Università di Trieste
LAUREA MAGISTRALE IN GEOSCIENZE
Curriculum Geofisico
Curriculum Geologico Ambientale

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Geologia Marina

Modulo 6.X Jurisdiction at sea

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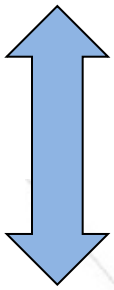
Two ways to see the world :

Pure Research (Natural SCIENCE)

- Exploring the 'blue planet' - 71% oceans
- Onshore geology dominated by submarine deposits
- 'No geology without marine geology' (Kuenen 1958)
- To understand *how the Earth works* (in the past, present and future), we need to study what goes on in and beneath the oceans over time

Applied Research (Natural R€$OURC€$)

- Using the seabed (for cables, pipelines, platforms…)
- Exploring for opportunities (solid, liquid & gas)
- All offshore activities require some understanding of how the Earth works, for exploration/exploitation
- In turn, an important driver for pure research activity (both technologically and financially)



Sources: Wikimedia commons

➢ Working at sea is expensive - vessels cost 10,000-100,000€/day

OGS Explora: a publicly-funded research vessel

- acquired by OGS in 1989, only ocean-going ship owned by a research institute
- scientific campaigns worldwide (from Antarctica to the Arctic)
    - € 10^6/year from Italian government for use & maintenance

OGS Explora *in Galway harbour, Ireland, 2009 (International Polar Year campaign)*

Operating costs offshore :€15-25,000/day In port :€6-10,000/day)

Secondary activity: commercial service work

- contracted to offshore companies (e.g. Fugro)
- geophysical/geological surveys (e.g. cables, exploration…)
- return to origins: originally a Geco-Prakla seismic boat (1973-1989)

OUTLINE

- The Law of the Sea – who owns what?

discussion / pause

- Offshore (geo-) economic activities
  - Submarine cables & pipelines
  - Renewable energies (wind farms)

  Seabed installations, old & new

  - Seabed mapping (a service industry)
  - Nearshore sand and gravel mining
  - Deep sea mineral mining
  - Bio-prospecting (sub-seabed)
  - Hydrocarbon exploration
  - Methane hydrates?

  Natural resources, nearshore to deep-sea

- Career paths for (potential) young marine geoscientists

what kind of activity might interest you?

WHO OWNS THE SEAS?

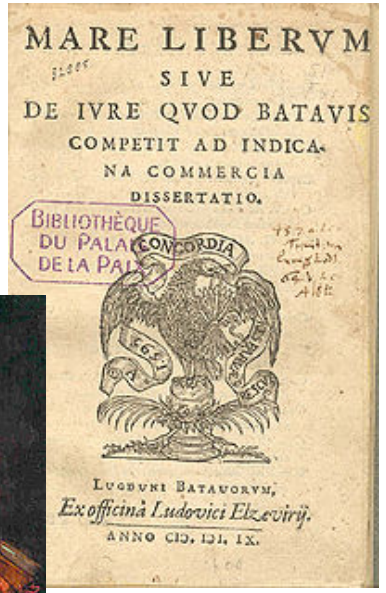
Roman Empire : *Mare nostrum* (Mediterranean), based on control of surrounding coasts; seas not territorial, i.e. not 'owned'

Republics of Venice, Genoa : local forms of *Mare clausum*: in parts of Mediterranean, control of shipping by military force

15-16th centuries : *Mare clausum* – Age of Discovery, Iberians claim vast areas of globe --> conflict with French, Dutch, British…

17th century : *Mare liberum* (Hugo Grotius 1609) ⟶

> the High Seas are the *common property of all…*



18th century: codified by Bynkershoek in *De dominio maris* (1702) :

> coastal waters = one cannon shot = 3 nautical miles

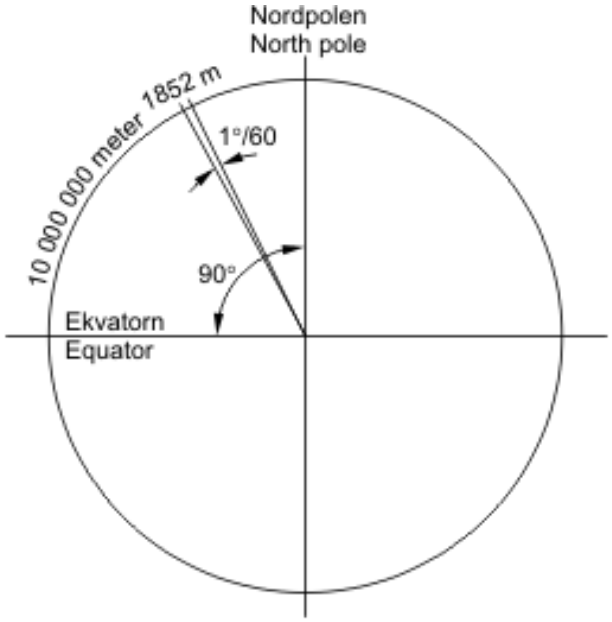
Source of images: Wikimedia commons

Nautical Miles

Earth divided into 360°, equator to pole 90°
Each degree divided into 60 minutes

1 nautical mile = 1 minute of latitude
(= 1843 m at the equator,
1861 m at the poles,
mean length 1852.216 m)

1 International Nautical Mile = exactly 1852 m



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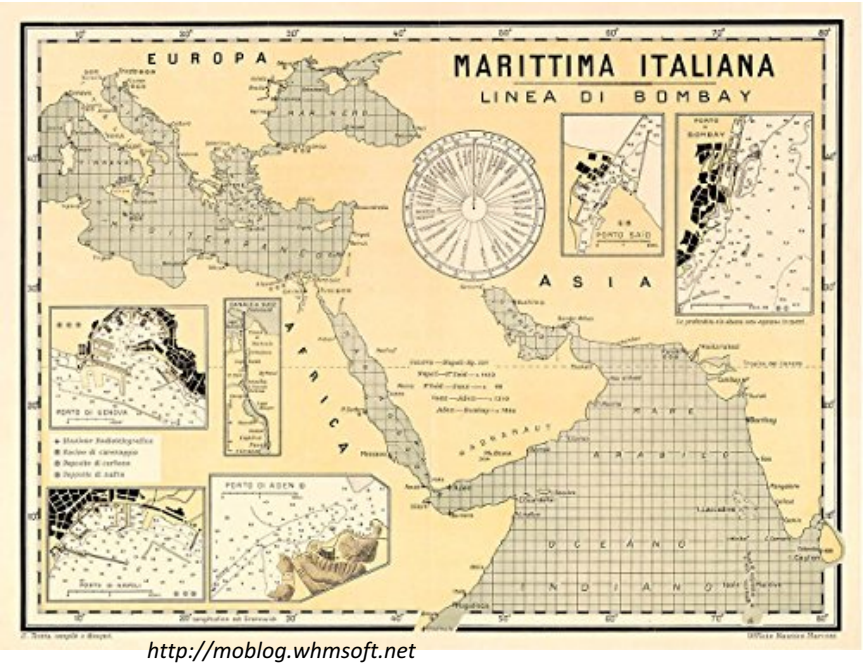
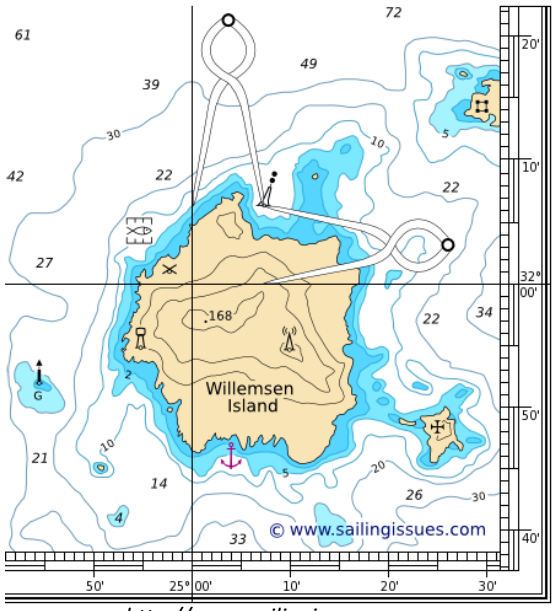
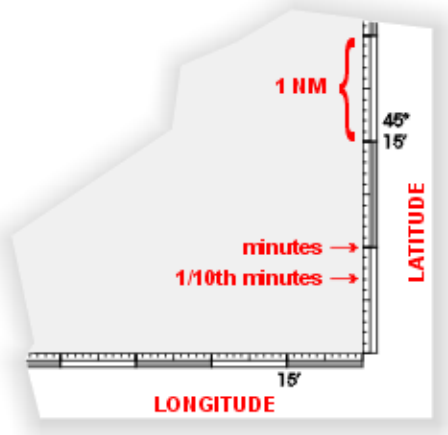


http://moblog.whmsoft.net

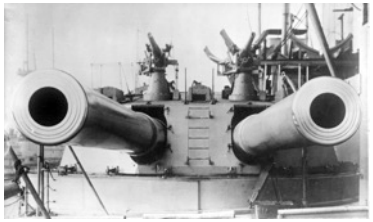


http://www.sailingissues.com



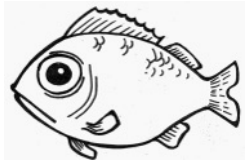
http://www.coastalnavigation.com/

WHO OWNS THE SEAS?



19-20th centuries (ever bigger cannons …) ⟶

- *Mare liberum* respected by most nations – 'territorial' seas to 3 nm, Spain to 6 nm (although control of high seas disputed during wars)
- Growing interest in *marine resources* (mineral, but mainly biological)



1945 : something new (from the USA)

- Presidential Proclamations (2667, 2668) established jurisdiction and control of natural resources & fisheries in high seas adjacent to the coastline, across the 'Outer Continental Shelf'

See http://www.trumanlibrary.org/proclamations/index.php

- Many nations responded, extending their territorial waters to 12 nm (eastern Europe, Middle East) or even to 200 nm (Peru, Ecuador, Chile)

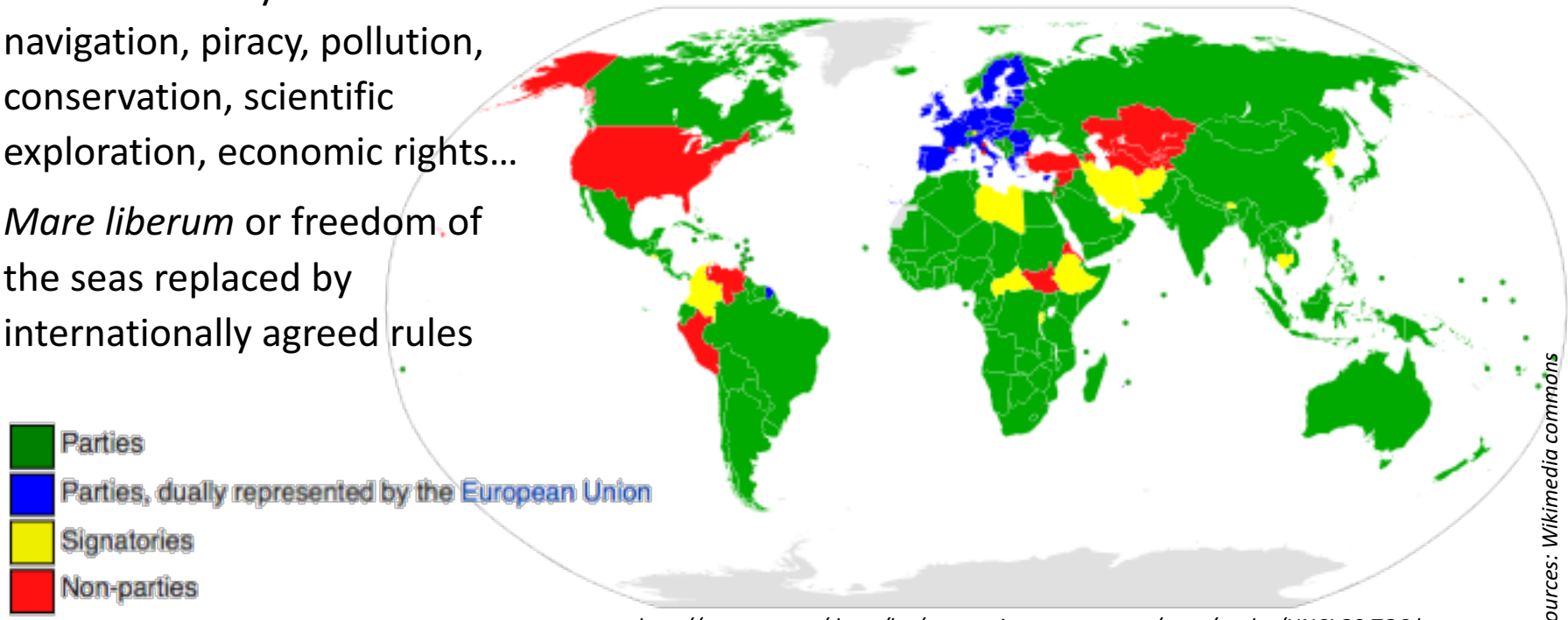
1947: 1st offshore oil platform (Gulf of Mexico, <6 m of water, but out of sight of land)

1949 : International Law Commission of the United Nations, 1st session

> added to agenda the question of determining legal extent of offshore waters

United Nations Convention on the Law of the Sea = UNCLOS

- based on a series of international conferences from 1958-1982
- convention in force since 1994 (when 60th signatory ratified)
- not a law, but a treaty currently ratified by 166 parties plus the European Union
- one of the longest treaties in history – 320 articles + 9 annexes
- addresses many issues: navigation, piracy, pollution, conservation, scientific exploration, economic rights…
- *Mare liberum* or freedom of the seas replaced by internationally agreed rules



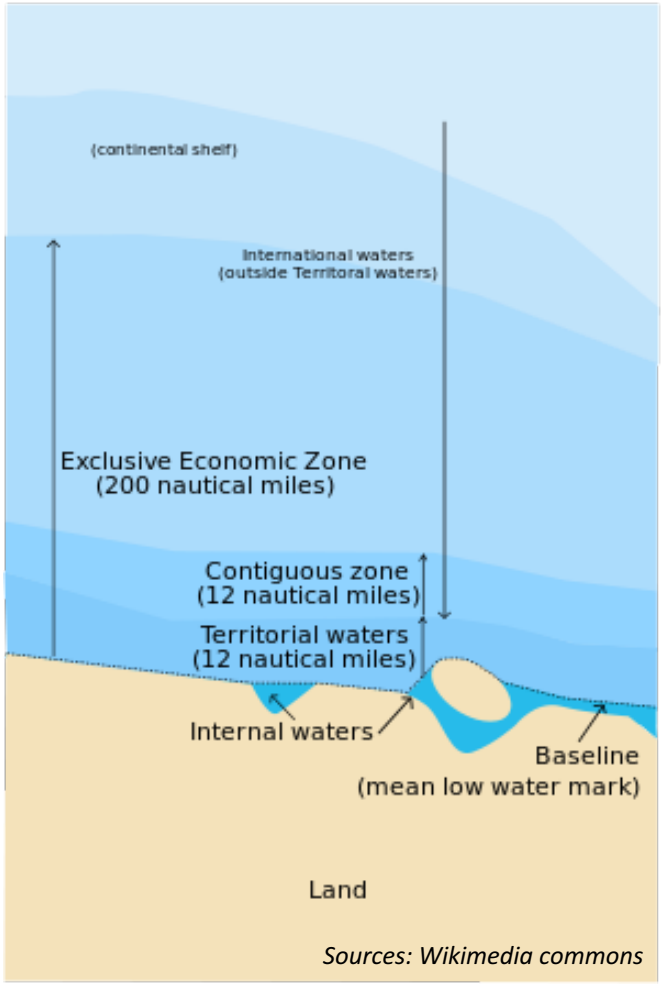
http://www.un.org/depts/los/convention_agreements/texts/unclos/UNCLOS-TOC.htm

Sources: Wikimedia commons

UNCLOS & CONTROL OF NATURAL RESOURCES

- extends national jurisdiction of biological and mineral resources seaward to the edge of 'the Continental Shelf':
  - *Article 77.1 : The coastal State exercises over the continental shelf sovereign rights for the purpose of* ***exploring it and exploiting its natural resources****.*
  - *77.4: The natural resources referred to … consist of the* ***mineral and other non-living resources*** *of the seabed and subsoil together* ***with living organisms belonging to sedentary species****… unable to move except in constant physical contact with the seabed or the subsoil.*

- creates a series of defined maritime zones, *Exclusive Economic Zone* (EEZ) extends to 200 nms, beyond which is the '*Continental Shelf*' …
- beyond the Shelf, international jurisdiction and management of the resources of *The Area* (Part XI)



Sources: Wikimedia commons

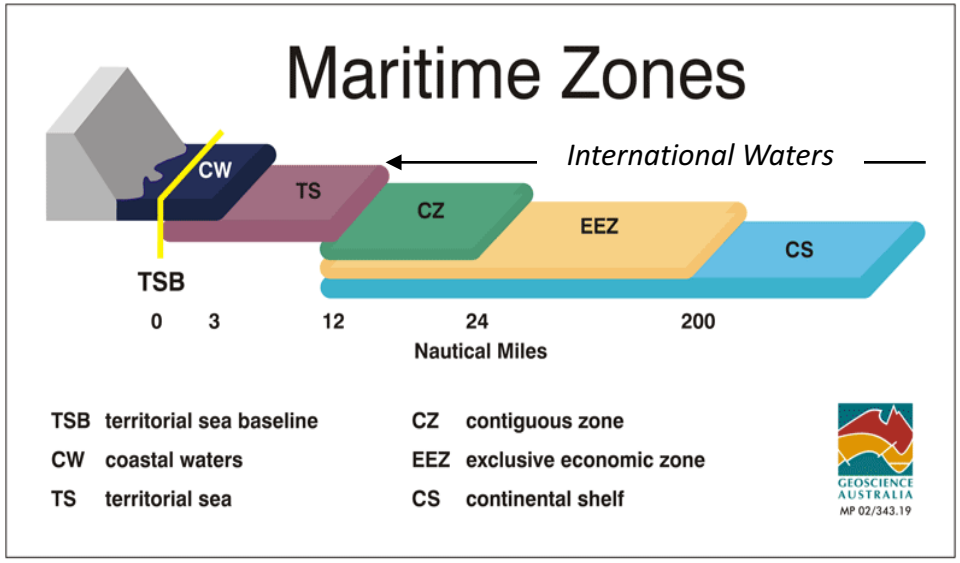
UNCLOS MARITIME ZONES

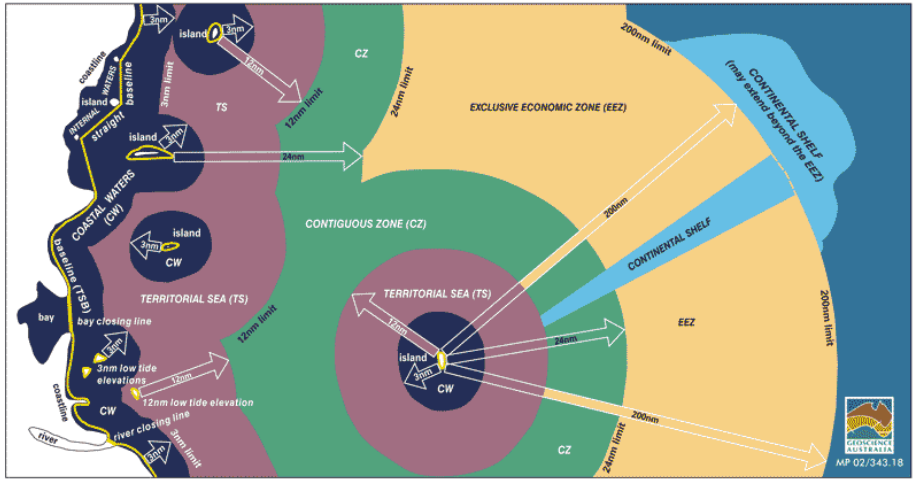
- Baseline = low water line (or straight line between headlands)
- 3 nm = Coastal Waters (one cannon shot…)
- 12 nm = Territorial Seas (right of 'innocent passage')
- 24 nm = Contiguous Zone (zone of 'hot pursuit')
- 12-200 nm = Exclusive Economic Zone (EEZ)
- 12-350 nm *or more* = Continental Shelf

National control of resources in & beneath the seas

National control of resources at & beneath seabed

Sources: Wikimedia commons





Relationship of maritime features, limits and zones

- Beyond: *The Area*

Internationally managed

The Exclusive Economic Zone (EEZ)

- Simple definition: extends up to 200 nm offshore (from a baseline)
- International waters, in which coastal nation has rights to all resources in and beneath the seas
- Contains 99% of world's fisheries, and >80% of hydrocarbon reserves

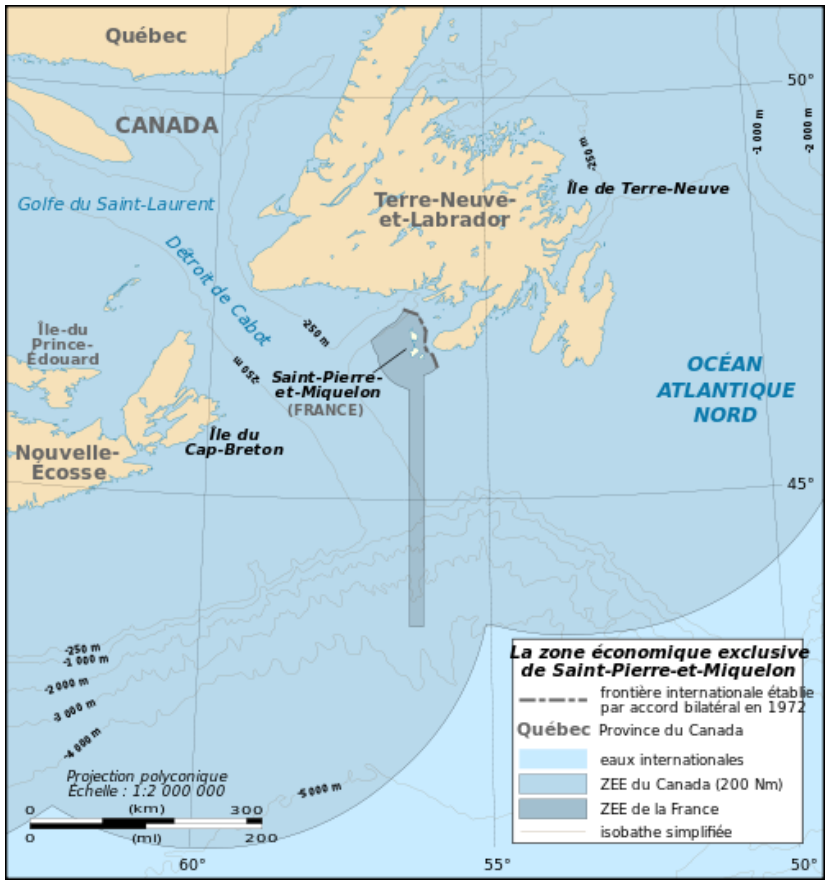
(see http://www.eoearth.org/view/article/156775)

Sources: Wikimedia commons

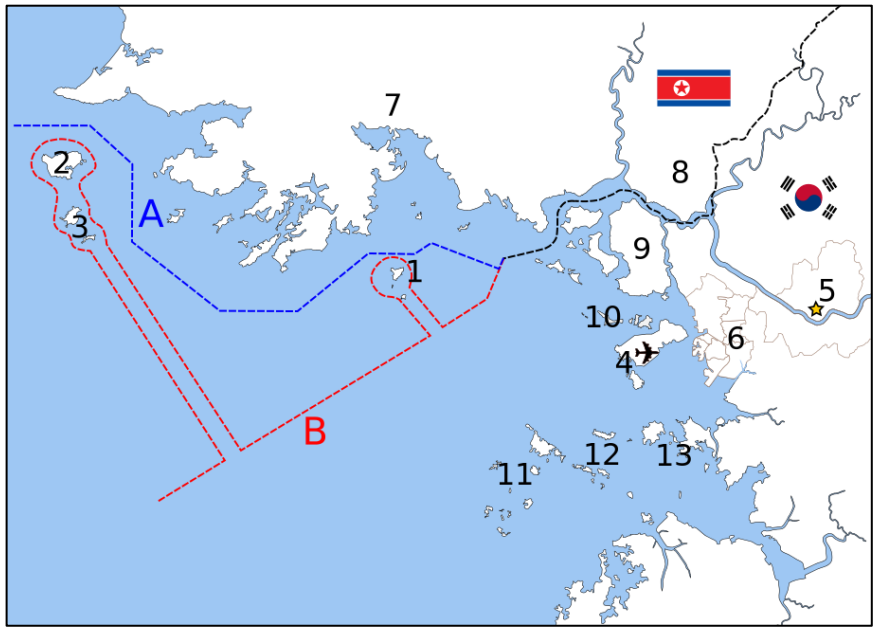
Nonetheless, there are disputes

- Where nations are <400 nm apart, they must agree (or not) on median lines
- *International Tribunal for the Law of the Sea* (Hamburg) - separate from UN

Examples of EEZ disputes :



Canada vs France (Saint-Pierre-et-Miquelon)
RESOLVED



The two Koreas (unresolved…)

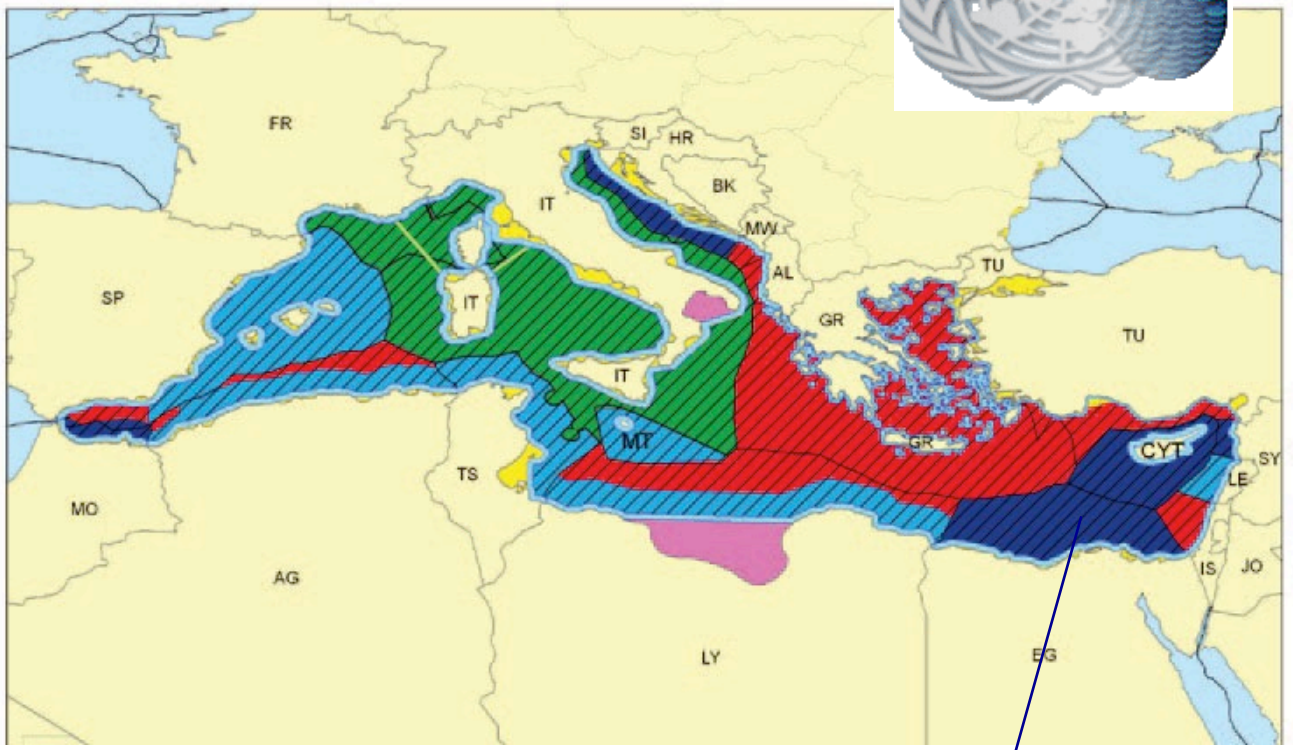
A: Northern Limit Line, created by the United Nations in 1953[18]

B: "Inter-Korean MDL in the Yellow Sea", declared by North Korea in 1999

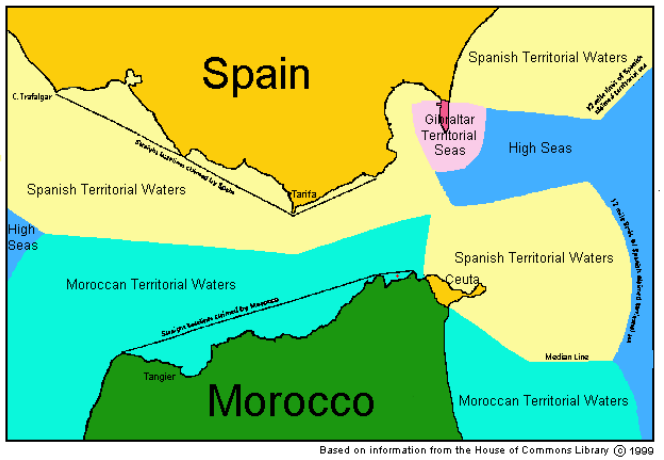
Sources: Wikimedia commons

Mediterranean EEZs

- Inland waters
- Territorial sea
- Fishing zone
- High seas
- Historical Bay
- EEZ
- Ecological protection zone
- Sanctuary of cetaceans
- Freedom of navigation



Example:



One possible representation of Mediterranean maritime jurisdictions
(Suarvez de Vivero 2007) (http://www.guidopicchetti.it - UNEP-MAP, The Mediterranean Sea)

Consequence: increasing difficult for research vessels to conduct international surveys in eastern Med (e.g. myself offshore Egypt in 2007, Greece-Turkey 2014)

Sources: Wikimedia commons

A Mediterranean EEZ continuing dispute :

http://en.wikipedia.org/wiki/Croatia%E2%80%93Slovenia_border_disputes

Border dispute in the Gulf of Piran.

Dragonja's original flow, according to Croatia

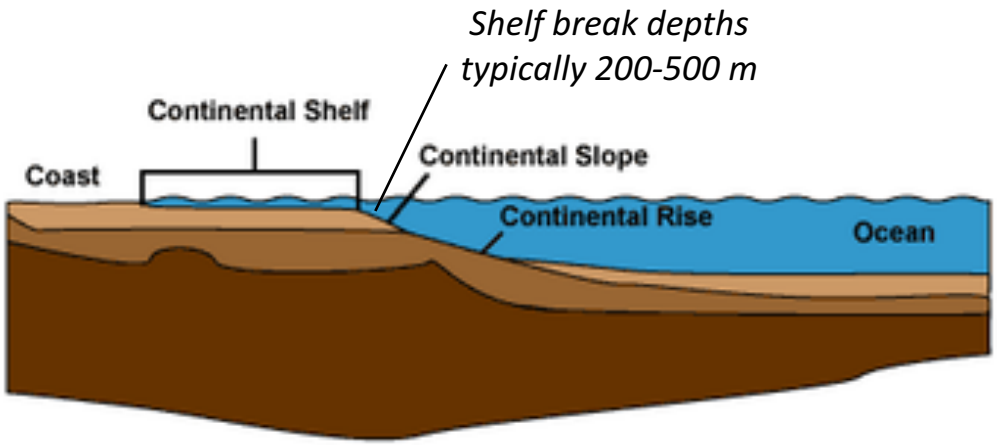
The artificial canal of St. Odoric

Slovenian claimed border

Since 1992, based on differing interpretations of UNCLOS and Slovenian wish for access to International waters)

Note that EEZ disputes do not involve geology

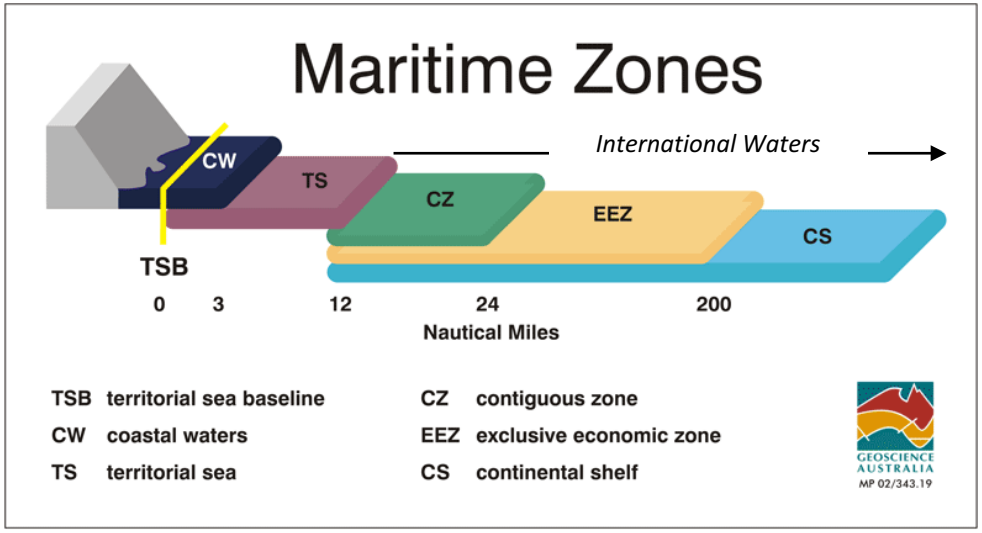
The 'Continental Shelf'



- To a geologist, the continental shelf (*la piattaforma continentale*) is a physiographic feature, based on geomorphology and geology

- For UNCLOS, the continental shelf mixes geology with a legal concept - a 'natural prolongation of land areas' in which a coastal nation has exclusive rights to mineral and biological resources (Article 76)

- The Continental Shelf lies beneath the EEZ (200 nm) and extends past it as the 'Extended Continental Shelf' (ECS) to *at least* 350 nm
- ECS may extend well beyond the geological platform, but geology is still used to define it…



'Extended Continental Shelf' Limits Defined

UNCLOS Article 76 :

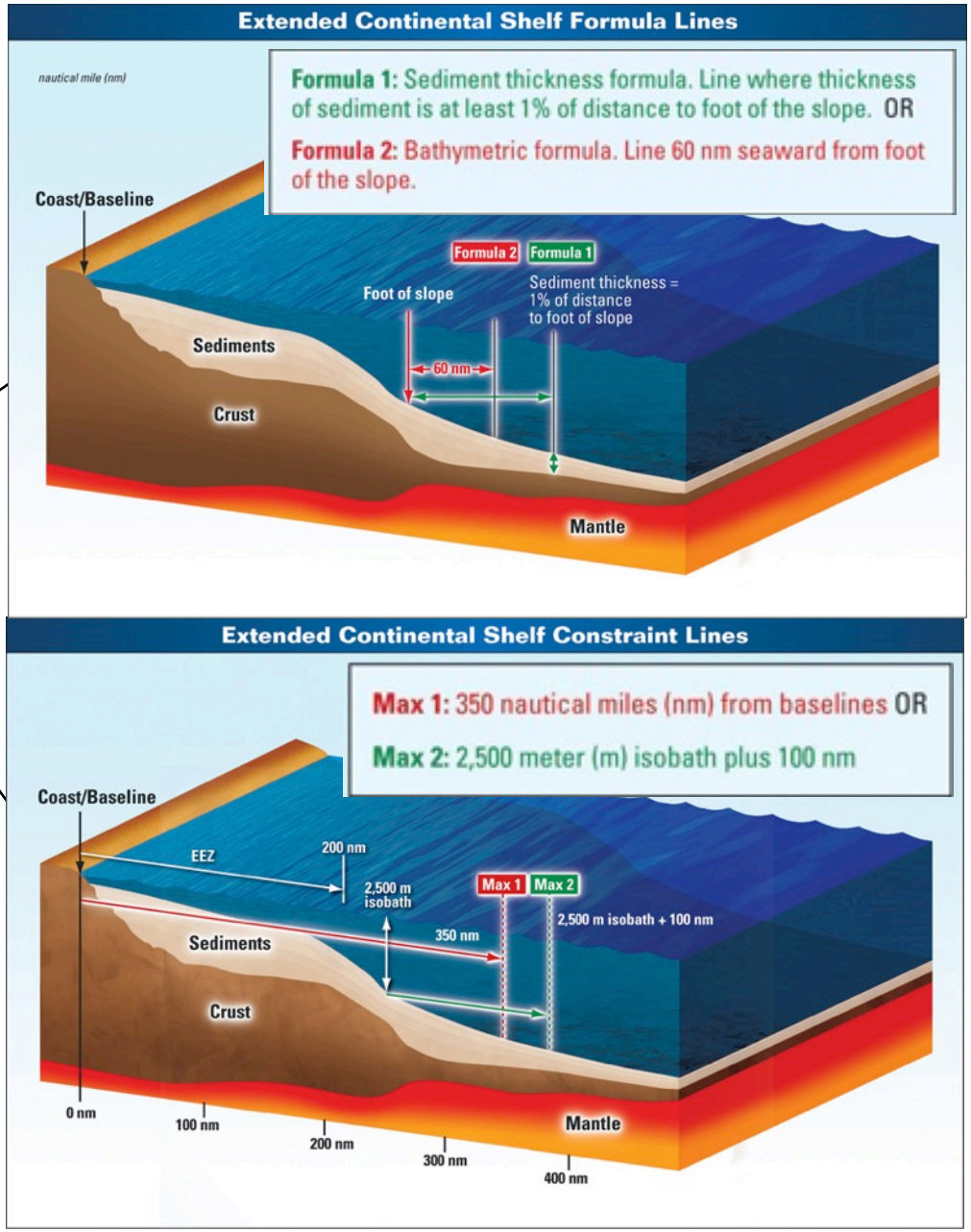
- criteria of geomorphology and geology used to define…

Formula lines
(maxima?)

Constraint lines
(minima?)

Each in any combination; used together to define (maximise) the Extended Continental Shelf (ECS)

US Extended Continental Shelf Project, http://www.continentalshelf.gov/)

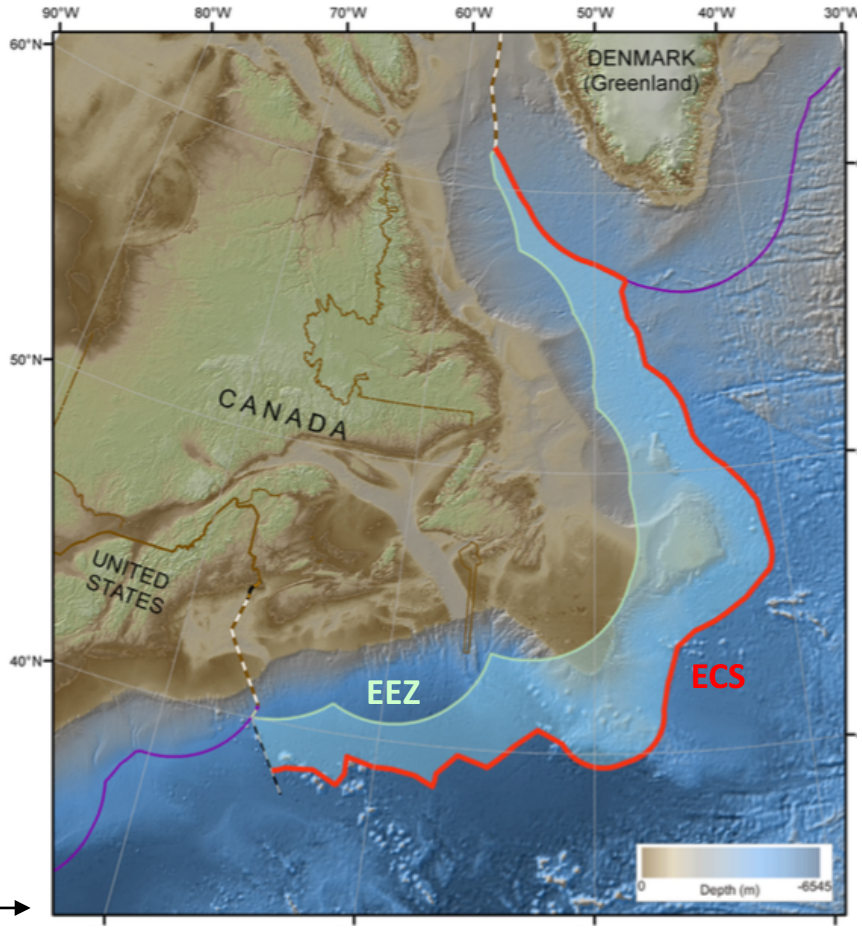


Extended Continental Shelf claims

- Based on submissions to the *UN Commission on the Limits of the Continental Shelf* (CLCS), within 10 years of ratifying UNCLOS
- Require supporting information on:
  - bathymetry (multibeam sonar data)
  - sediment thickness (seismic profiles)
- Preparation of 'Law of the Sea claims' can mean national funding for marine geoscience (e.g. USA, Canada, Australia…)
- OGS Explora has been contracted to acquire data for Canada's ECS program

Partial submission of Canada to the CLCS regarding its continental shelf in the Atlantic Ocean, 2013

(precedes submission on Arctic shelf)



Source: http://continentalshelf.gov/

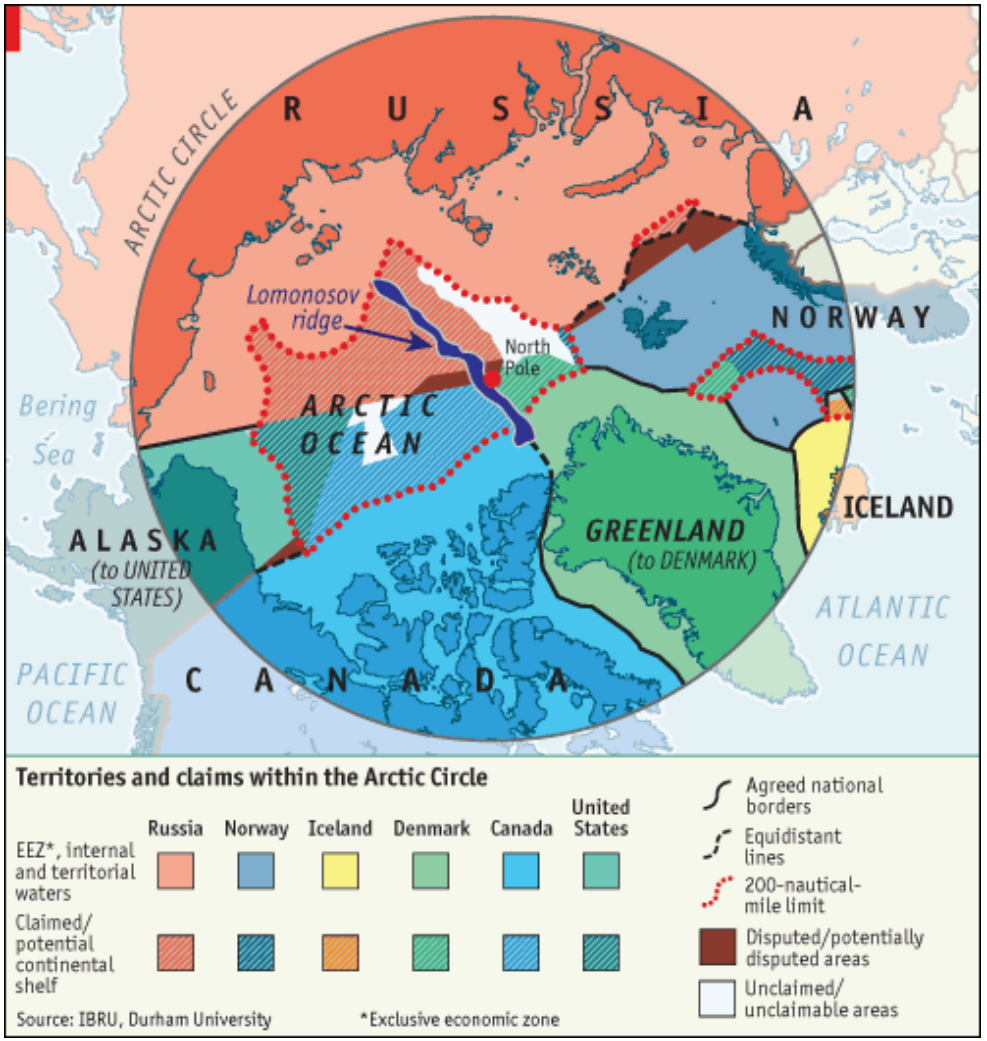
Submitted limits of the 'Extended Continental Shelf' of Atlantic Canada

Extended Continental Shelf claims also lead to disputes…

'The race for the Arctic'

(The Economist, 14 May 2009)

- A race for control of resources, arbitrated through the UN via submissions to the CLCS
- A slow race: within 10 years of ratifying UNCLOS, many still in preparation (joined at different times, or not joined yet – USA)
- Arctic disputes have made the news (e.g. North Pole), but over relatively small areas…
- Versus national jurisdiction of almost the entire Arctic Ocean (and its resources)

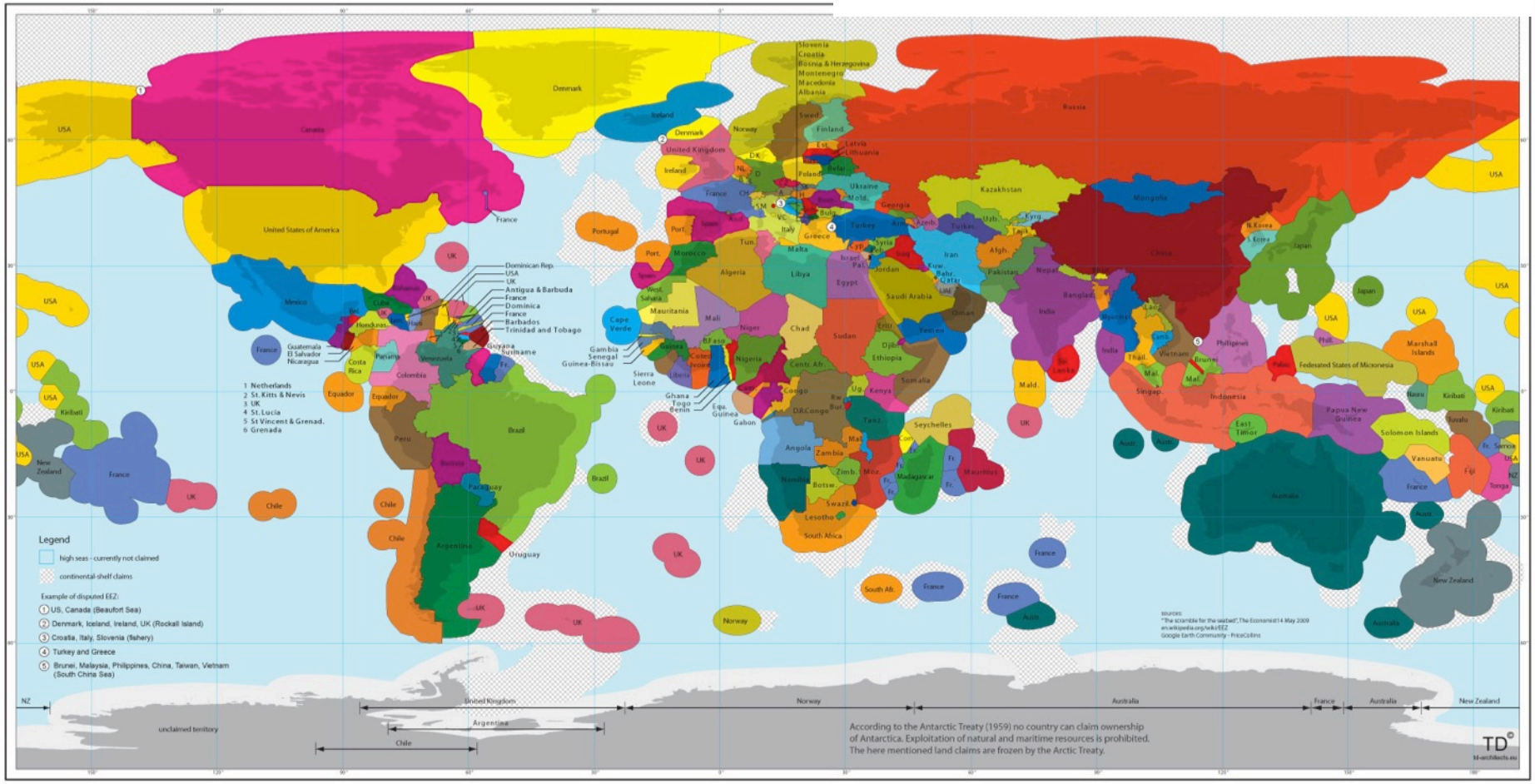


Source: The Economist, 14 May 2009

One way to see EEZs :

'a rock in the ocean = 430,000 km^2 exploitable surface offshore'
(Theo Deutinger)

Source: http://td-architects.eu (2009)



EEZs represent approximately 1/3 of the oceans (or 1/4 of the planet)

an 'invisible global chessboard' for control of world's natural resources

Beyond the ECS and national jurisdiction lies…

‘The Area’ = more than 50% of the Earth’s surface

- **International jurisdiction**

> *UNCLOS Preamble & Part XI :*
>
> …the seabed and ocean floor and the subsoil thereof, **beyond the limits of national jurisdiction**, as well as its resources, are **the common heritage of mankind…**

- ‘freedom of the seas’ replaced by the international management of marine resources
- called for wealth and technology transfers from developed to undeveloped nations

International Seabed Authority (ISA), Jamaica

founded 1994

Opposed and weakened by developing nations e.g. USA (‘market forces…’)

ISA retains control over geo-resources (mining)

Being (con)tested in regard to bio-prospecting

Publications: T. Scovazzi (2004, 2006), Prof of Intl Law, Milano-Bicocca