Coastal monitoring and flooding risks mitigation

Plenary session #3

Coastal Hazards

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5th Symposium | Accra, Ghana | 24 – 28 October 2022

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BLUE PLANET

Coastal monitoring and flooding risks mitigation

Anne-Laure BECK – EO engineer

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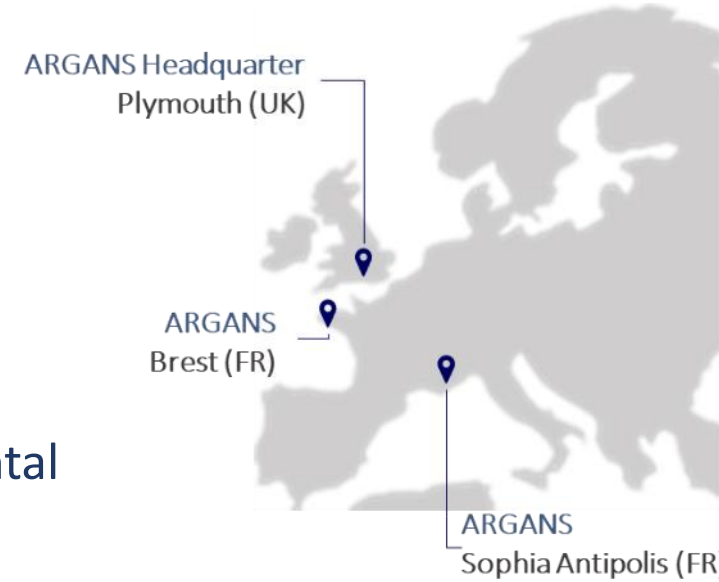
Coastal Mapping From Space

Saltmarsh Restoration From Space

Sea Level & Coastal Hazards From Space

SMOS

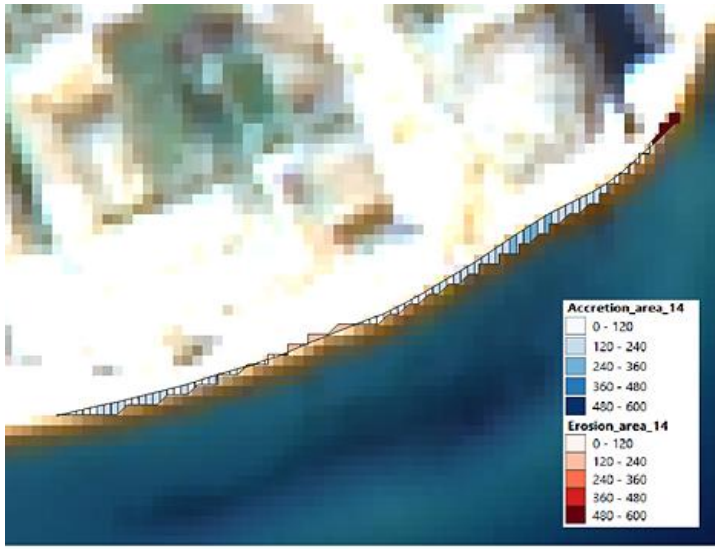


- EO Research & Development
- Software Engineering
- Sensor Calibration & Validation
- User Support & Quality Control
- Strategic & Sustainable Planning
- Climate Change & Environmental Monitoring from Space
- Nautical Charting & Coastal Mapping
- Big Data Management and Analytics
- Coastal Zone Management and Coastal Civil Engineering Solutions
- Earth Observation Products & Services

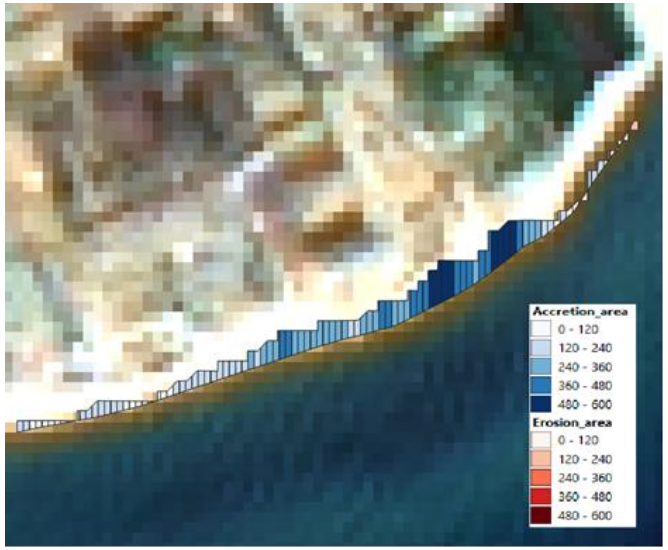
- ESA funded project
- 25 years of analysis
- 4 countries engaged
- Coastal indicators

Indicators for coastal change

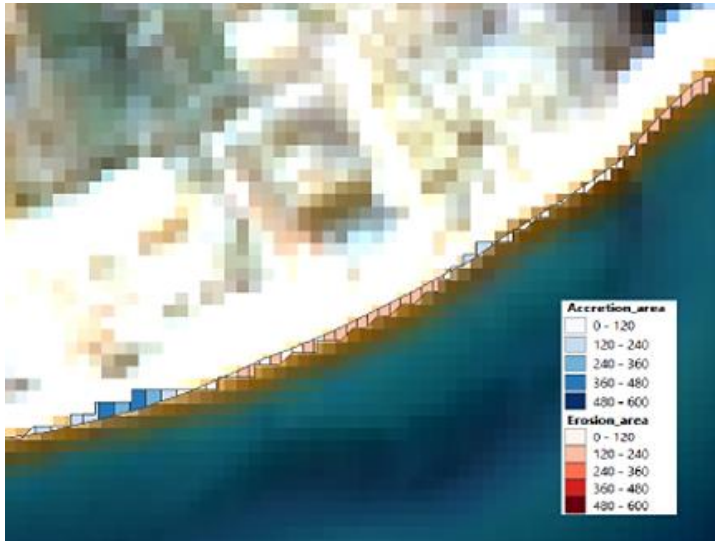
March- July time series



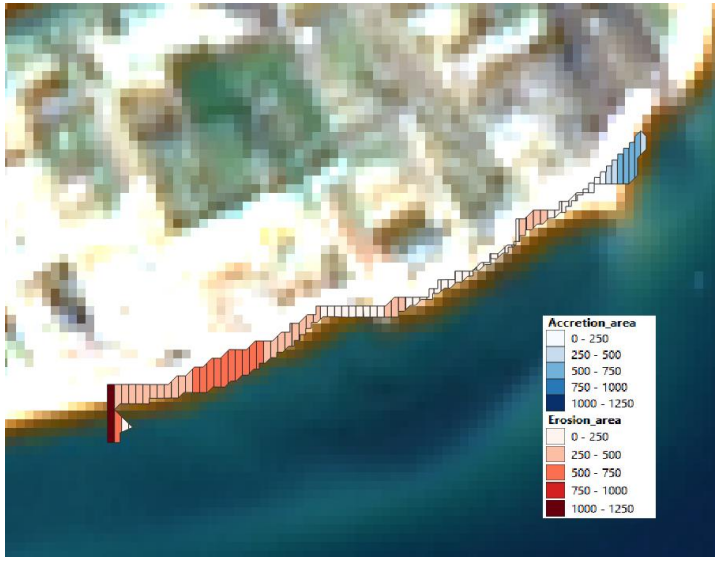
2014



2015

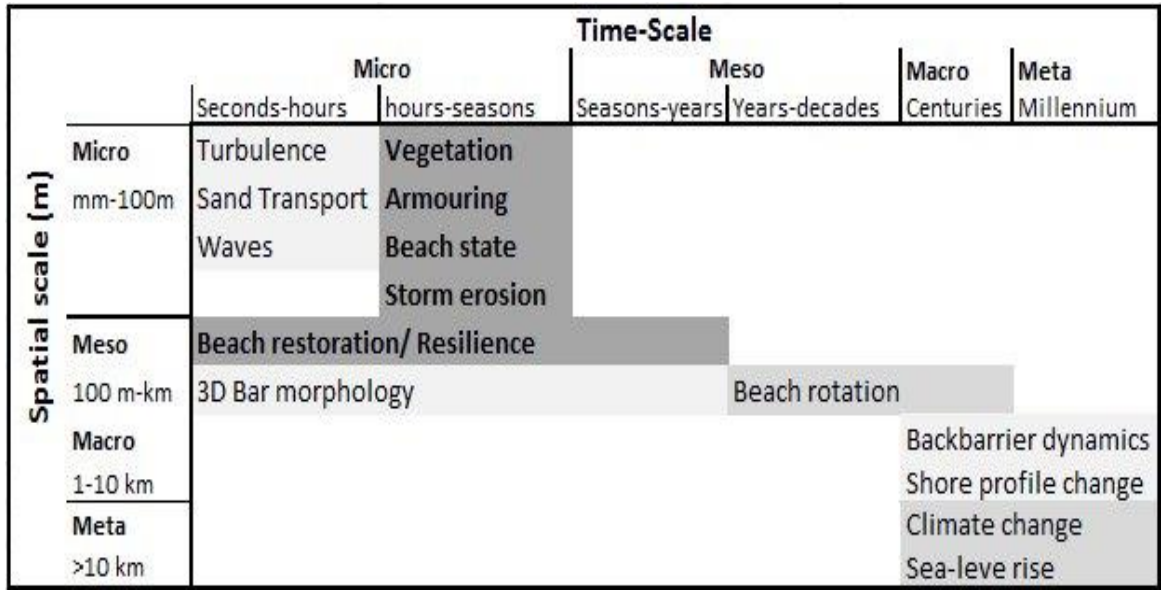


2016

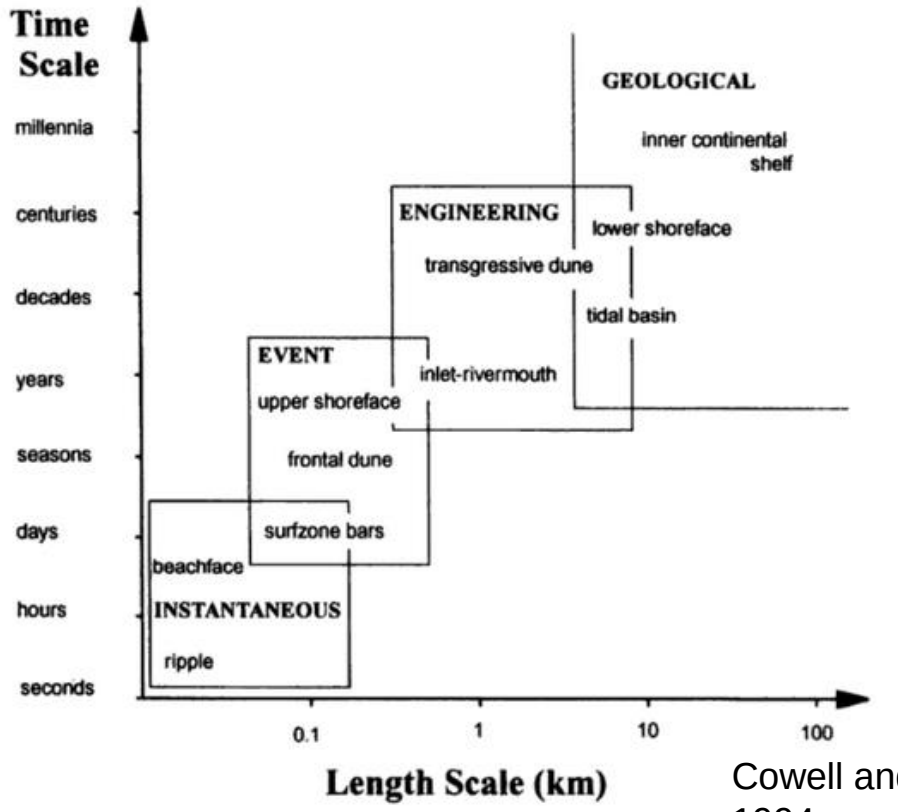


2017

Understanding coastal change



Vos et al., 2017



Cowell and Thom, 1994

The disaster resilience project

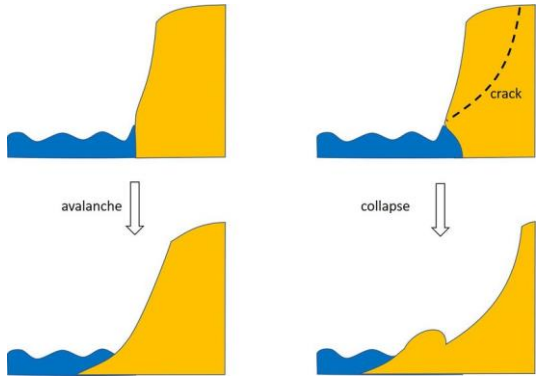
The disaster resilience project

What can be done?

- Natural or Manmade causes of erosion.
- Seasonal changes and long-term structural erosion.

How we do that?

- High temporal resolution and time range
- Calculating change rates, identifying coastal weak spots and estimating sediment transport.



The coastal resilience

Coastal Resilience

a balance

Erosive Power

force

by
waves & currents

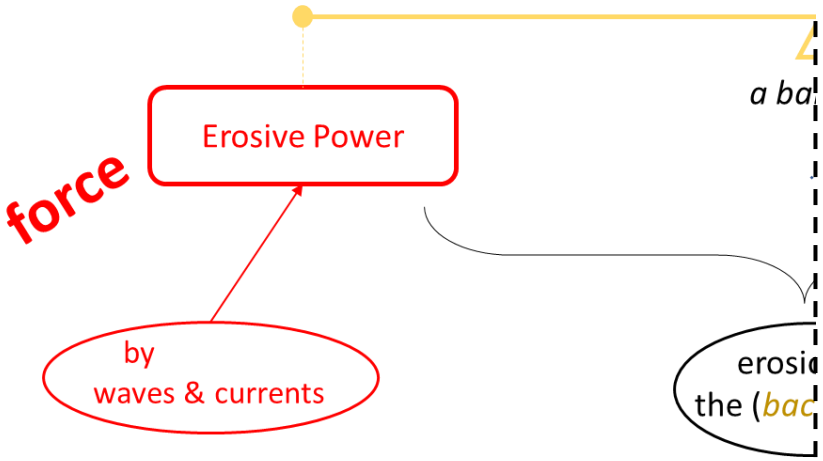
Erosive Resistance

counter-force

of
the materials

erosion of
the (*back*)*shore*

The coastal resilience



Erosive power

- *Is erosion **likely** to happened ?*
- *Capacity to **remove** materials from the shore*
  - offshore and alongshore currents
  - mean seal level and sea level rise
  - storm and other extrem event

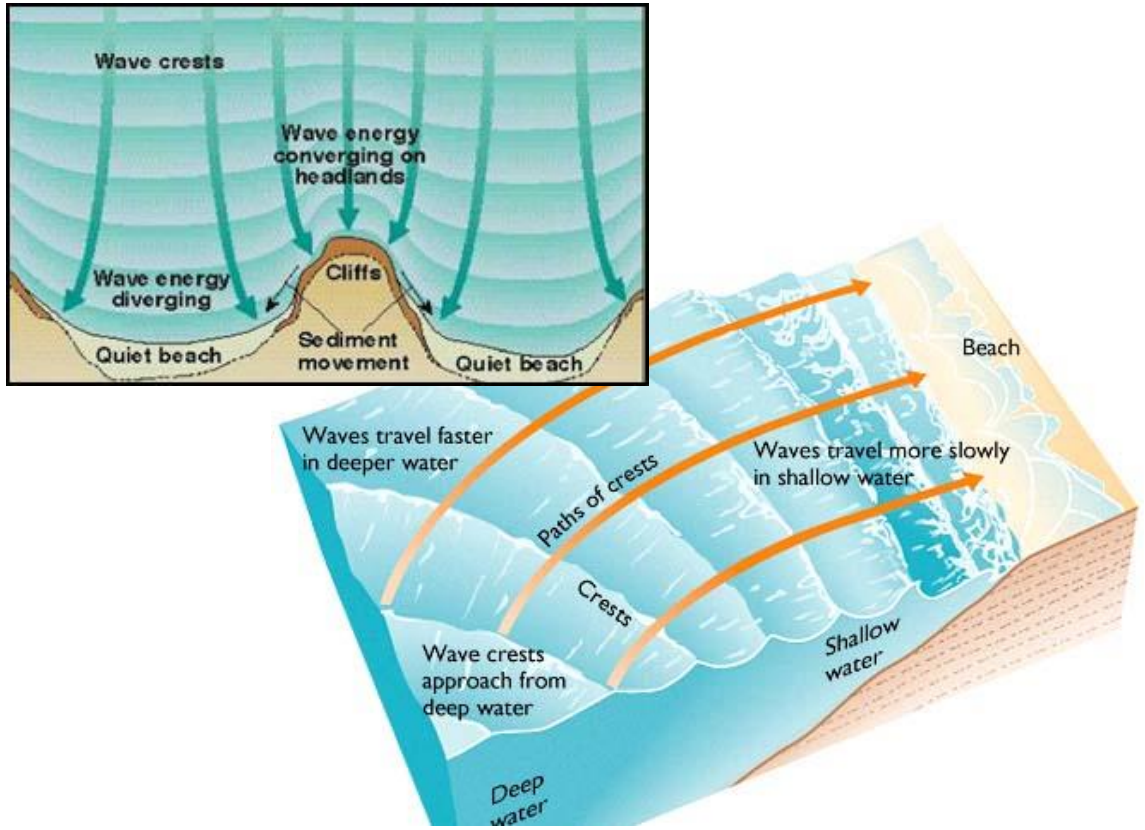
↳ Waves properties' maps

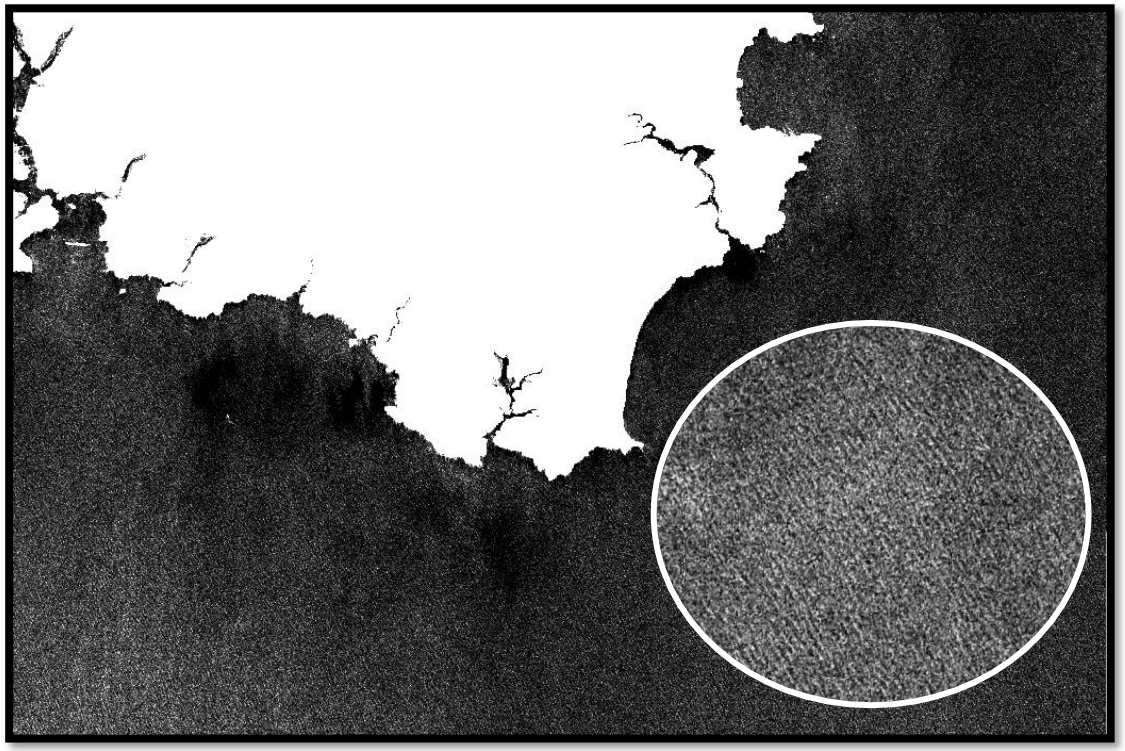
↳ Coastal flooding maps

The coastal resilience

Erosive power

↳ Waves properties' maps

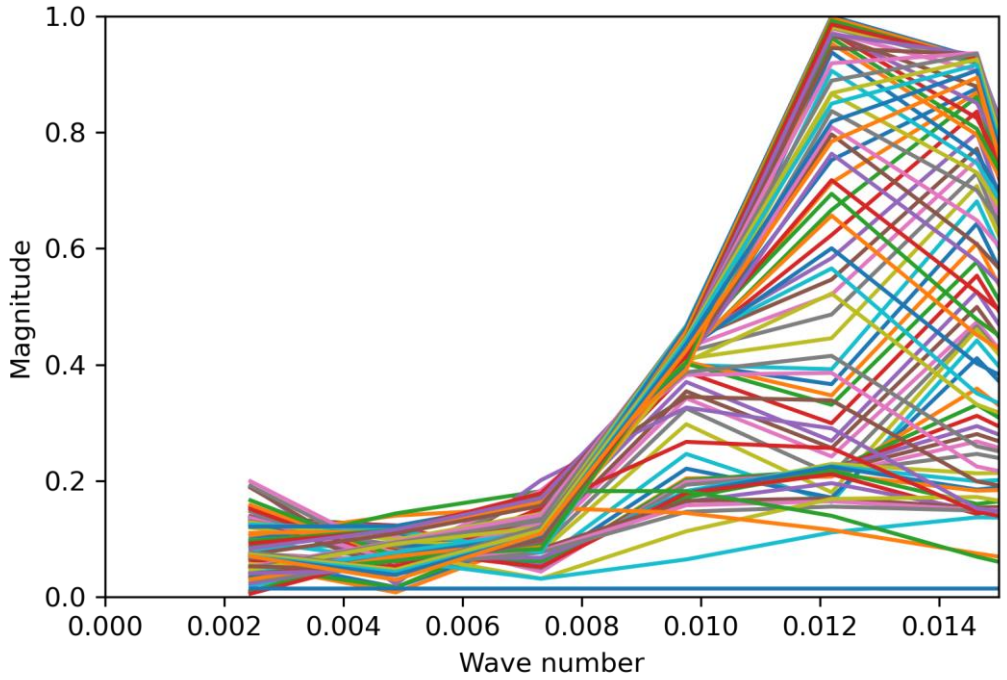


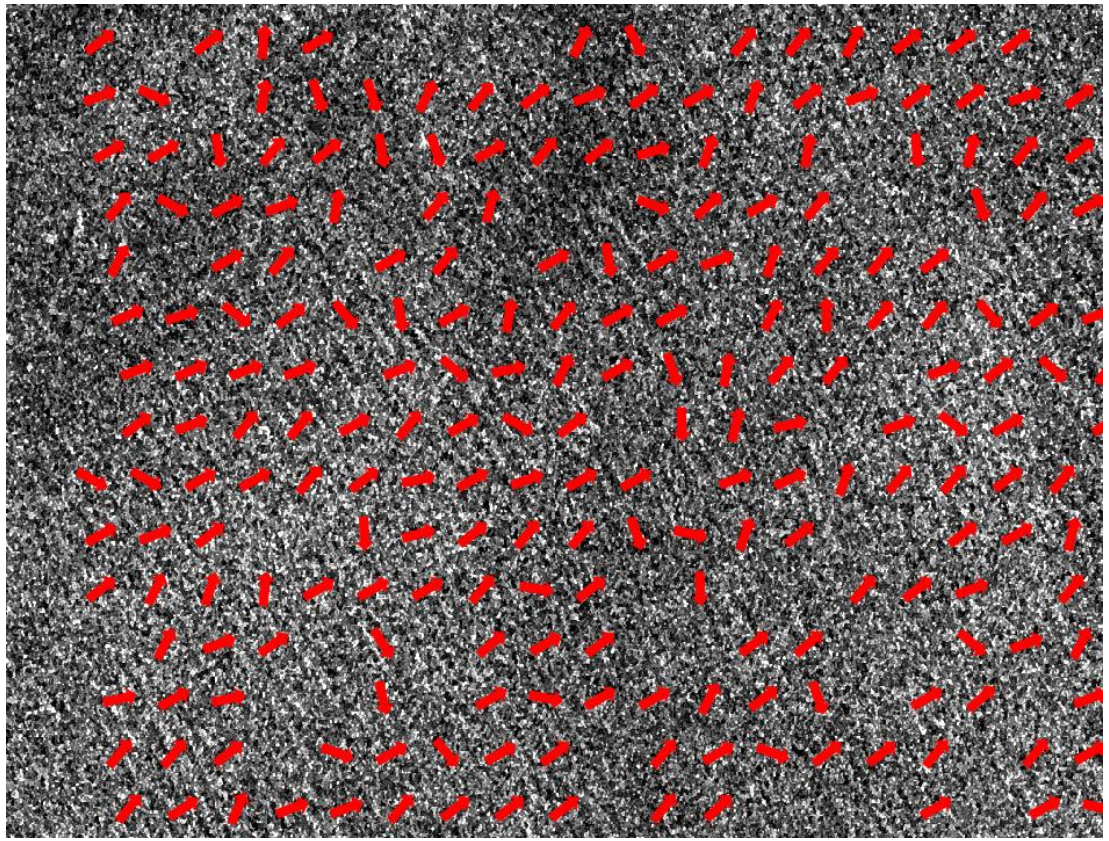


The coastal resilience

Erosive power

↳ Waves properties' maps

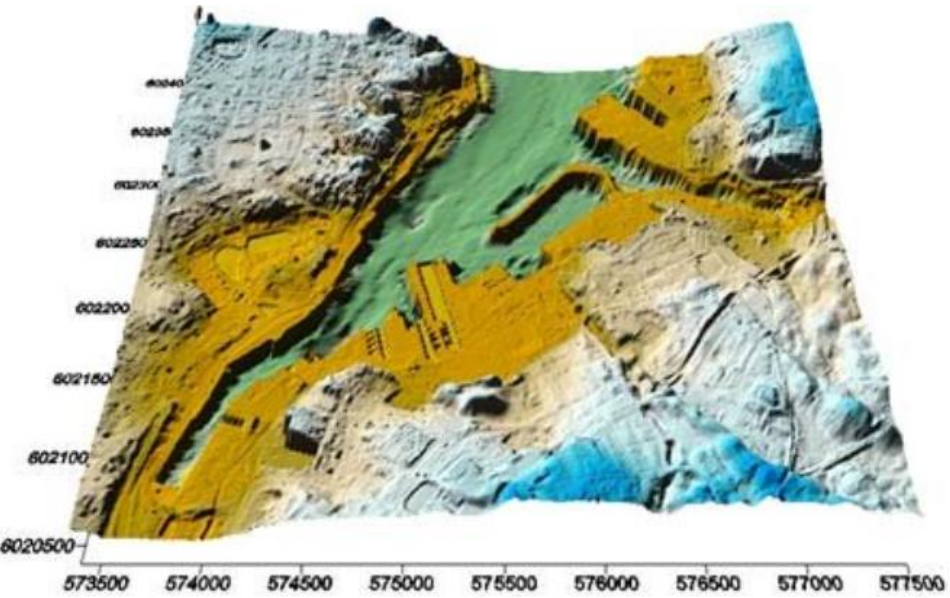




The coastal resilience

Erosive power

↳ Coastal flooding maps



Simple “Bathtub” approach

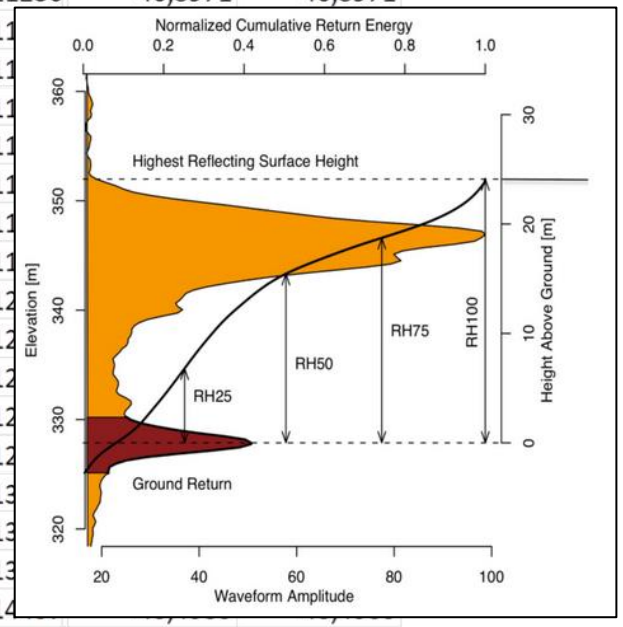
- 30 DEM
- No consideration of the type of soil/ occupation
- No consideration of obstacle

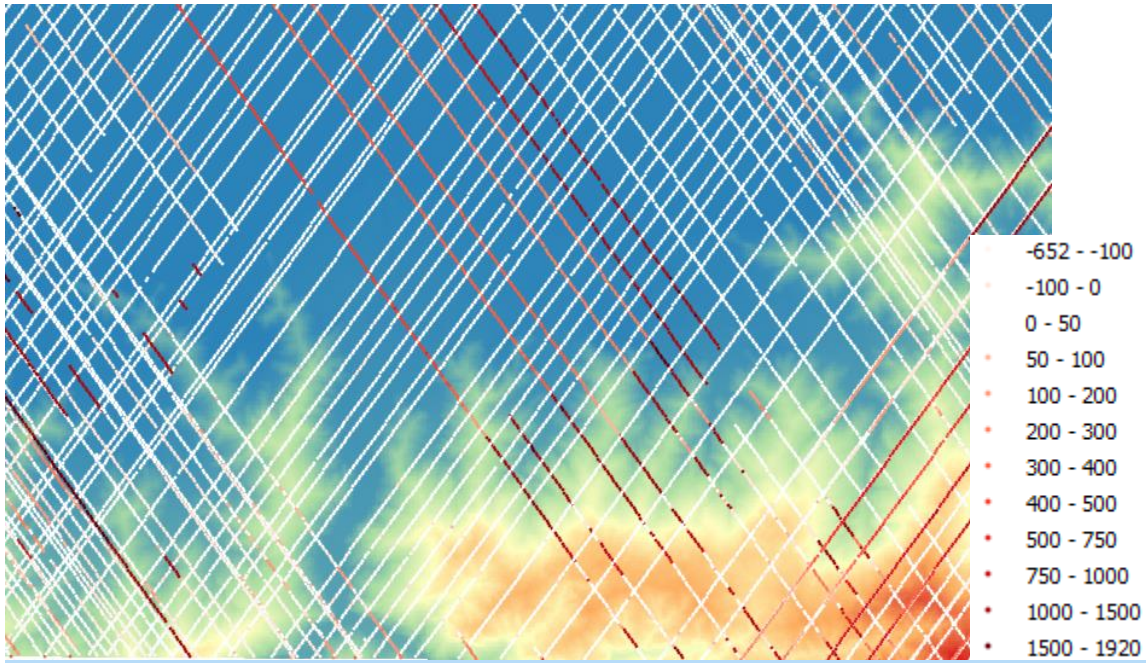
The coastal resilience

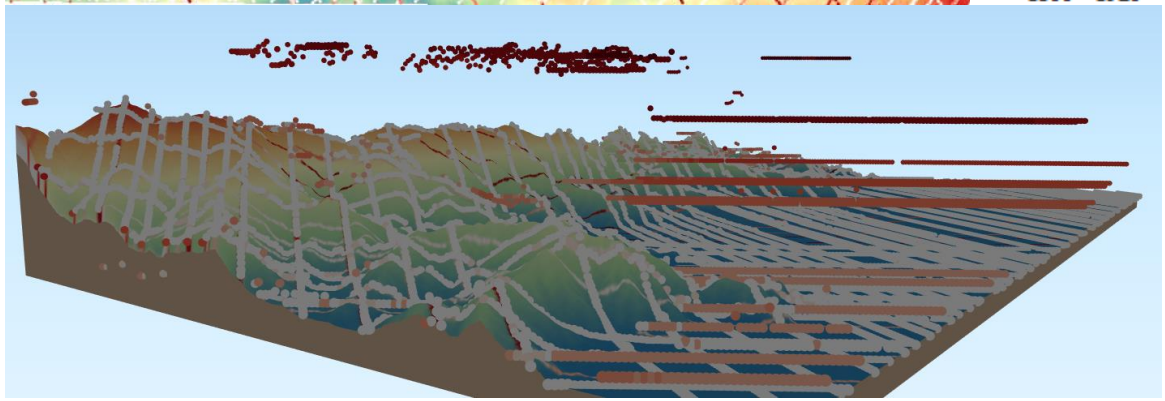
Erosive power

↳ Coastal flooding maps

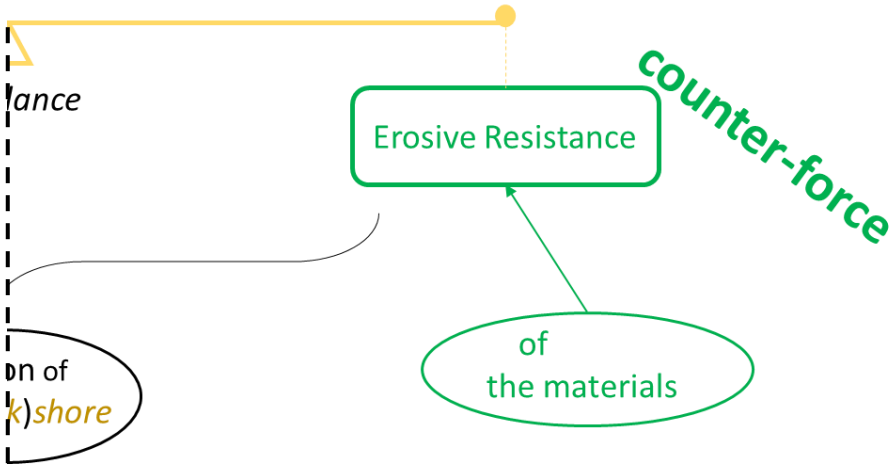
Latitude	Longitude	elevH(m)	GEOID	G_H_geoid	error
-8,50824	125,62457	92,81048	46,11210	46,6984	46,6984
-8,50866	125,62487	93,00948	46,11236	46,8971	46,8971
-8,50950	125,62548	94,02743	46,11		
-8,50992	125,62579	93,76059	46,11		
-8,51034	125,62609	93,45061	46,11		
-8,51076	125,62640	93,83196	46,11		
-8,51118	125,62670	93,90438	46,11		
-8,51160	125,62701	93,65744	46,11		
-8,51202	125,62731	93,93874	46,11		
-8,51244	125,62762	93,97631	46,12		
-8,51285	125,62792	94,38702	46,12		
-8,51327	125,62823	94,01144	46,12		
-8,51369	125,62853	101,25859	46,12		
-8,51411	125,62884	94,49187	46,12		
-8,51453	125,62914	94,25710	46,13		
-8,51495	125,62945	94,83176	46,13		
-8,51537	125,62975	94,48251	46,13		
-8,51578	125,63006	94,58267	46,14		
-8,51620	125,63036	94,60131	46,14805	48,4533	48,4533







The coastal resilience



Erosive resistance

- *Can the coast **resist** to erosion?*
- *Where are the « **weak** » spots ?*

  - type of coastal sediment/ geology
  - presence and effectivness of protection
  - where the sediment settle

↳ Suspended sediment sources map

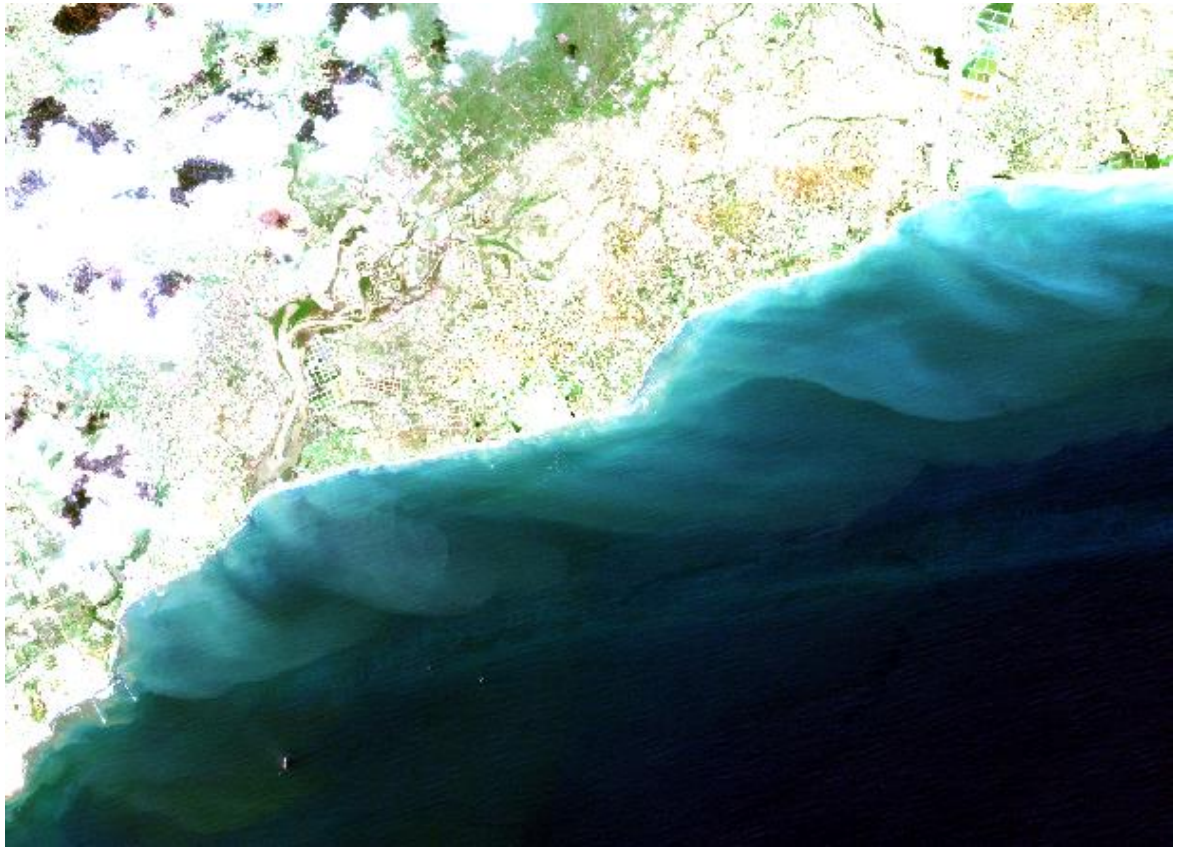
↳ Offshore sediment transport debit map

↳ Littoral land use map

The coastal resilience

Erosive resistance

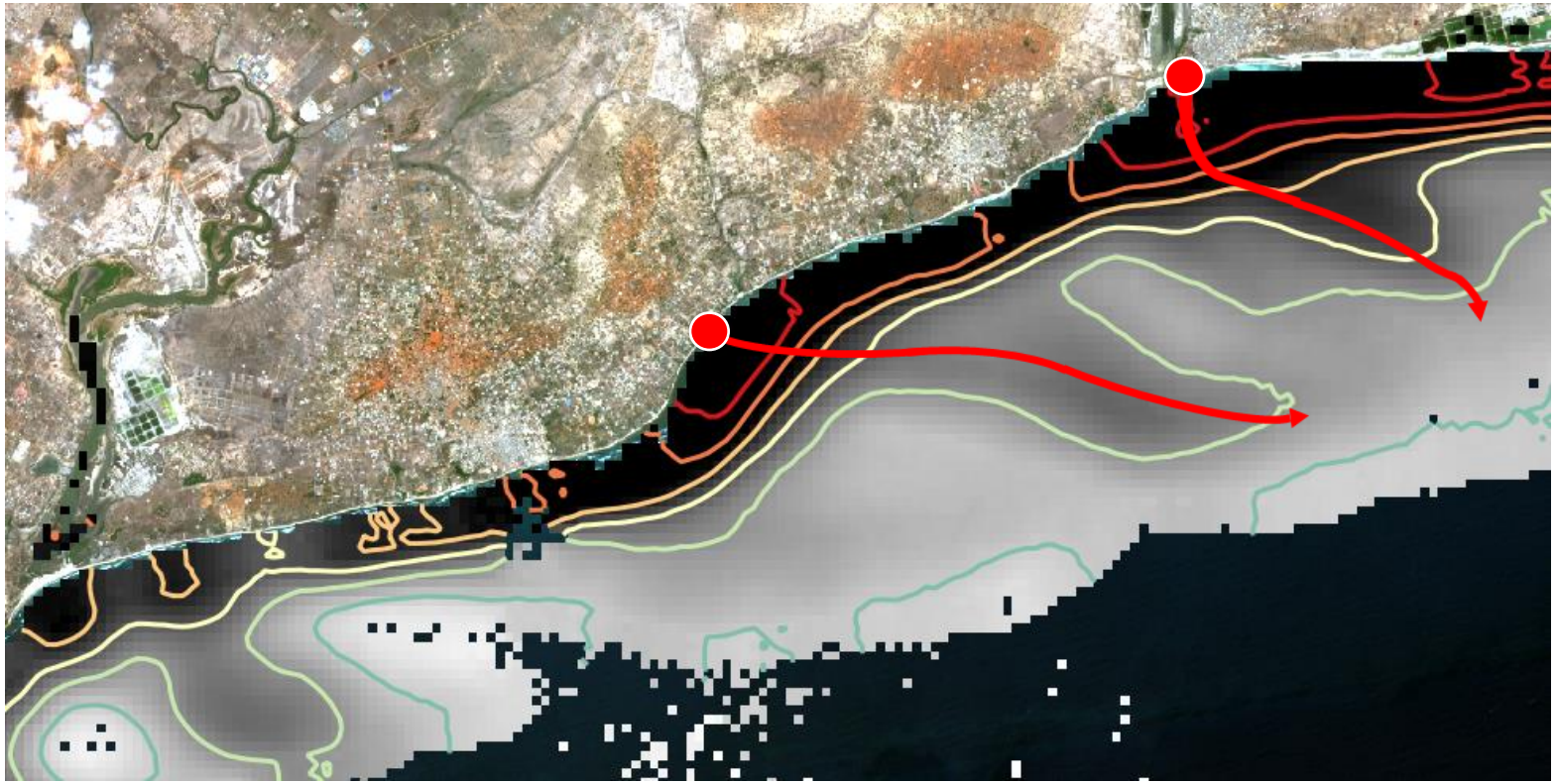
↳ Suspended sediment sources map



The coastal resilience

Erosive resistance

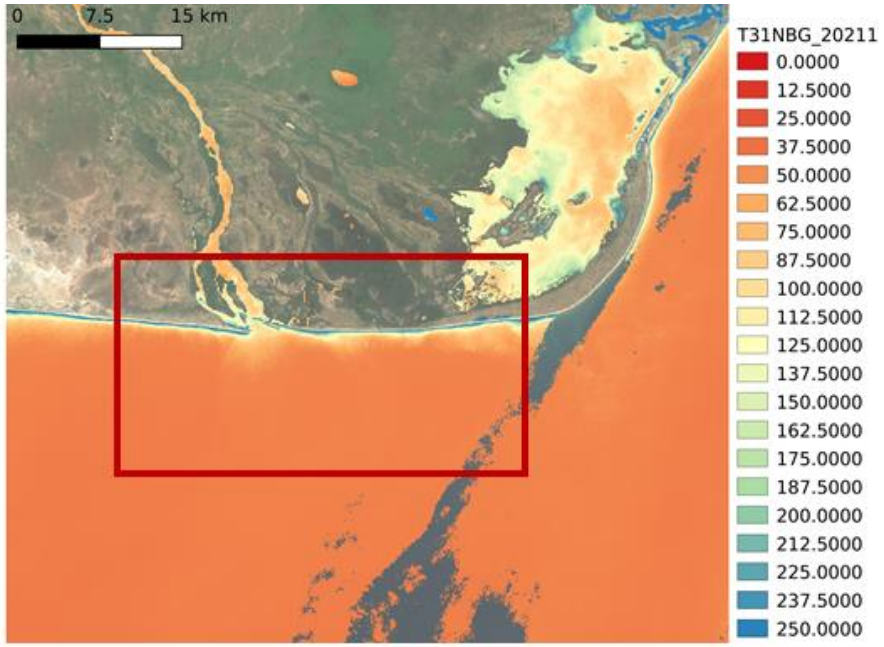
↳ Suspended sediment sources map



The coastal resilience

Erosive resistance

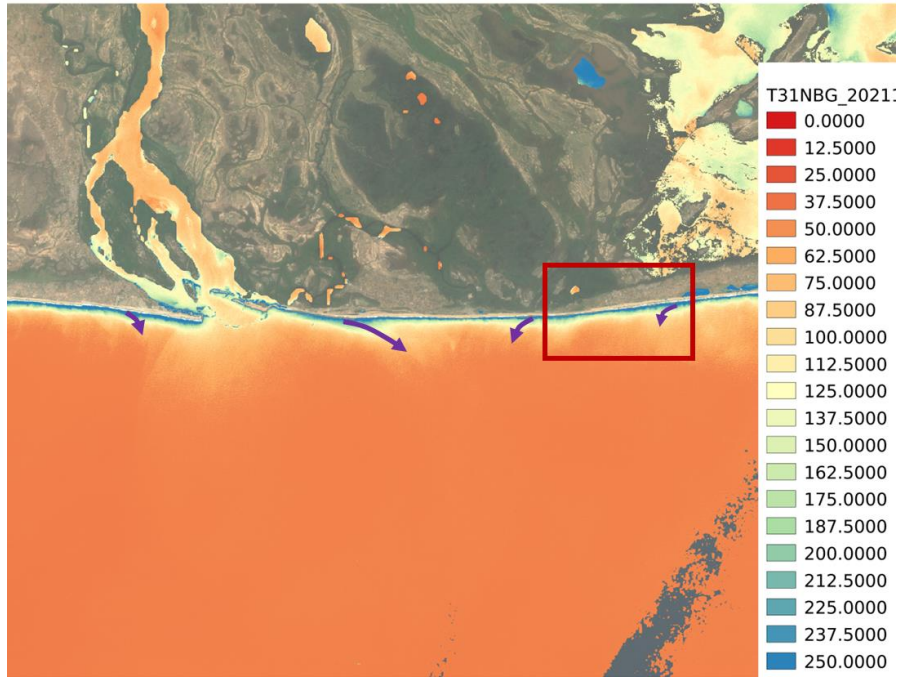
↳ Offshore sediment transport debit map

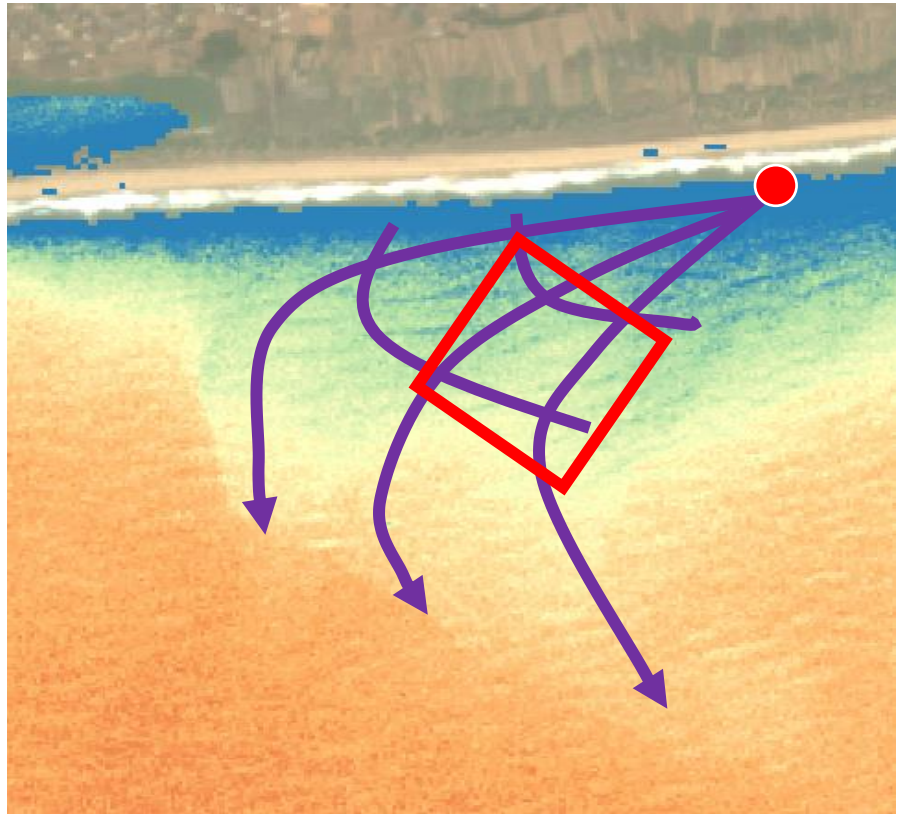


The coastal resilience

Erosive resistance

↳ Offshore sediment transport debit map

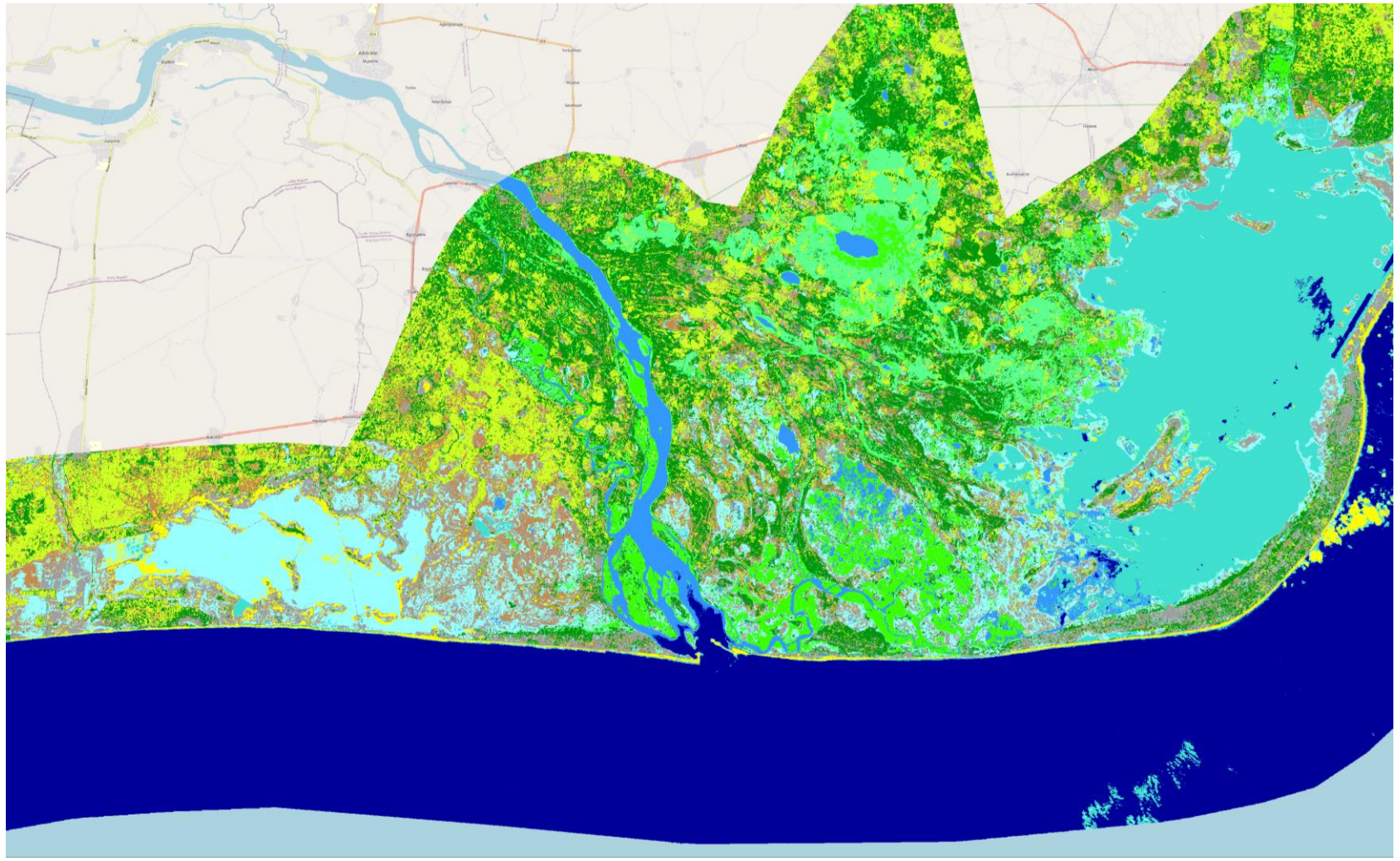


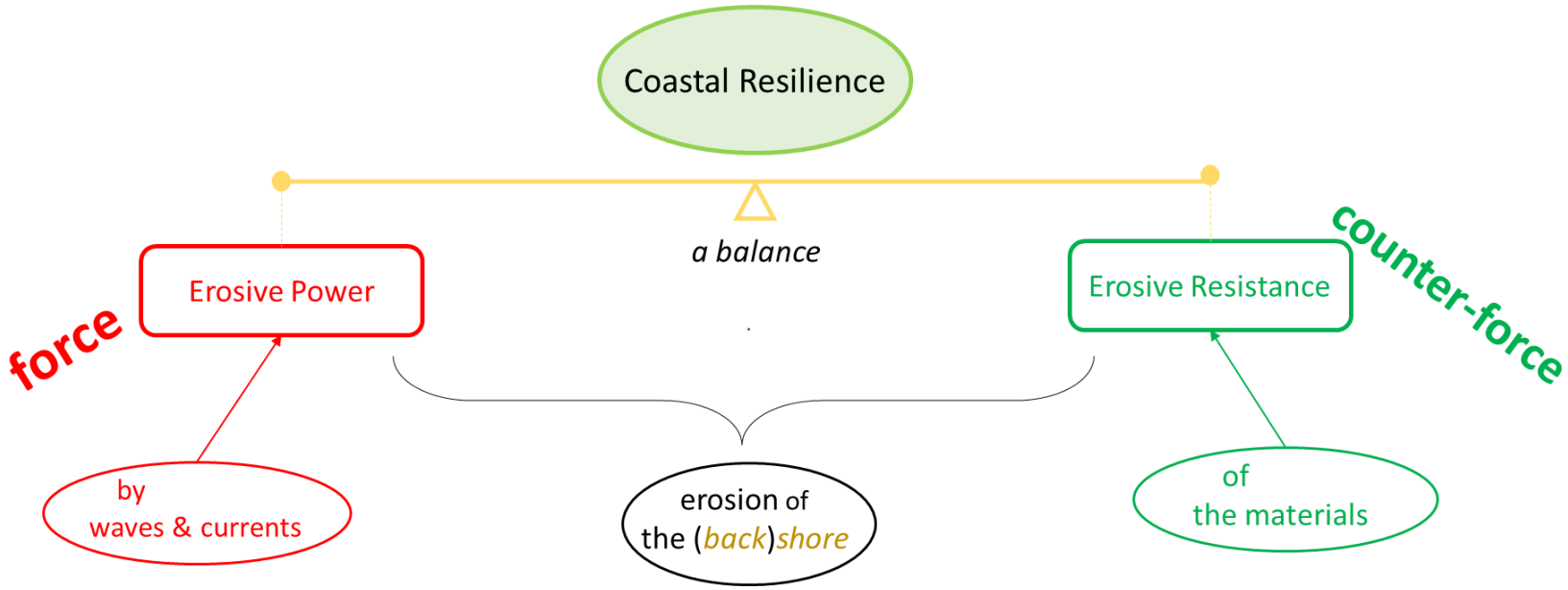


The coastal resilience

Erosive resistance

↳ Land cover maps





Waves properties' maps ↵

Coastal flooding maps ↵

↳ Suspended sediment sources map

↳ Offshore sediment transport debit map

↳ Littoral land use map

GEO BLUE PLANET

Thank You.
Medaase.
Oyiwaladon.