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Thank you.



# Generating Maritime Limits

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IBRU Training Workshop No.71  
An Introduction to Technical Aspects  
of Maritime Boundary Delimitation  
12 September 2023

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World Maritime University, Sweden



# Generating Maritime Limits

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- **Generating Maritime Limits from Normal Baselines**
- **Generating Maritime Limits from Straight/Artificial Baselines**
- **Potential Impacts of Sea Level Rise on Baselines and the Outer Limits of Maritime Claims**
- **Declaring and Fixing Baselines and Maritime Zone Limits**

# “Normal” Baselines

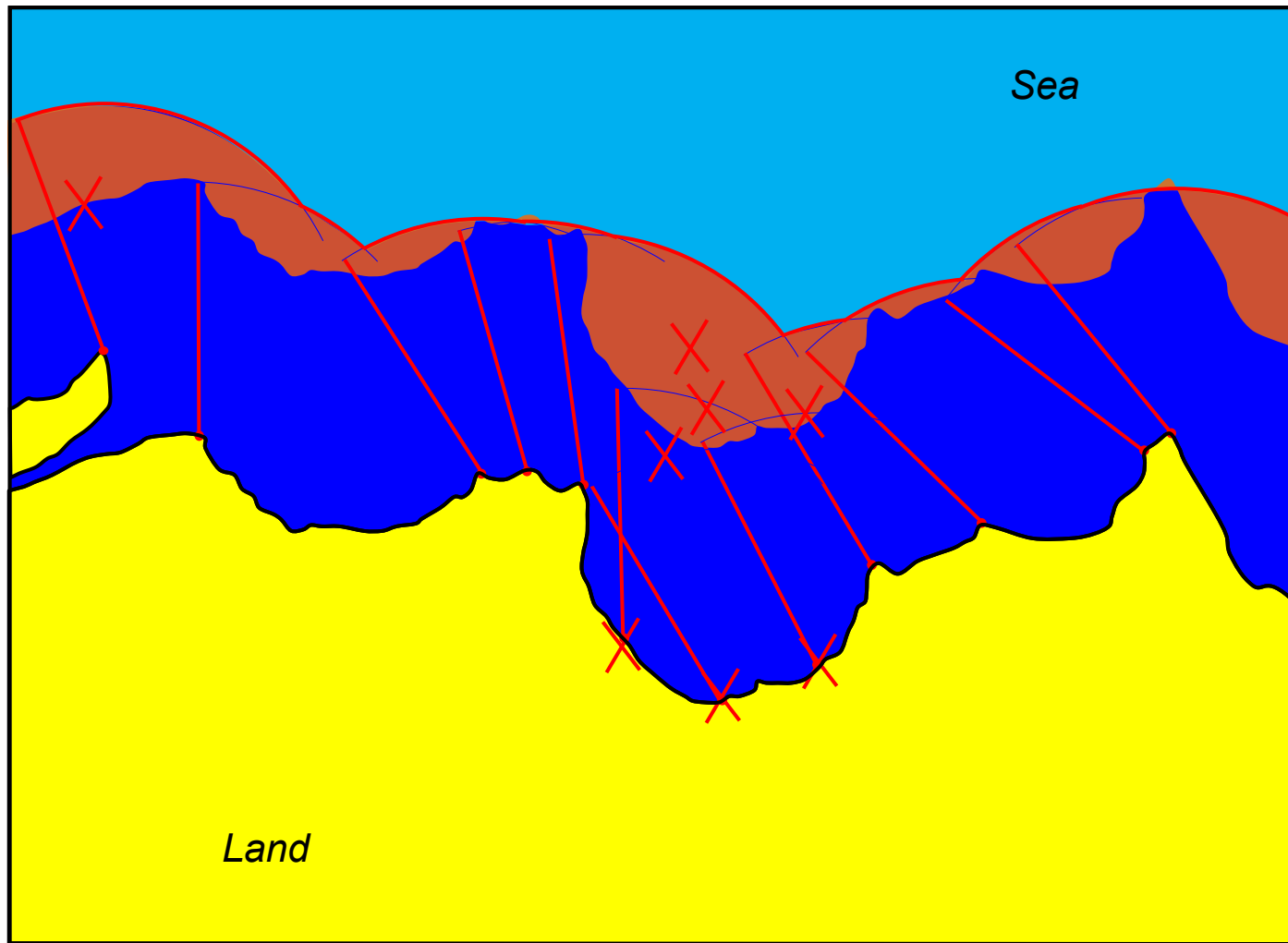
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## 1958 Convention on the Territorial Sea and the Contiguous Zone, Article 3

### LOSC, Article 5

Except where otherwise provided in this Convention, the normal baseline for measuring the breadth of the territorial sea is the low-water line along the coast as marked on large-scale charts officially recognised by the coastal State.

# Normal Baselines and Maritime Limits

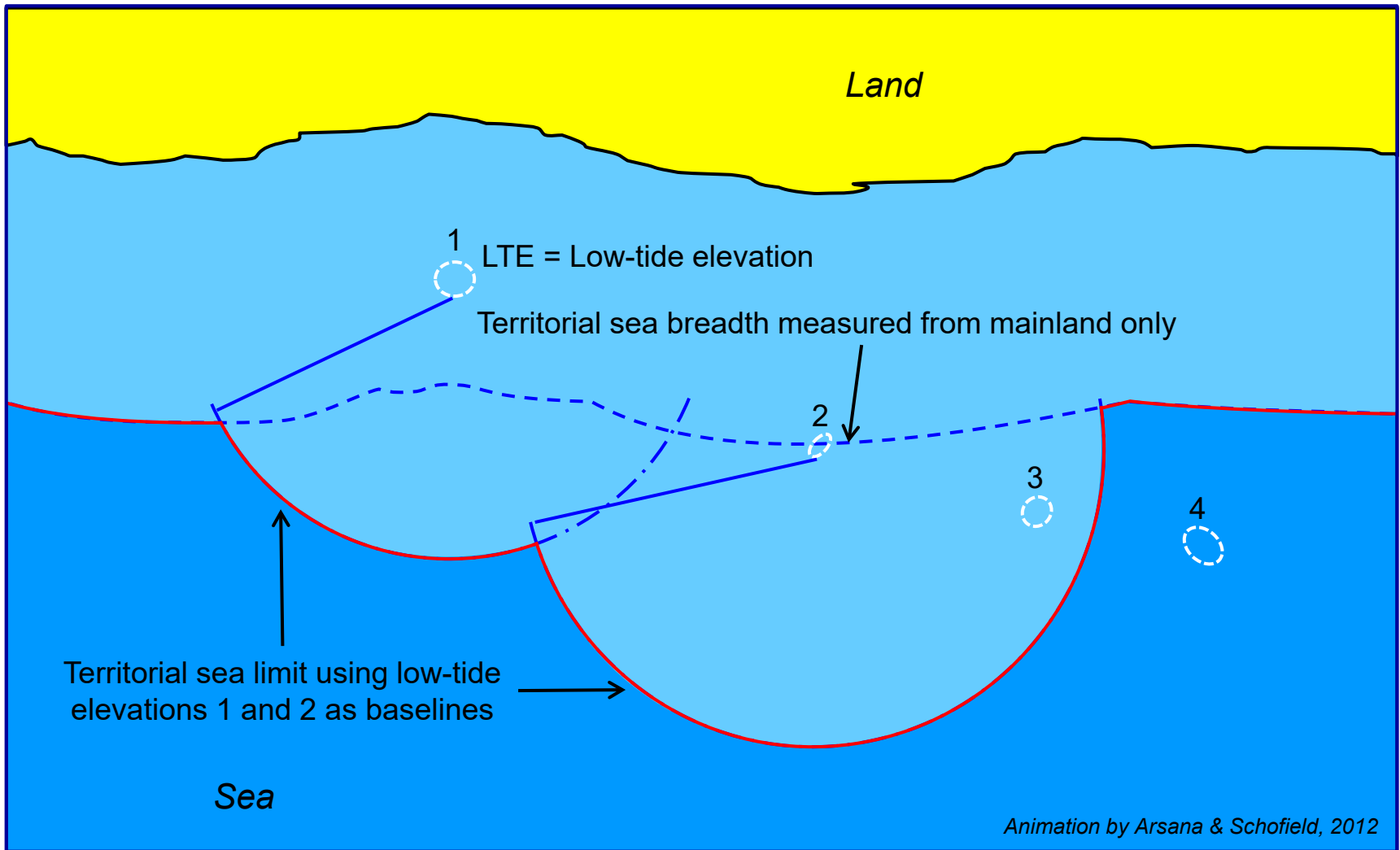


I Made Andi Arsana (c) 2013

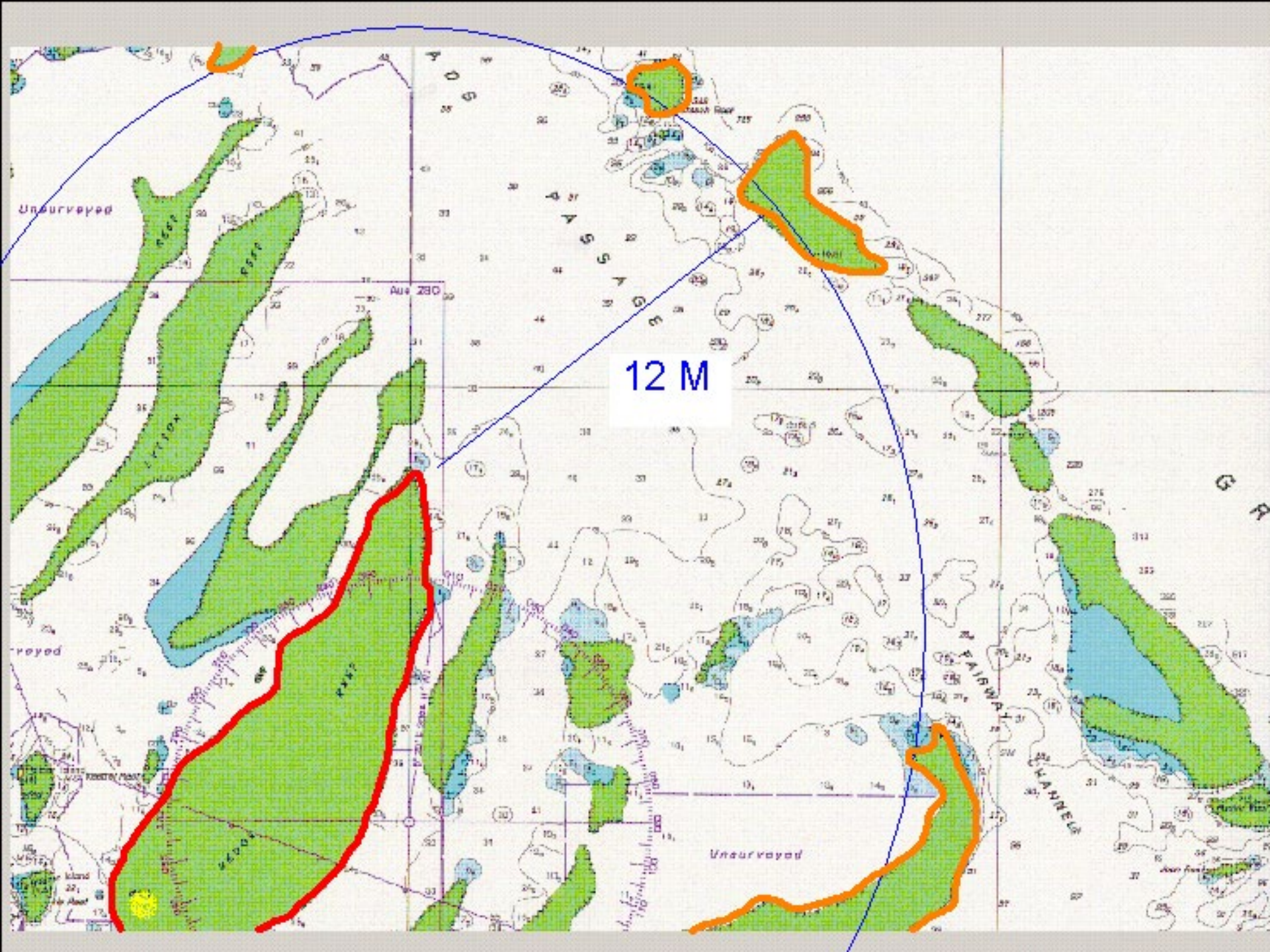
## Baselines versus Basepoints:

Not all of the baseline contributes to defining the limits of maritime jurisdiction

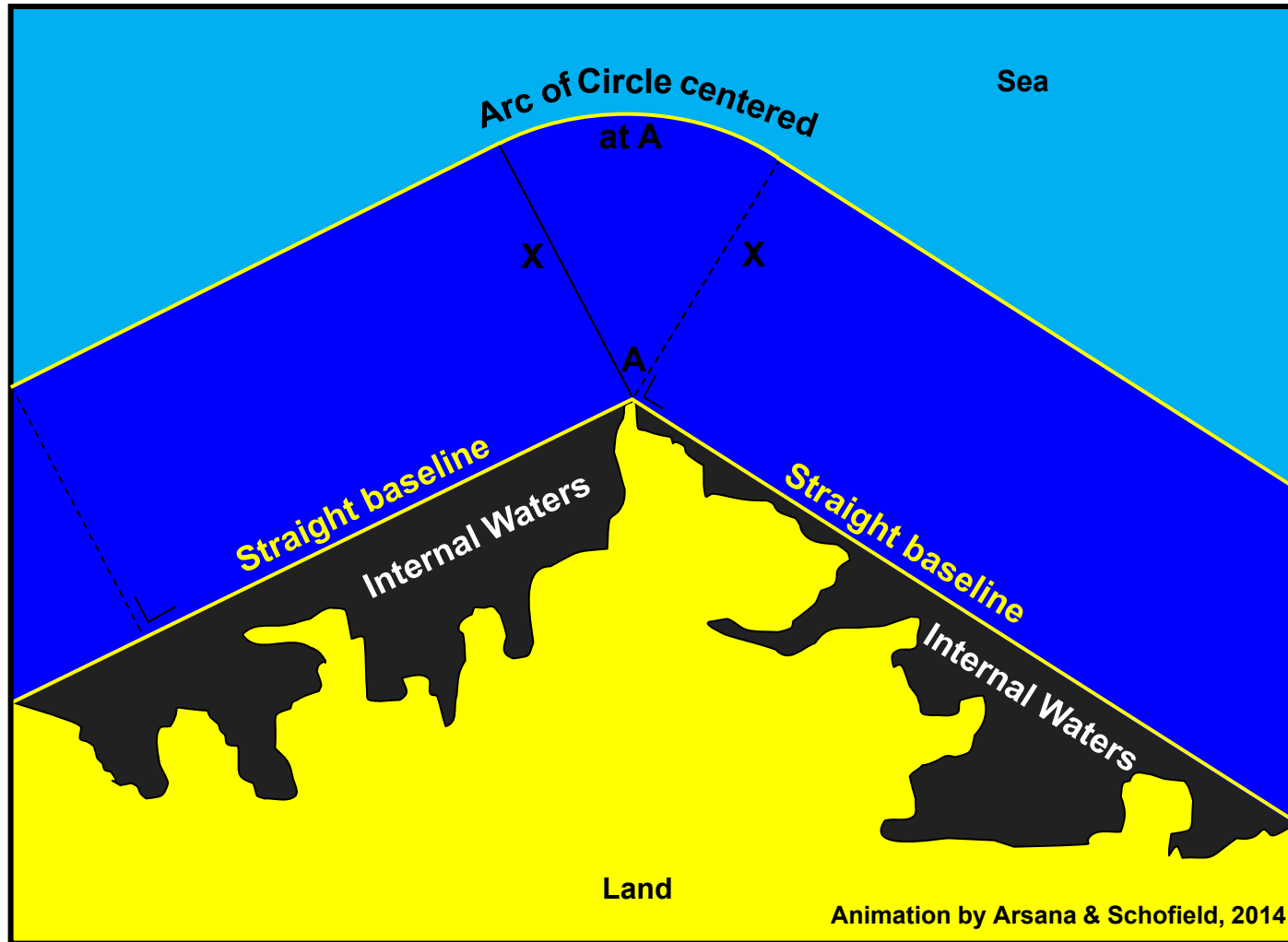
# LTEs and Maritime Limits



Source: TALOS Manual (5<sup>th</sup> edition, October 2012)



# Straight baselines and maritime limits





# Implications of Dynamic Coastlines

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- Coastlines have long been known to be dynamic features of the land/sea-scape
  - Depositional processes advance the position of the coastline
  - Glacial isostatic readjustment
  - Tectonic processes
  - Volcanism
  - Erosive forces
- Changing coast = **“ambulatory”** normal baselines?
- Exacerbated by **sea level rise**
- Implications for:
  - **Limits and extent of maritime claims**
  - **Status of insular features**
  - **Delimitation of maritime boundaries**
  - **Maritime surveillance and enforcement**

# Sea Level Rise and Potential Impacts on Baselines, Limits and Boundaries

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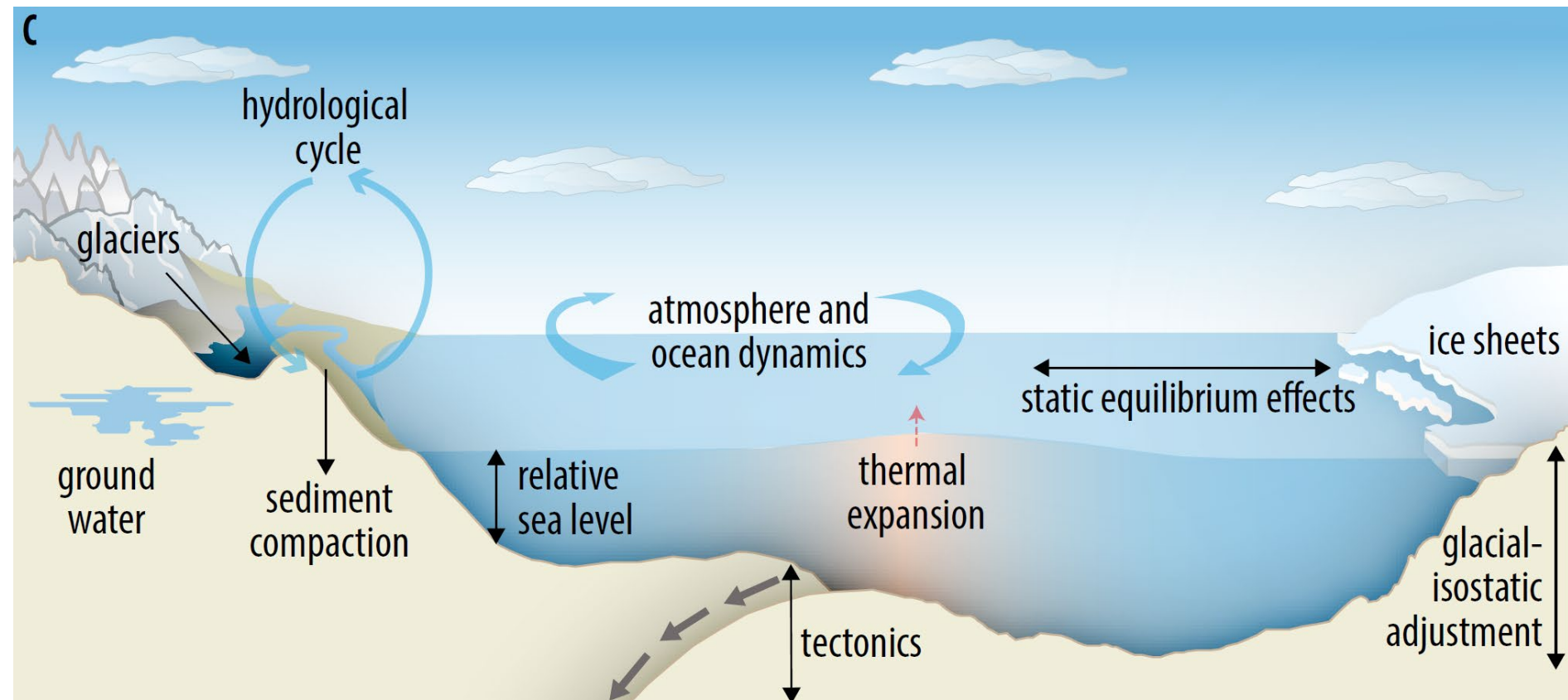
- Sea Level Rise
- Impacts on baselines
- Impacts on limits and boundaries
- Response options

# Key Drivers for Changing Sea Levels

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- Sea level influenced by multiple factors:
  - Ocean warming (expansion)
  - Glacio-eustatic processes influencing volume of water in the oceans – contributions from cryosphere a key uncertainty
  - Processes influencing the shape of land and oceans
  - Anthropogenic impacts
- Uncertainties of the scale and pace of sea level rise
- Significant spatial and temporal variability
  - Tidal complexity/variability
  - Influence of oceanic-atmospheric interactions (e.g. El Niño Southern Oscillation)

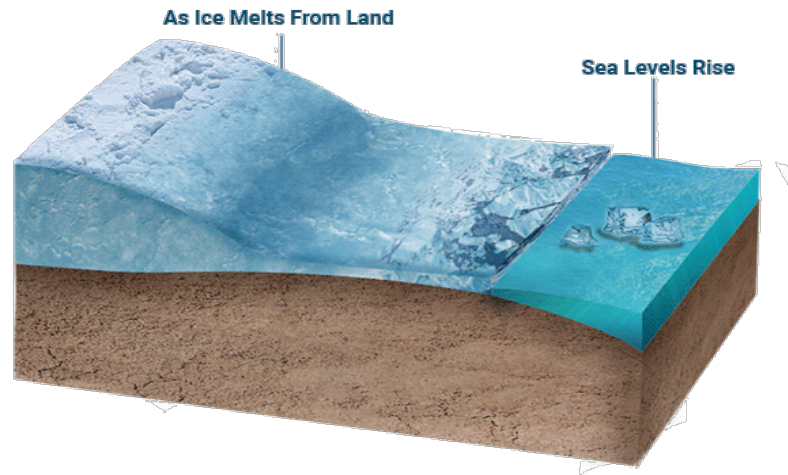
# Changes in sea level are driven by a variety of global, regional and local scale processes that vary spatially and temporally



Courtesy of Professor Ben Horton

**SEA LEVELS**  
PAST, PRESENT AND FUTURE

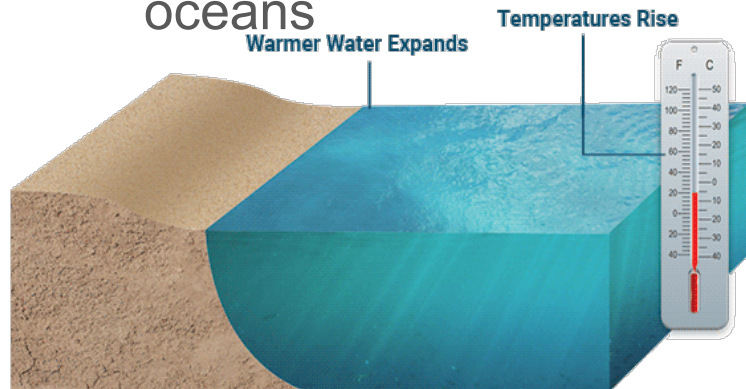
# DRIVERS OF SEA-LEVEL CHANGE



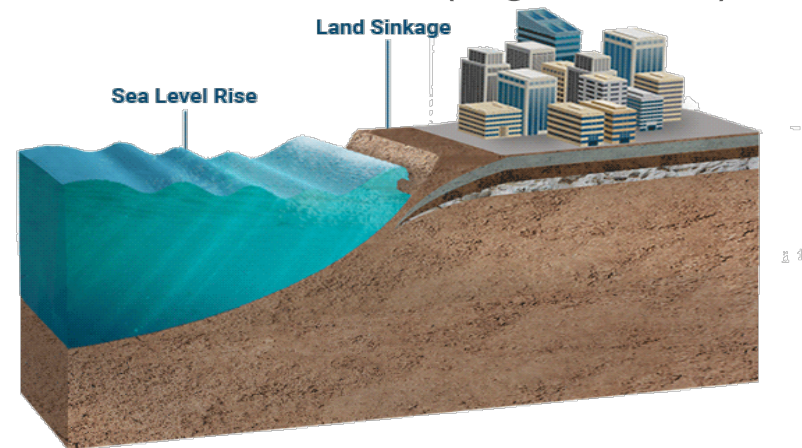
Land based ice is the biggest threat to magnitudes of future sea level change



Thermal expansion of oceans



Land subsidence (e.g. Manila)

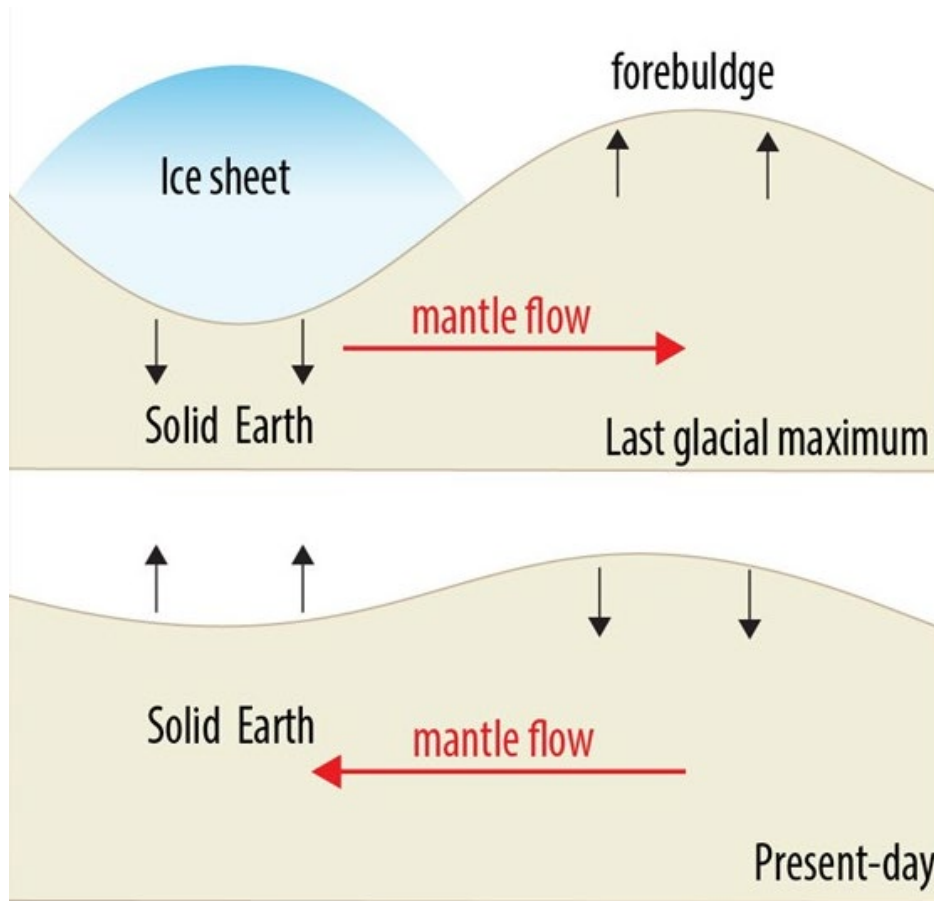


Courtesy of Professor Ben Horton

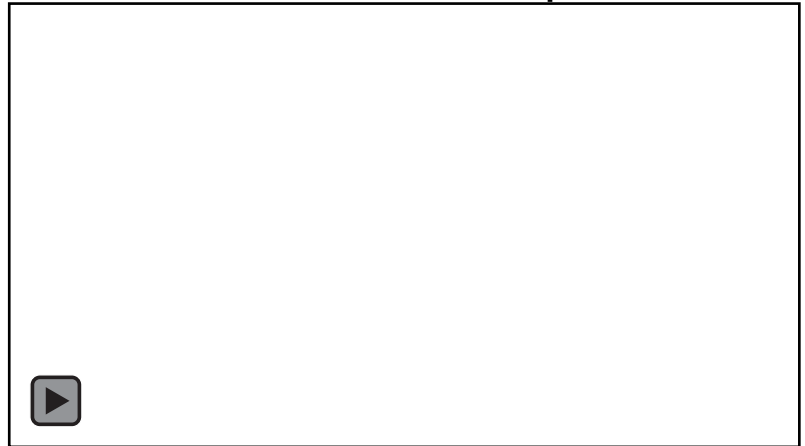
[www.sealevelrise.org](http://www.sealevelrise.org)

**SEA LEVELS**  
PAST, PRESENT AND  
FUTURE

# GLACIAL ISOSTATIC ADJUSTMENT

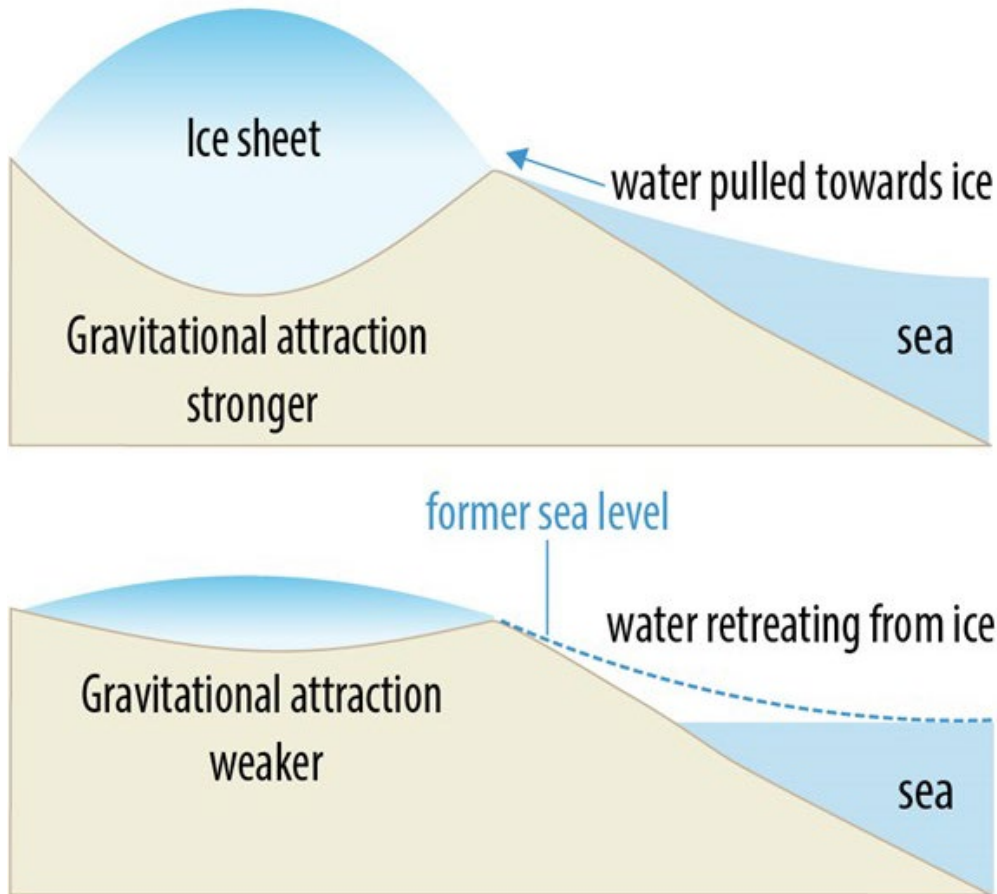


Glacial isostatic adjustment is the ongoing movement of land once burdened by ice sheets. The last glaciation occurred just 20,000 years ago, when great sheets of ice covered much of Earth's Northern Hemisphere

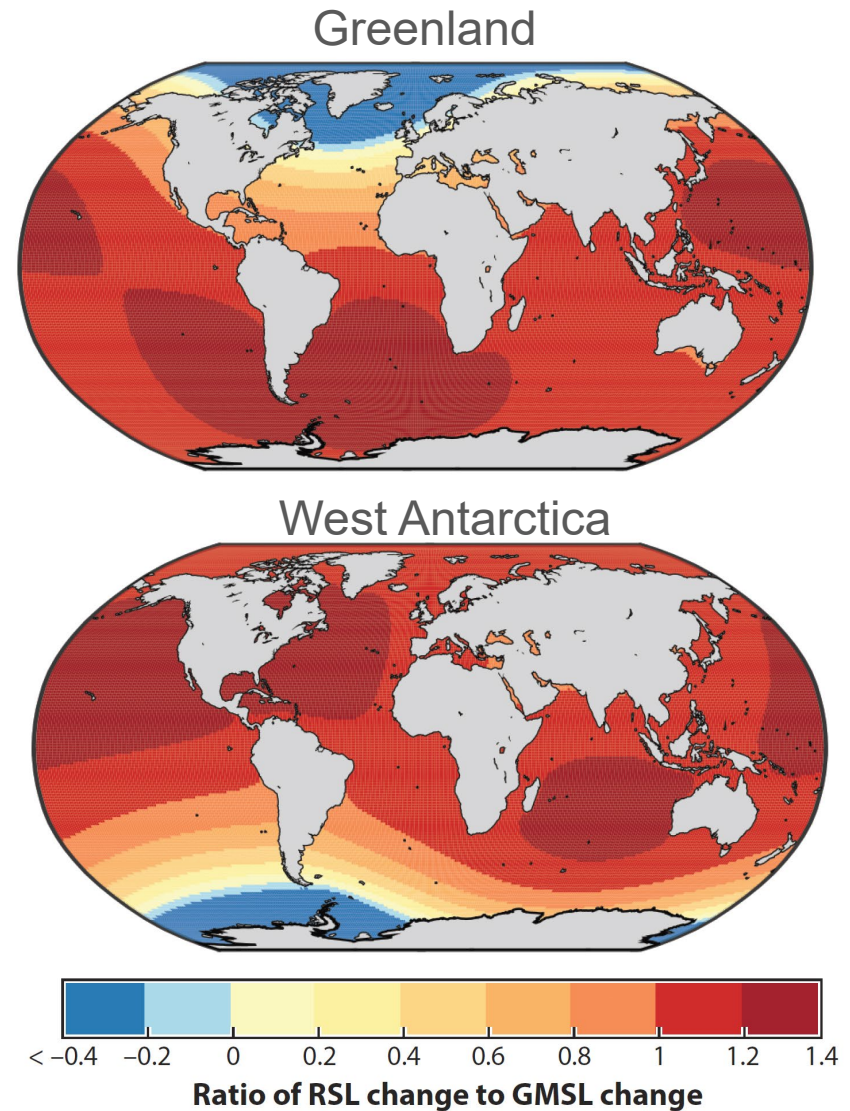


Courtesy of Professor Ben Horton

# SEA-LEVEL FINGERPRINTING



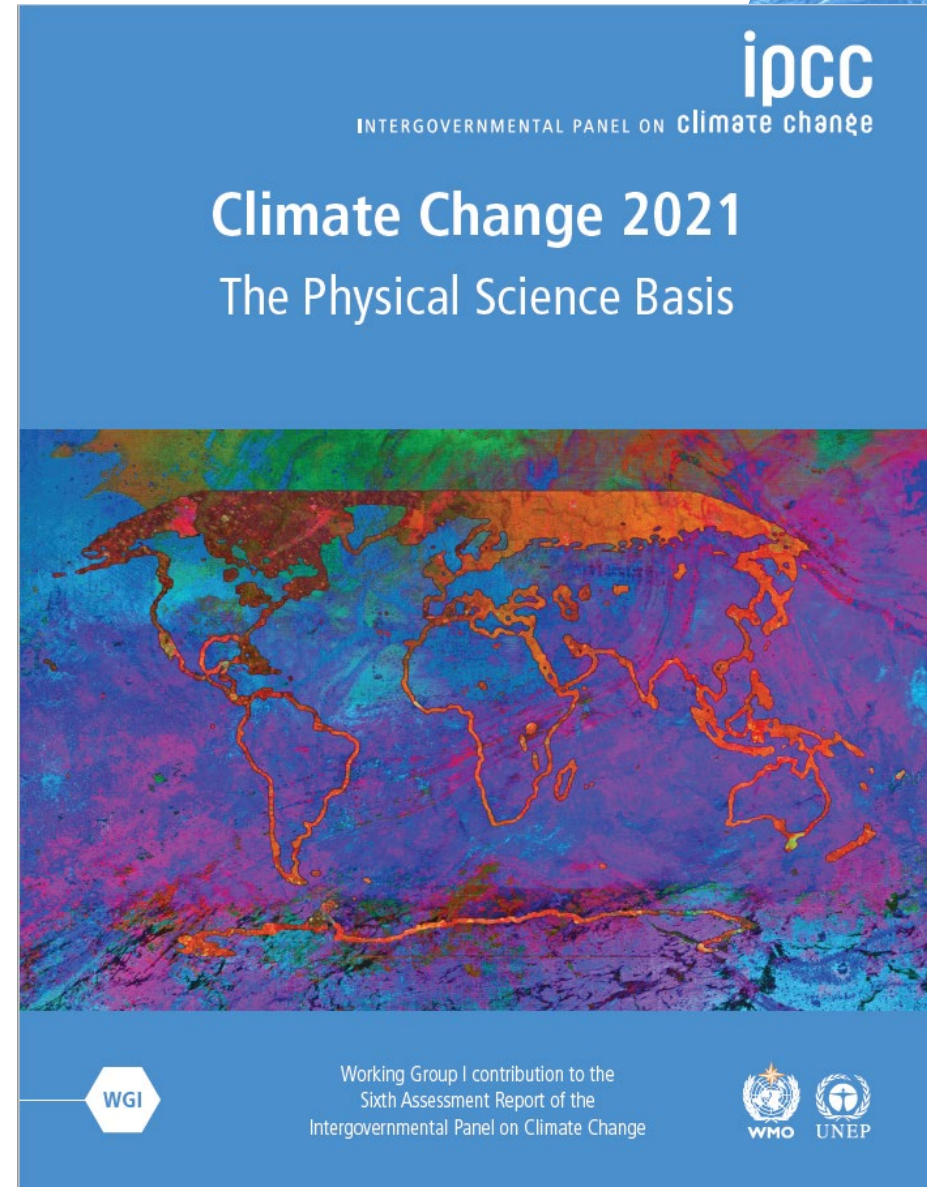
Courtesy of Professor Ben Horton



**SEA LEVELS**  
PAST, PRESENT AND FUTURE

# Climate Change 2021 Report: Sea Level Rise

- Average rate of SLR:
  - 1.3mm/yr, 1901-1971
  - 1.9mm/yr, 1971-2006
  - 3.7mm/yr, 2006-2018
- GMSL rose faster since 1900 than any preceding century in at least 3,000 years
- Virtually certain that “sea level is committed to rise for centuries to millenia...and that it will remain elevated for thousands of years.”
- Implications for coasts?





# Potential Impacts of Sea Level Rise

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Seaward impacts:  
Changes to baselines and maritime limits

Landward impacts:  
Coastal areas less habitable

# Caveats

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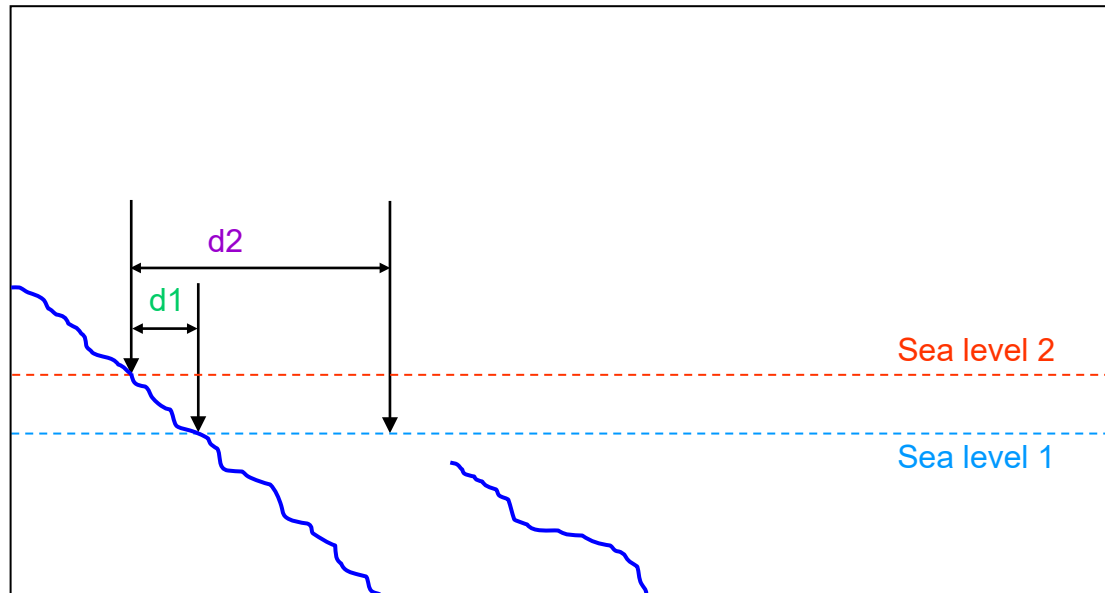
- Sea level influenced by:
  - Ocean warming (expansion)
  - Glacio-eustatic processes influencing volume of water in the oceans – contributions from cryosphere a key uncertainty
  - Processes influencing the shape of land and oceans
  - Anthropogenic impacts
- Complexity of interacting drivers
- Uncertainties of the scale and pace of sea level rise
- Significant **spatial and temporal variability**
  - Tidal complexity/variability
  - Influence of oceanic-atmospheric interactions (e.g. El Niño Southern Oscillation)

# Sea Level Changes and Coasts

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- Sea level rise will have greater horizontal impacts on low-elevation, shallow gradient coasts
- Coasts change/adapt both vertically and horizontally with sea level
- Complex **feedbacks** between changing sea levels and coastal morphology
  - Sea level does not ‘march up the contours’
  - Beware of ‘bathtub modelling’!
- Distinct responses of coastal ecosystems
  - Mangroves
  - Coral Reefs
- Basepoints versus baselines
  - Outer limits of EEZ less susceptible to change compared to territorial sea limits

# Implications of Coastal Gradient



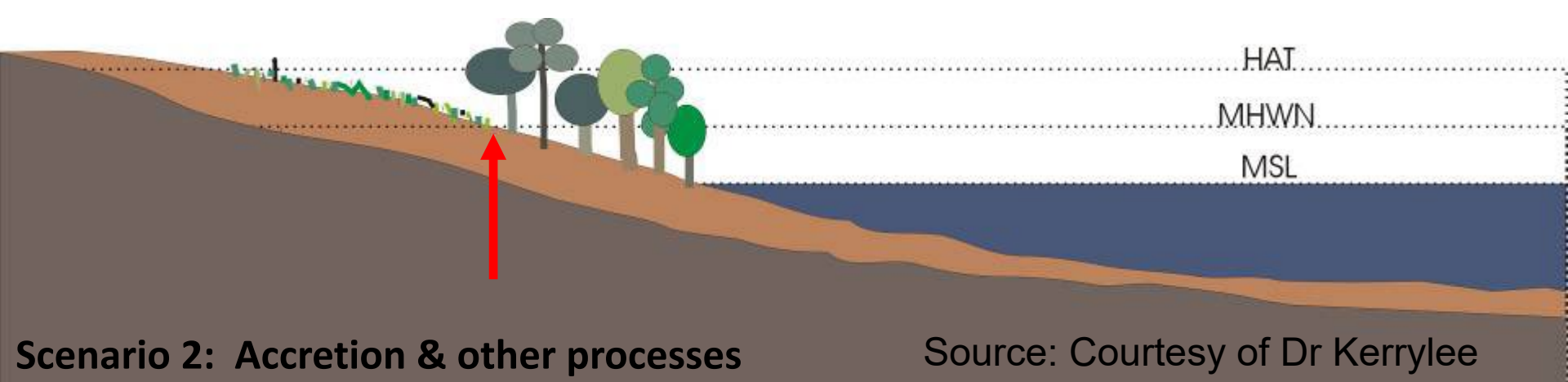
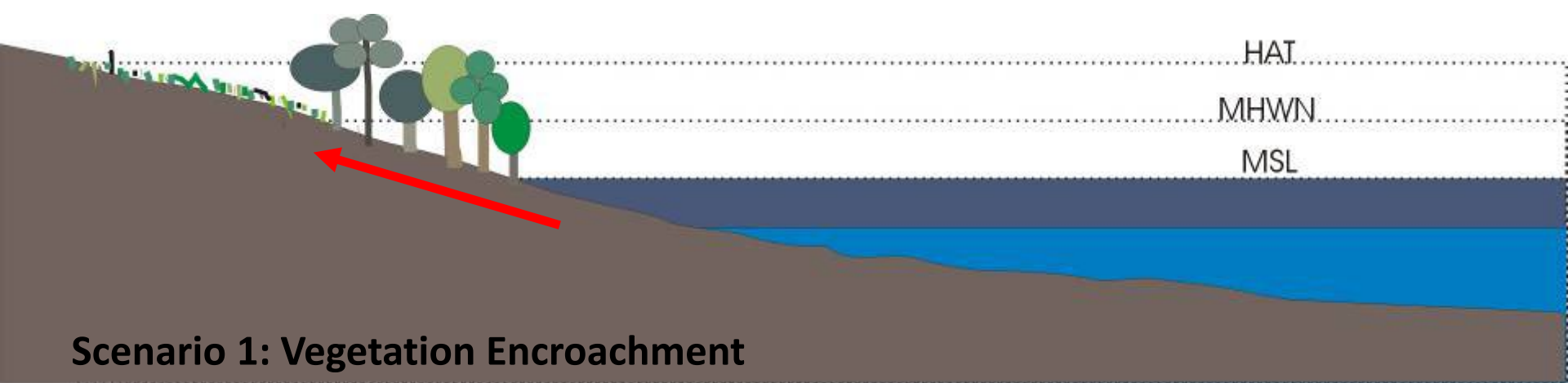
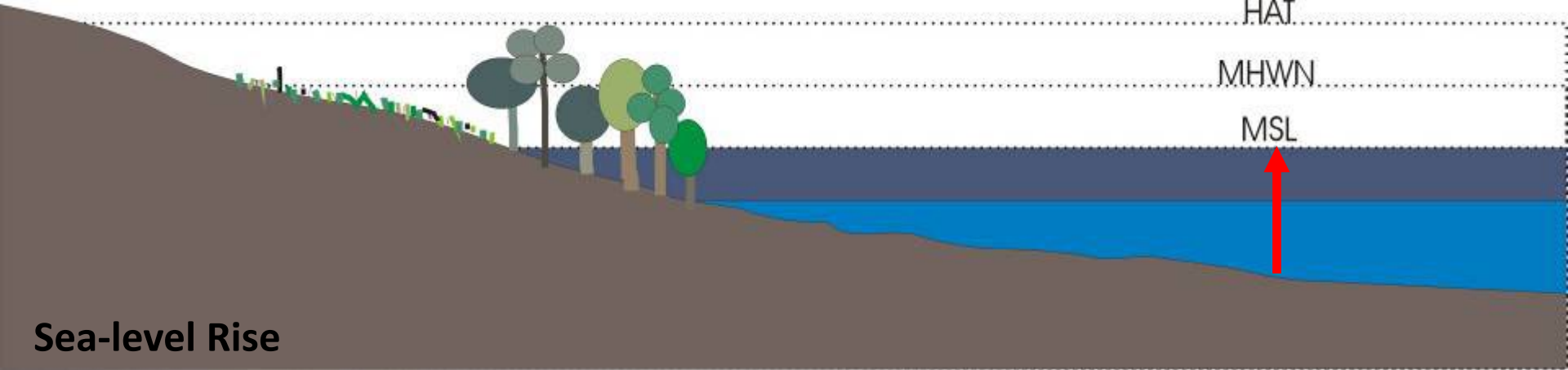
**d2** is significantly longer than **d1**

The less the gradient of the coast, the longer the impact will be.

# Increasingly Contested Coasts

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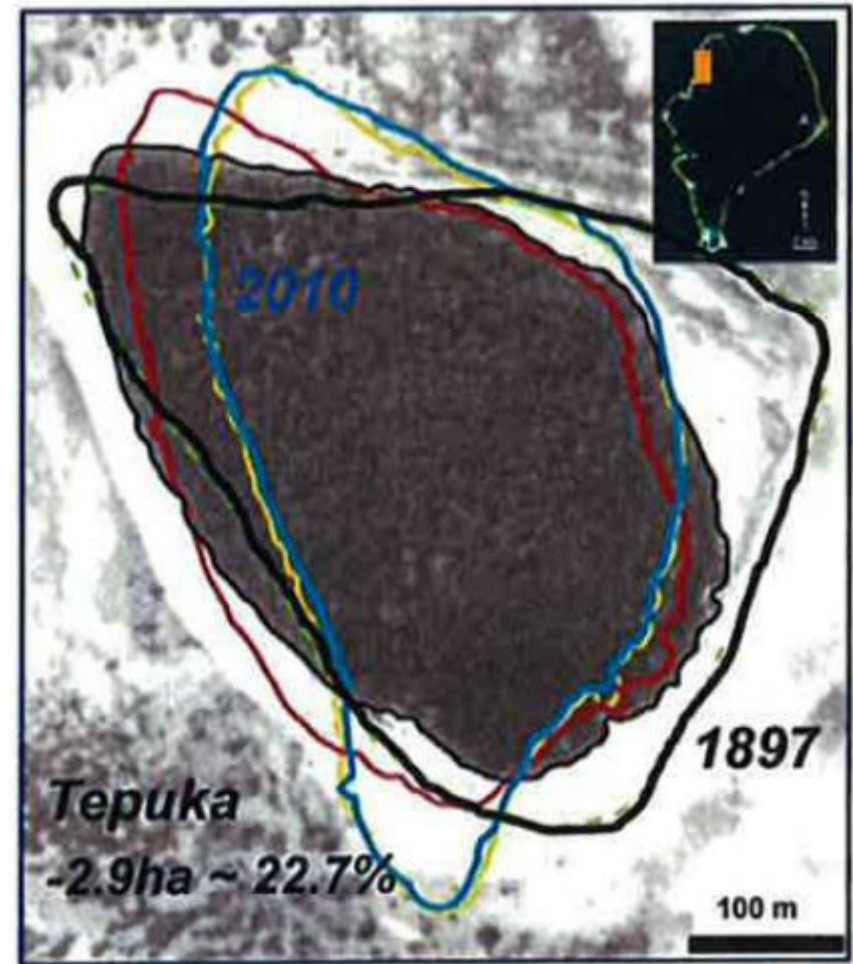
- Longstanding trends in population movements: rural/urban, inland/coastal
- Increasing concentration of population/development in the coastal zone
  - c.40% of global population within 100km of the coast
- Result: Increasing **“coastal squeeze”**
- Coastal landscapes/ecosystems under pressure and increasingly contested
- Results in loss of vital ecosystem services, including coastal protection



Source: Courtesy of Dr Kerrylee

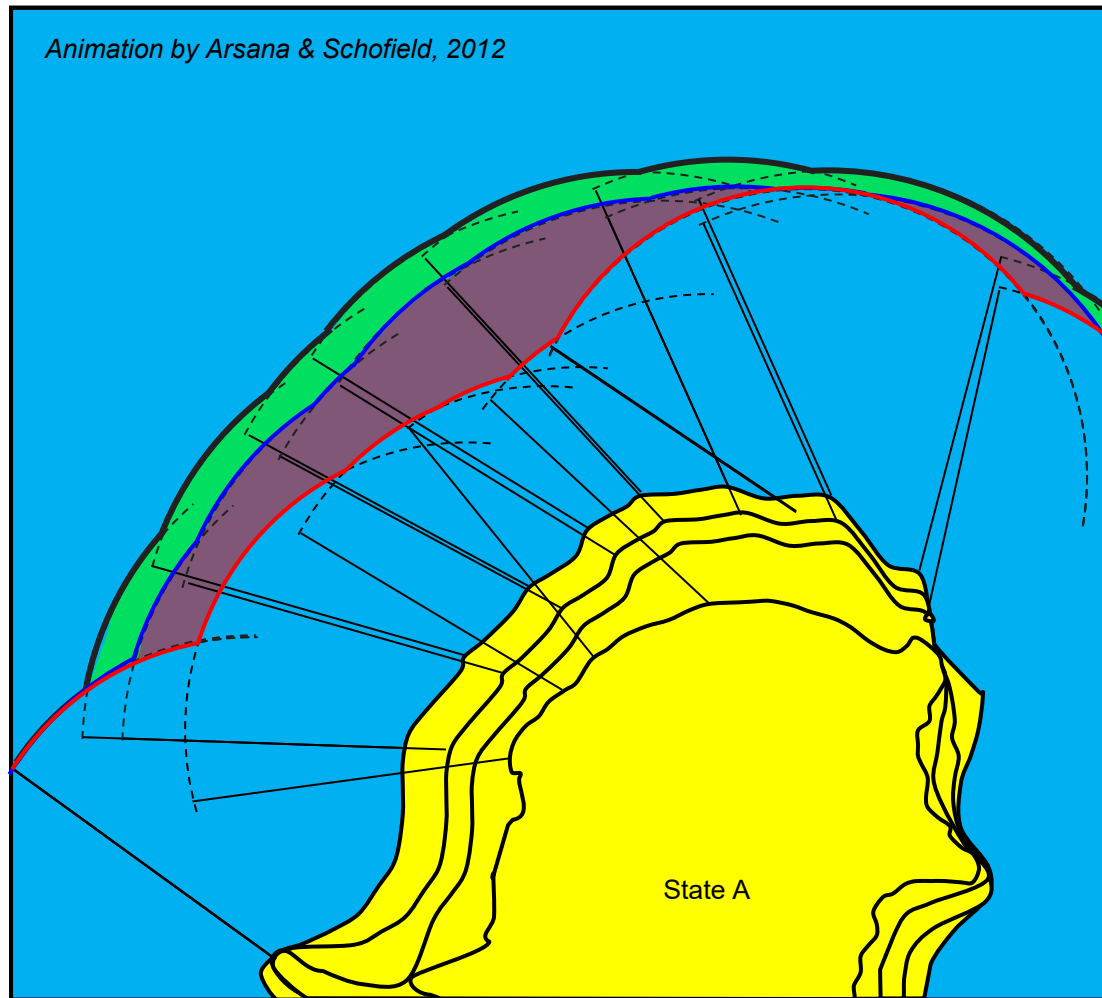
# Stability and Change in Reef Baselines

- While the reef edge may be stable the location and size of islands on reefs may change
- e.g. Funafuti Atoll, Tuvalu (1897-2010)
- Islands on reef exhibit significant change and mobility
- 31.3% **increase** in land area
- **BUT**: dire prospects for tropical corals in context of ocean warming and acidification



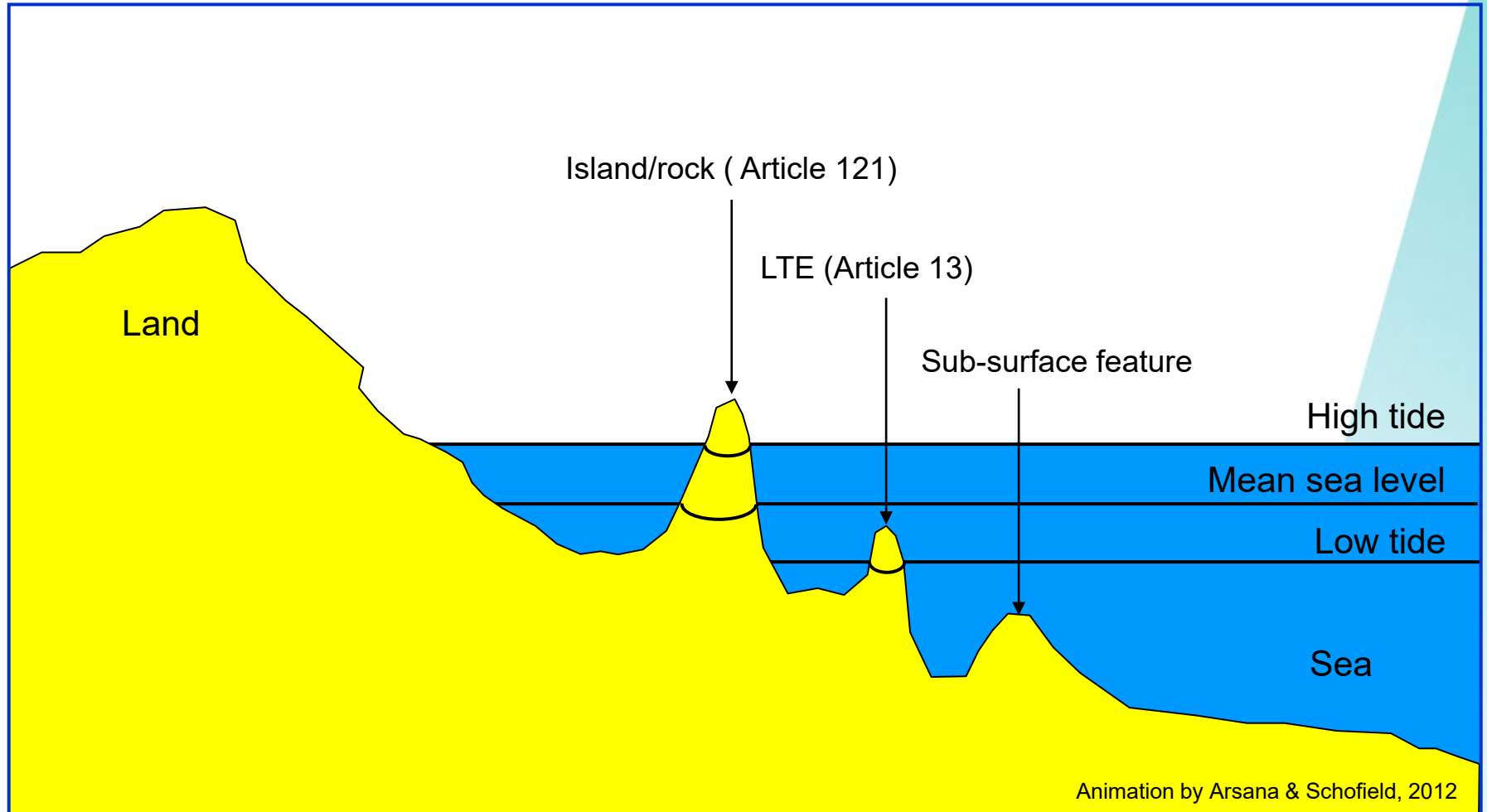
Source: Paul Kench,  
University of Auckland

# Impacts on Baselines and Outer Limits





# Impacts on Islands?



Source: TALOS Manual (5<sup>th</sup> edition)

# Implications for Maritime Boundaries

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- **Stability of international boundaries**
  - Hold a privileged position under the international law of treaties
  - Not subject to change even in the case of fundamental change of circumstance
  - Applicable to maritime as well as land boundaries?

“maritime delimitations, like land boundaries, must be stable and definitive to ensure a peaceful relationship between the States concerned in the long term”

(Bangladesh-India case, 2014)

# Response Actions

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- **Retreat**
  - allow coast to find new natural equilibrium
  - politically and practically unpalatable?

# Impacts of Climate Change on Arctic Coasts



Drew Point, Beaufort Sea, Alaska



Shishmaref, Chukchi sea,



Herschel Island, Beaufort Sea, Canada



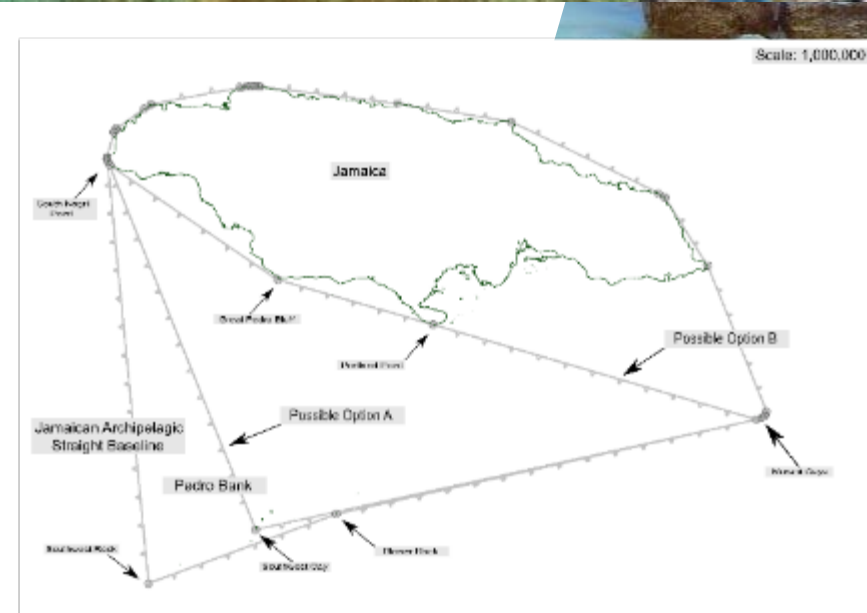
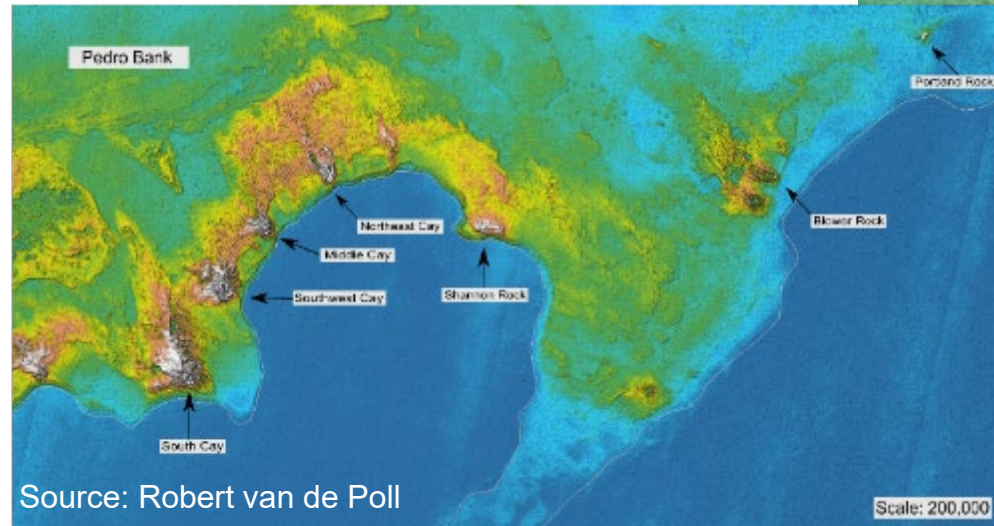
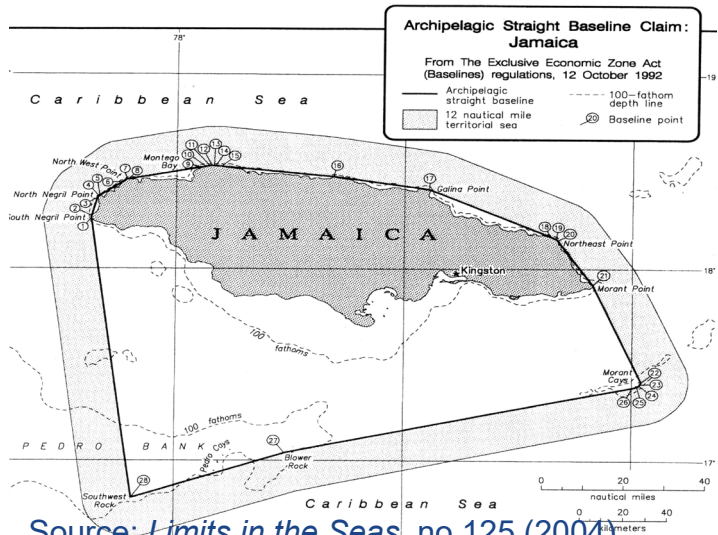
Vize Island, Kara Sea, Russia

# Response Actions

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- **Retreat**
  - allow coast to find new natural equilibrium
  - politically and practically unpalatable?
- **Defend**
  - construct (expensive) sea defences
  - risk of unanticipated and unwelcome consequences elsewhere along the coast?

# Preserving Archipelagic Baselines



Source: Freestone, D. and Schofield, C.H. (2021) 'Sea Level Rise and Archipelagic States: A Preliminary Risk Assessment', *Ocean Yearbook*, Volume 35, 340-387.

# Jamaica's Southern Cays

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Southwest Rock (1m elevation)

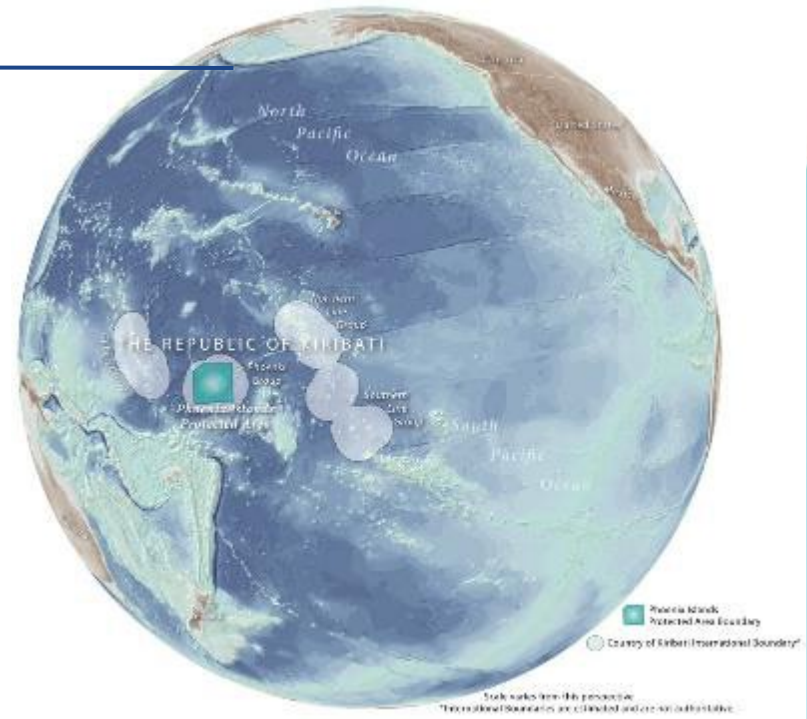
# Alternatively...Advance (like Singapore)





# Feasible for Kiribati?

- EEZ: 3,441,810 km<sup>2</sup>
- Land area: 811 km<sup>2</sup>



# Working for Maldives?

- Capital, Malé, densely populated and surrounded by sea wall
- Artificial island of Hulhumalé
- 3m+ above sea level
- “City of Hope”
- 240,000 population planned?



# Floating Communities

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# Floating Islands

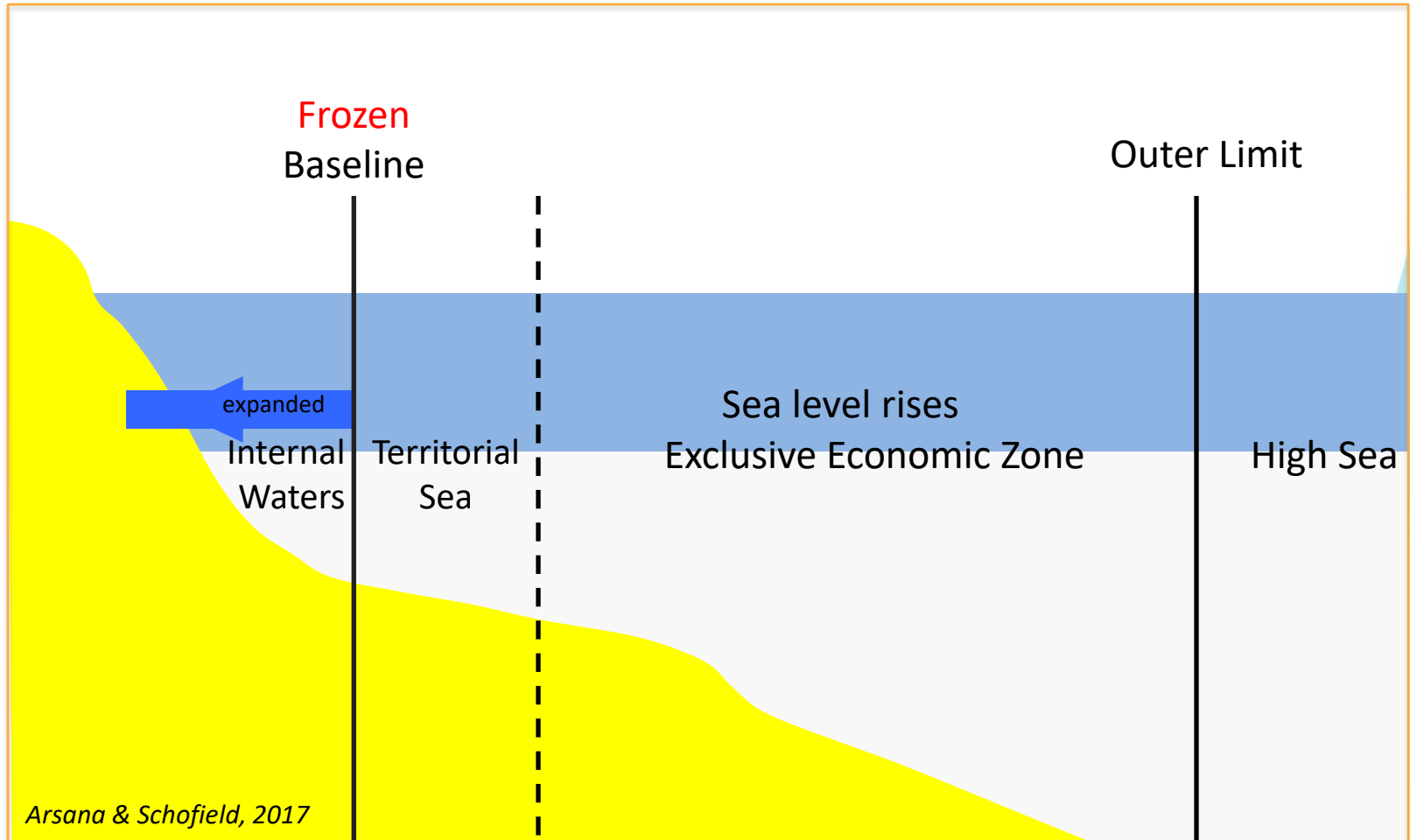


# Legal Response Options

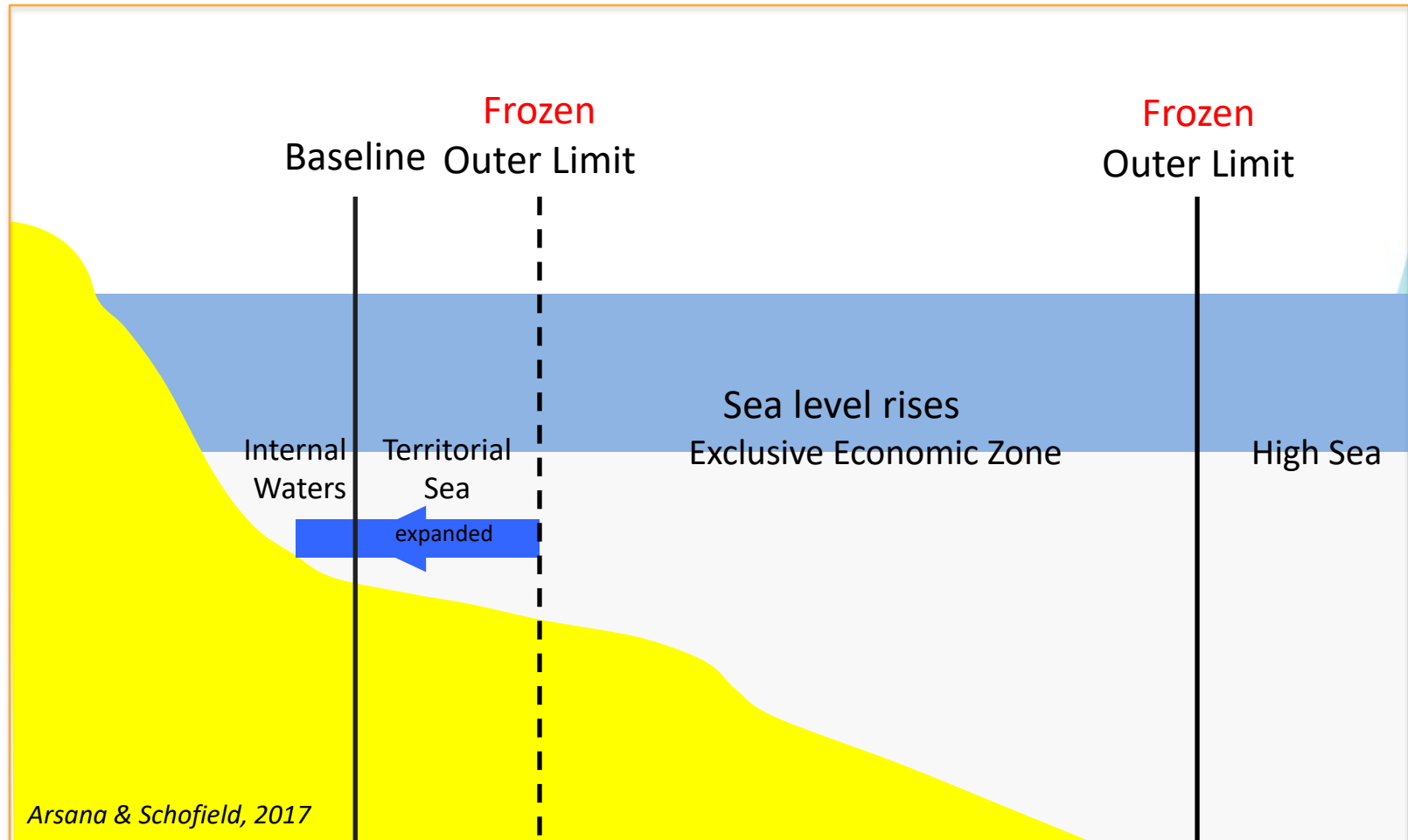
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- Freeze the baselines (and limits)
- Freeze Limits
  - Freeze the territorial sea limit
  - Freeze EEZ limits
- Pros and cons to these options
  - Note work of the International Law Association (ILA) Committee on International Law and Sea Level Rise
  - International Law Commission (ILC) Study Group also initiated

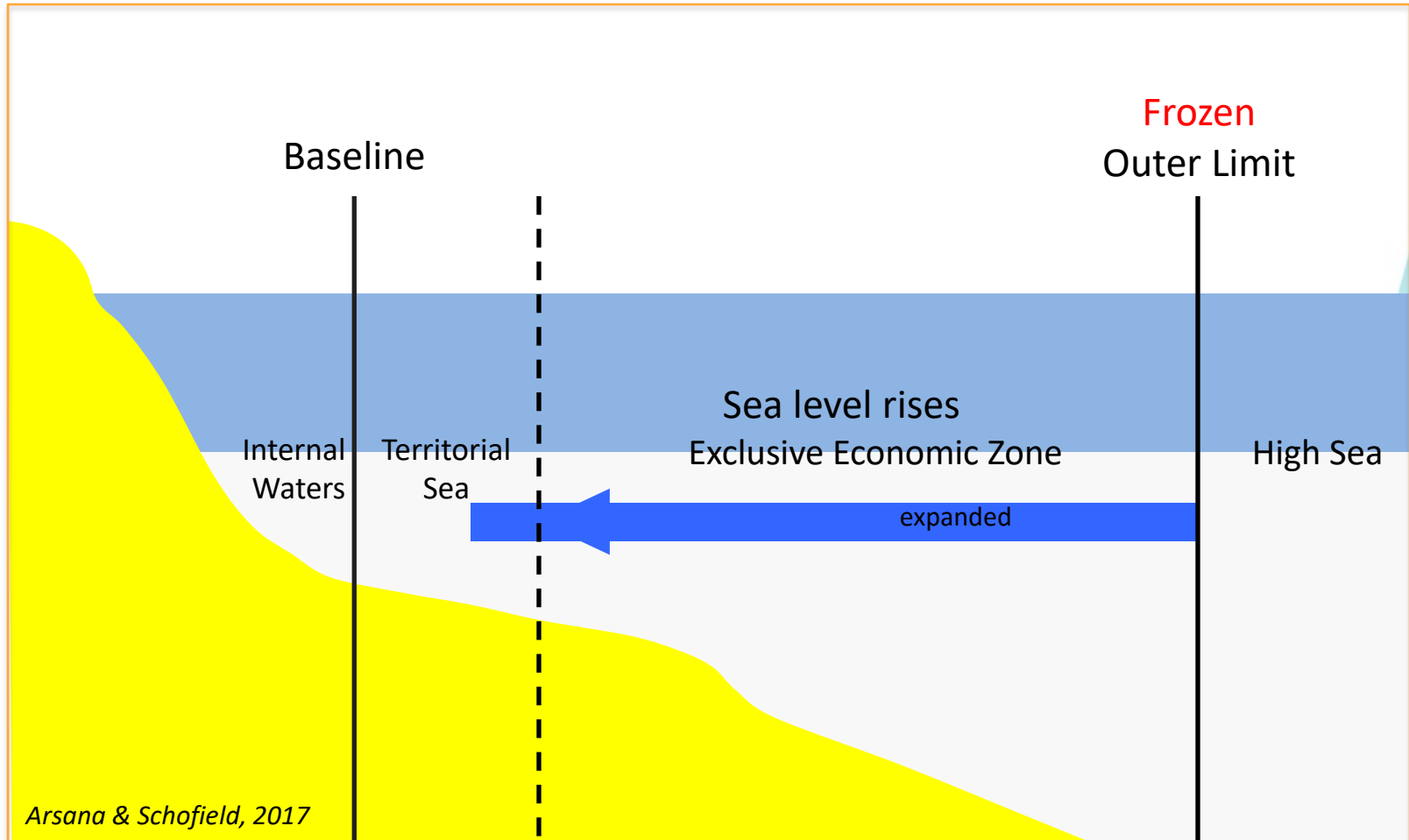
# Freezing Baselines



# Freezing Outer limits: Territorial Sea



# Freezing Outer limits: EEZ





# Pros and Cons?

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# Pros and Cons?

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- **Pro:**

- Vulnerable States from climate change impacts that they have often done little to cause
- Retention of existing rights
- Fixing baselines arguably permitted by the LOSC?
- Separation of charts versus coordinates of limits and boundaries

- **Con:**

- Legal fiction?
- Risk to navigation?
- If limits fixed baselines still reflect the reality of the coast
- Limits broader than allowed
- Land no longer dominating the sea?
- Prevents high seas/Commons expanding – global public interest concern?

# International Law Association Resolution, 2018

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- Based on proposal of ILA Committee on International Law and Sea Level Rise:

“on the grounds of legal certainty and stability, provided that the baselines and the outer limits of maritime zones of a coastal or an archipelagic State have been properly determined in accordance with the 1982 Law of the Sea Convention, these baselines and limits should not be required to be recalculated should sea level change affect the geographical reality of the coastline ”

- ILC Study Group on Sea Level Rise Established in 2019

# Emerging State Practice

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- To provide maritime jurisdictional clarity and certainty
- **BUT** once established these ‘lines in the sea’ defining baselines, limits and boundaries **will not move in the future** in keeping with the *Pacific Oceanscape* regional Action 1B “**to Ensure the Impact of Climate Change and Sea-Level Rise does not result in reduced jurisdiction of PICTS**”
- Multiple declarations from Pacific leaders that maritime baselines, limits and boundaries should be fixed in perpetuity regardless of sea level rise

# Declaration on Preserving Maritime Zones in the Face of Climate Change-related Sea Level Rise, 2021

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- Pacific Islands Forum 6 August 2021
- Unlike previous declarations, statements made in definitive terms
- Affirms that the text of LOSC does not impose any obligation to “keep baselines and outer limits of maritime zones under review” nor to “update charts or list of geographical coordinates” once deposited with the UN

# Declaration on Preserving Maritime Zones in the Face of Climate Change-related Sea Level Rise, 2021

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- In the future, having “established and notified our maritime zones to the Secretary-General of the United Nations, we intend to maintain these zones without reduction, notwithstanding climate change-related sea level rise” and further they “do not intend to review and update the baselines and outer limits of our maritime zones as a consequence of climate change-related sea level rise”

# Declaration on Preserving Maritime Zones in the Face of Climate Change-related Sea Level Rise, 2021

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Clear statement of intended future practice:

**“Proclaim that our maritime zones, as established and notified to the Secretary-General of the United Nations in accordance with the Convention, and the rights and entitlements that flow from them, shall continue to apply, without reduction, notwithstanding any physical changes connected to climate change-related sea level rise.”**

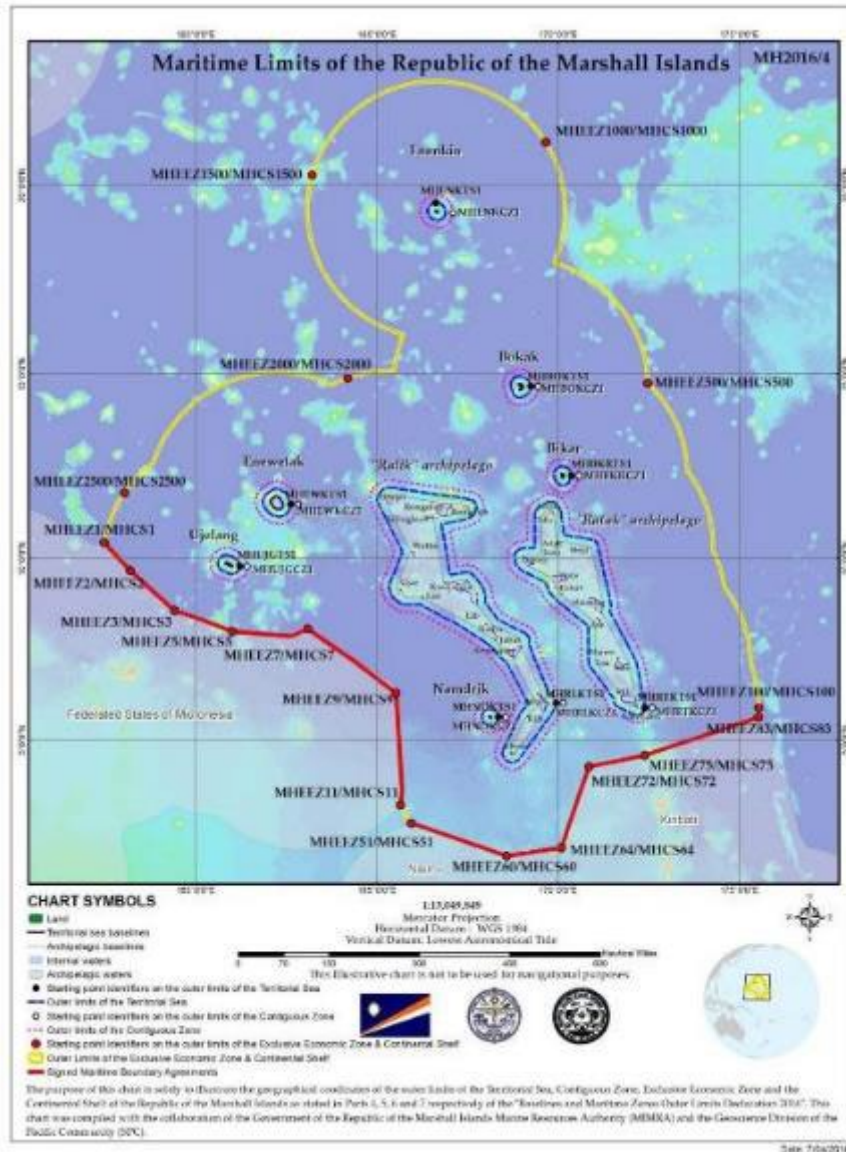
# Emerging State Practice

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- Significant progress in region maritime boundary delimitation
  - Doubling of number of agreements 2005-2015
- Unilateral fixing of baselines, limits and boundaries
- Coupled with deposit of information with UN Secretary General via DOALOS
  - e.g. Marshall Islands Declaration (2016)

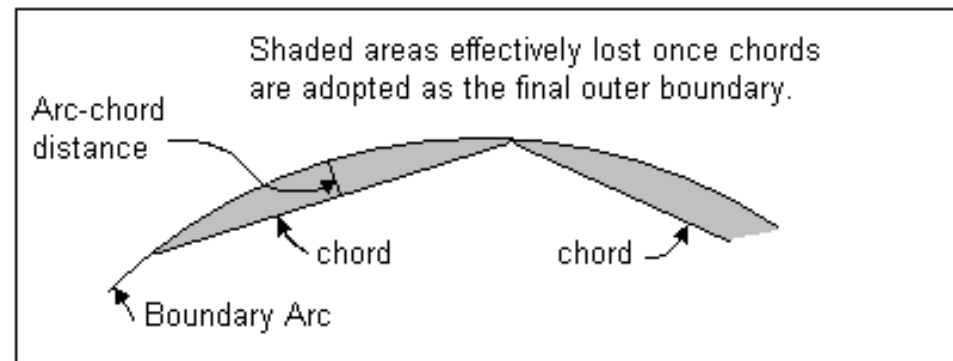


# Marshall Islands Declaration, 2016



## Comprehensive definition of:

- Baselines
- Closing lines
- Outer limits of all maritime zones
- Deposited with UN
- **Declaration 451 pages long!**
- Implications:
  - Does the land no longer dominate the sea?
  - Opposable to other States?
  - Distinction between limits and boundaries?



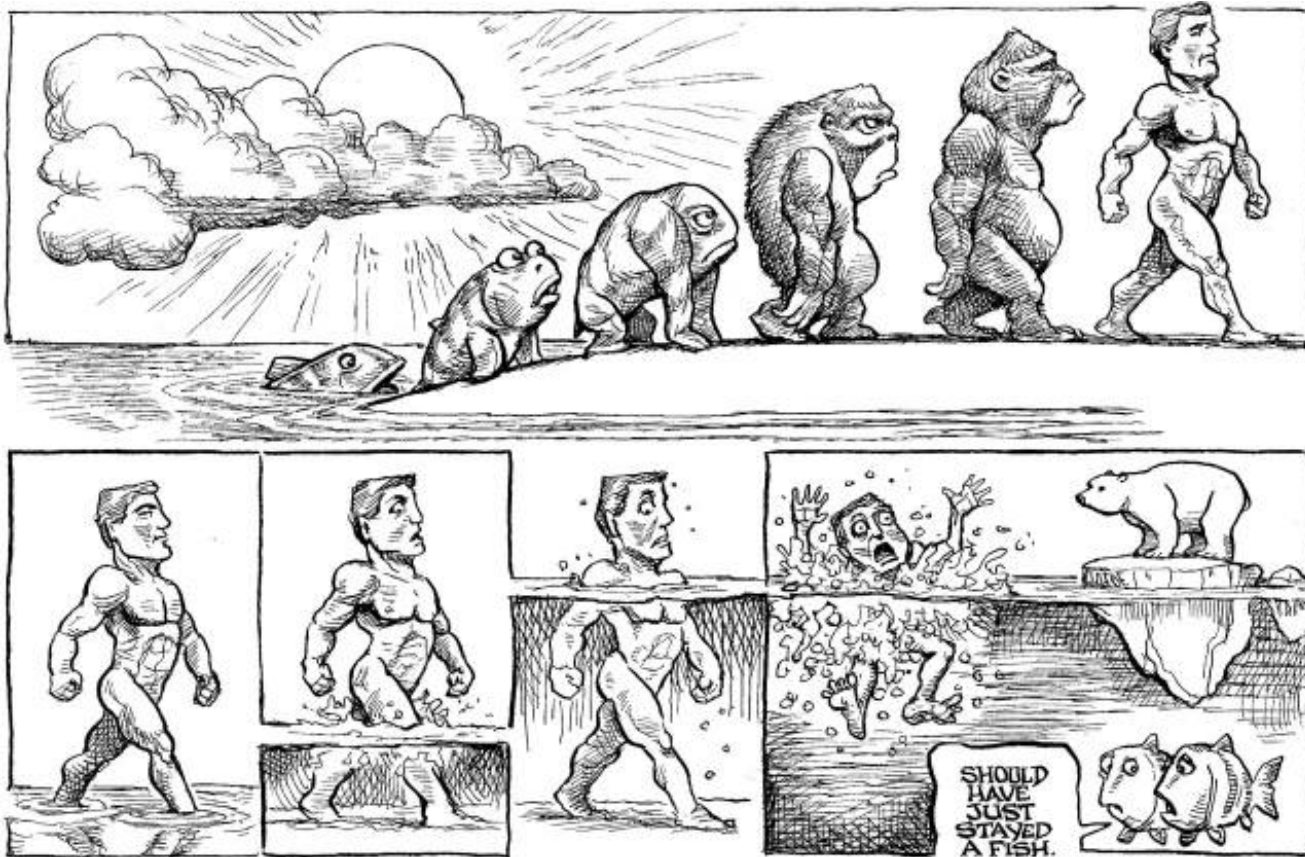


# Conclusions

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- Climate and Oceans fundamentally intertwined in scientific as well as law and policy terms
- Climate change will have enormous impacts on the Ocean
- Significant implications for the international law of the sea
  - e.g. in relation to the **definition** of baselines, **delineation** of the outer limits of maritime zones and **delimitation** of maritime boundaries
- An evolving area of international law

# Thank you!



Economist.com

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Source: *The Economist*, 17 April 2019