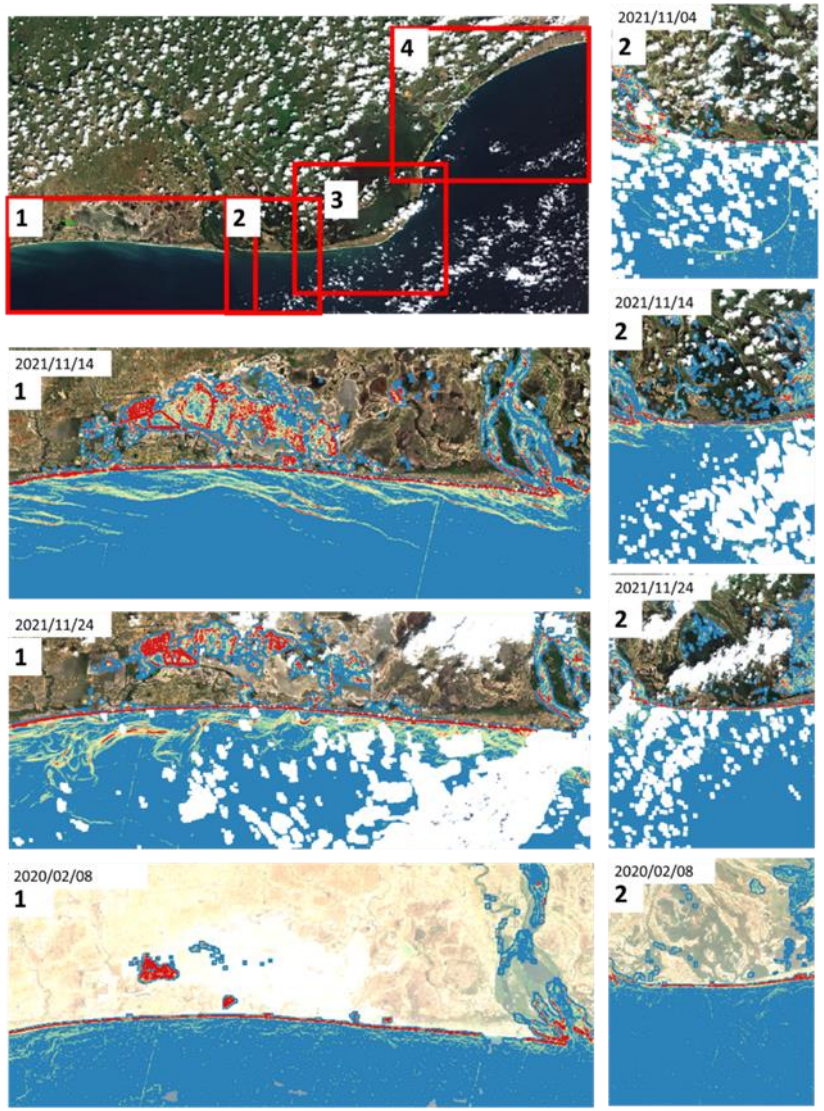
Building upon traditional shoreline indicators



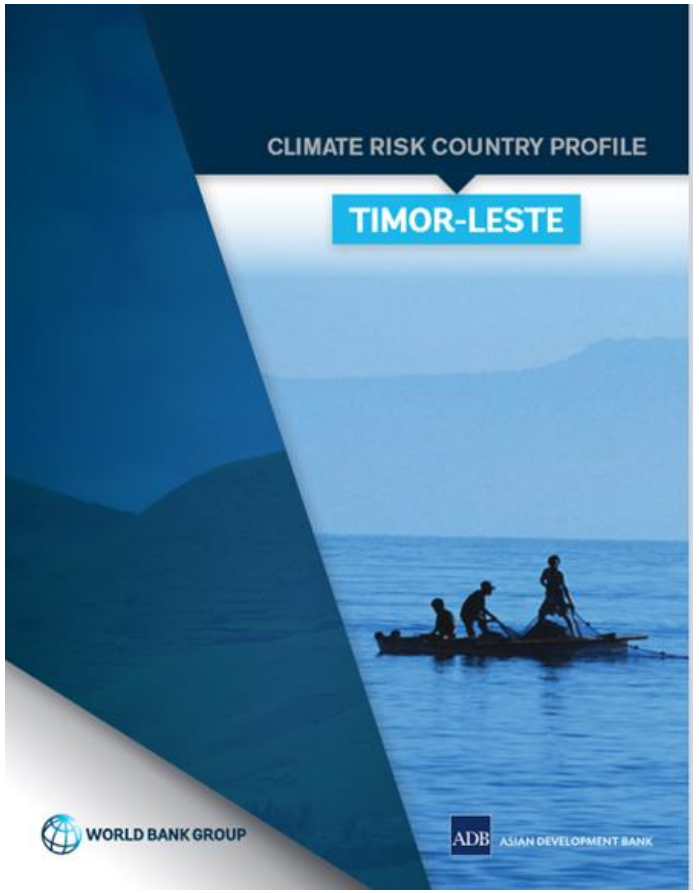




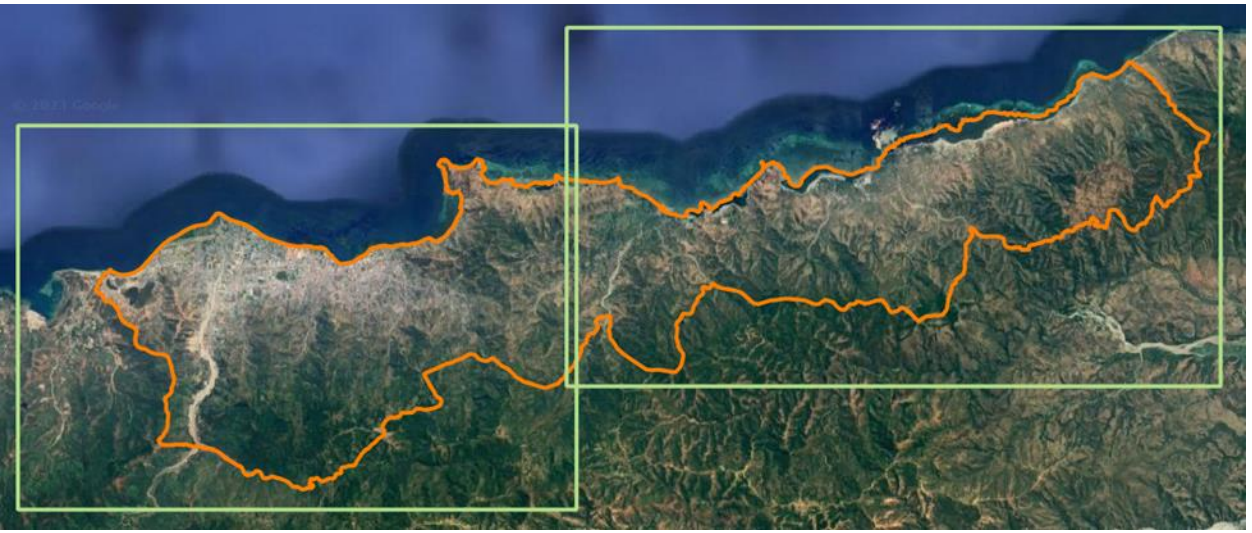
Factors influencing coastal erosion.



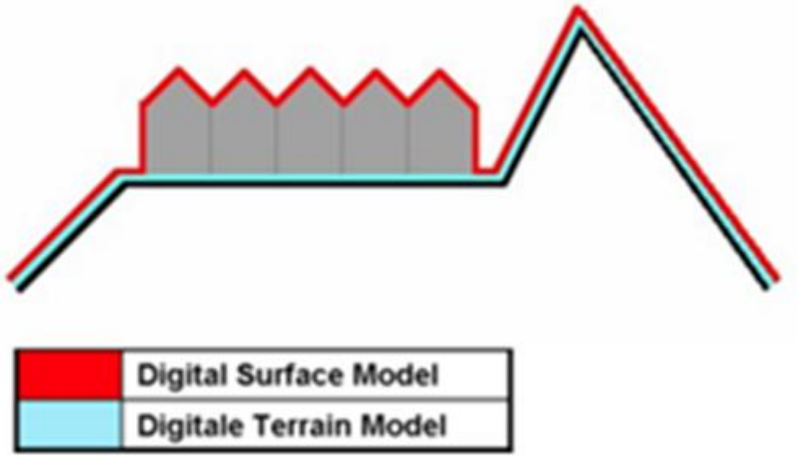
Coastal City Flood modelling East Timor

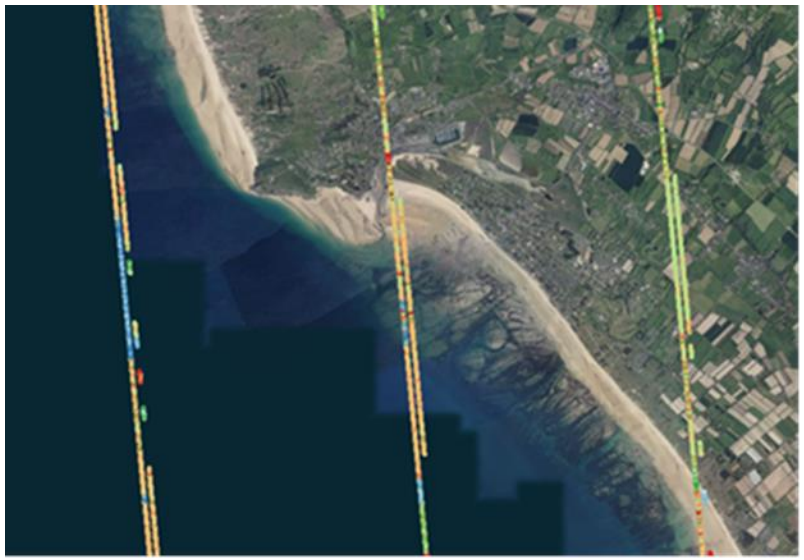


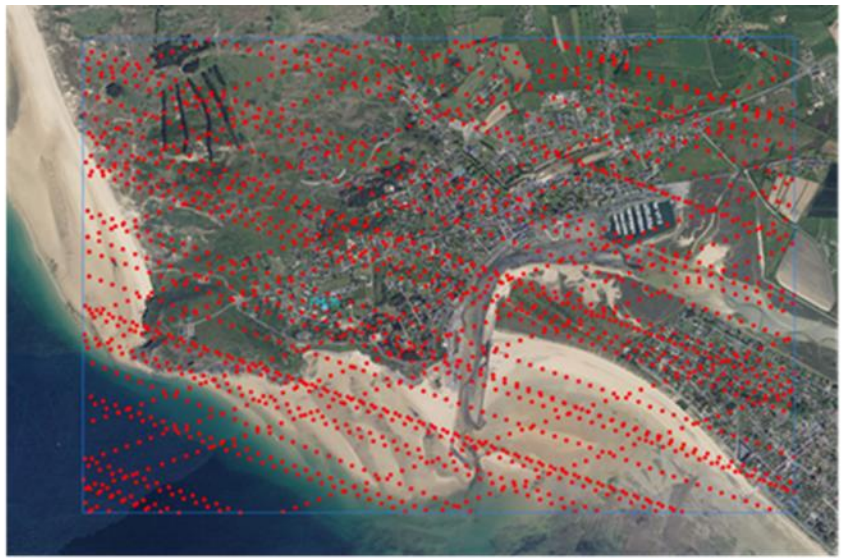
1. **What we think is needed – a better and more accurate understanding of how seawater flows through cities (in storms and with SLR)**
2. **How we can achieve this – by Terrain Model Improvement, terrain classification and object identification to provide drag, absorption and flow bespoke to a city.**

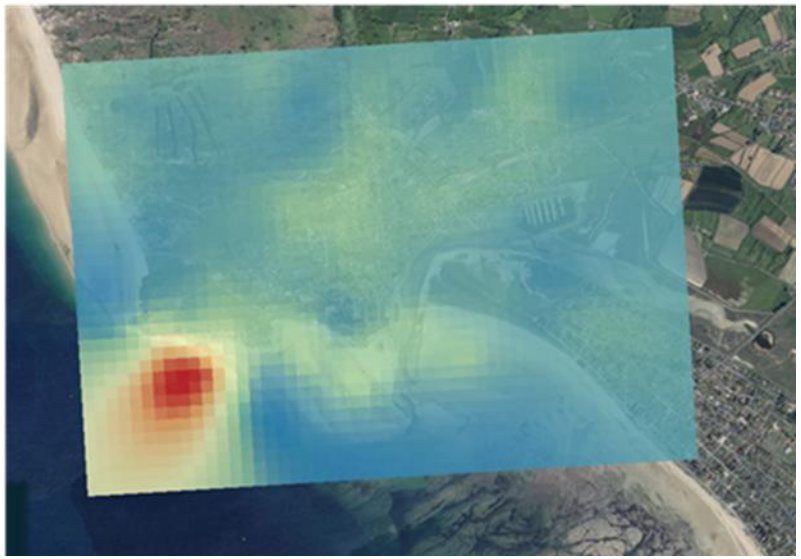


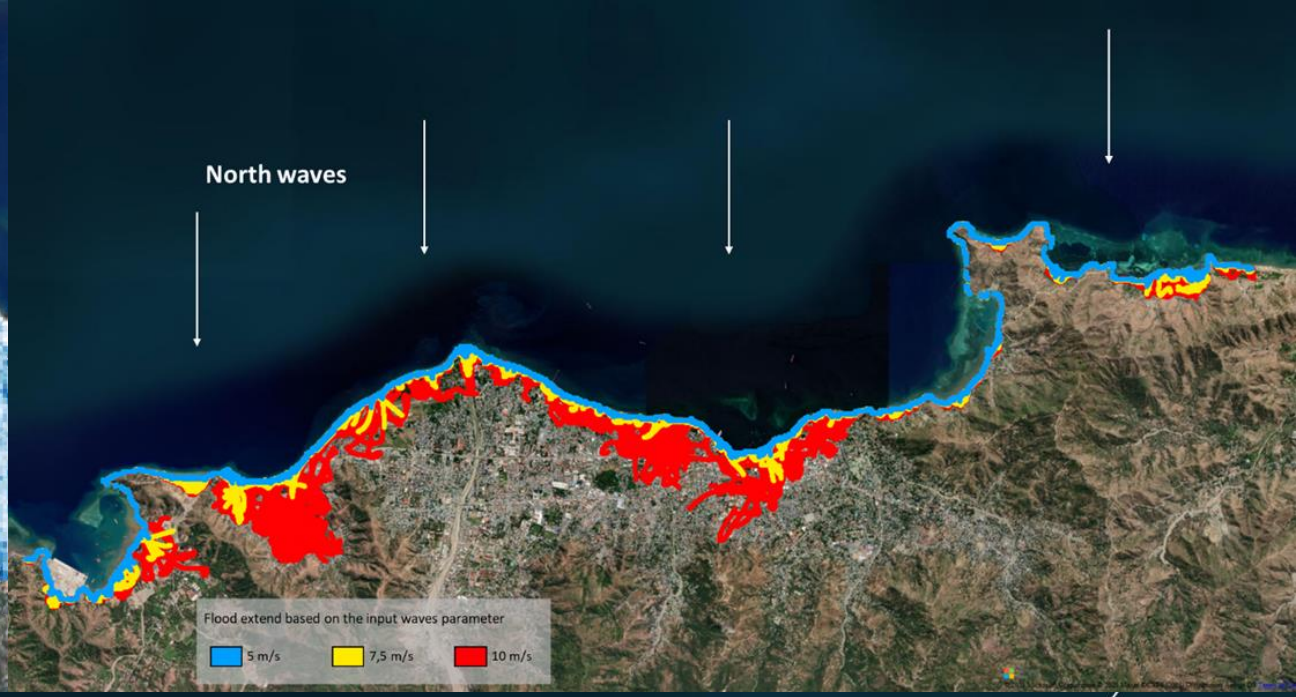
We need to understand the ground shape (DTM) and the nature of the ground in so much as how it will affect the flow of water.

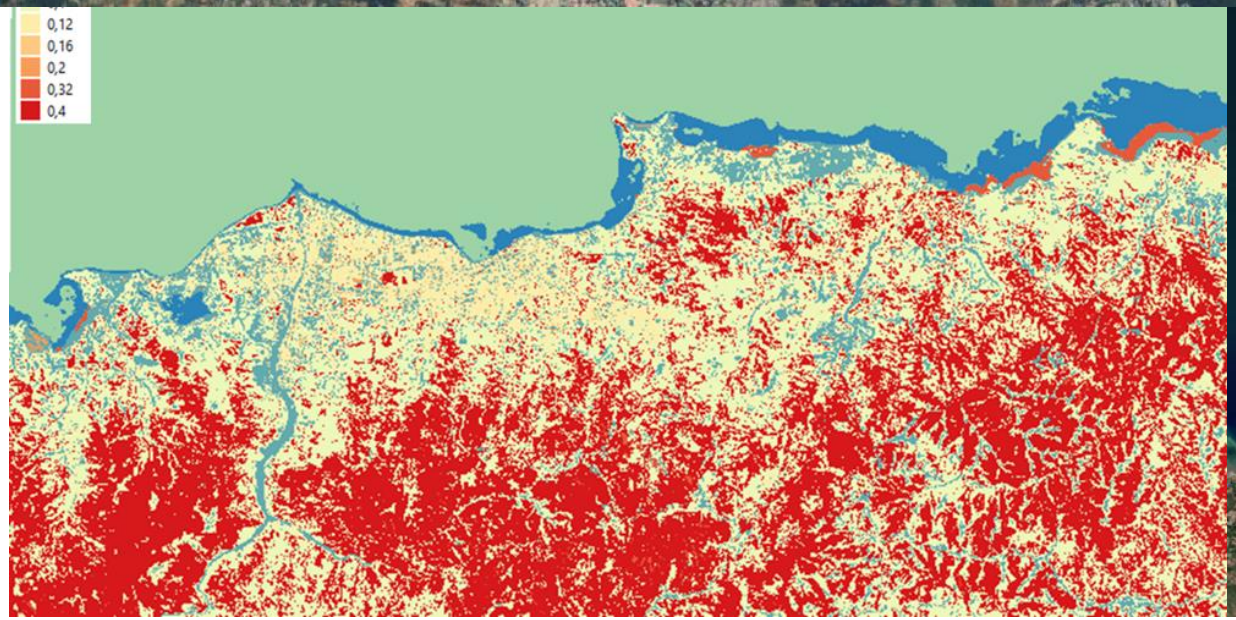


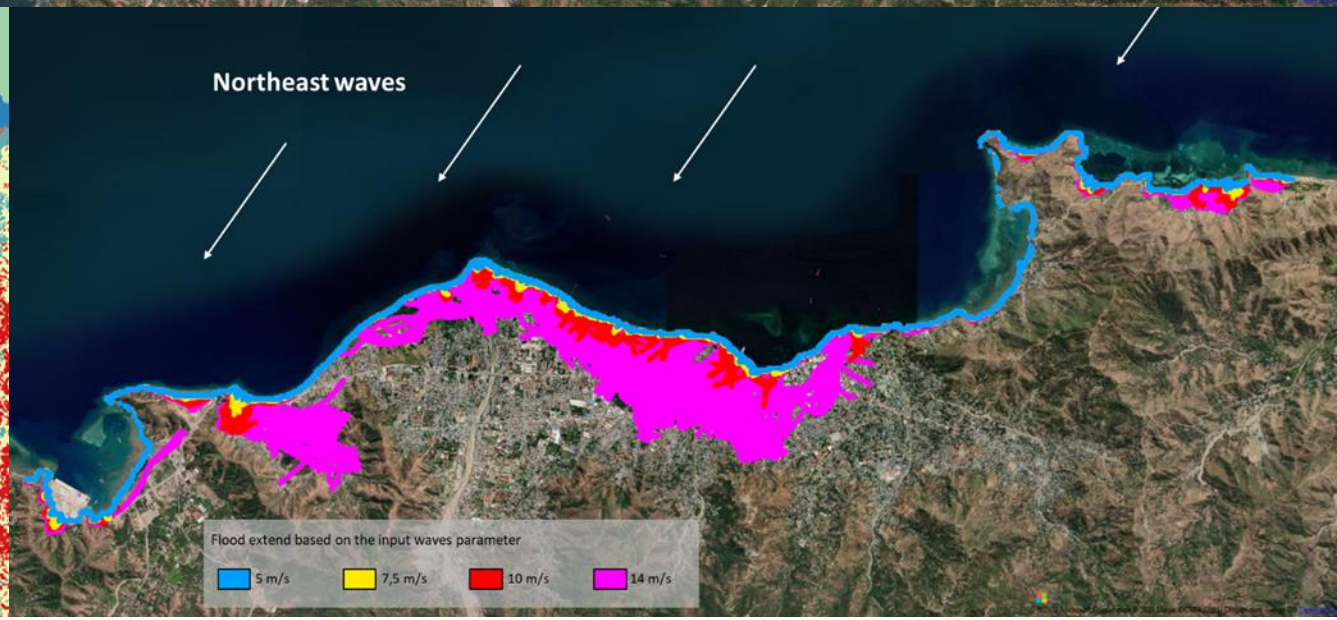




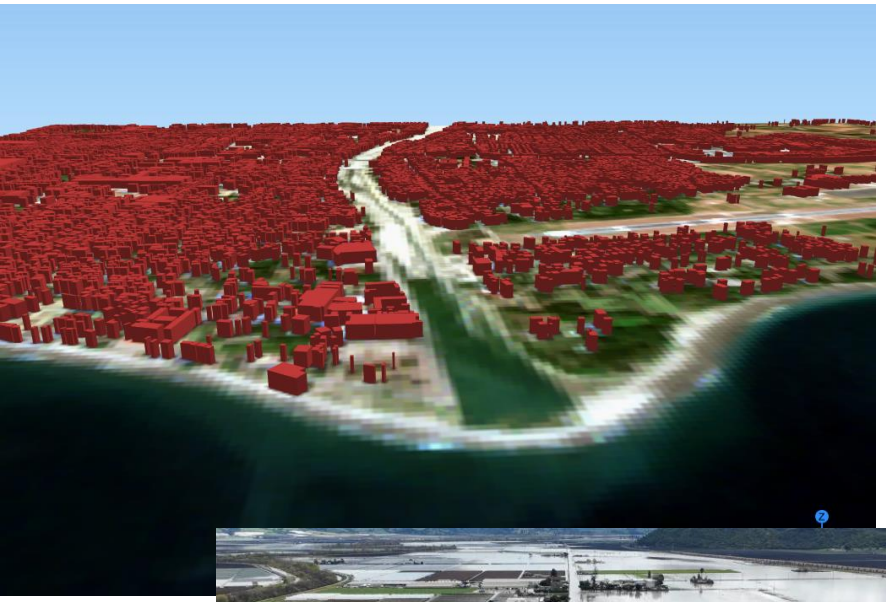


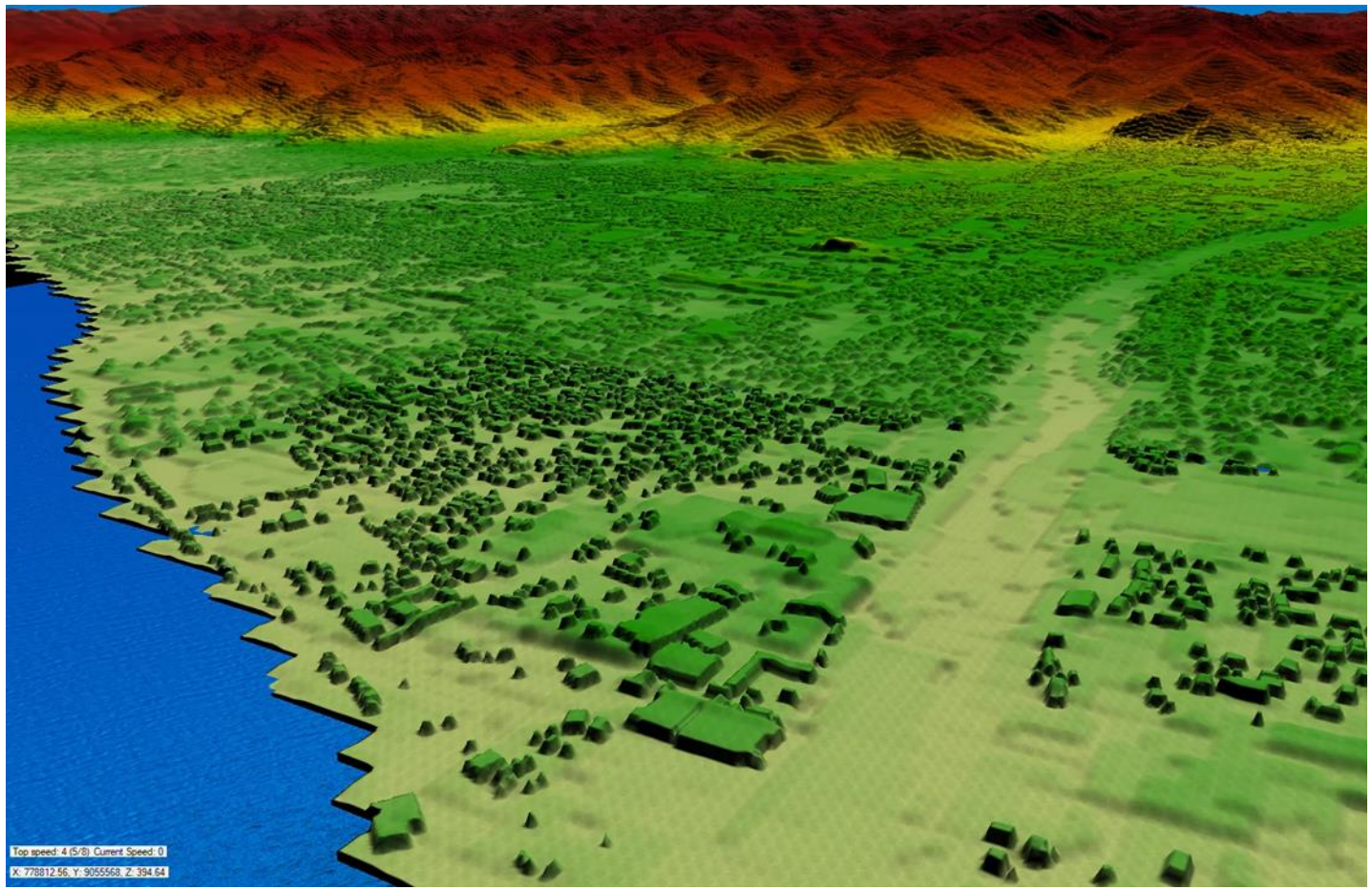

North waves
Flood extend based on the input waves parameter
5 m/s
7,5 m/s
10 m/s


0,12
0,16
0,2
0,32
0,4


Northeast waves
Flood extend based on the input waves parameter
5 m/s
7,5 m/s
10 m/s
14 m/s

Computed using a 2D hydraulic Modelling software with the addition of the built cover obtained from open street map

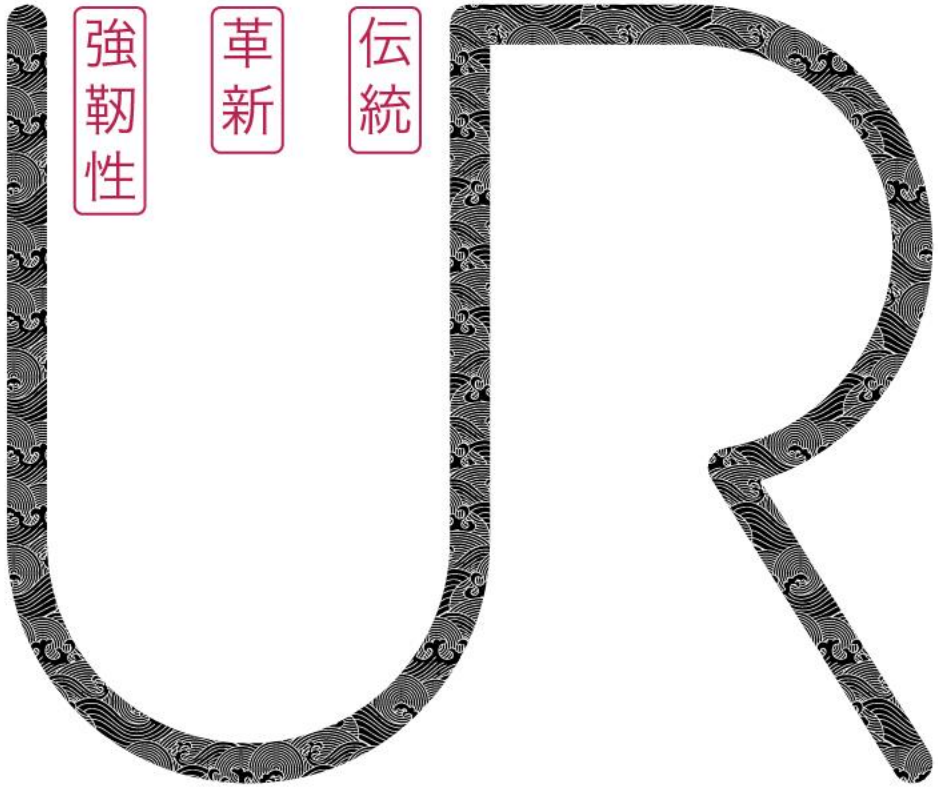




A quick re-cap

1. Calibrated Digital Terrain Modelling using GEDI/ICESAT-2 missions including heights and density of features
2. Backshore Classification
3. Flow drag coefficient map and channeling element

4. Inundation model maps :
   a) Improved flood model : bathtub approach based on DTM low point water accumulation
   b) Inverse watershed model : model based on slope angle and land occupation rugosity



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Thank you !

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Logos: