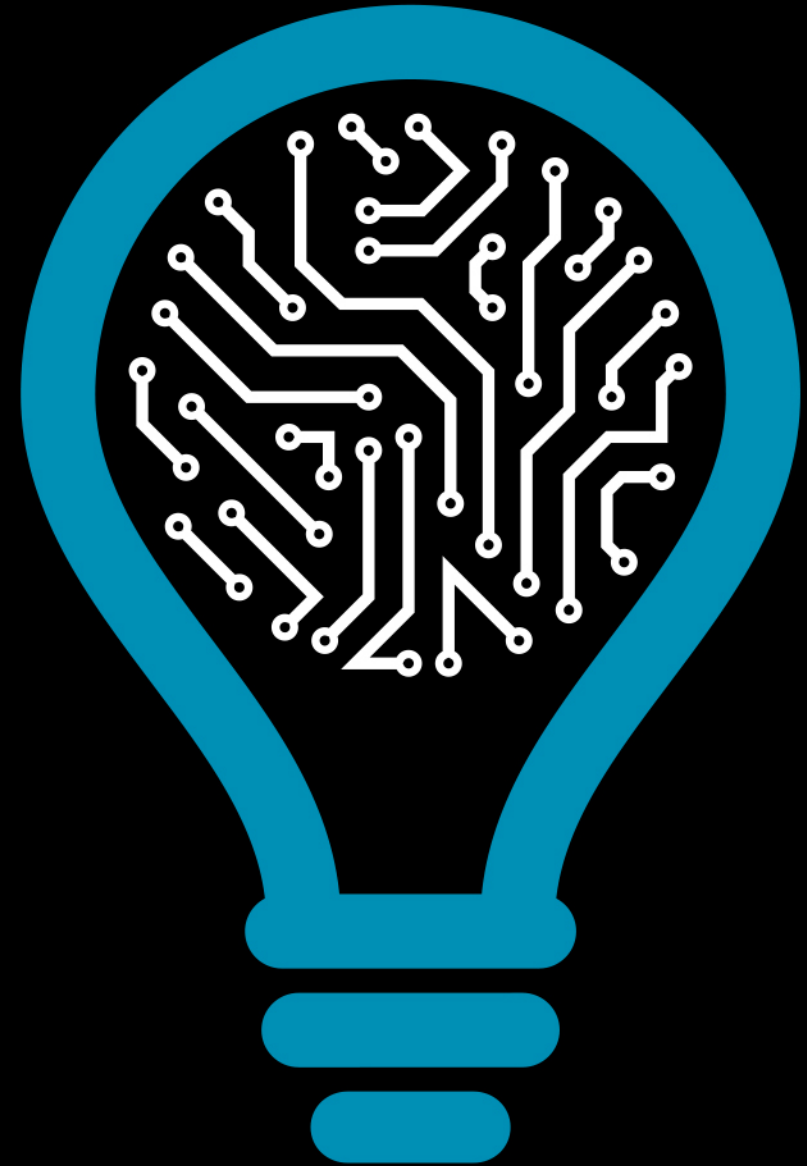


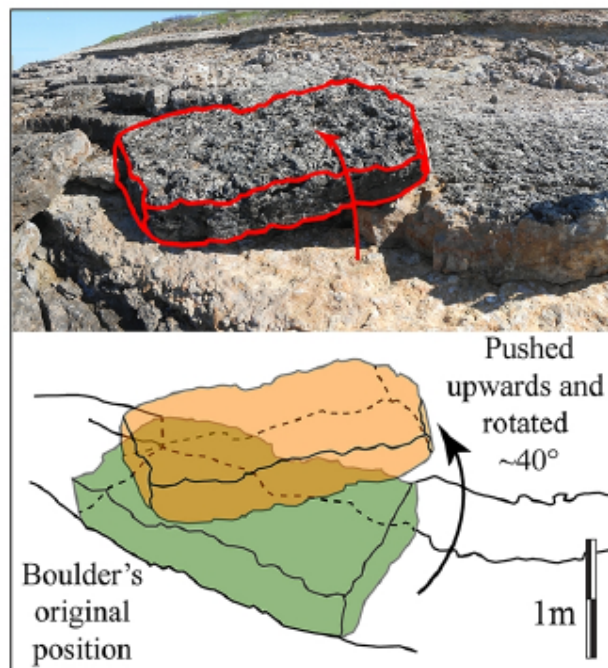
Challenges in data-driven assessment of coastal change

Susana Barbosa



Vulnerability of coastal areas

storm surges, extreme waves, winds, water temperature,...

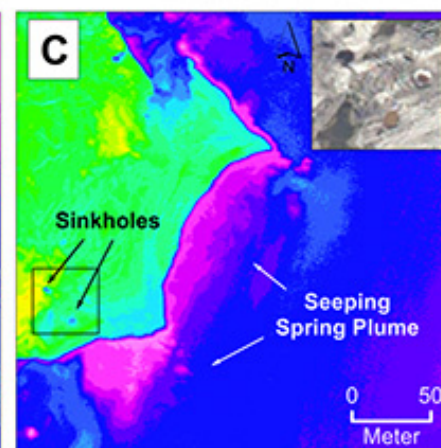
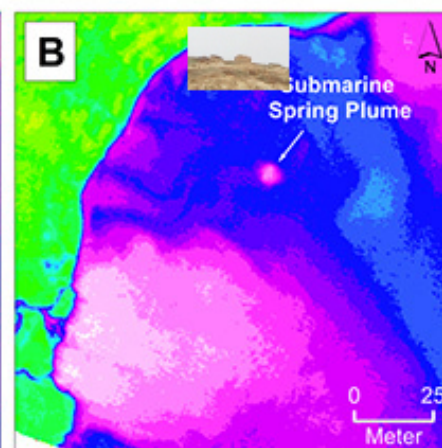
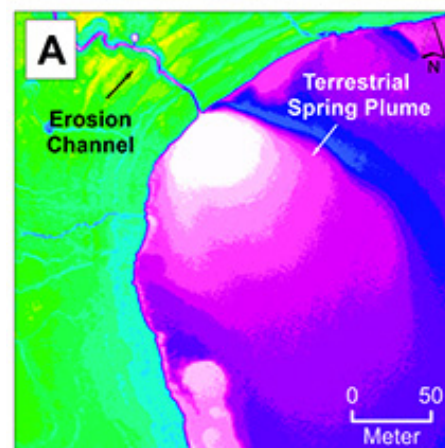
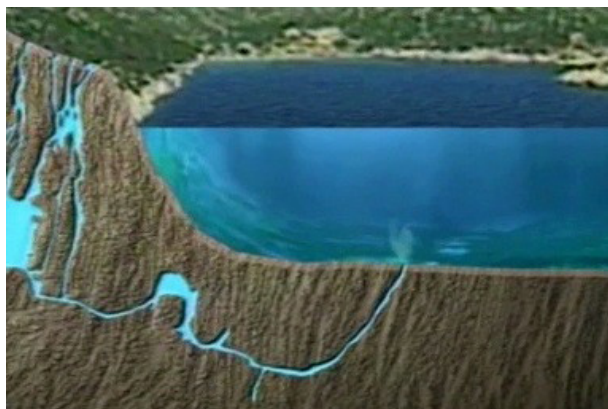


Oliveira et al 2019
(submitted)

New boulders
on top of a ridge

Vulnerability of coastal areas

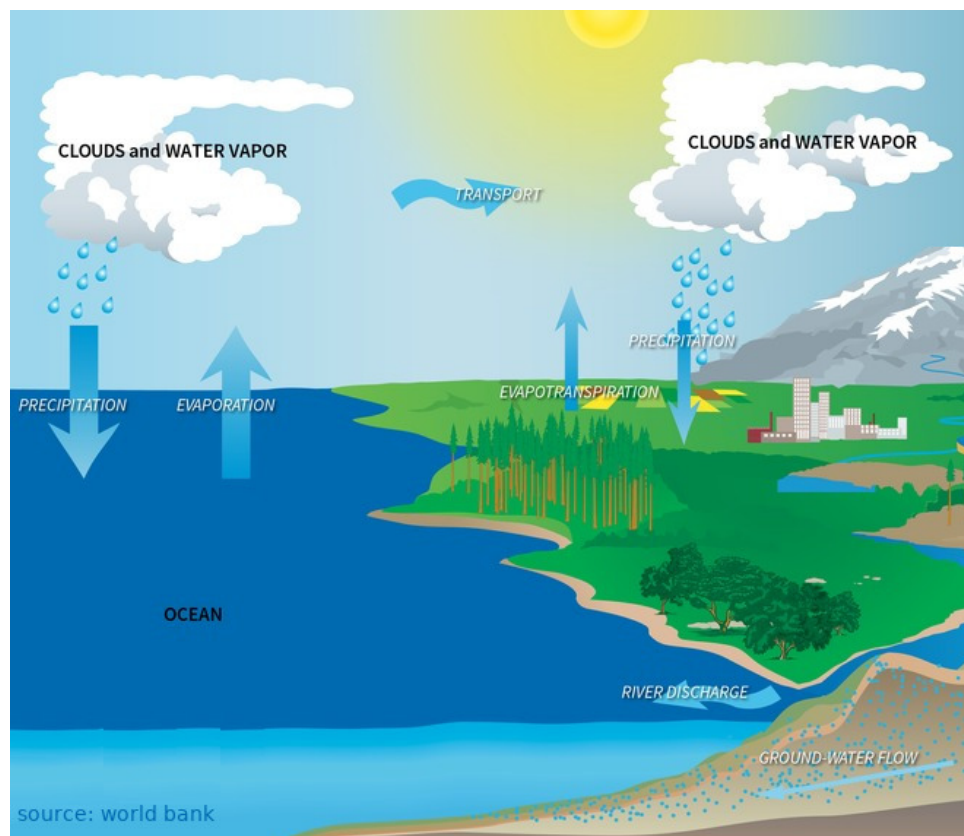
Sediments transport, SGD (Submarine Groundwater Discharge),...



(UFZ, U. Mallast)

Ocean-land interface

Ocean-Atmosphere-Land interactions



- moisture fluxes
- heat exchanges
- transport processes

Data for coastal assessment

Integrated earth system approach → in-situ + satellite + model

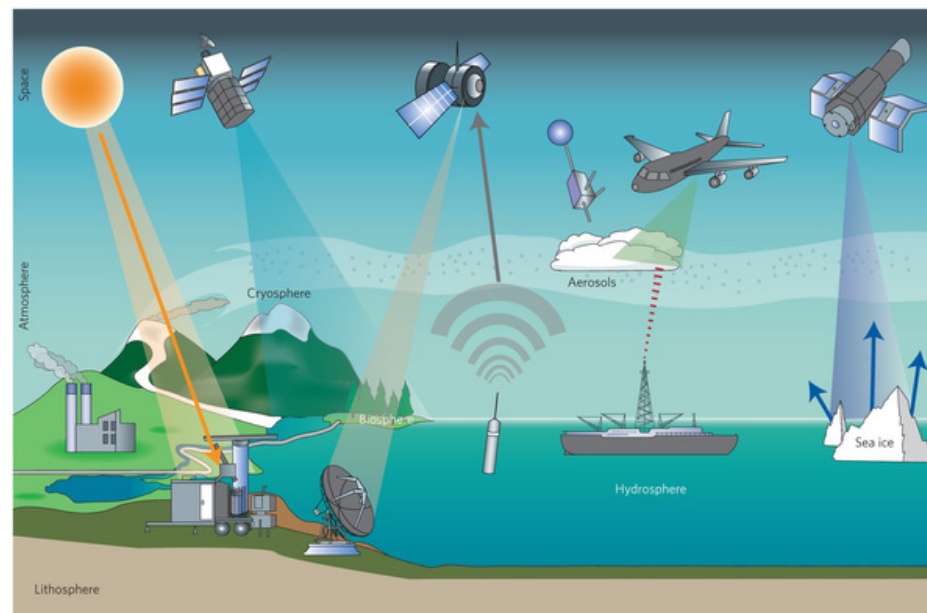
Challenges:

- Data collection
- Data integration
- Data analysis

Data collection paradigms



- analogical, human-intensive
- daily (or higher) resolution, local
- single-variable, single-domain
- 'hard to get' data



- digital, automatic
- high-resolution (sub-hourly, global)
- multi-site, multi-variable, multi-domain
- 'available' data



Data collection

Challenges

- Fast-changing interface
- Satellite issues
(clouds, corrections,
Spatial resolution,...)
- In-situ sparseness

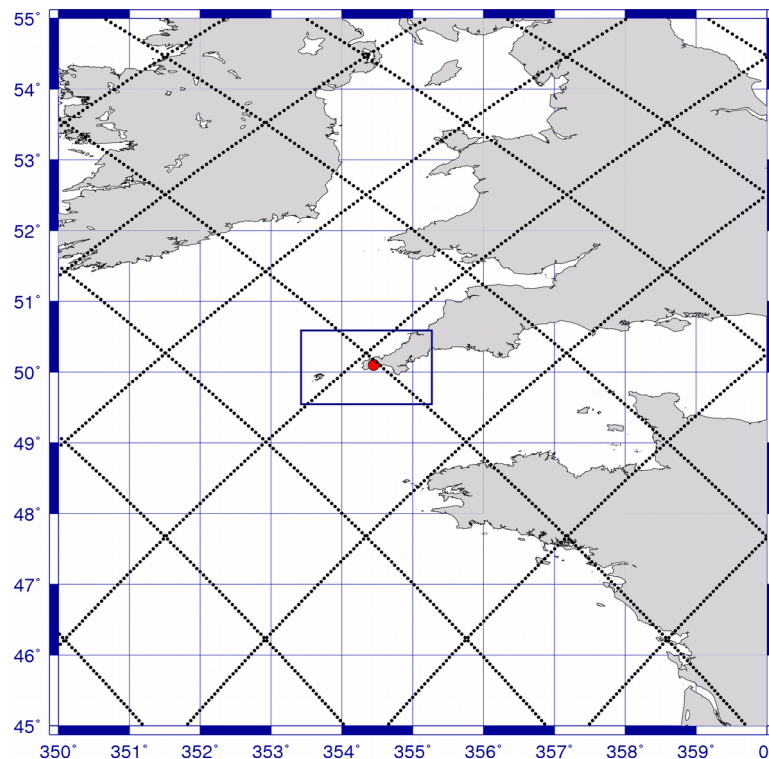


Opportunities

- AUVs, ASVs, AAVs
- + Buoys
- IoT / cities data
- + Variables (e.g. SGD)

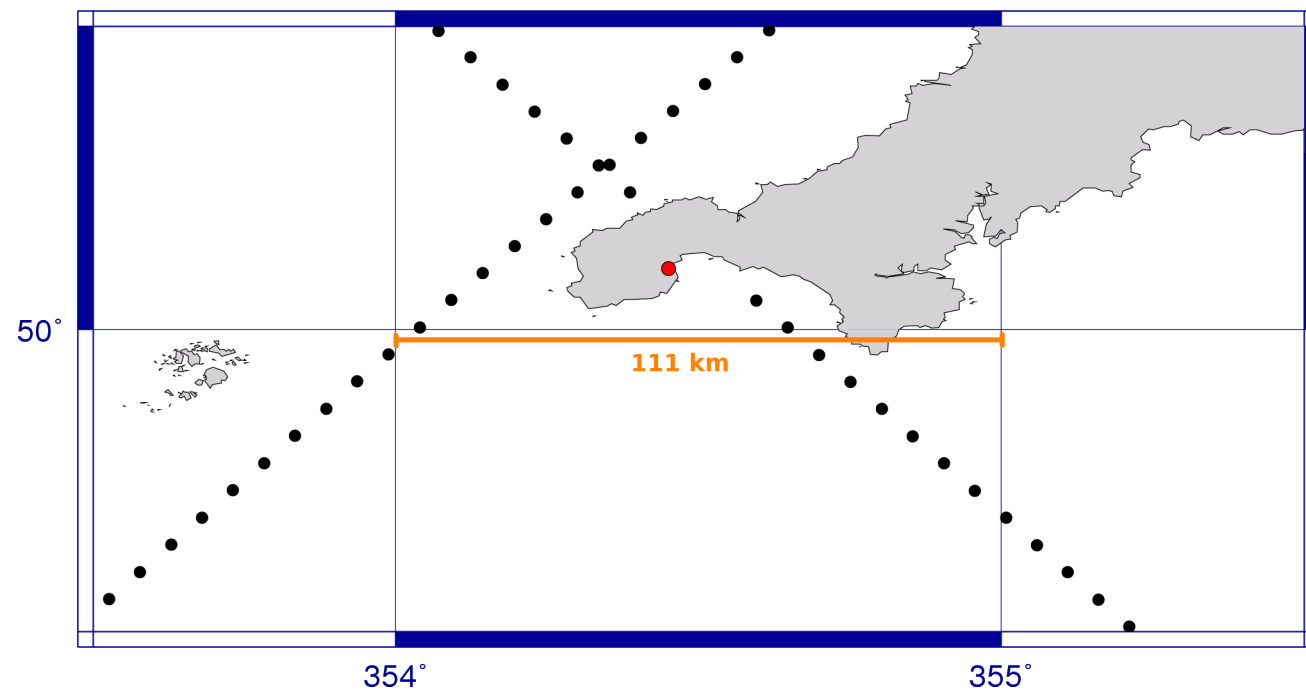
Data integration

Example: satellite altimetry / tide gauges



tide gauge: < hourly

satellite: 10-days

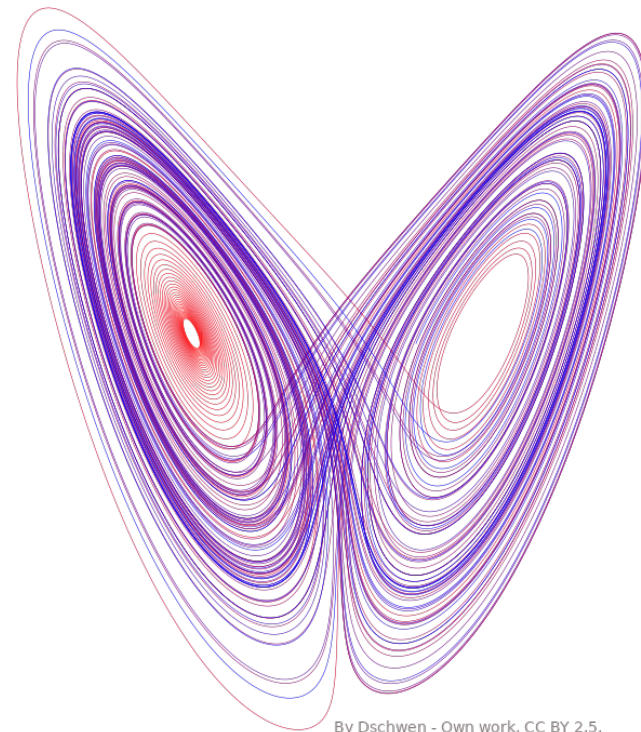


Data analysis

Coast: complex & nonlinear system

but ... mainly linear analysis methods

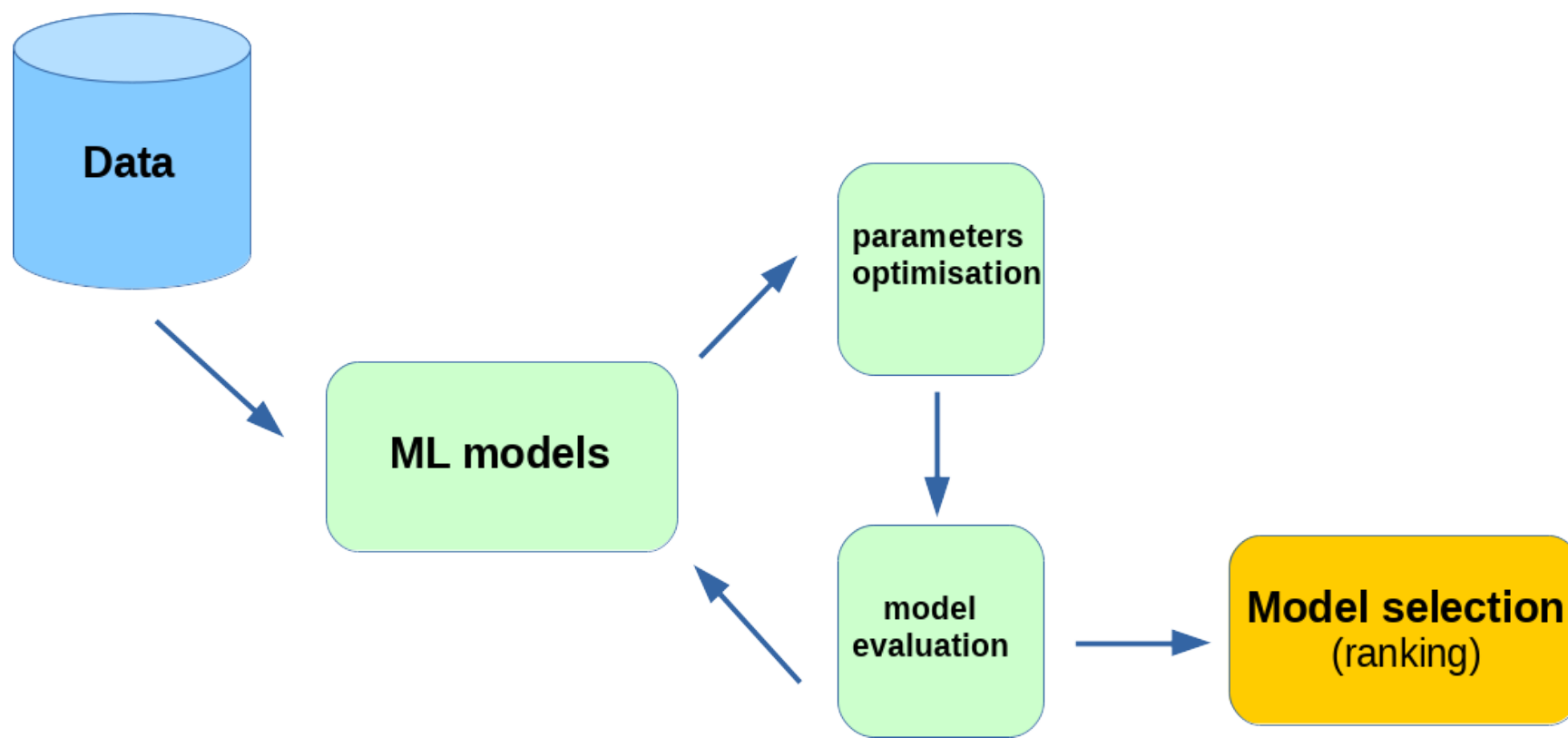
- linear trends (e.g. sea-level, mm/year)
- non-stochastic modeling
- correlation



By Dschwen - Own work, CC BY 2.5,
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Data analysis

Large volumes of data / Machine learning / Explainability



Summary

Coastal vulnerability to climate change

Interplay of ocean/climate/land-use effects at the ocean/land interface

Multiple data sources: in-situ + satellite + model

Challenges / opportunities for data-driven assessment of coastal change

- data collection
(coastal satellite measurements, sampling)
- data integration
(multiple spatial and temporal scales)
- data analysis
(nonlinearity, ML, AI + physical understanding)



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