



# Redefining the global coastal ocean

A project concept for CoastPredict

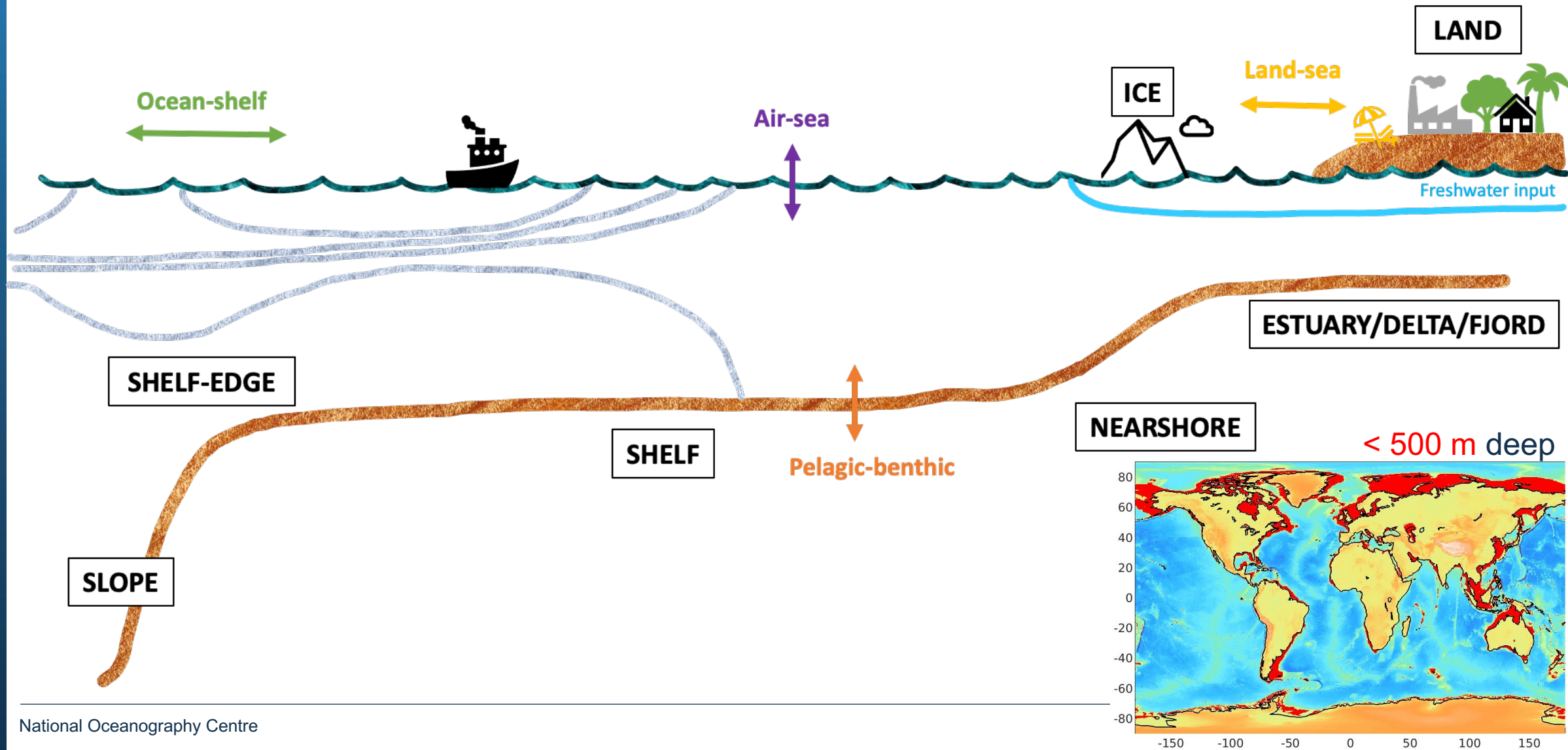
Jo Hopkins

Marine Physics and Ocean Climate

[j.hopkins@noc.ac.uk](mailto:j.hopkins@noc.ac.uk)



# Coastal ocean transition zones and connectivity

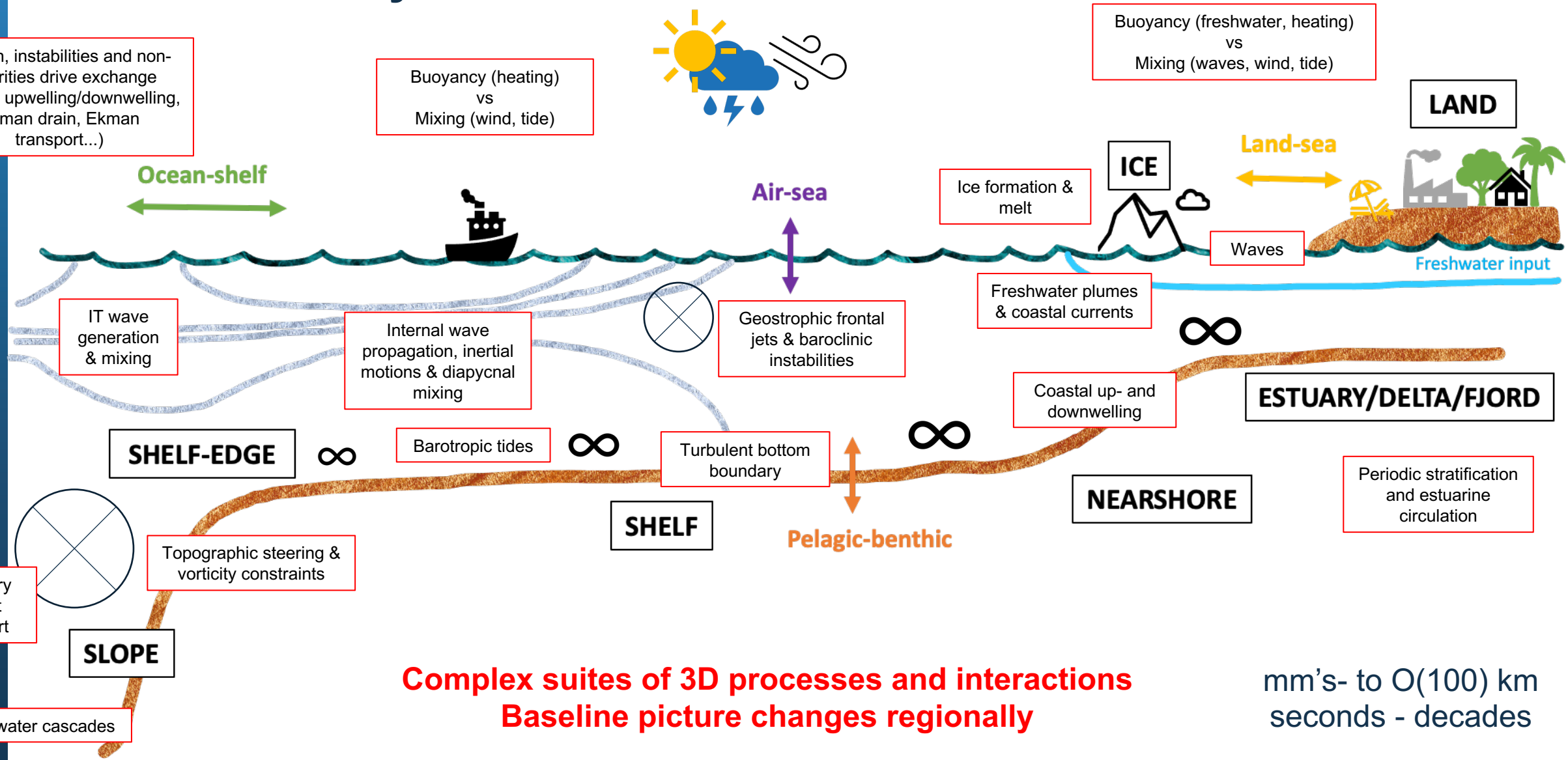


# Coastal ocean dynamics

Friction, instabilities and non-linearities drive exchange (eddies, upwelling/downwelling, Ekman drain, Ekman transport...)

Buoyancy (heating) vs Mixing (wind, tide)

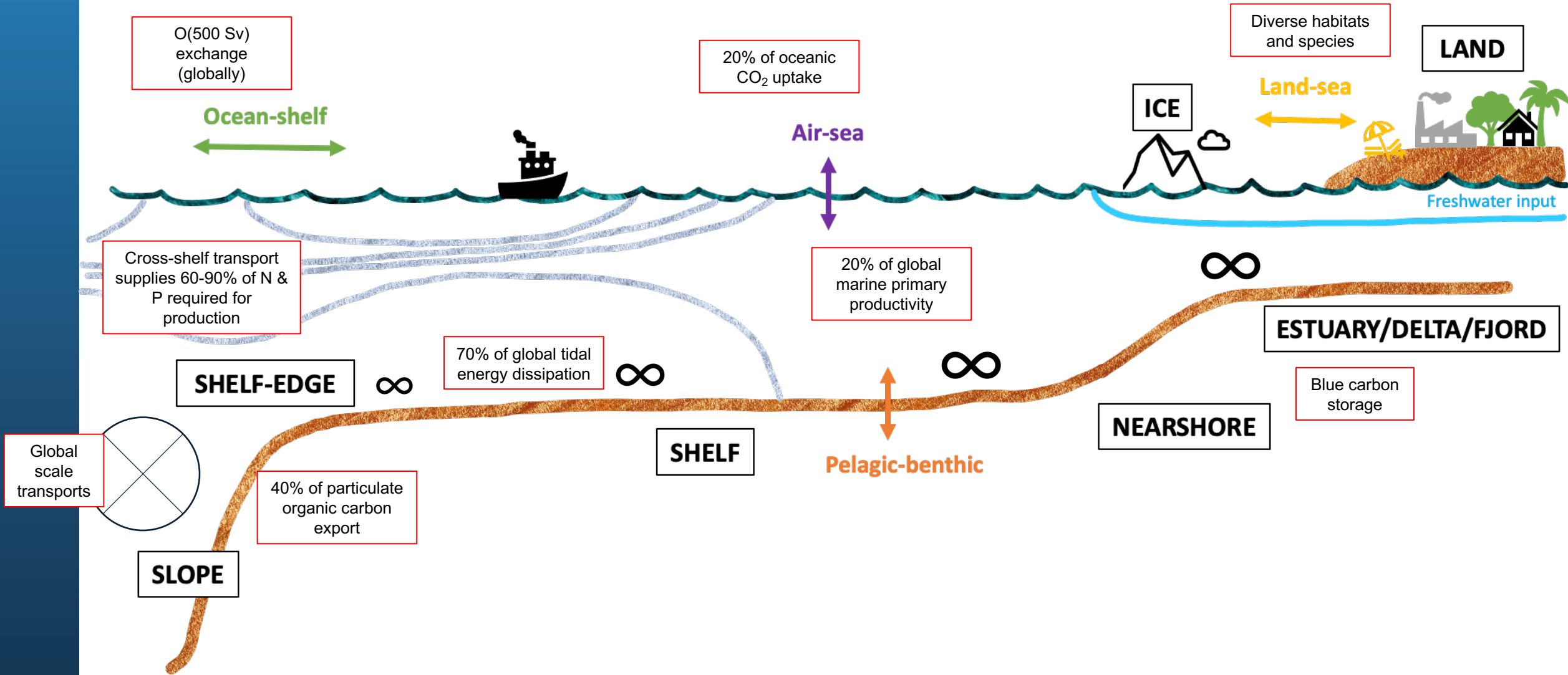
Buoyancy (freshwater, heating) vs Mixing (waves, wind, tide)



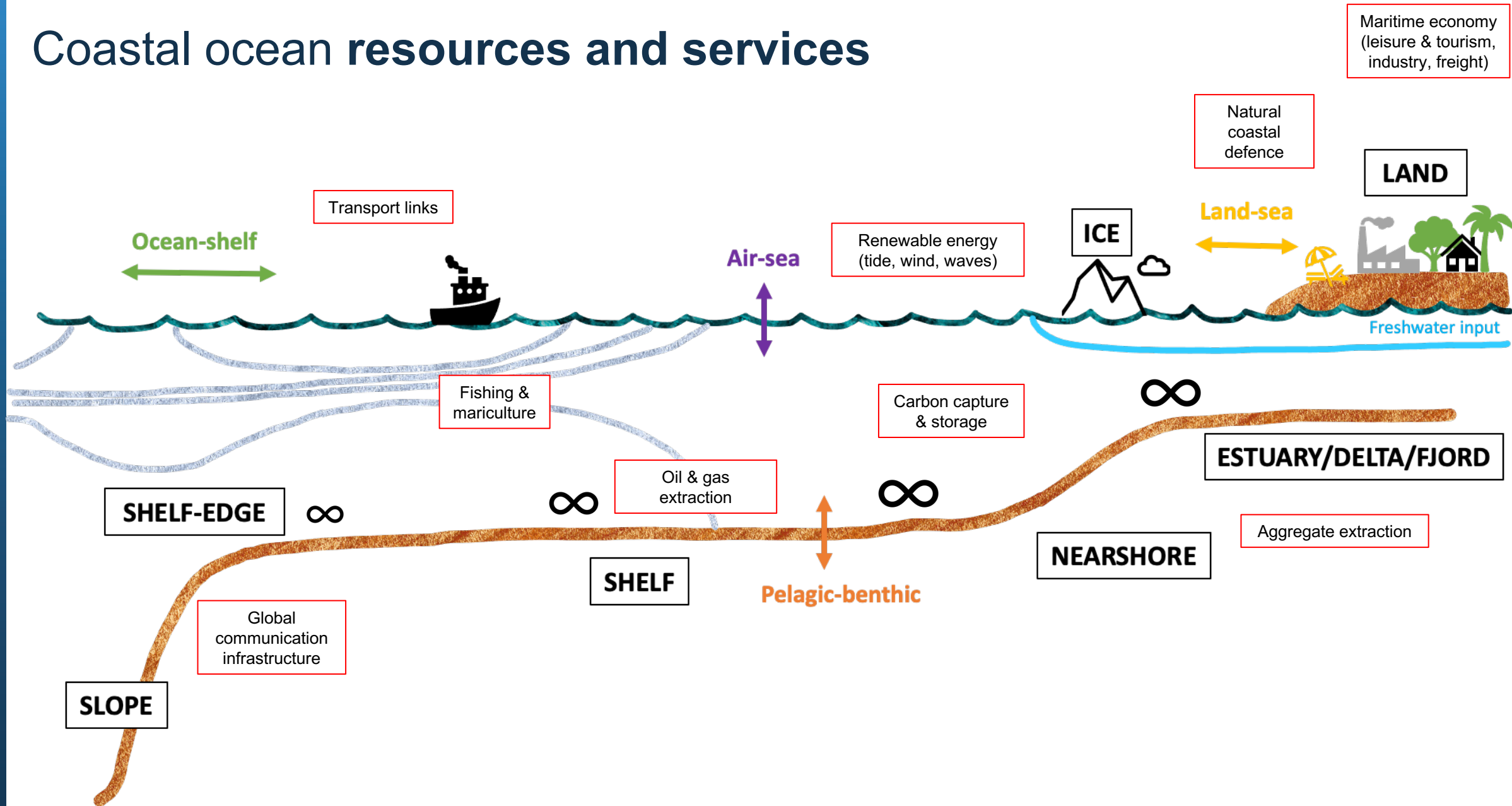
**Complex suites of 3D processes and interactions**  
**Baseline picture changes regionally**

mm's- to O(100) km  
 seconds - decades

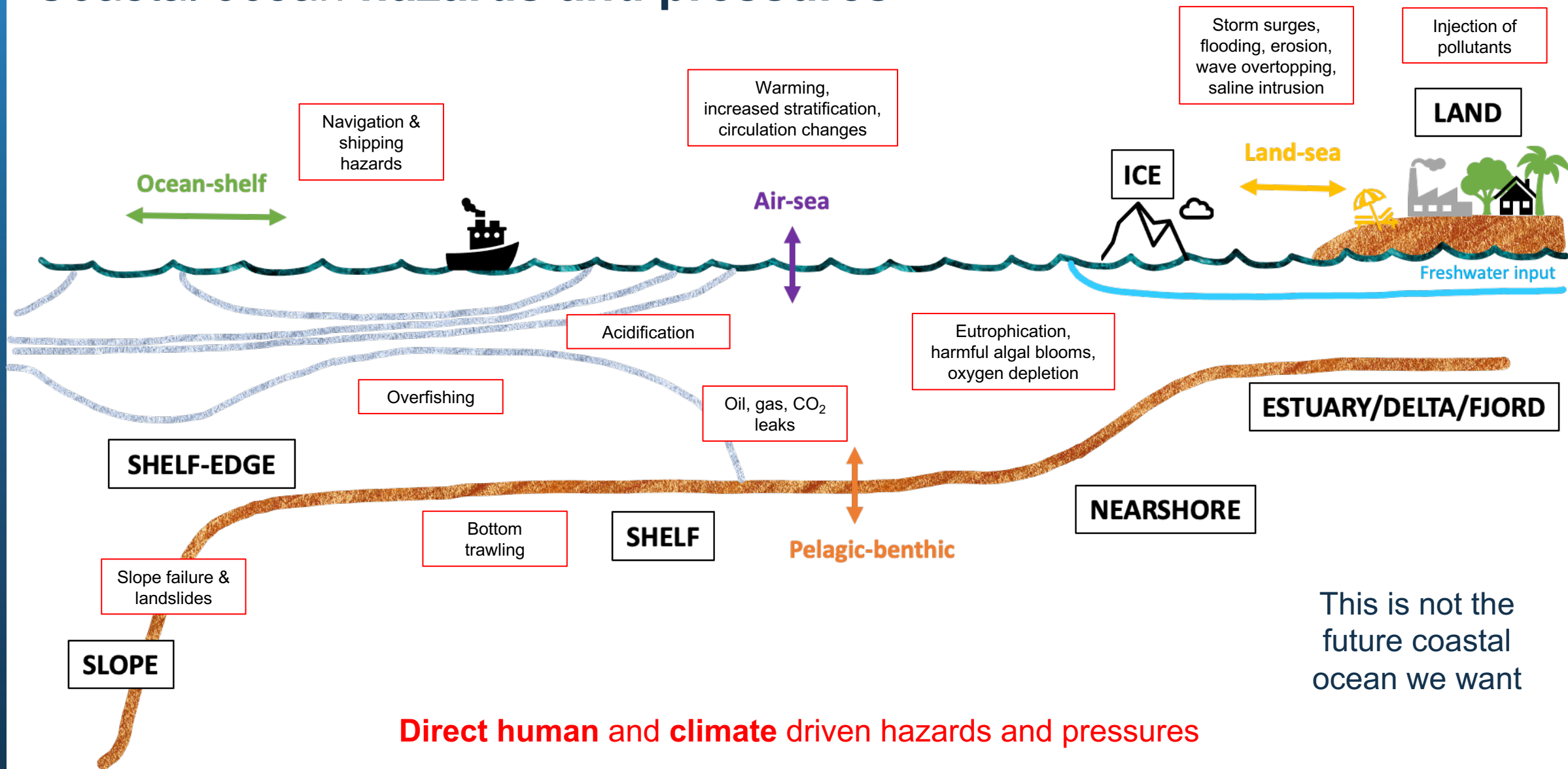
# Coastal ocean role in Earth system



# Coastal ocean resources and services

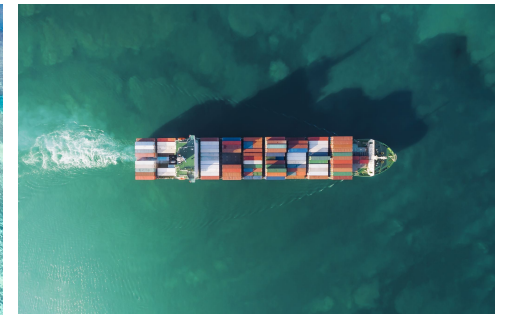


# Coastal ocean hazards and pressures



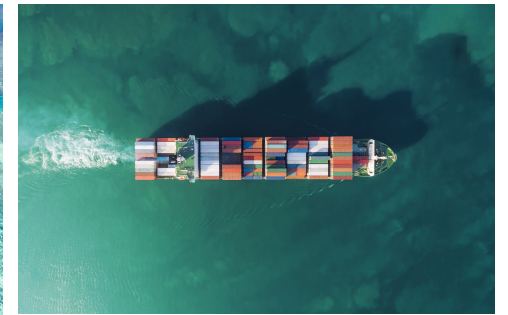
# Defining the global coastal ocean

- How do we currently define the global coastal ocean?
  - Isobaths (200-500 m)
  - Geographic setting and geomorphology associated with the ocean-shelf boundary  
(eastern- western boundaries, polar, sub-polar, tropical, marginal seas)
  - Shelf- or slope-dominated ; wide vs. narrow
- These classifications are not based on objective, dynamical understanding and quantification that is appropriate for the problem/solution in question
- Nor do they draw upon the wealth of observational and modelling data we have available



# Defining the global coastal ocean

- Why might we want a dynamically based typology?
  - **Upscaling budgets** (e.g. carbon and nutrient fluxes...)
  - **Identifying downscaling priorities**  
(e.g. identification of processes missing in coarse-res global models)
  - **Global scale quantification of a resource or function**  
(e.g. energy, habitat niche, water mass formation...)
  - **Wider assessment of risks and vulnerability**  
(e.g. hypoxia, coastal erosion, pollutant dispersal...)
  - **Wider implementation of locally developed technology, solutions or observation design**  
(e.g. renewable energy devices, mariculture, CCS schemes, coastal observatories...)
  - **Wider adoption of policy and governance approaches**

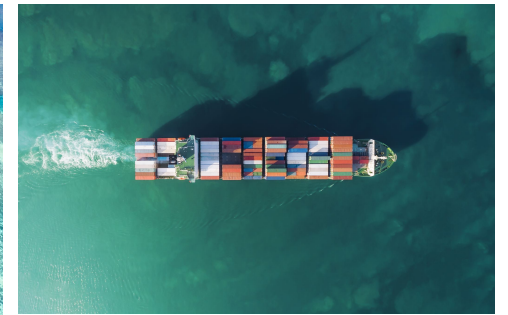
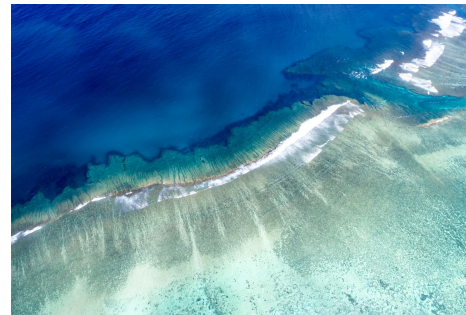




# Defining the global coastal ocean

Although geographically remote, not all coastal areas are necessarily unique – there will be locations where relevant sets of dominant forces and balances are similar

**The challenge** is to develop a new, flexible and dynamically based approach to identifying coastal ocean typologies and behaviors

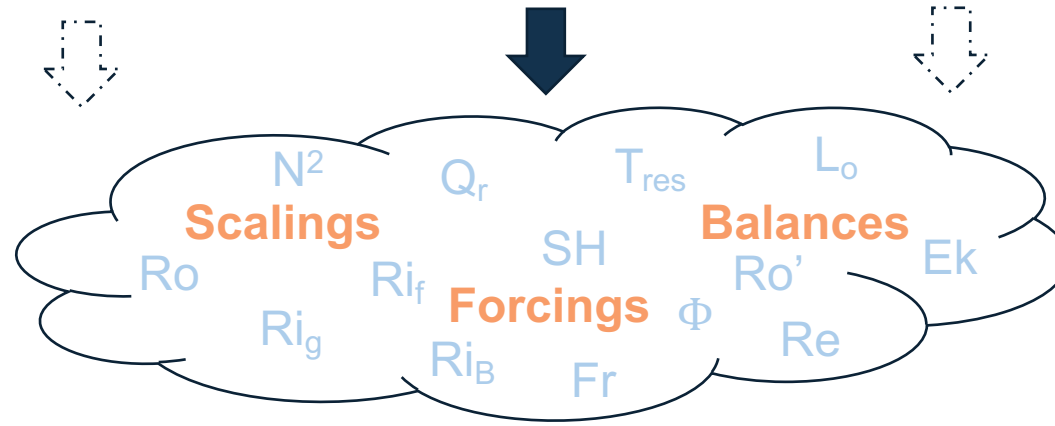


# Redefining the global coastal ocean: concept and ambition

Morphodynamics      Hydrodynamics      Biogeochemical

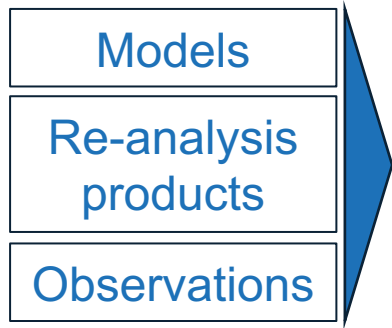
mm's → O(100) km's

Seconds → decades



Objective & dynamically based decision making

**(custom) coastal ocean typology**



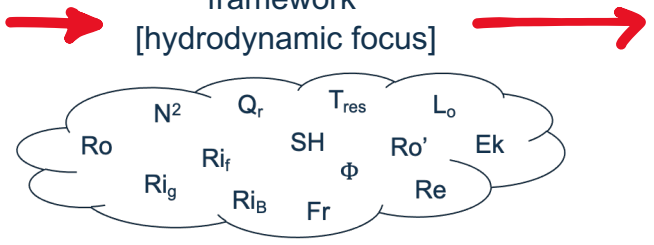
# Next steps...



NERC Global Partnerships  
Seedcorn Funding  
Application (March 2022)



Desk-top studies  
Establish baseline  
framework  
[hydrodynamic focus]



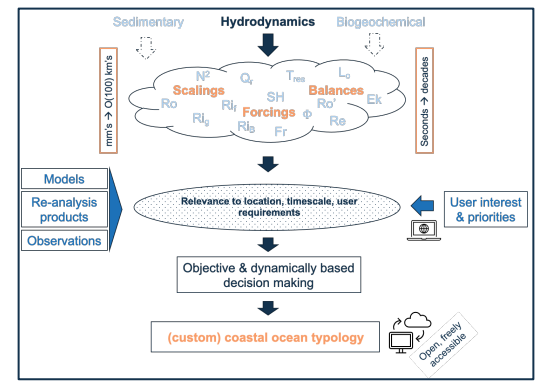
Shape scientific  
challenge and the  
societal benefits of  
addressing it

Larger funded project(s)  
with international  
partners  
[inc. PhD studentships]

Engagement with  
International  
partners &  
stakeholders

Engagement with  
International  
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stakeholders

## End Product



Questions?

