

Considering holistic coastal response to climate-change induced shifts in natural processes and anthropogenic modifications

Introduction

Barrier islands are sandy, low-lying landforms which are sensitive to changes in sediment flux arising from climate change.

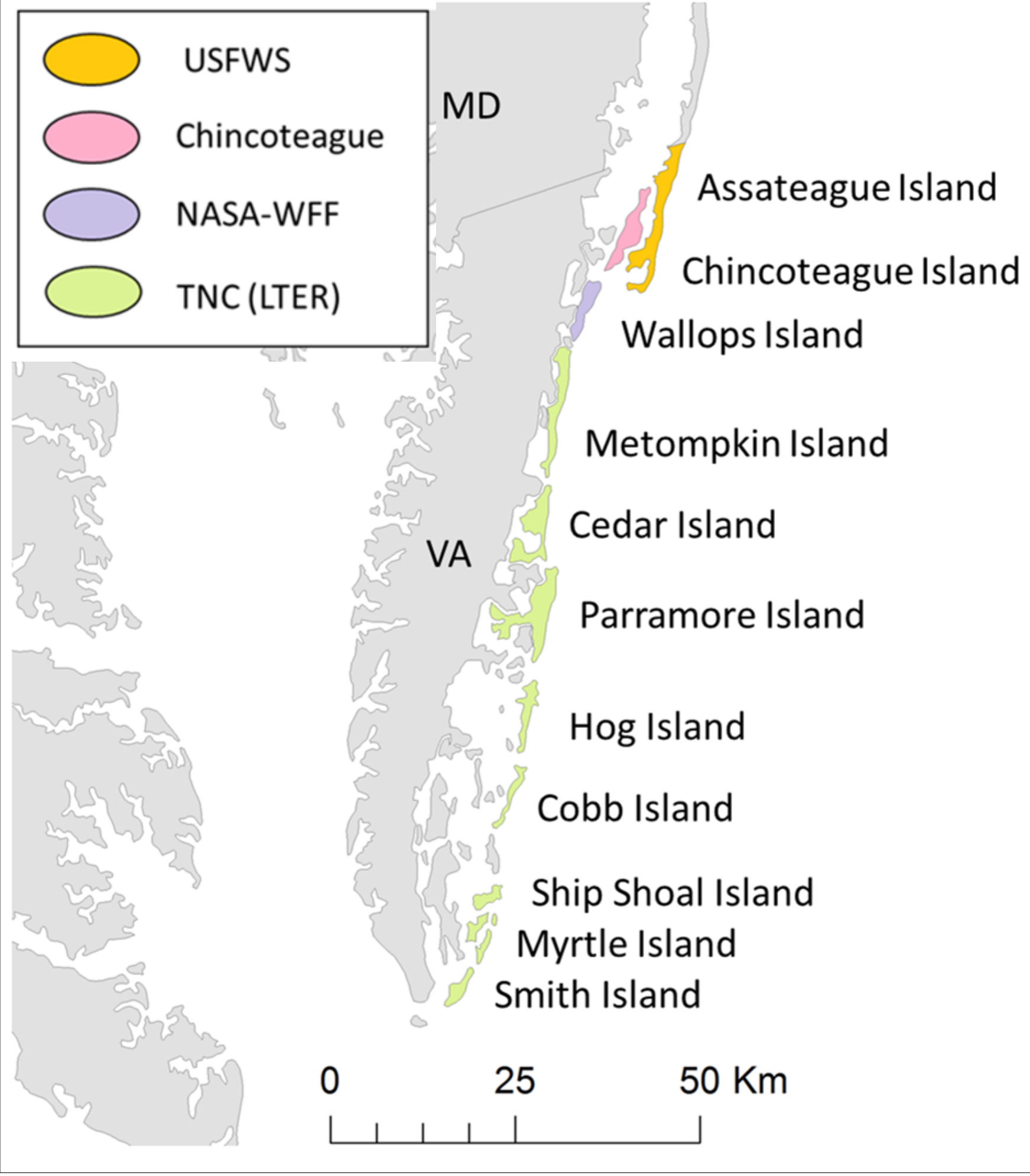


Because management decisions have non-local effects, adopting regional management approaches may be beneficial.

How might this coupled-natural human system respond to climate change?

Hypothesis: The optimal mitigation strategy will vary depending on the climate scenario.

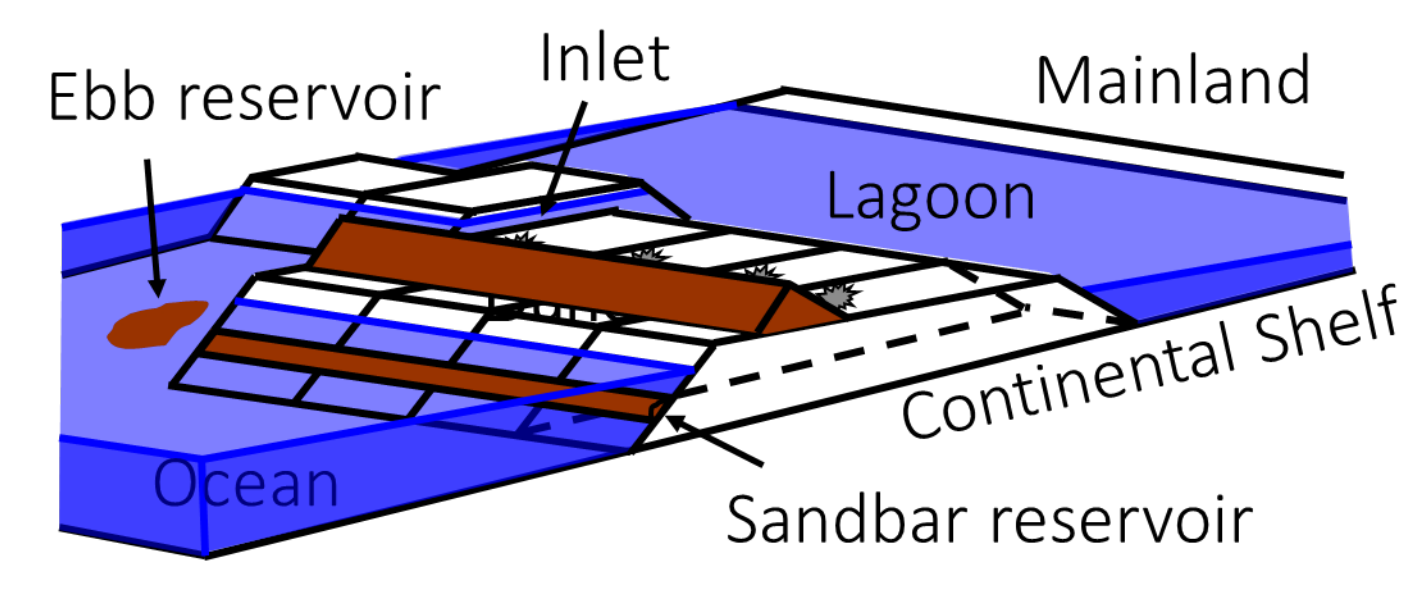
Study Area



Islands in close proximity, owned by different organizations, each with their own management goals

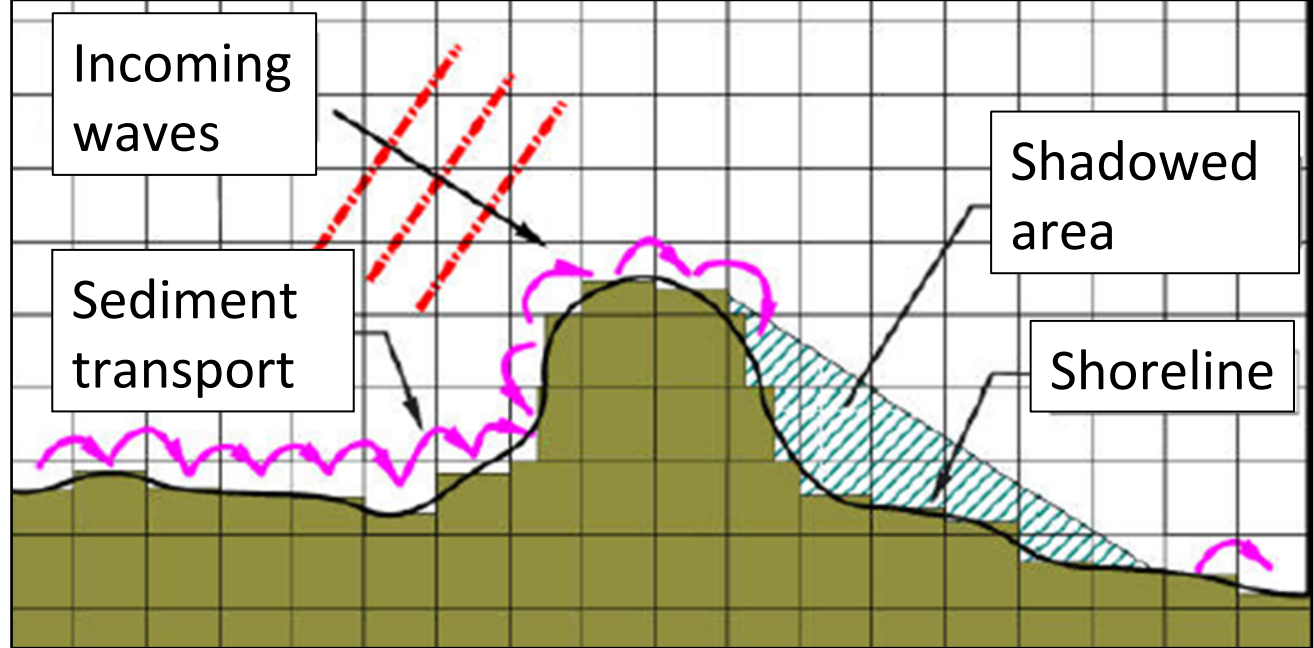
Proposed Coupled Model

Barrier Island Model¹



- Primarily cross shore
- Storm and inter-storm dynamics
- Includes inlet processes

Coastline Evolution Model²



- Plan view
- Shoreline change arises from gradients in alongshore sediment transport

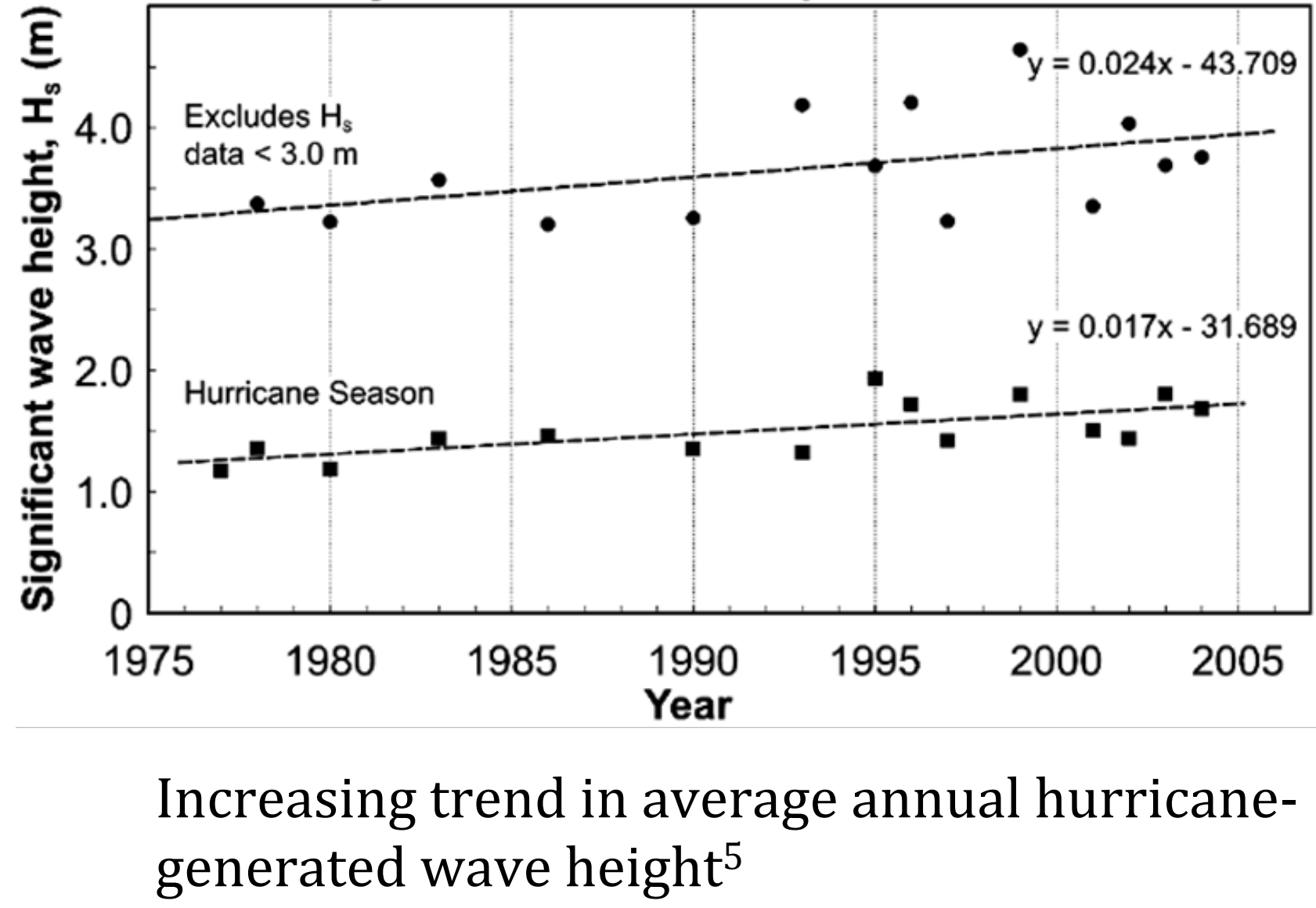
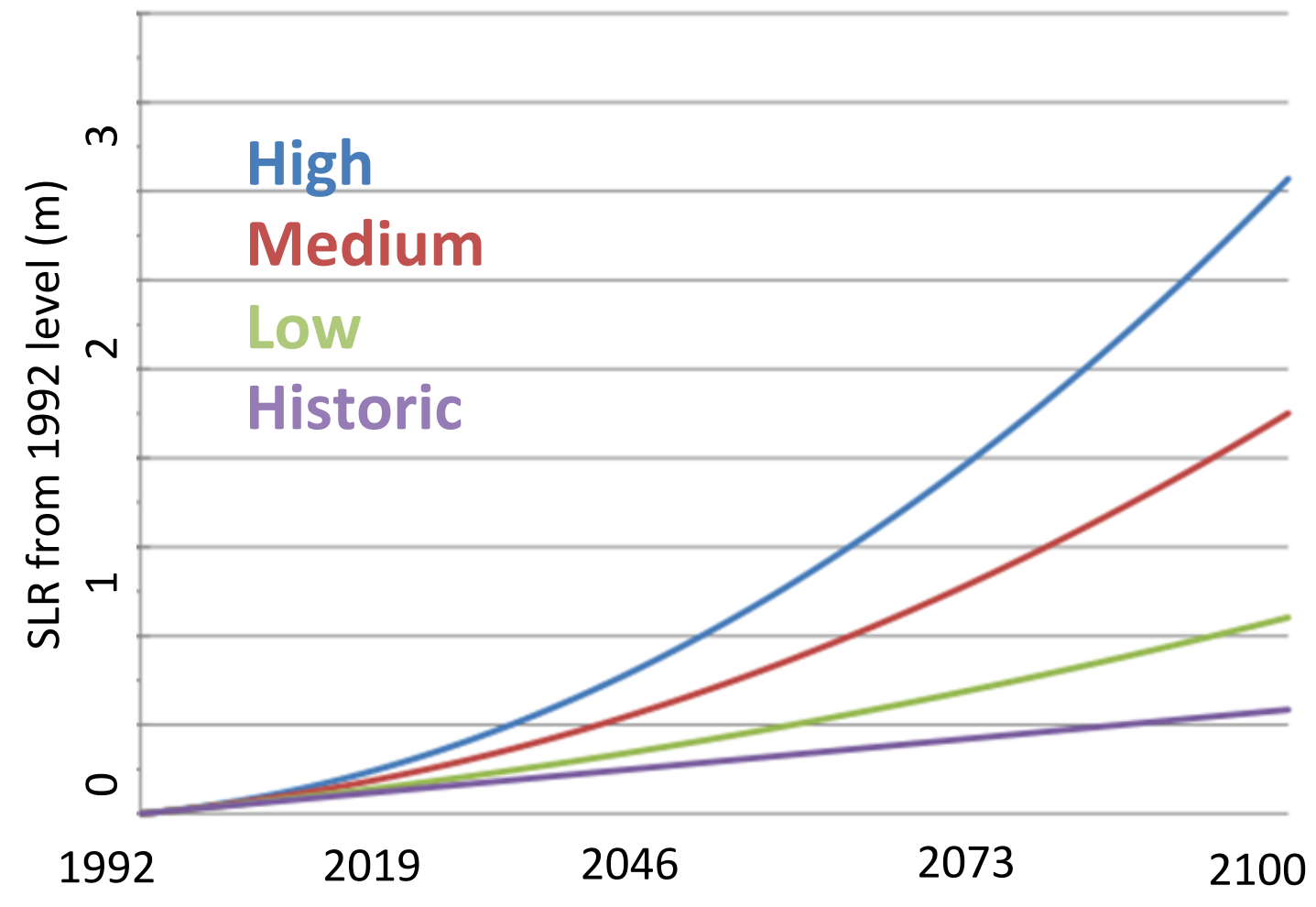
Coupling utilizes strengths of both models

Proposed Experiments

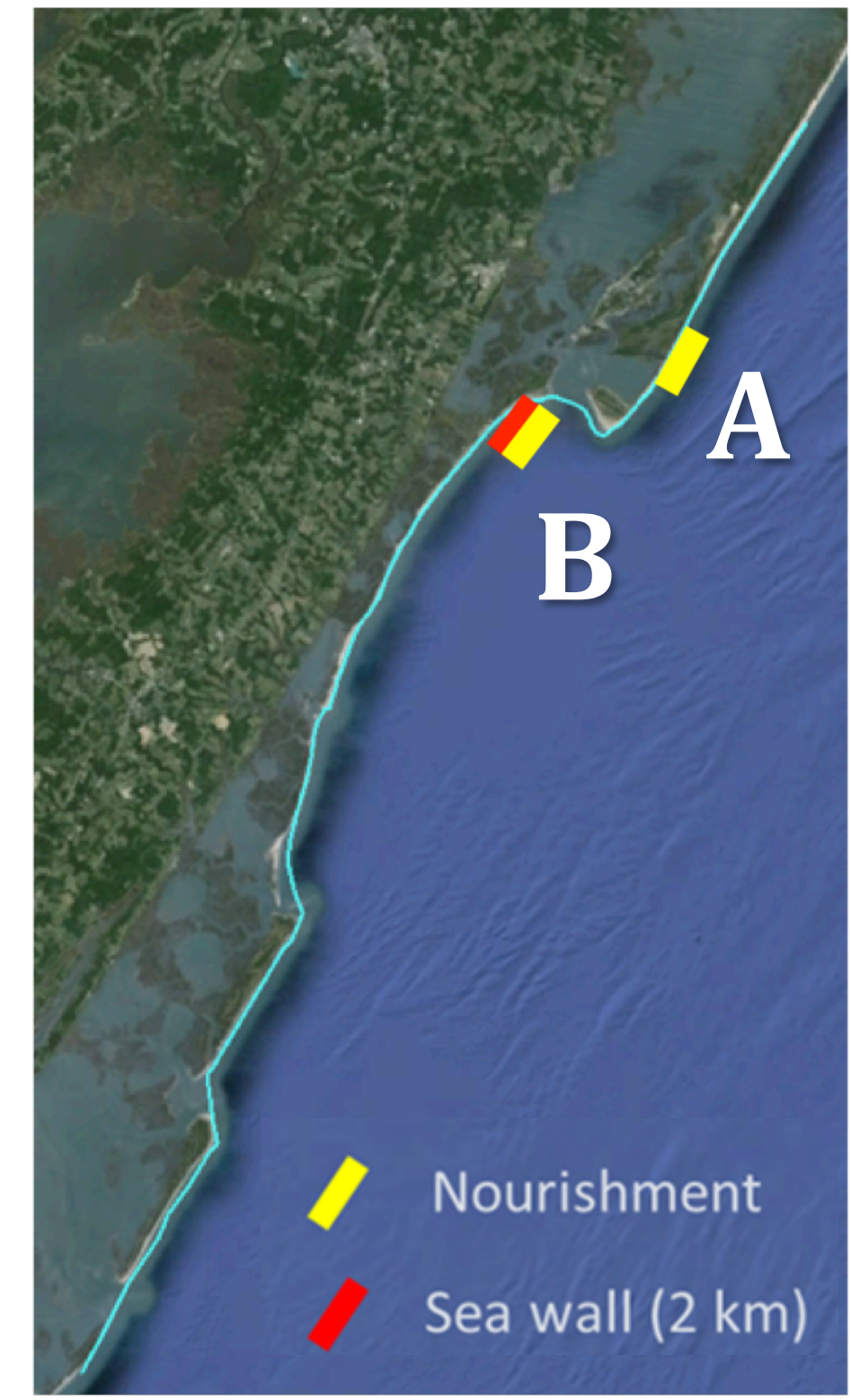
1. How will the natural system evolve without human intervention?

Explore island evolution:

- without climate change
- under multiple climate change scenarios



2. How will management strategies affect island evolution without climate change?



Consider each management action alone and in concert

Scenario Number	Nourishment at A	Nourishment at B	Seawall at B
1	X		
2		X	
3			X
4	X	X	
5	X		X
6		X	X
7	X	X	X

Combinations of management actions to be considered

3. How does climate change alter the coupling between human and natural systems?

Combine management actions with climate change scenarios...



...to determine optimal combination for greatest number of stakeholders

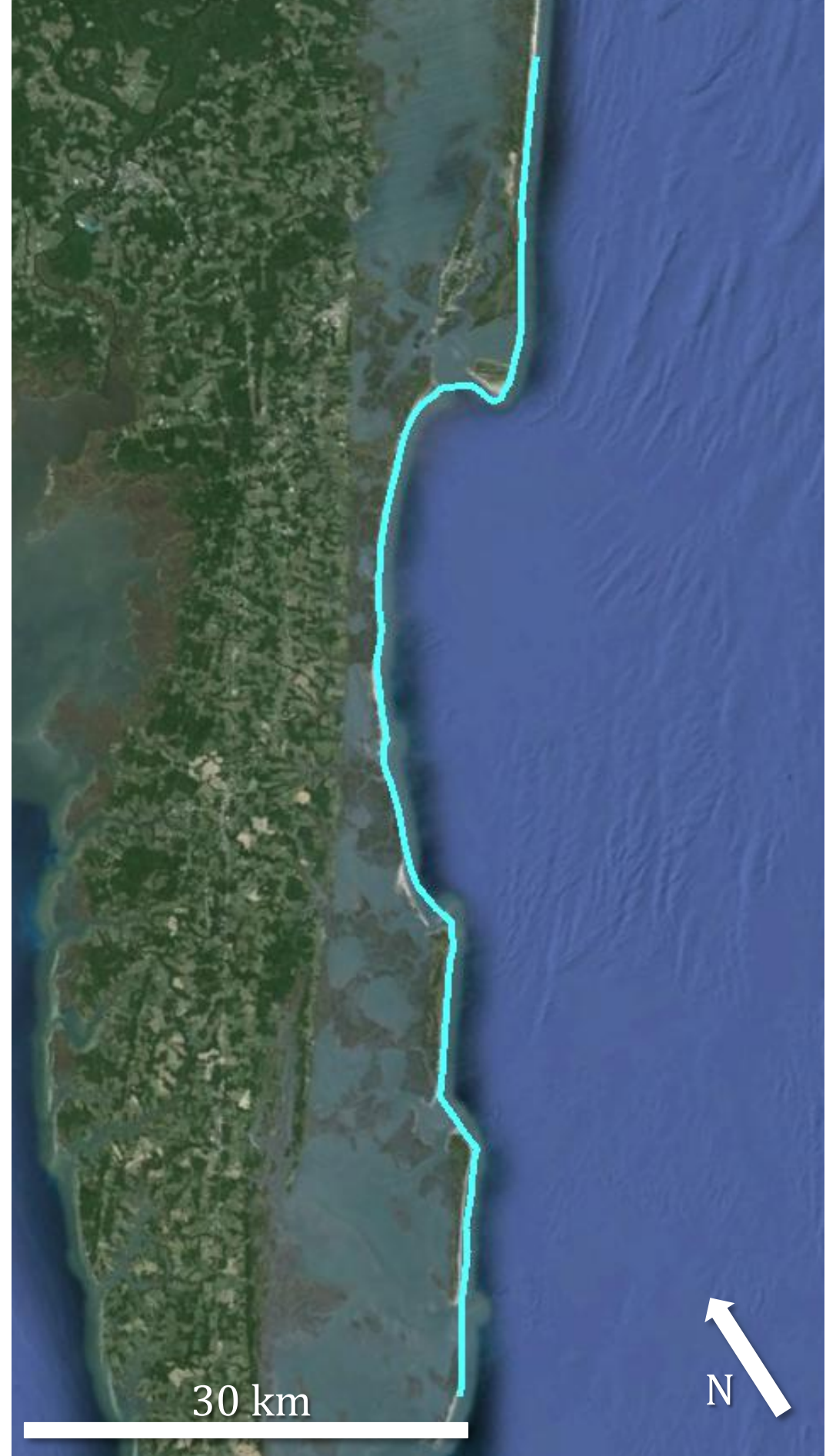
References

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Acknowledgements

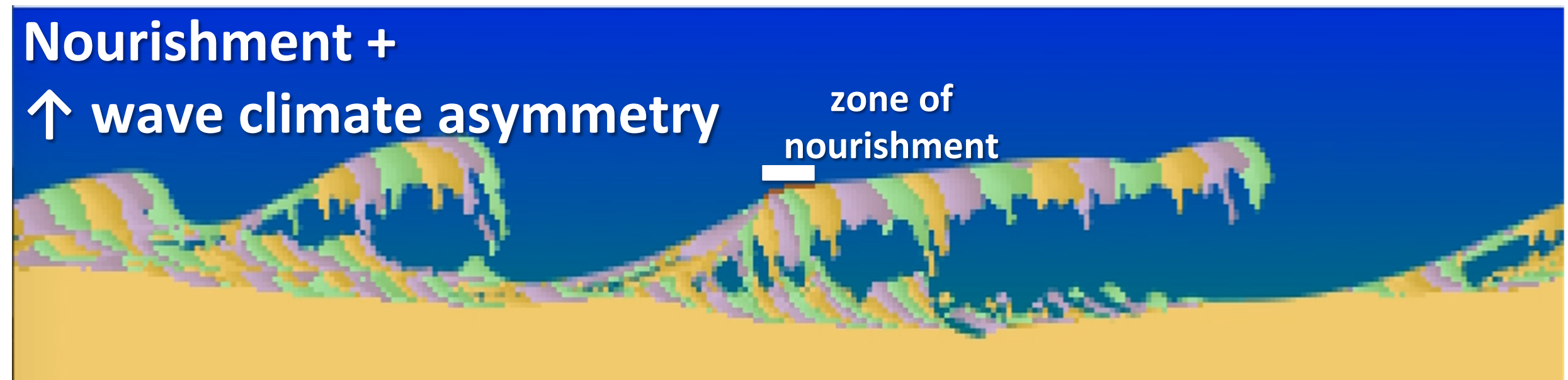
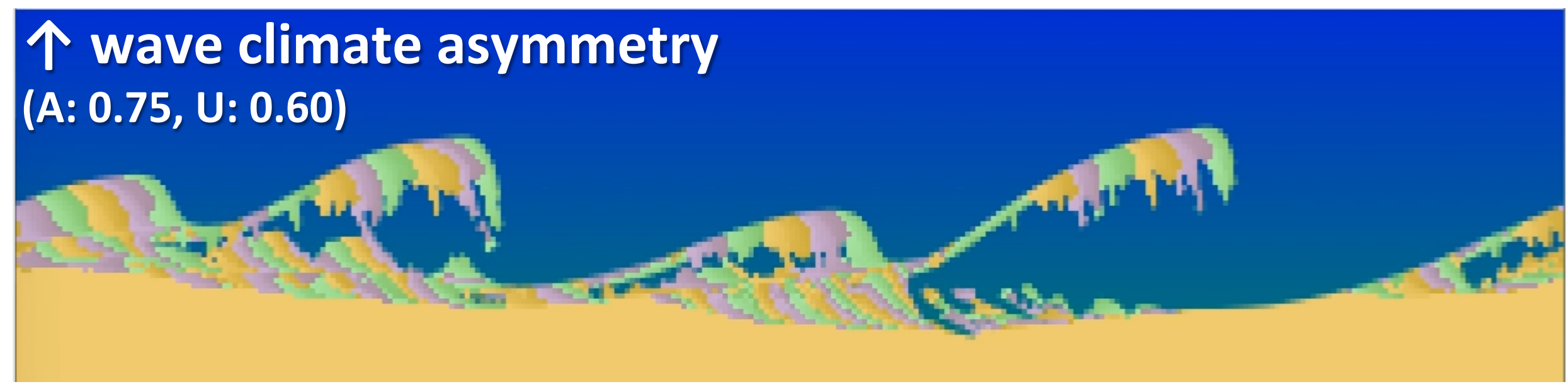
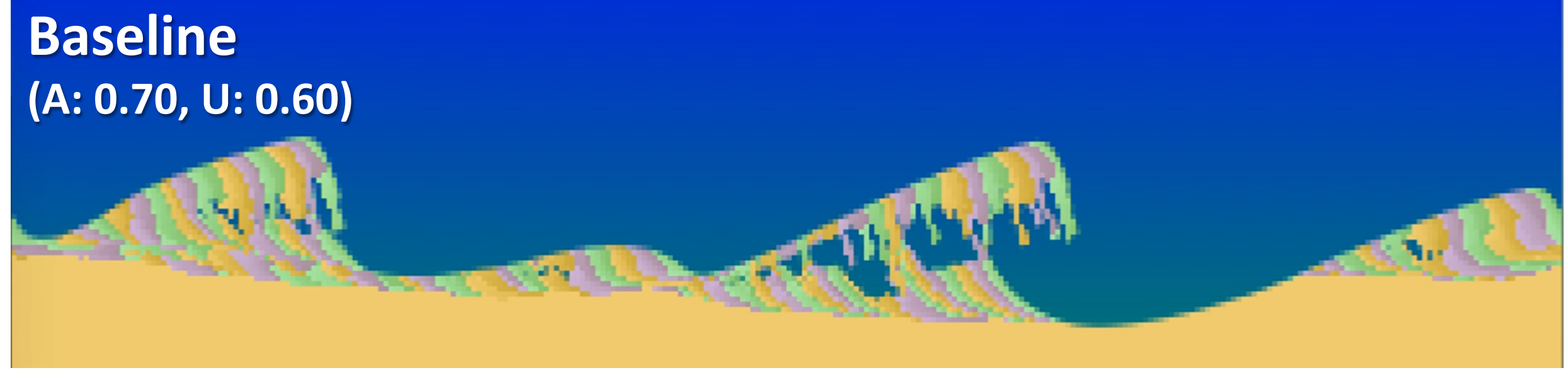
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Initial (uncoupled) Results

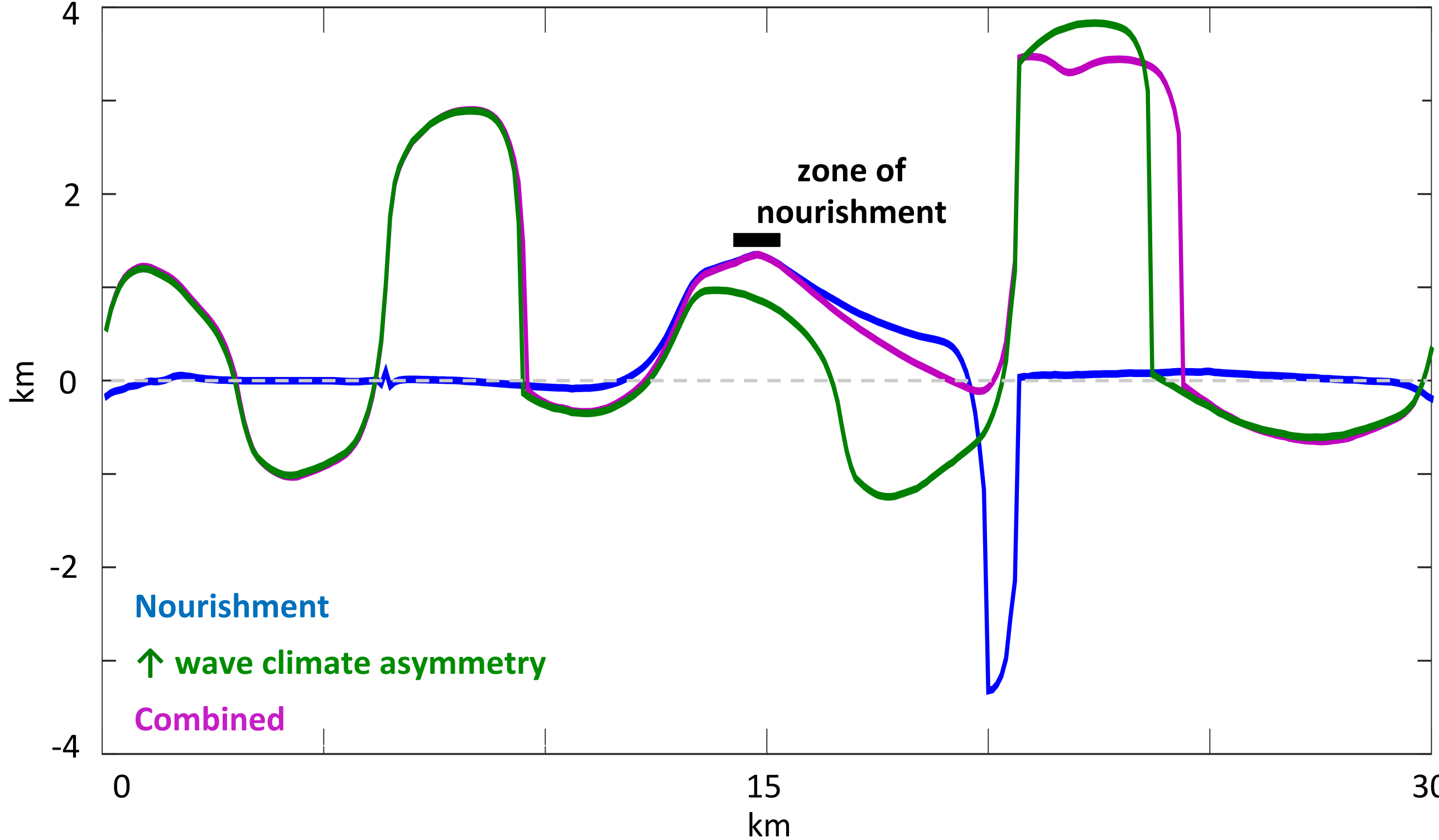


A: proportion of waves approaching from left
U: proportion approaching from high angle

Initial conditions
A: 0.70
U: 0.60



Differences relative to baseline after 100 years:



Initial work suggests that a more asymmetric wave climate may cause the effects of nourishment to extend farther from the zone of nourishment.