



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

Anno accademico 2020 – 2021

Geologia Marina

Modulo 6.1.2 Jurisdiction at sea

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WHO OWNS THE SEAS?

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

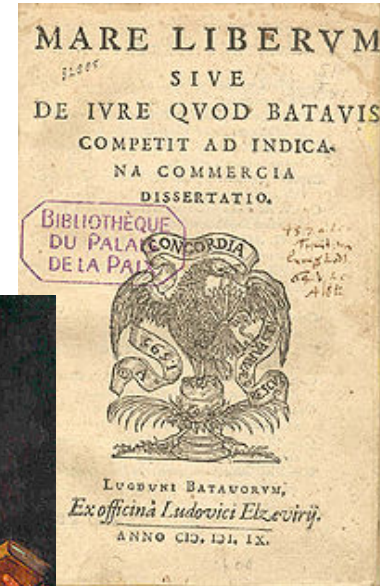
Republics of Venice, Genoa : local forms of *Mare clausum*: in parts of Mediterranean, control of shipping by military force

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



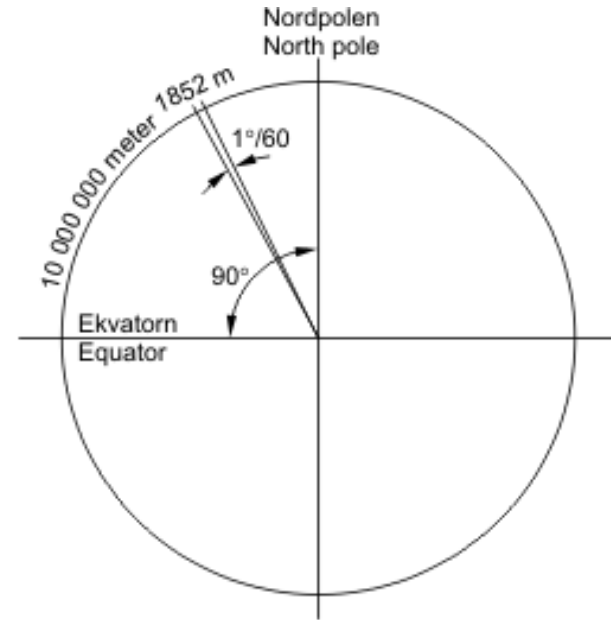
Nautical Mile

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

Speed: 1 knot (kt) = 1 nm per hour



Source of image:
Wikimedia commons

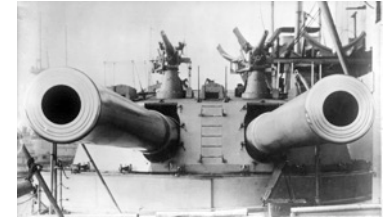
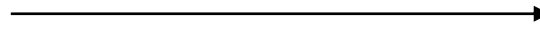
MERCATOR PROJECTION !



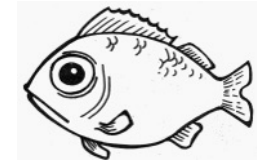
<http://www.coastalnavigation.com/>

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

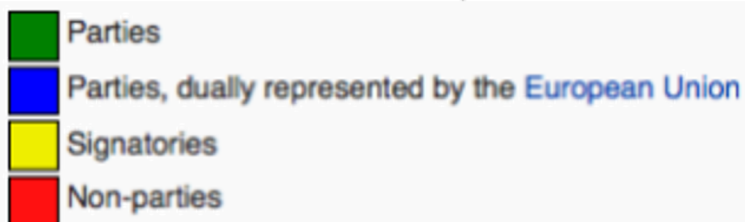
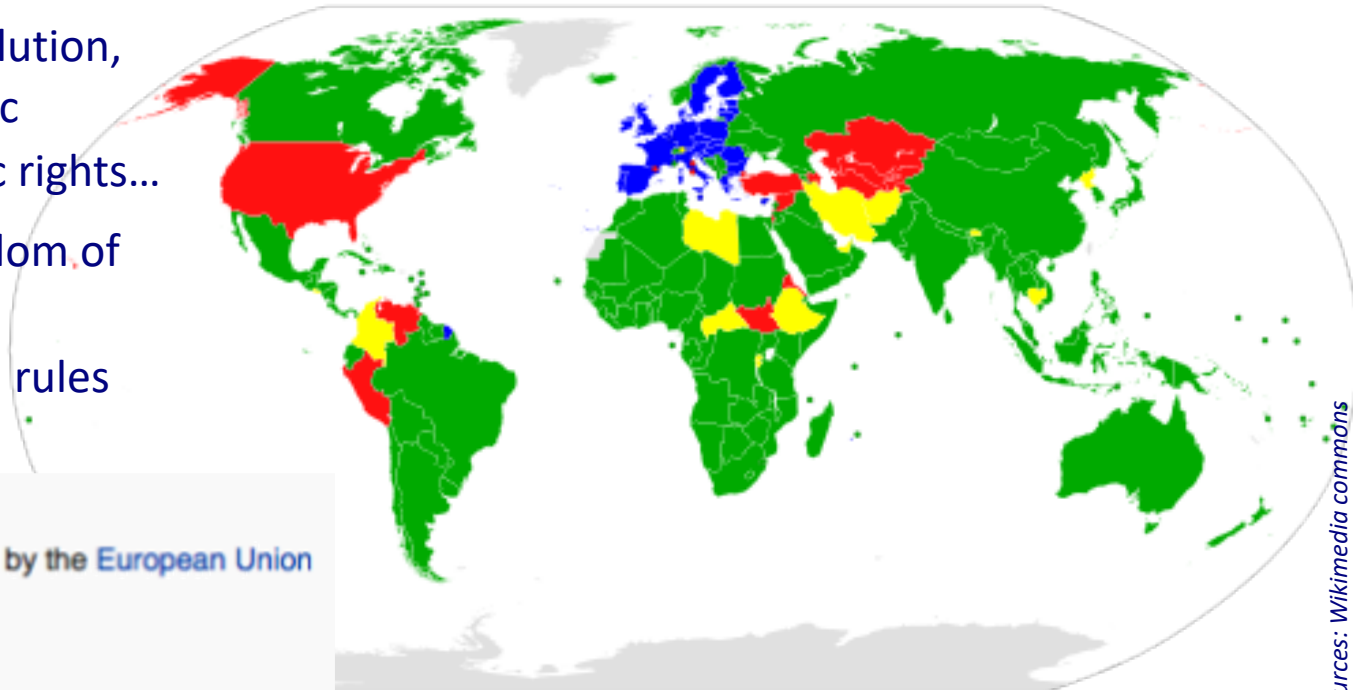


> added to agenda the question of determining legal extent of offshore waters

United Nations Convention on the Law of the Sea = UNCLOS



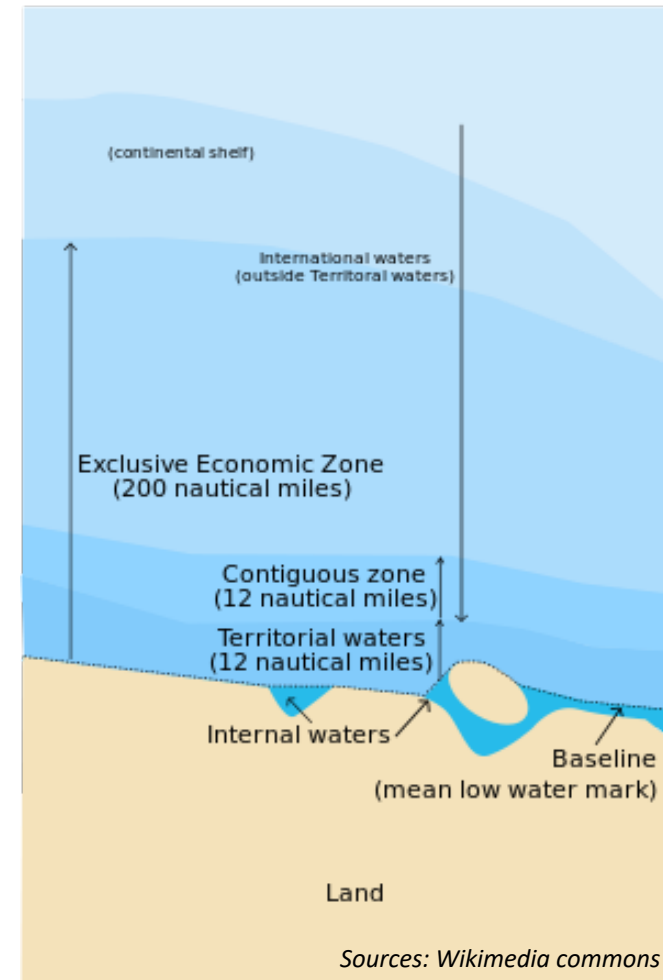
- based on a series of international conferences from 1958-1982
- convention in force since 1994 (when 60th signatory ratified)
- not a law, but a treaty currently ratified by 166 parties plus the European Union
- one of the longest treaties in history – 320 articles + 9 annexes
- addresses many issues: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



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)



UNCLOS MARITIME ZONES

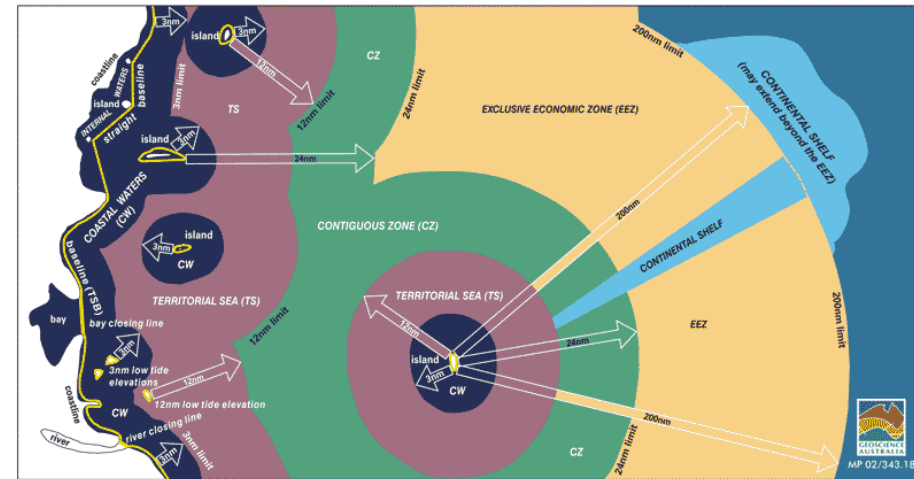
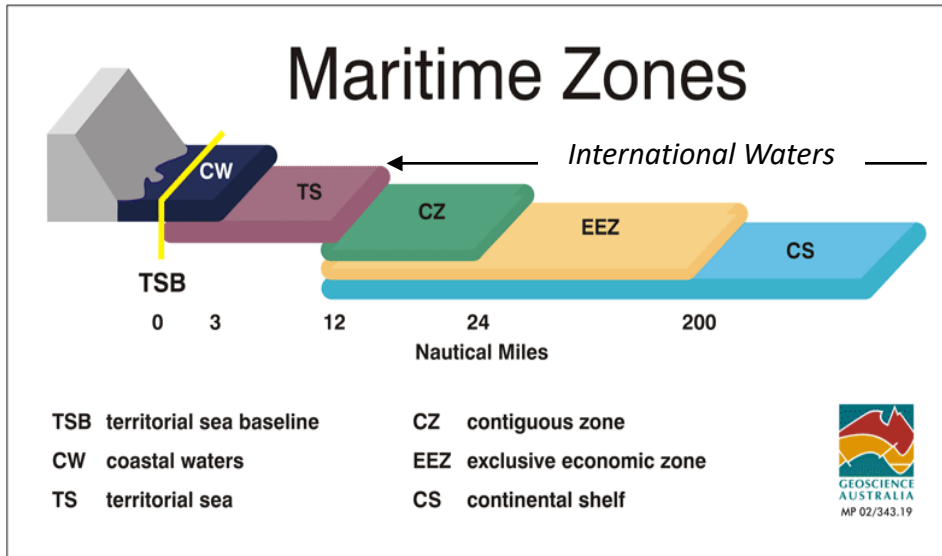
- Baseline = low water line (or straight line between headlands)
- 3 nm = Coastal Waters (one cannon shot...)
- 12 nm = Territorial Seas (right of 'innocent passage')
- 24 nm = Contiguous Zone (zone of 'hot pursuit')
- 12-200 nm = Exclusive Economic Zone (EEZ)
- 12-350 nm or more = Continental Shelf



National control of resources in & beneath the seas

National control of resources at & beneath seabed

Sources: Wikimedia commons



- 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>)

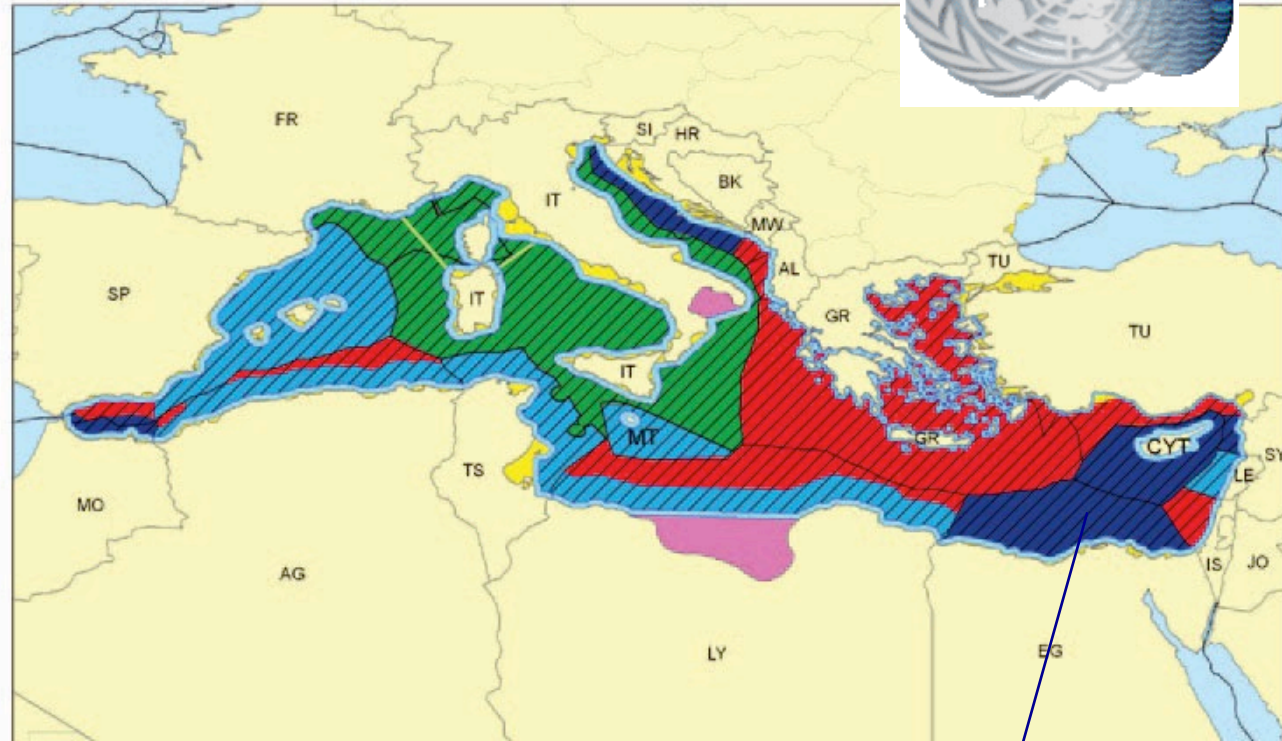


Nonetheless, there are disputes

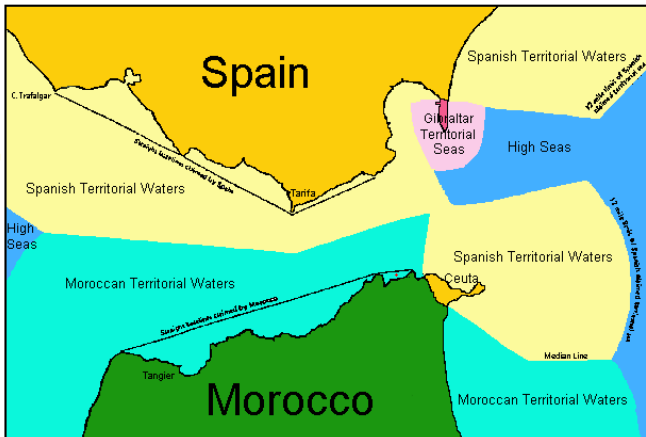
- Where nations are <400 nm apart, they must agree (or not) on median lines
- *International Tribunal for the Law of the Sea* (Hamburg) - separate from UN

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

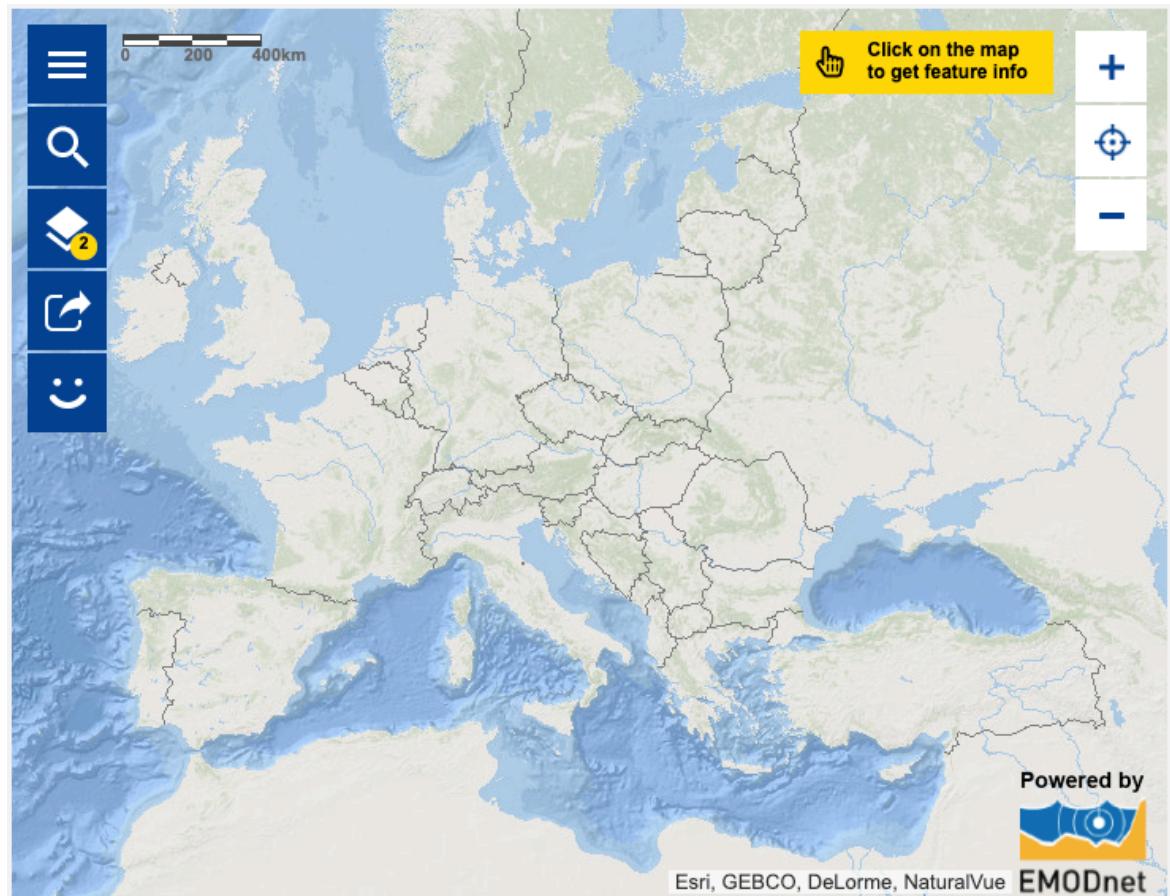
Exclusive Economic Zone (EEZ)

On land, countries are separated by borders that indicate which country governs a particular piece of land, its inhabitants and its natural resources.

What happens when these borders reach the coast

How are the many natural resources available at the seafloor divided between the different coastal countries

who governs the ships that travel across the seas?

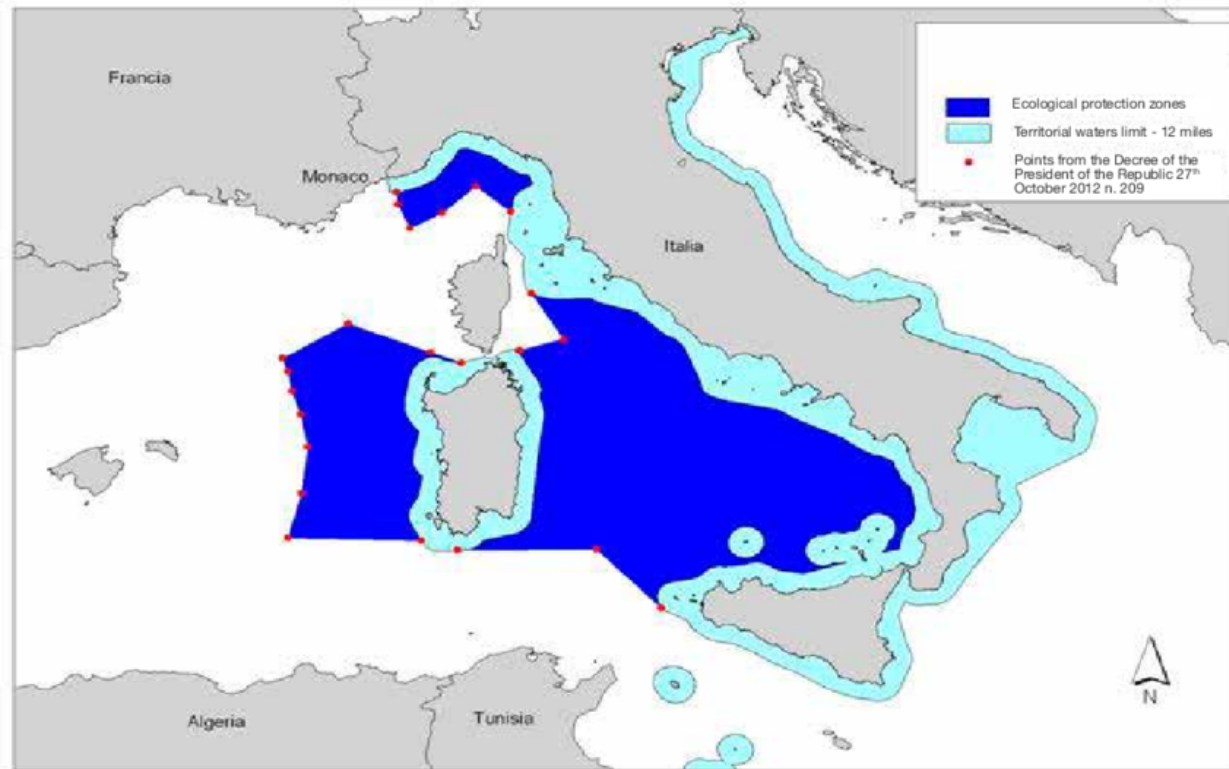


Exclusive Economic Zone (EEZ)

To provide an answer to these questions, in 1982 the United Nation Convention on the Law of the Sea defined a set of rules on how to divide the marine regions.

A country has **control over both the seafloor as well as ships travelling** at the sea surface in an area that extends up to **12 nautical miles (22.2 km)** from its coastline.

This is called a country's **territorial sea** and its outline is similar to the borders that exist on land.



Tunesi et al., 2013

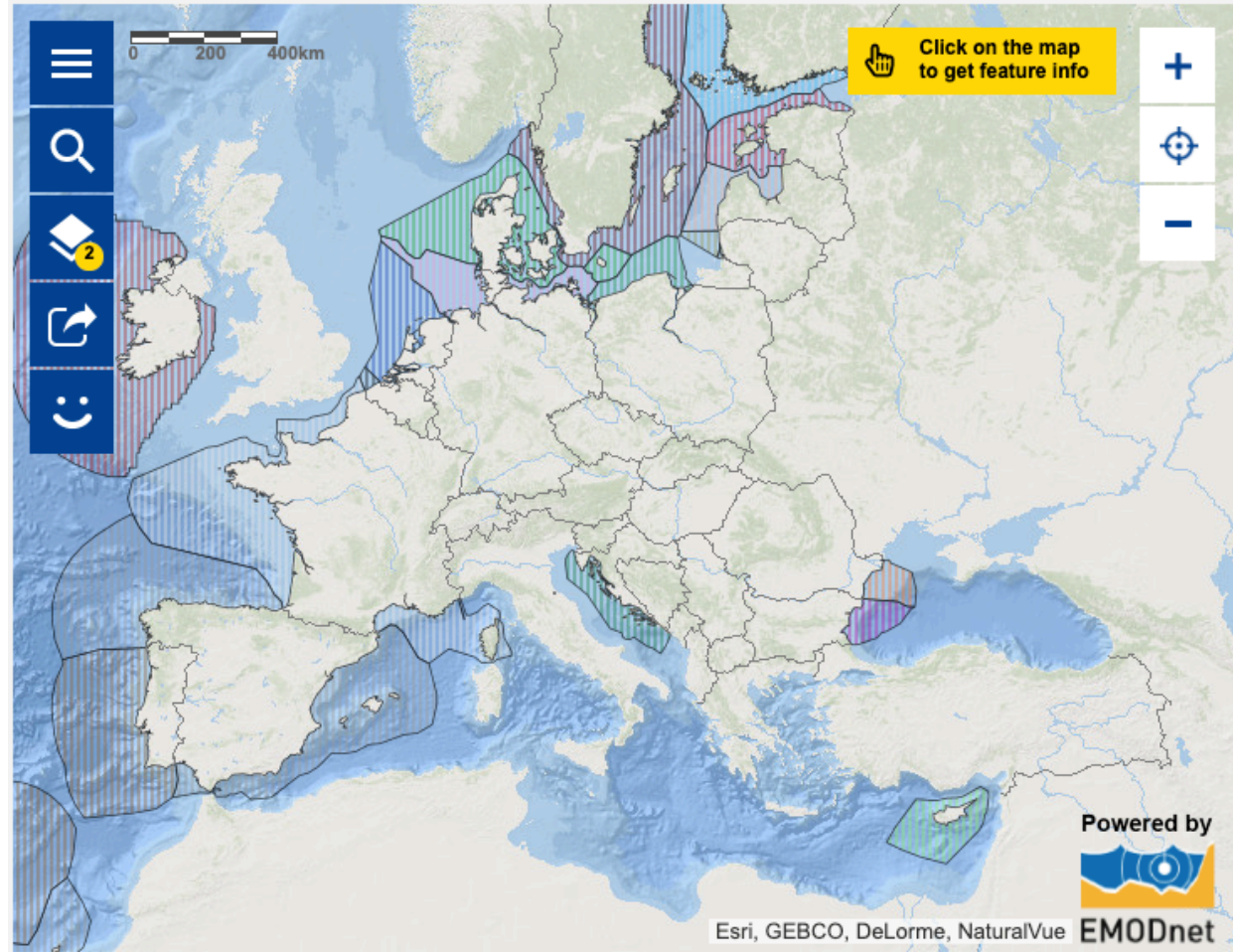
Exclusive Economic Zone (EEZ)

Extending beyond this point and reaching up to 200 nautical miles (370.4 km) from a country's coast lies its **Exclusive Economic Zone**.

Within this region, a country owns the natural resources at the seafloor but has no say on what happens at the surface.

Any ships in an Exclusive Economic Zone are essentially in international waters.

This map of the week features the Exclusive Economic Zones of EU Countries for which a regulatory text exists in UN's Convention on the Law of the Sea¹. Note that such a text does not exist for the EEZ of some EU countries (e.g. UK, Italy, and Greece) and these are currently not shown on the map.



https://ec.europa.eu/maritimeaffairs/atlas/maritime_atlas/#lang=EN;p=w;bkgd=5;them e=990:0.75,120:1;c=3866178.096260978,6568575.086273264;z=4;e=t

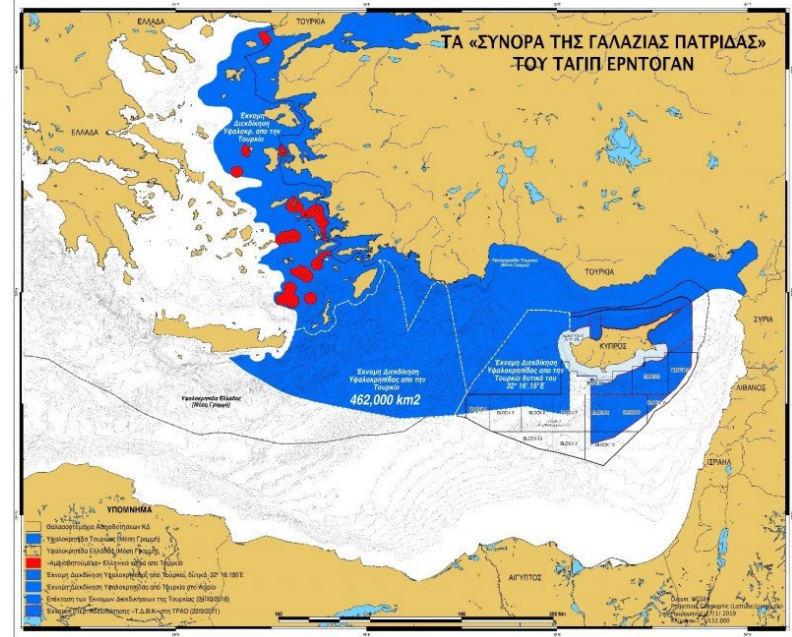
Disputes



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



Greece



Turkey

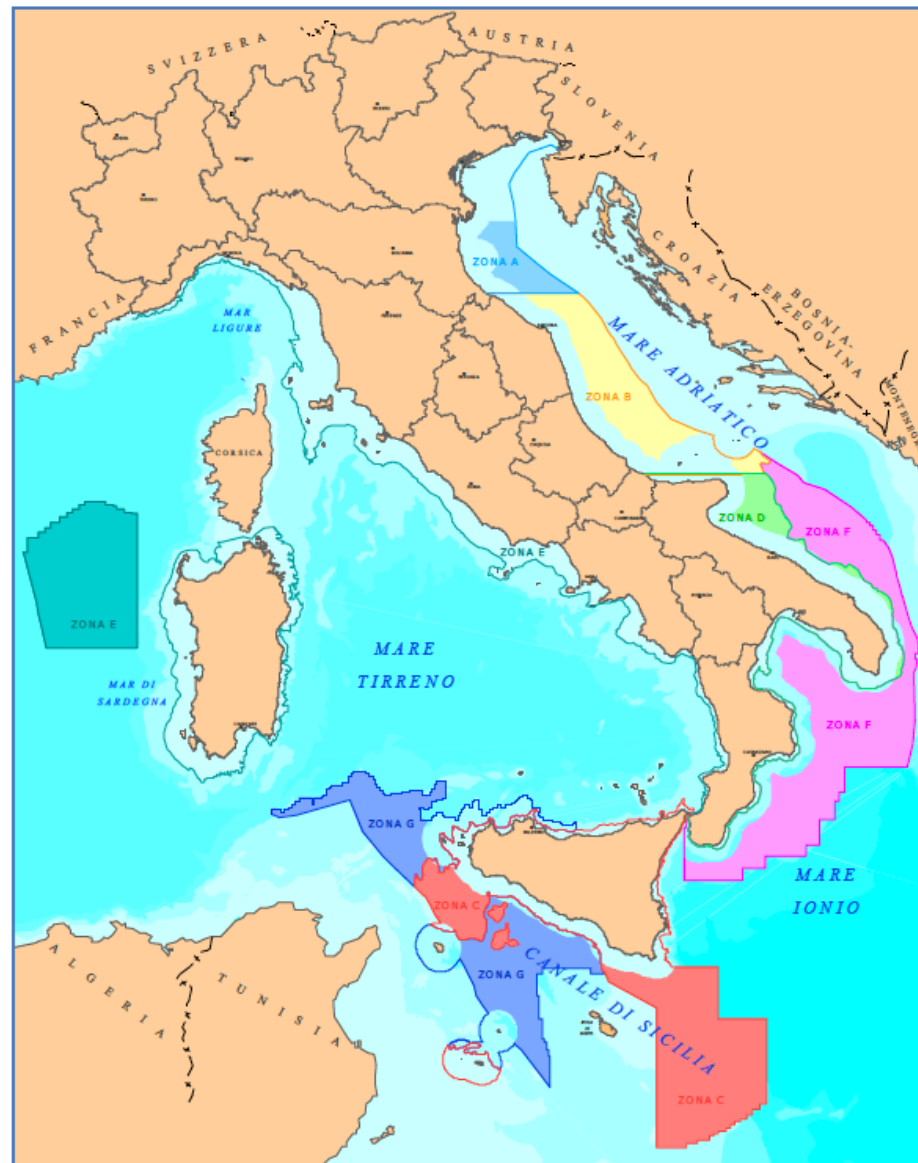


<http://strumentipolitici.it/il-corridoio-di-fuoco-turco-libico-il-rischio-di-terremoti-tsunami-e-vulcani-di-fango-sulle-esplorazioni-petrolifere2/>

<https://strategyinternational.org/war-exclusive-economic-zone/>



*Zone marine originariamente aperte
alle attività minerarie
(Elaborazione dell'Ufficio cartografia della DGRME)*

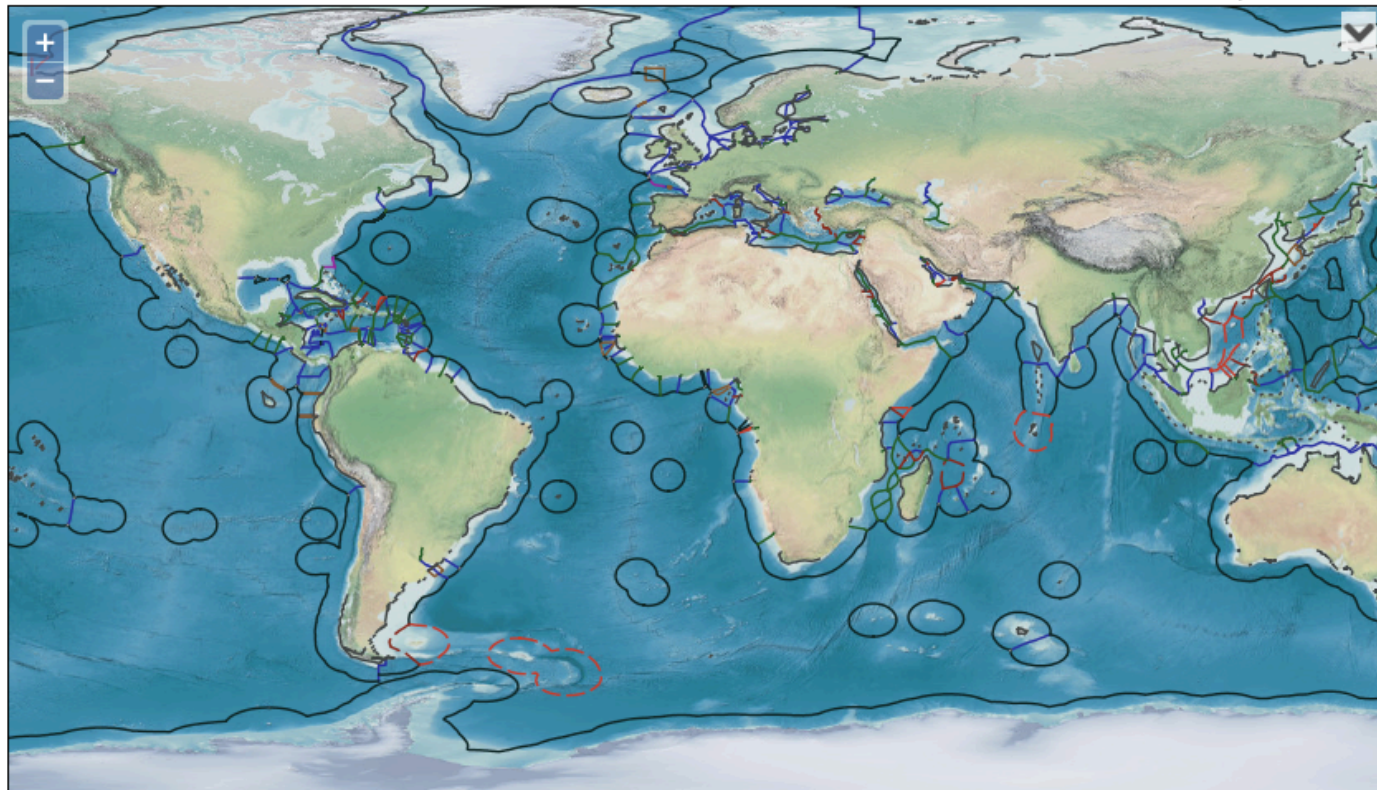


*Zone marine aperte alle attività minerarie e rimodulate
con D.M. 8/08/2013
(Elaborazione dell'Ufficio cartografia della DGRME)*



Marineregions.org

towards a standard for georeferenced marine names

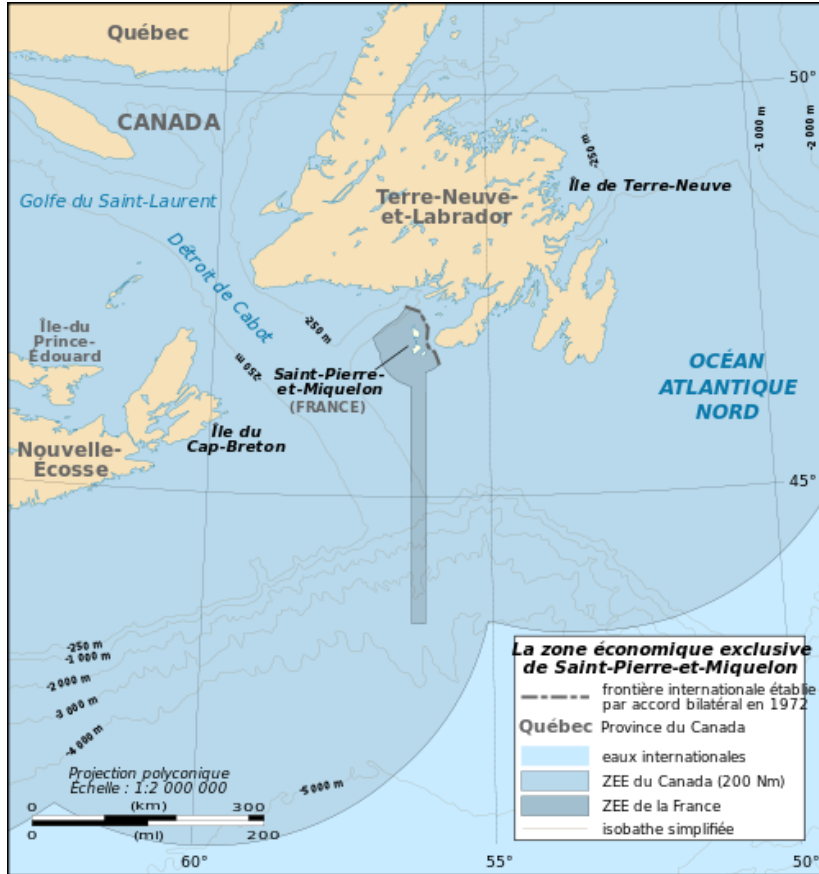
[About](#)[Gazetteer](#)[Maritime Boundaries](#)[Sources](#)[Statistics](#)[Downloads](#)[Search](#)[Map interface](#)[Methodology](#)[About](#)[Known issues](#) | [Disclaimer](#)

Lat: 80.33 Lon: -145.9

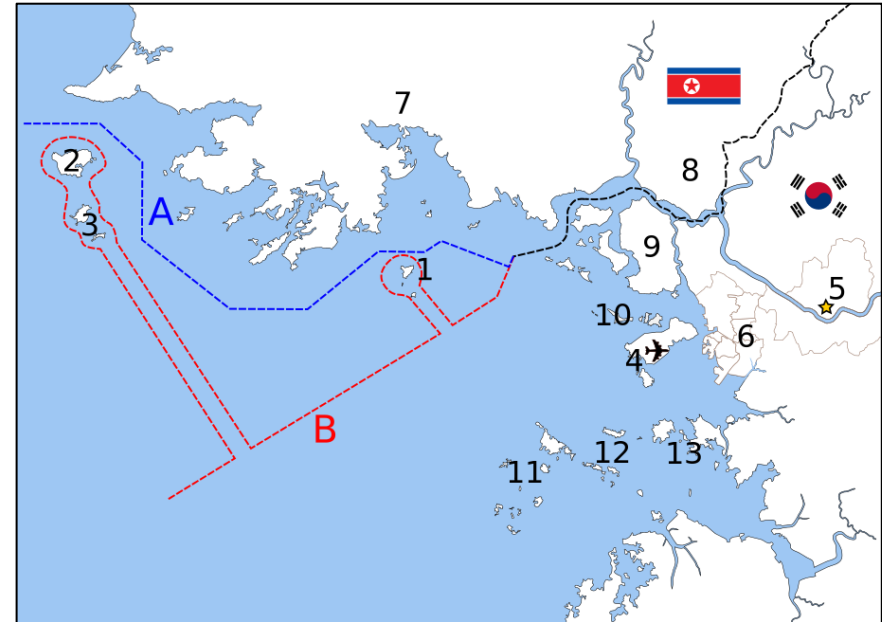
Click on the map to get feature info

<https://www.marineregions.org/eezmapper.php>

Examples of EEZ disputes :



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

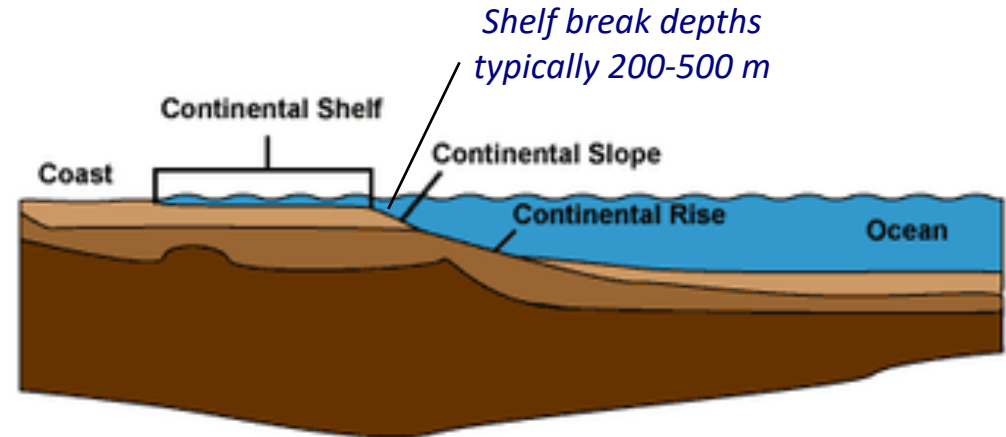


The two Koreas (unresolved...)

- 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

The 'Continental Shelf'

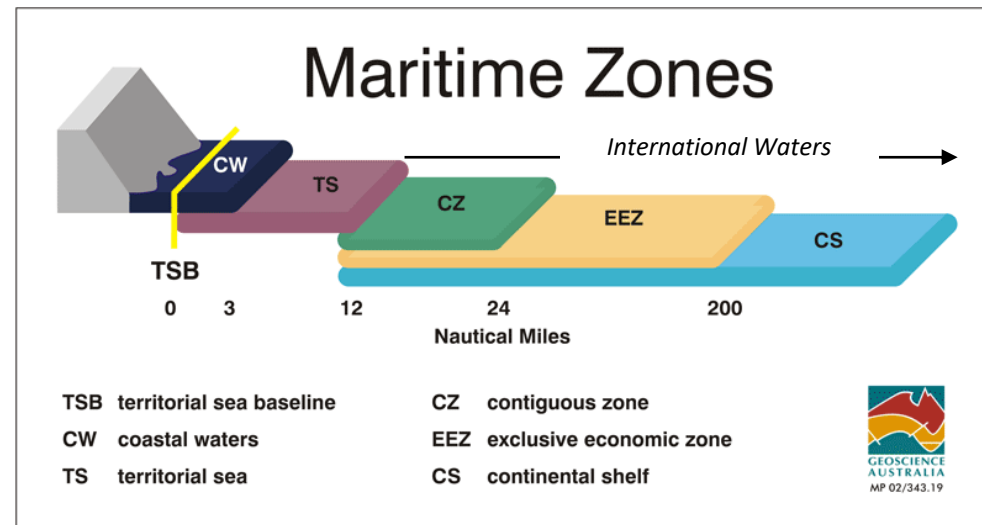
- To a geologist, the continental shelf (*la piattaforma continentale*) is a physiographic feature, based on geomorphology and geology



- 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 :

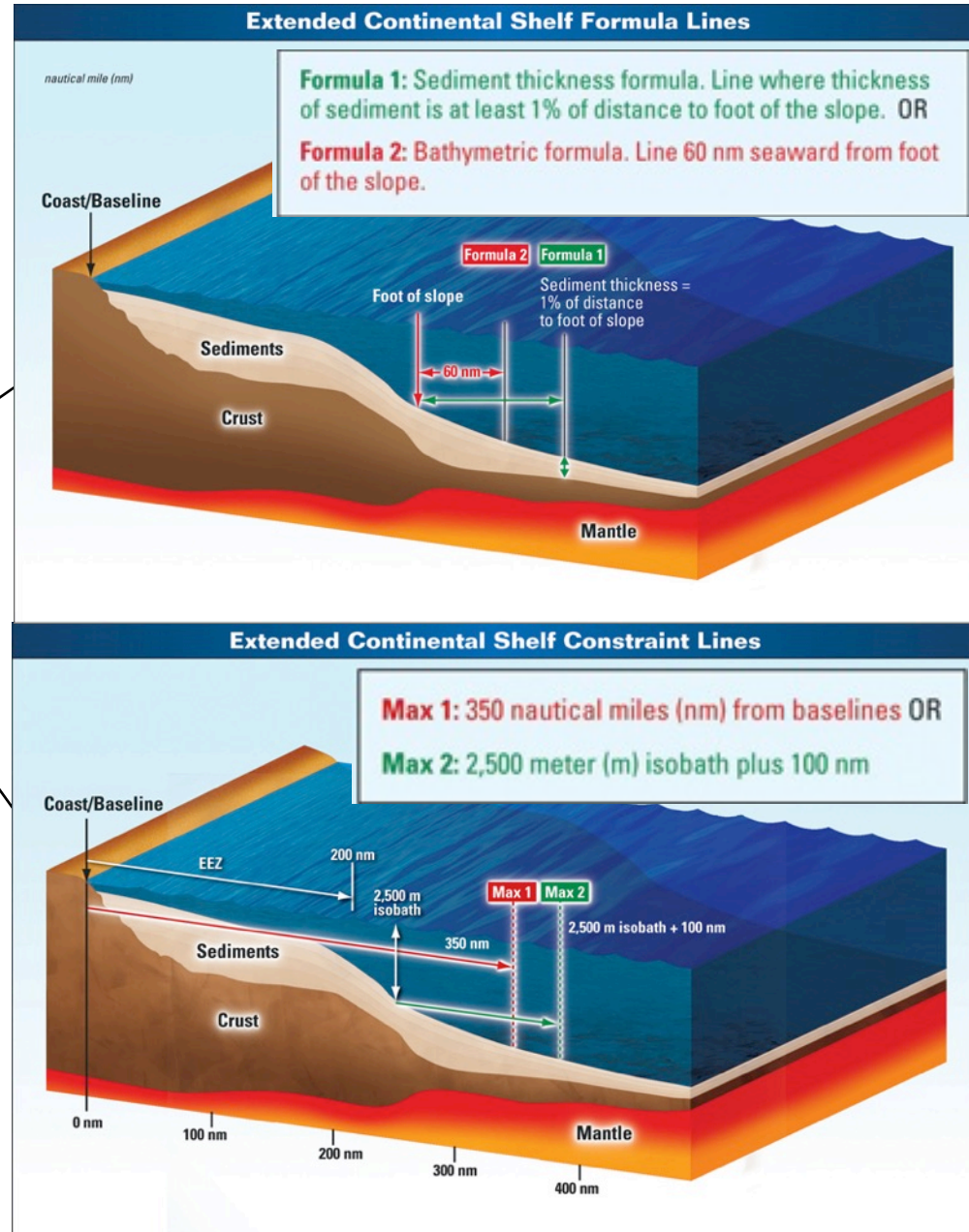
- criteria of geomorphology and geology used to define...

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.continentalshef.gov/>

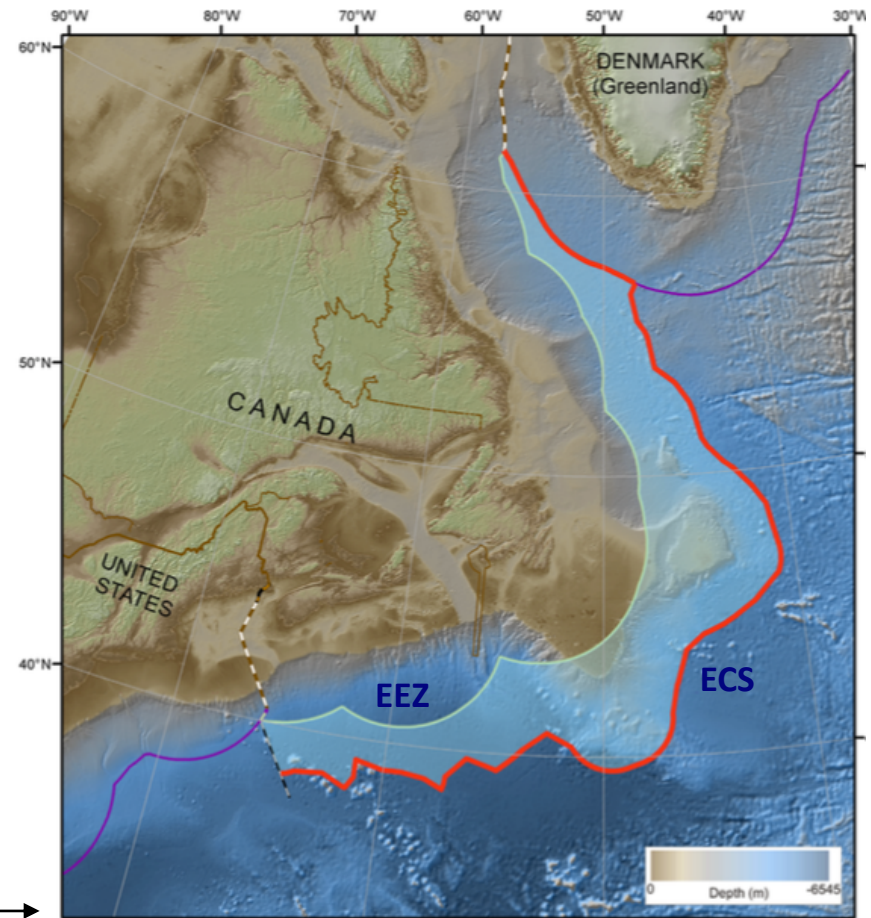


Extended Continental Shelf claims

- 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://continentalsshelf.gov/>

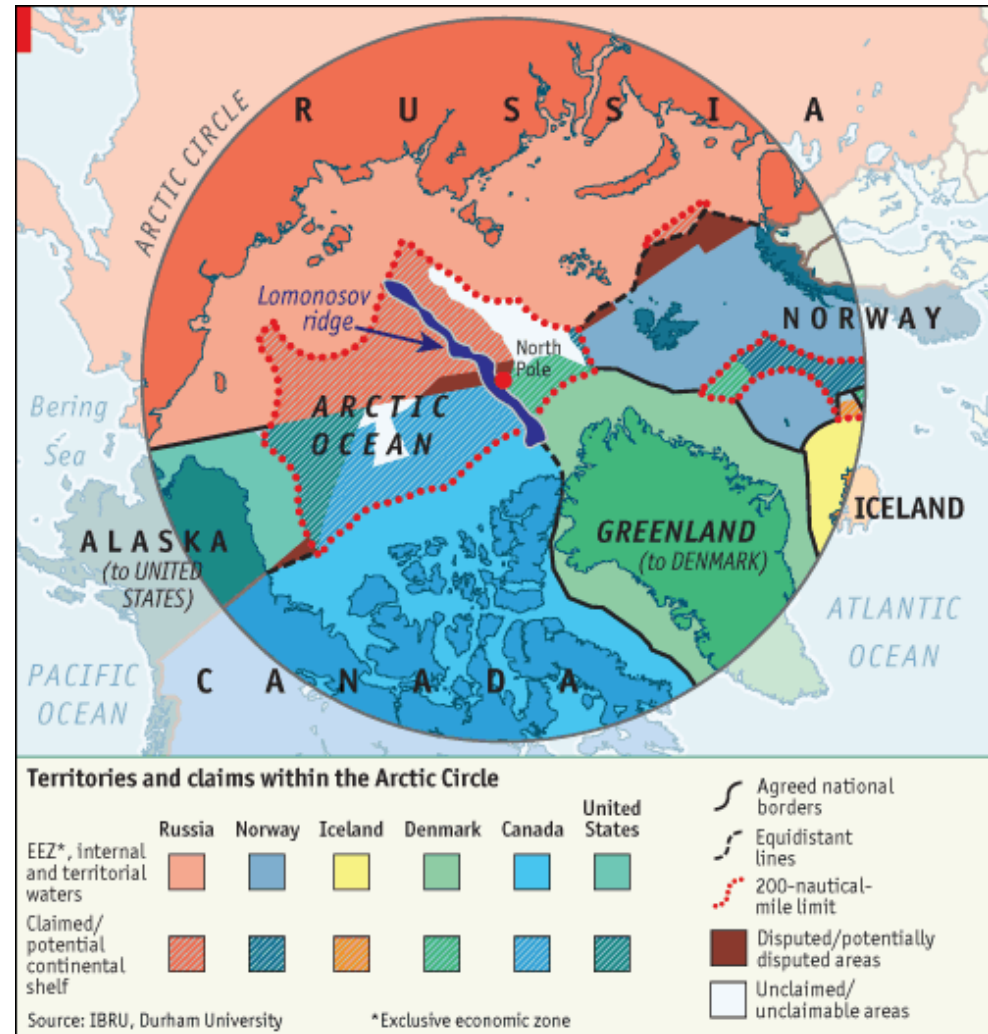
Submitted limits of the 'Extended Continental Shelf' of Atlantic Canada

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)

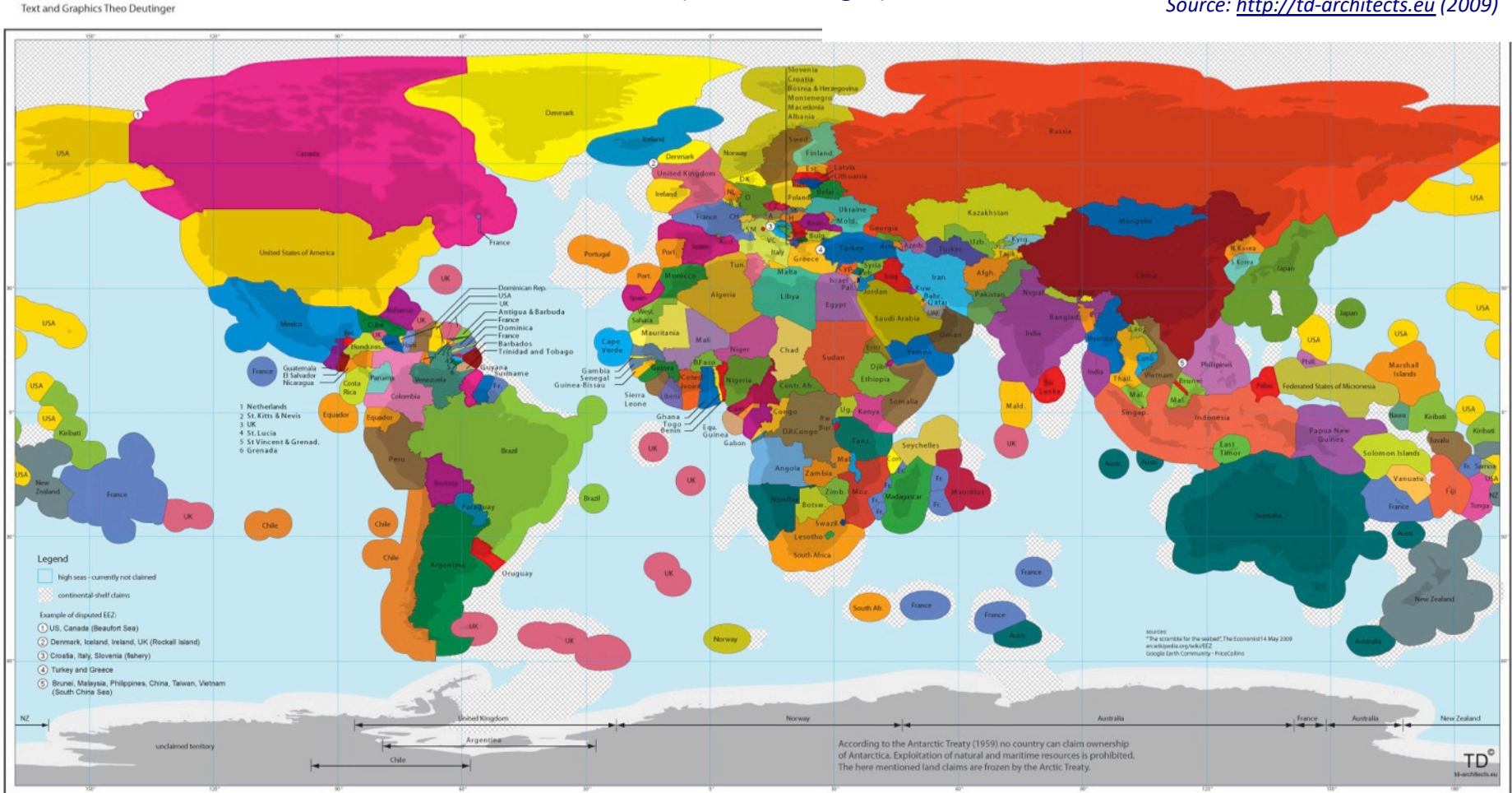


Source: The Economist, 14 May 2009

One way to see EEZs :

*'a rock in the ocean = 430,000 km² 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



International Seabed Authority

English Français Español



ABOUT THE AUTHORITY ▾

OUR WORK ▾

DOCUMENTS AND RESOURCES ▾

MEDIA CENTRE ▾

SESSIONS ▾

https://youtu.be/tzP-WqTJR_w



Made up of 167 Member States, and the European Union, the International Seabed Authority is mandated under the UN Convention on the Law of the Sea to organize, regulate and control all mineral-related activities in the international seabed area for the benefit of mankind as a whole.

In so doing, ISA has the duty to ensure the effective protection of the marine environment from harmful effects that may arise from deep-seabed related activities.

<https://www.isa.org.jm/>



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



EU REGULATORY FRAMEWORK



ENVIRONMENT

[Marine Strategy Framework Directive](#) adopted on 17 June 2008.

SCOPE: to achieve Good Environmental Status (GES) of the EU's marine waters by 2020 and to protect the resource base upon which marine-related economic and social activities depend. The Directive sets out eleven qualitative descriptors which describe what the environment will look like when GES has been achieved.

[Descriptor 1](#). Biodiversity is maintained

[Descriptor 2](#). Non-indigenous species do not adversely alter the ecosystem

[Descriptor 3](#). The population of commercial fish species is healthy

[Descriptor 4](#). Elements of food webs ensure long-term abundance and reproduction

[Descriptor 5](#). Eutrophication is minimised

[Descriptor 6](#). **The sea floor integrity ensures functioning of the ecosystem**

[Descriptor 7](#). Permanent alteration of hydrographical conditions does not adversely affect the ecosystem

[Descriptor 8](#). Concentrations of contaminants give no effects

[Descriptor 9](#). Contaminants in seafood are below safe levels

[Descriptor 10](#). Marine litter does not cause harm

[Descriptor 11](#). Introduction of energy (including underwater noise) does not adversely affect the ecosystem

Descriptor 6. The sea floor integrity ensures functioning of the ecosystem

Main pressures on the sea-floor?

Human activities induce different kinds of pressures that can affect the sea-floor. The main pressures that directly impact the state of the sea bottom are:

- 1. Coastal infrastructures (ports, defenses against erosion, etc.) and offshore installations (oil and gas platforms, wind farms, etc.);**
- 2. Offshore mining and sand extraction;**
3. Release of dredged sludge;
4. Moorings;
5. Some fishing practices (trawling, dredging, etc.);
6. Aquaculture (unused fish feed, fish faeces, etc.);
7. Introduction of non-indigenous species (through ballast water for instance);
8. Pollution (chemical pollution, litter);
9. Changes in riverine inputs (organic enrichment of particulate matter, etc.);
10. Sediment remobilization by fishing equipment (trawls, dredges);
11. Changes in freshwater riverine inputs as a consequence of damming and irrigation;
12. Changes in solid matter riverine inputs; and
13. Release of large quantities of warm (power plant cooling) or salty water (from desalination facilities)

DIRECTIVE 2013/30/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 12 June 2013 on safety of offshore oil and gas operations

PREVENTION OF MAJOR ACCIDENTS RELATING TO OFFSHORE OIL AND GAS OPERATIONS

- General principles of risk management in offshore oil and gas operations
- Safety and environmental considerations relating to licences
- Public participation relating to the effects of planned offshore oil and gas exploration operations on the environment
- Offshore oil and gas operations within licensed areas
- Liability for environmental damage

Among the documents submitted for carrying out offshore oil and gas operations:

Report on major hazards for a production installation

Report on major hazards for a non-production installation

In the entire document the term 'geo' is used only for geographical meaning

National implementation of the EU Directive:

Italian Ministry of Economic Development **Increased safety of offshore installations**

Among other activities....

- Evaluation of the seismic hazard (including induced-seismicity) of current platforms based on their position with respect to tectonic structures and induced pressures (load)
- Feasibility studies for seismic monitoring and soil deformation
- Studies of geological and stratigraphic conditions of new marine areas open to research and cultivation of hydrocarbons

Increased royalties on Oil and Gas to fund research projects on (among other):

- **Submarine geo-hazards (slope stability, enhanced erosion, gas emissions)**
- **Seismicity including induced seismicity**

Recommended Reading

Law of the Sea

- http://www.un.org/depts/los/convention_agreements/texts/unclos/UNCLOS-TOC.htm
- http://en.wikipedia.org/wiki/United_Nations_Convention_on_the_Law_of_the_Sea
- http://en.wikipedia.org/wiki/Maritime_boundary

Marine Resources

- World Ocean Review (worldoceanreview.com)