



# Small is beautiful ???

Waste management for a small nuclear program  
Need for cooperation

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WM'12 Phoenix, USA  
28 February 2012

# Small is beautiful ???

- many countries with long lived waste but no nuclear power programme
- many countries with research reactors, SF research waste
- many countries with small nuclear power programmes

# THE NETHERLANDS



- small country
- 16 mio people
- small nuclear programme

# WASTE PRODUCERS IN THE NETHERLANDS

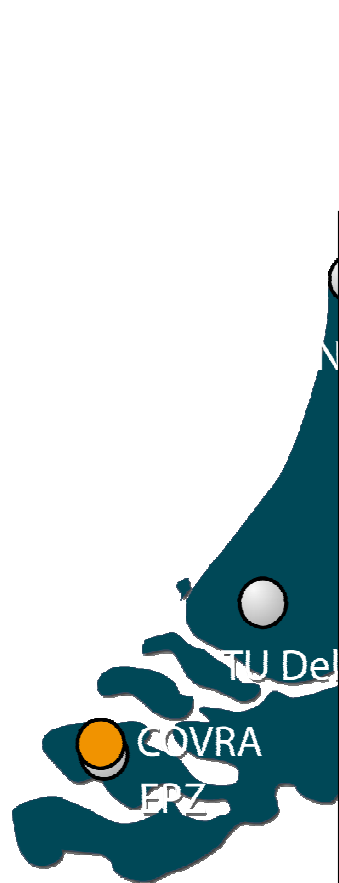
- 2 nuclear power plants
  - 1 operating (1973-2034)
  - 1 decommissioned (1968-1997)
- 2 reprocessing factors
- 1 plant

## Waste inventory (1982-2012)

HLW: 60 m<sup>3</sup>

LILW: 10.000 m<sup>3</sup>

NORM: 10.000 m<sup>3</sup>





# SOLUTIONS FOR THE NETHERLANDS



- small amount of waste
- high ground water table
- high population density
- high environmental awareness
- advanced spatial planning

**no shallow disposal,  
only deep disposal**

**COVRA<sub>NV</sub>**

# DISPOSAL SOLUTIONS



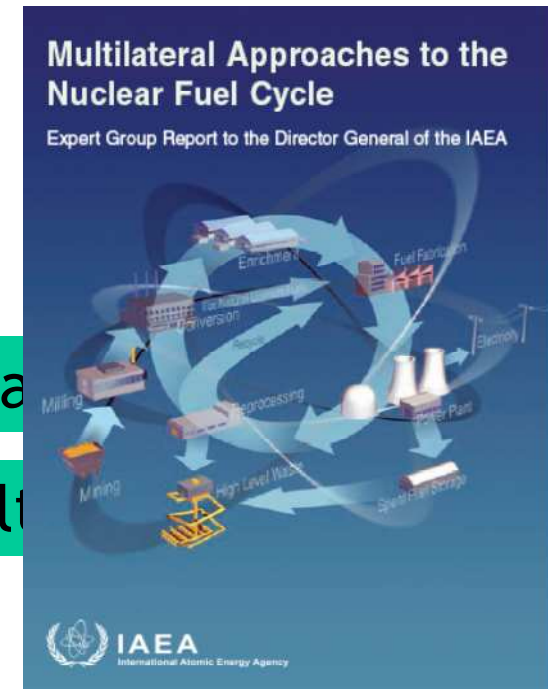
# POLICY THE NETHERLANDS

- at least 100 years storage, in buildings
- deep disposal HLW+LILW after 100 years
- look for cooperation: ARIUS, ERDO
- IGD-TP, OPERA
- double track policy
- IFNEC



# NUCLEAR FUEL CYCLE

- mining multinational
- enrichment multinational
- fuel fabrication multinational
- electricity production mult
- reprocessing multinational
- waste management (multi)national?
- disposal strictly national???????



# ERDO and ARIUS

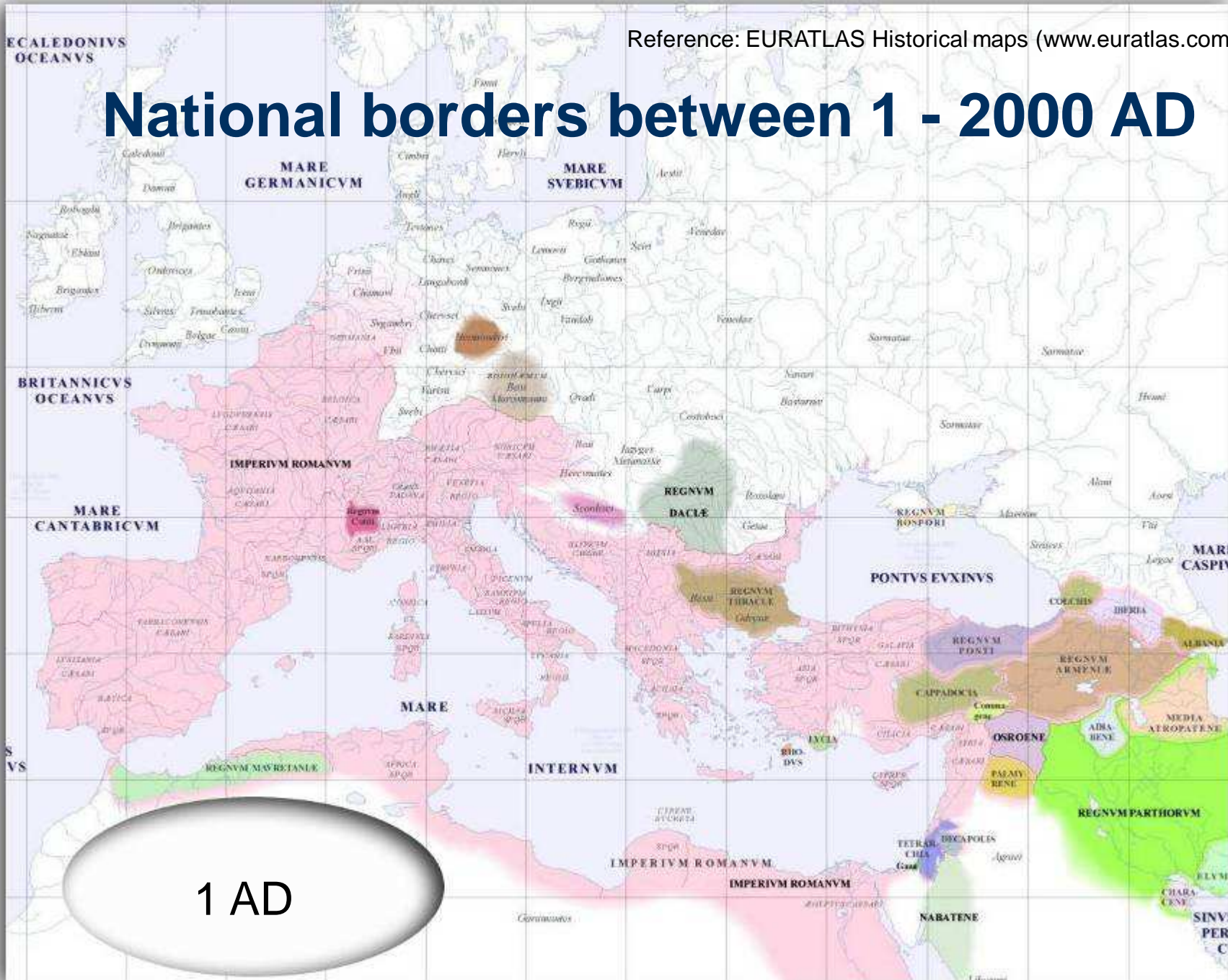


# REASONS TO SHARE

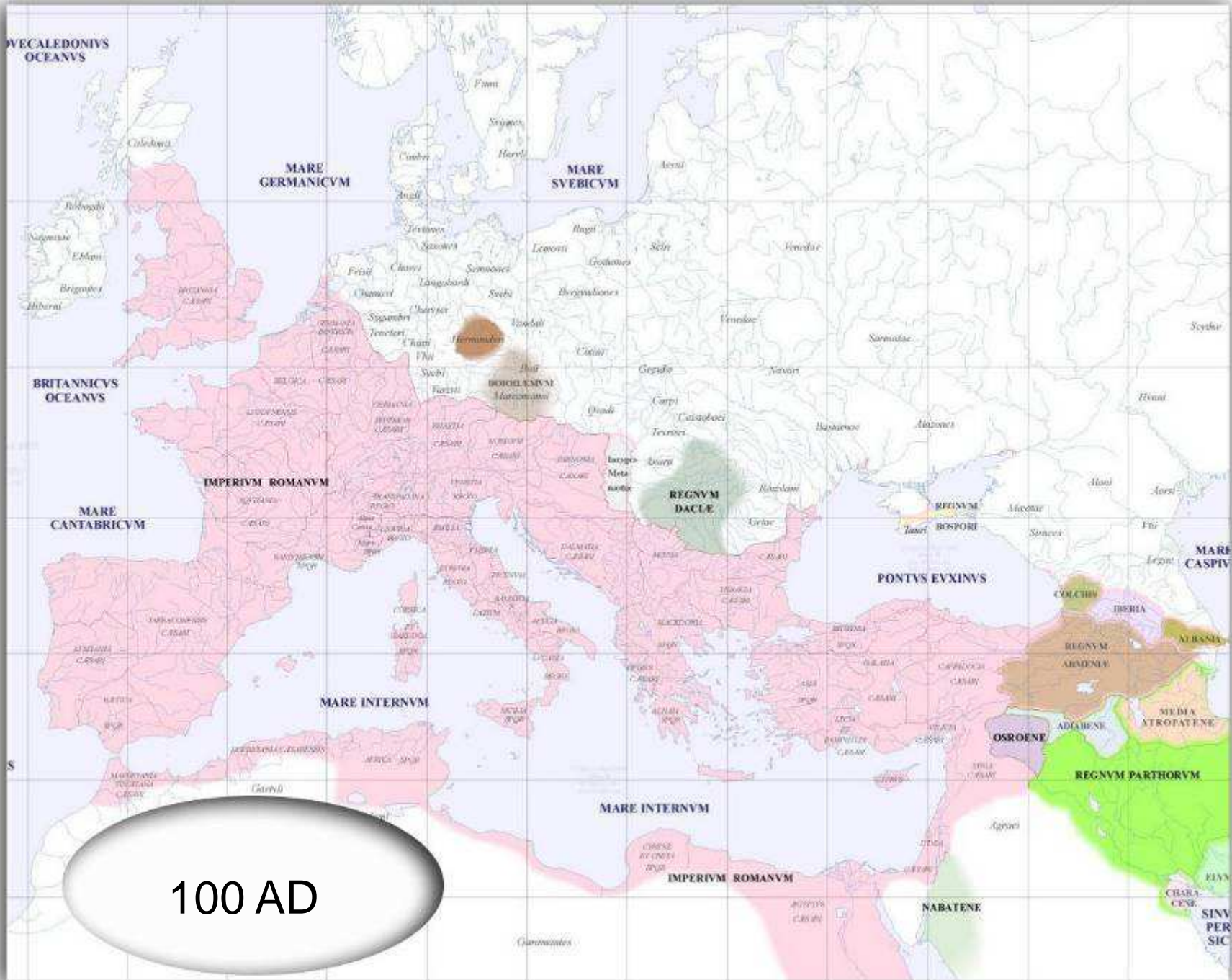
- financial
- advanced/specialized technology
- pool of expertise and staff
- selection of geology
- URL
- higher standards / quality
- better supervision
- more proliferation robust
- national borders are meaningless for disposal times

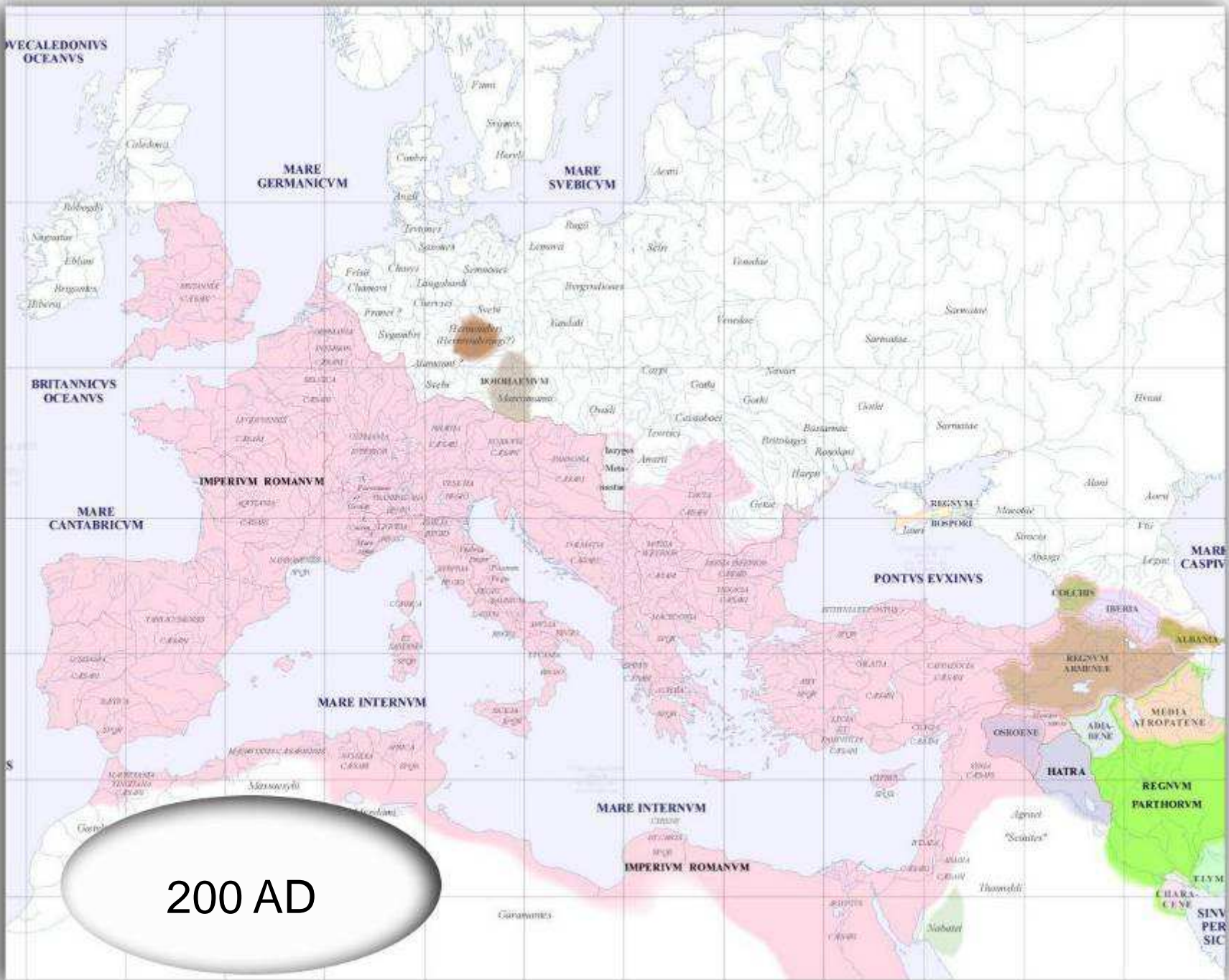
Reference: EURATLAS Historical maps (www.euratlas.com)

# National borders between 1 - 2000 AD

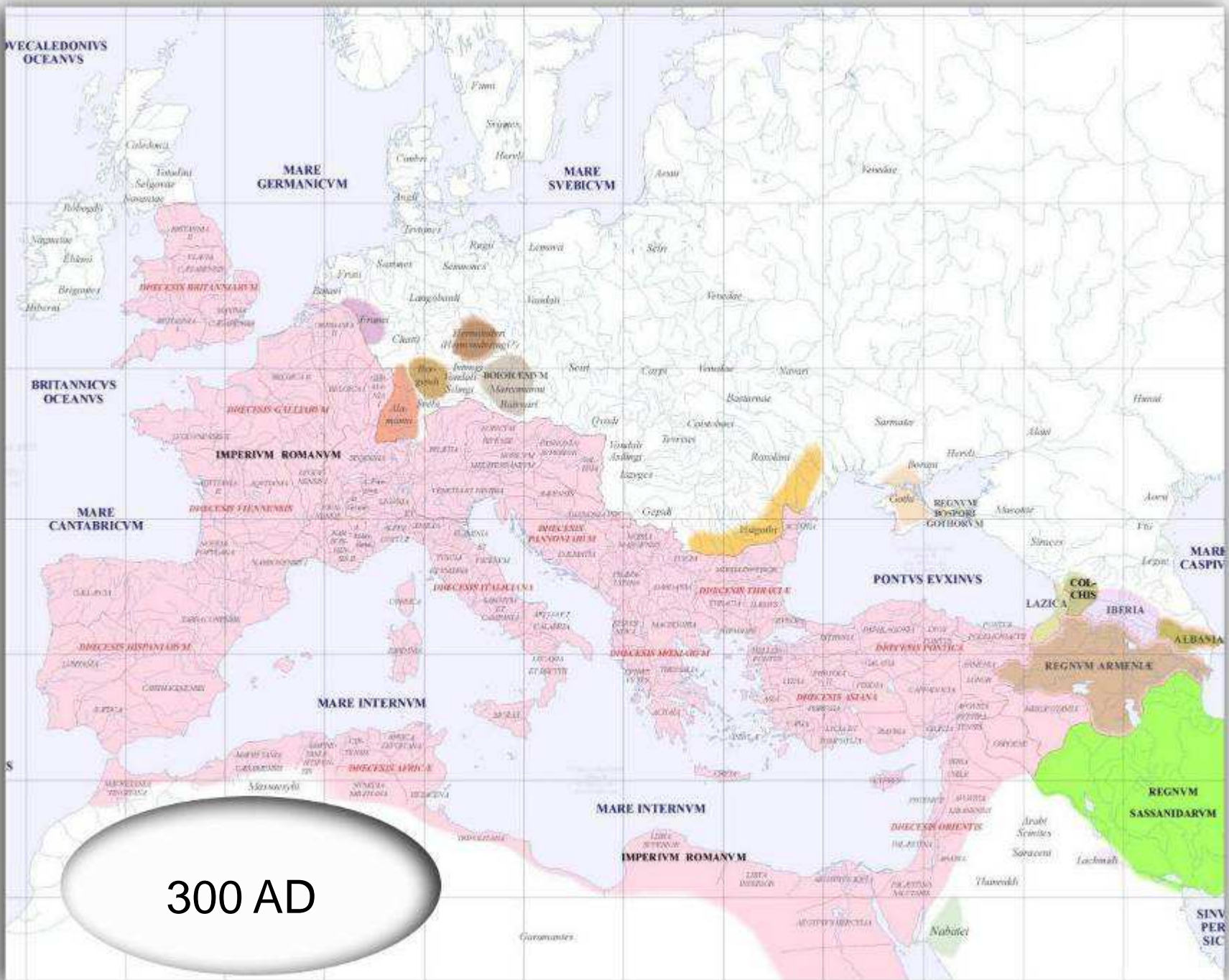


1 AD

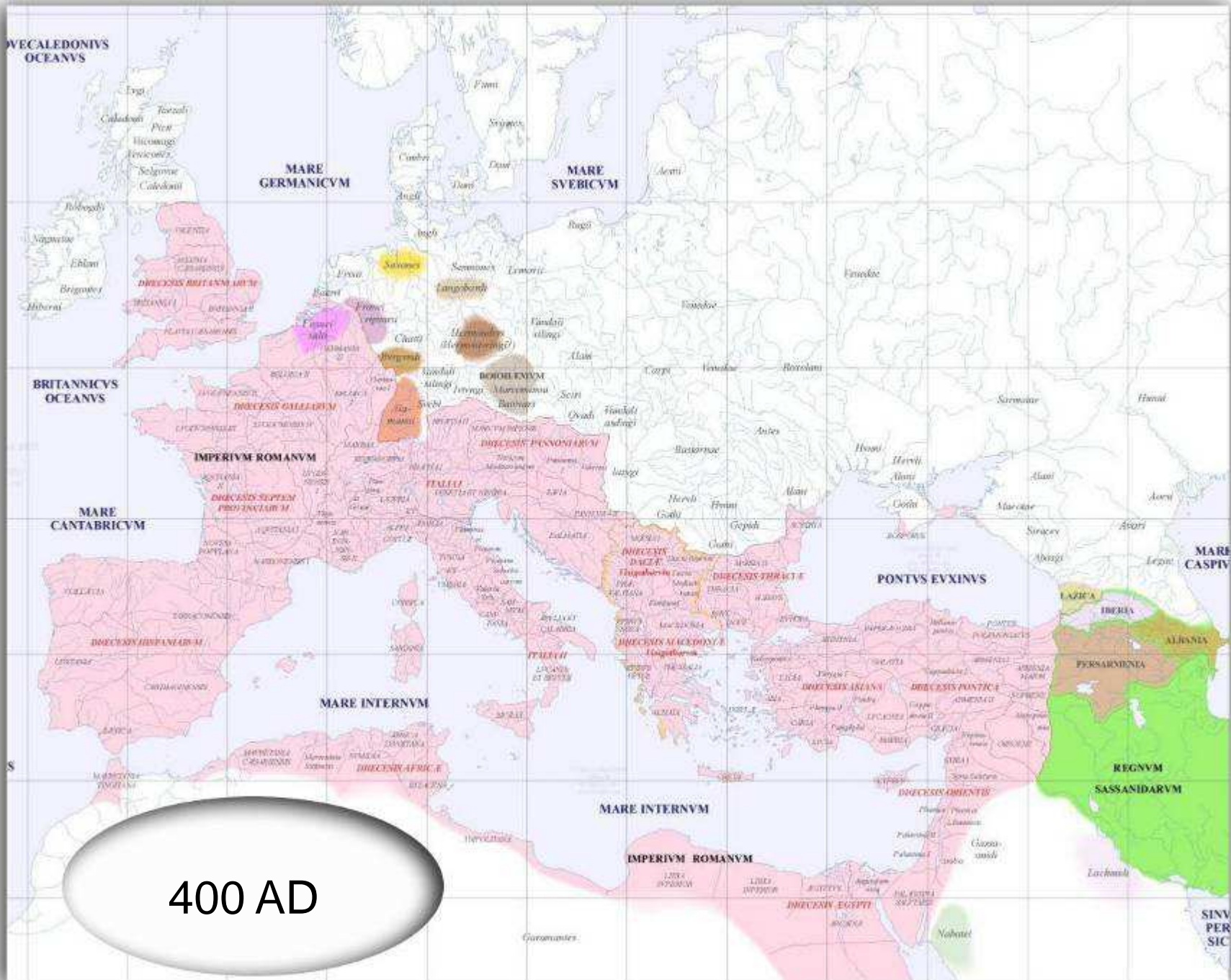




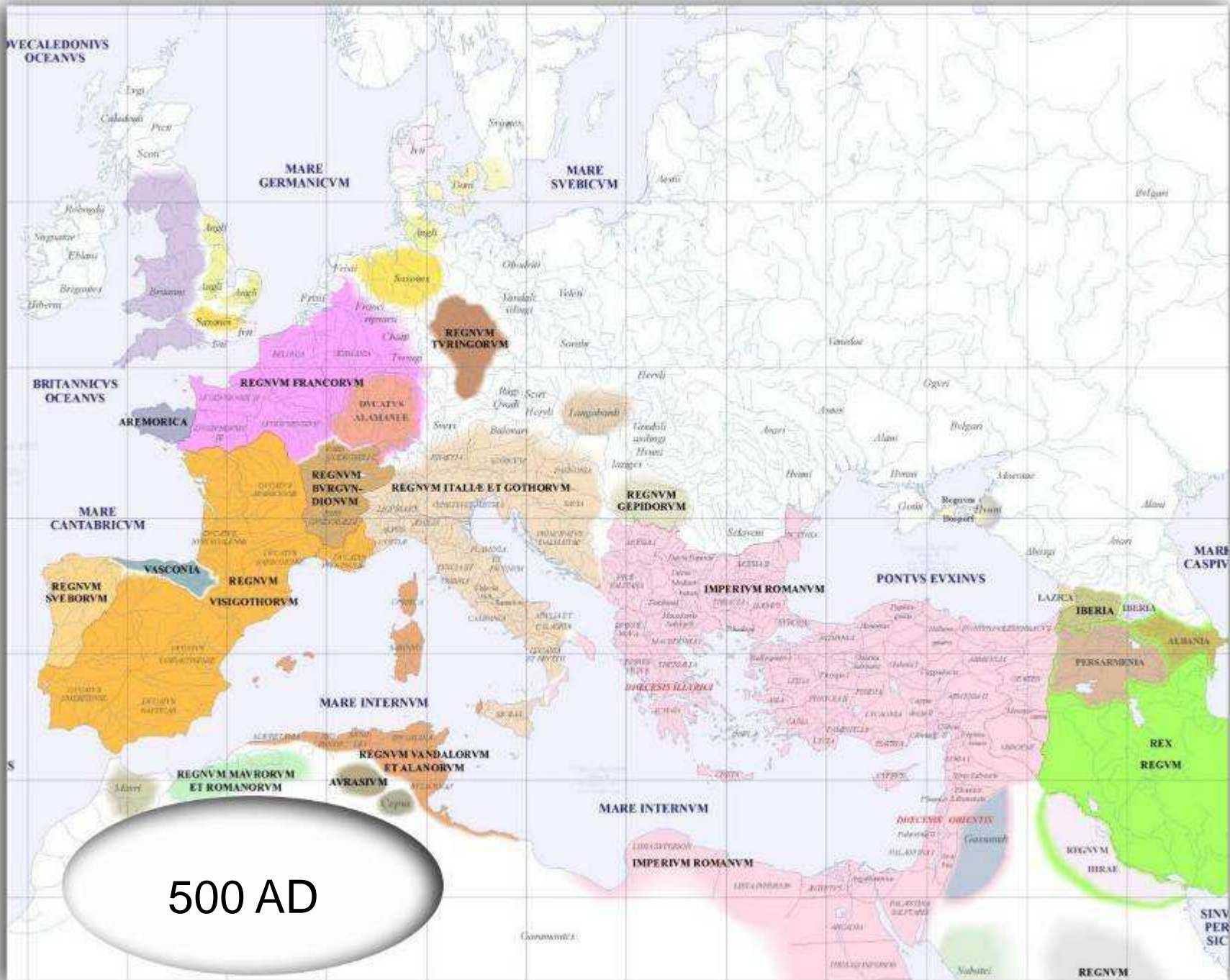
200 AD



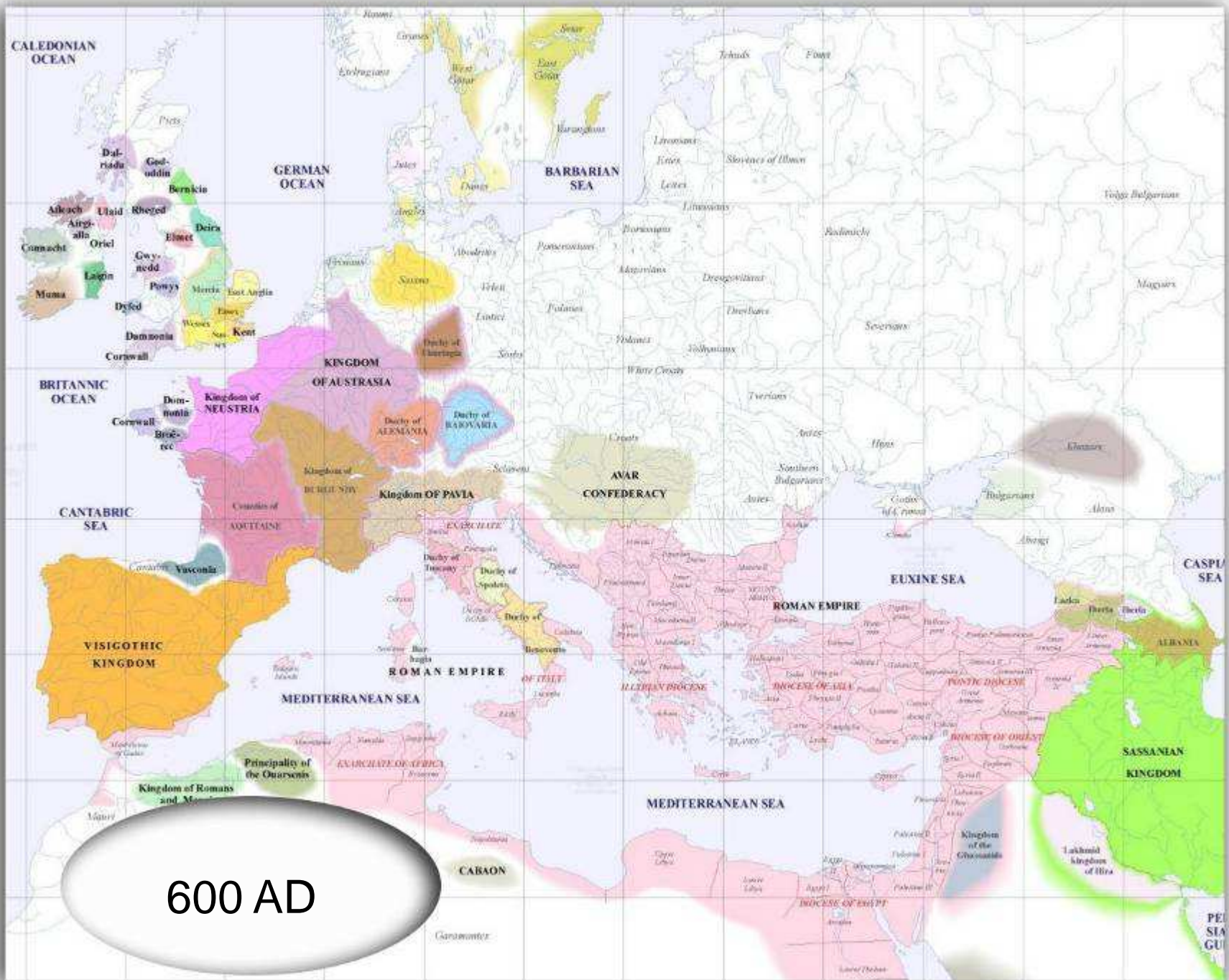
300 AD



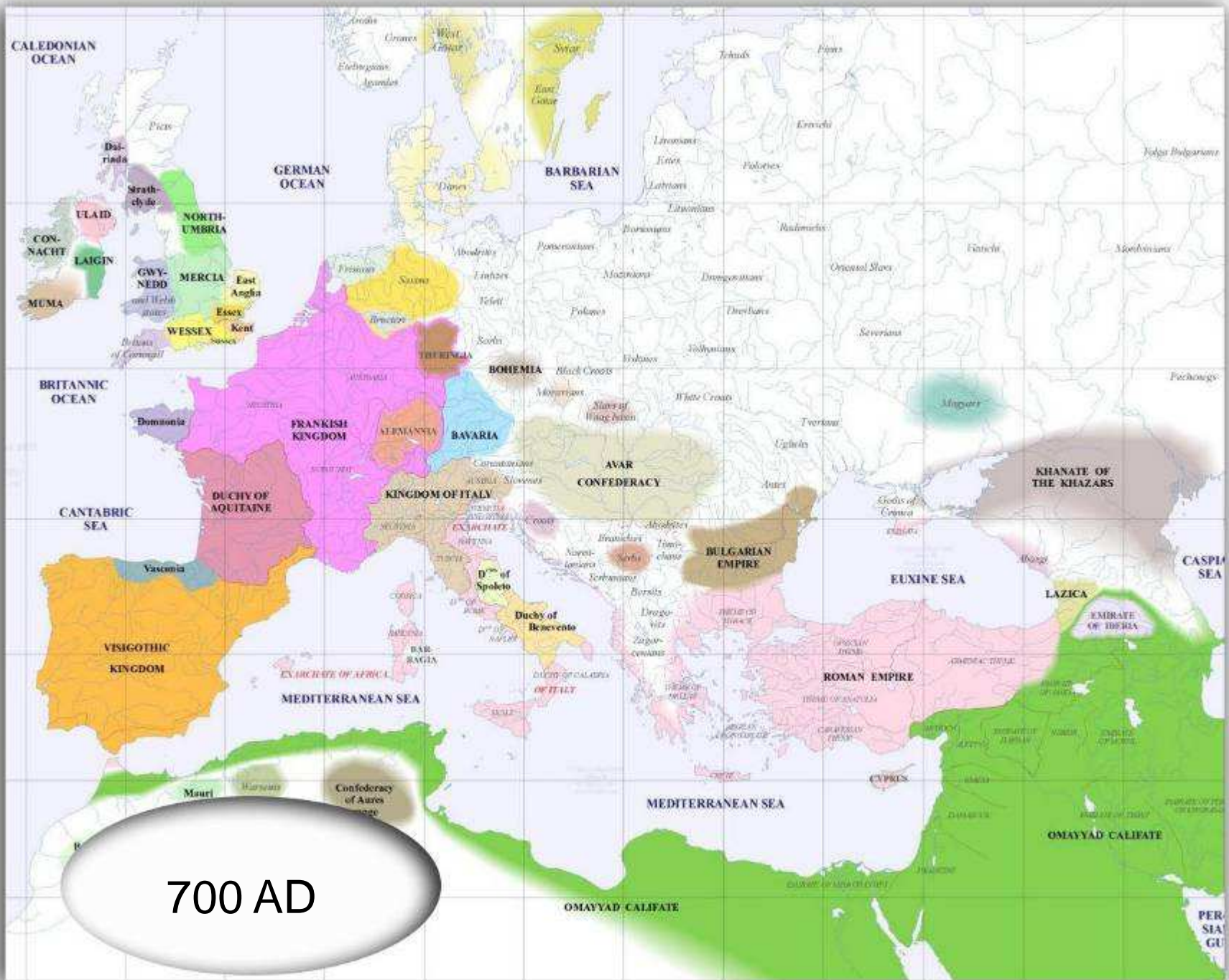




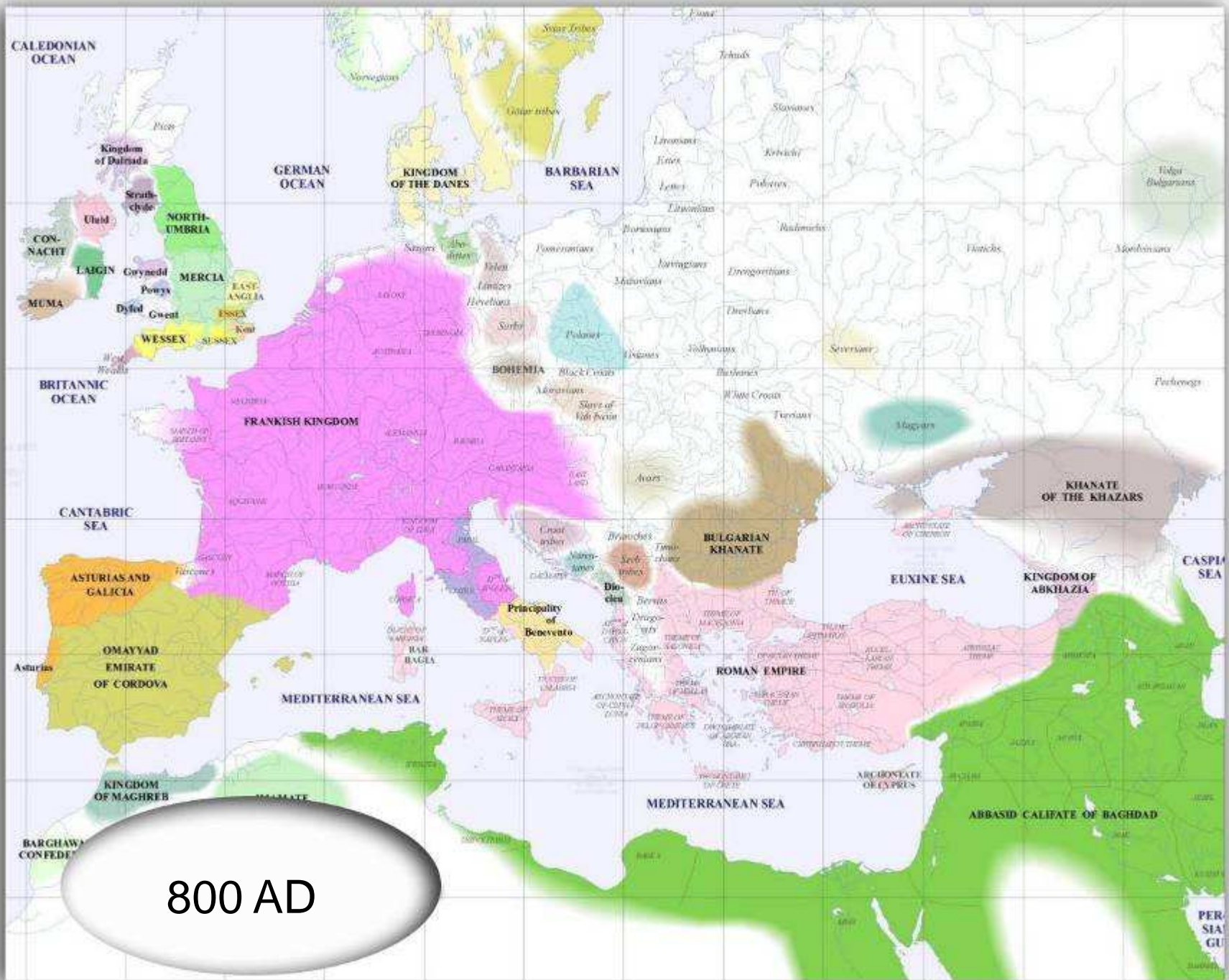
500 AD



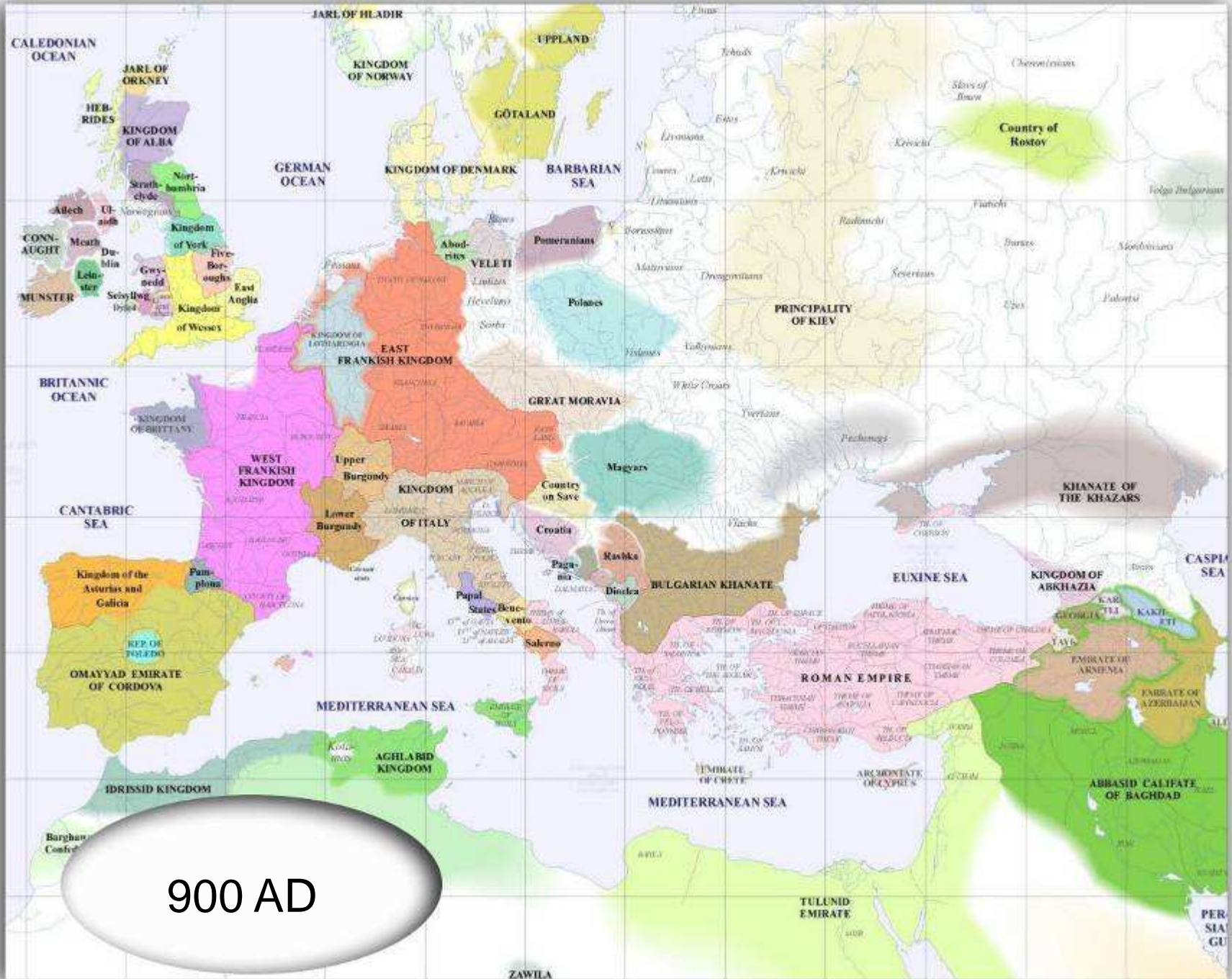
600 AD



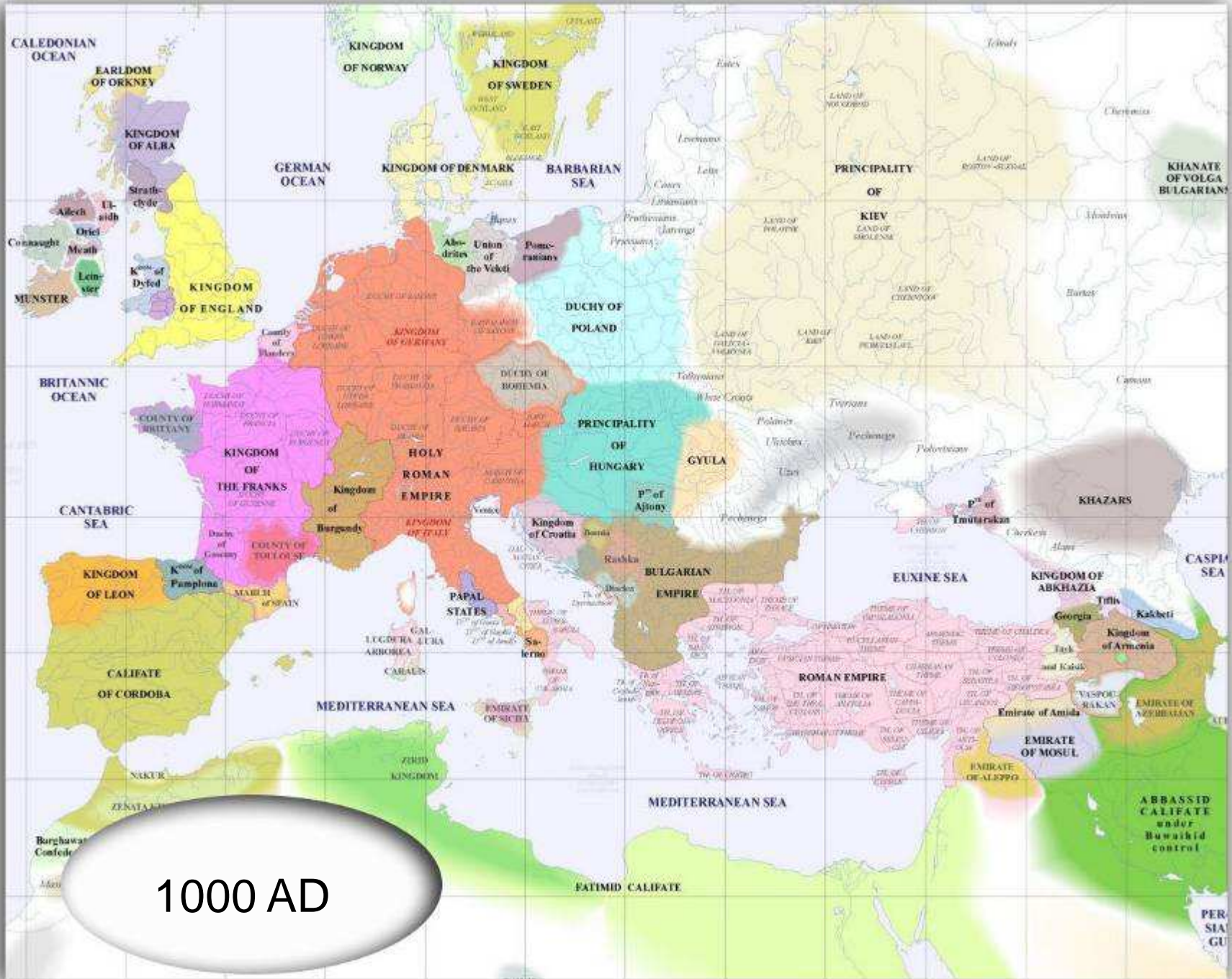
700 AD



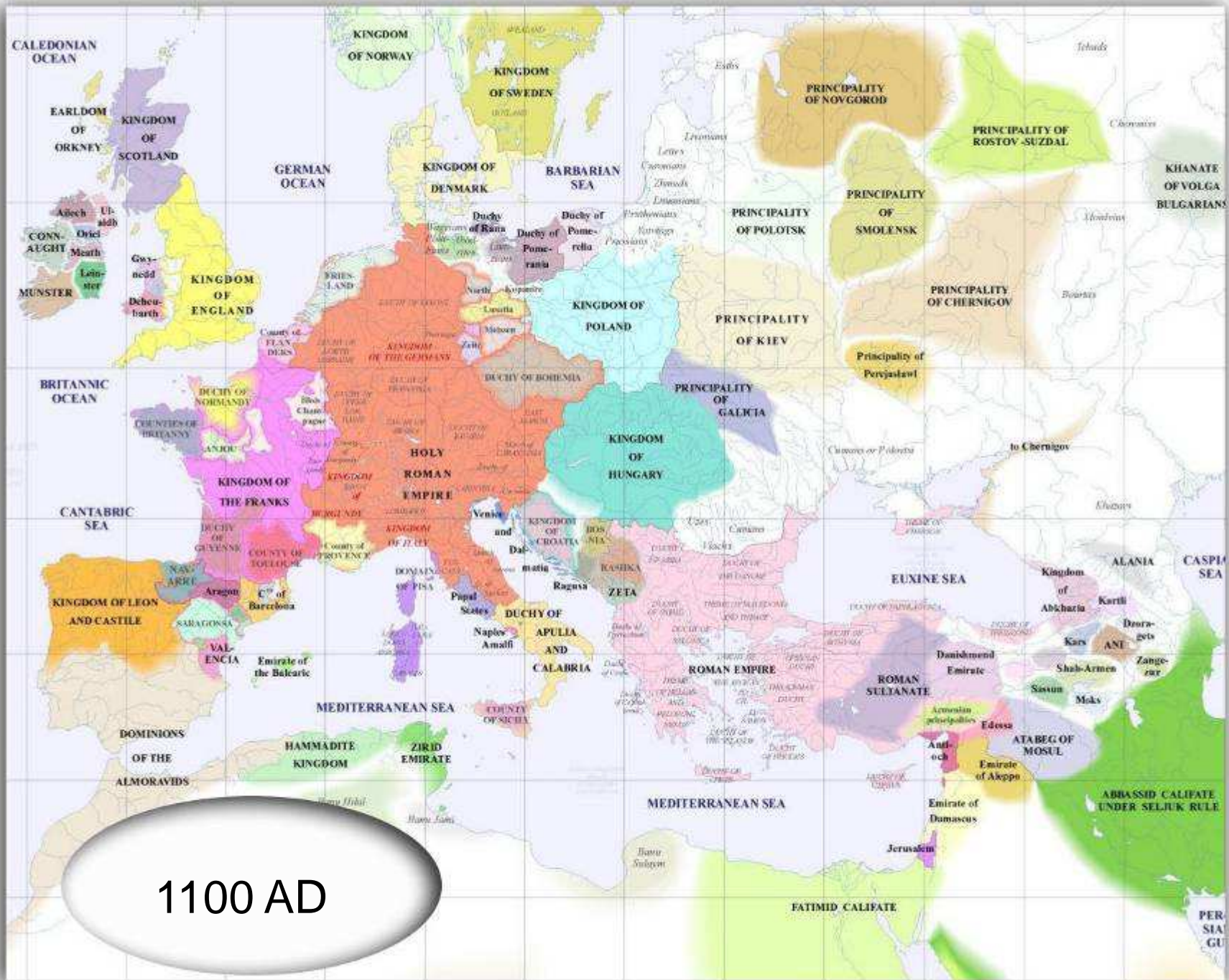
800 AD



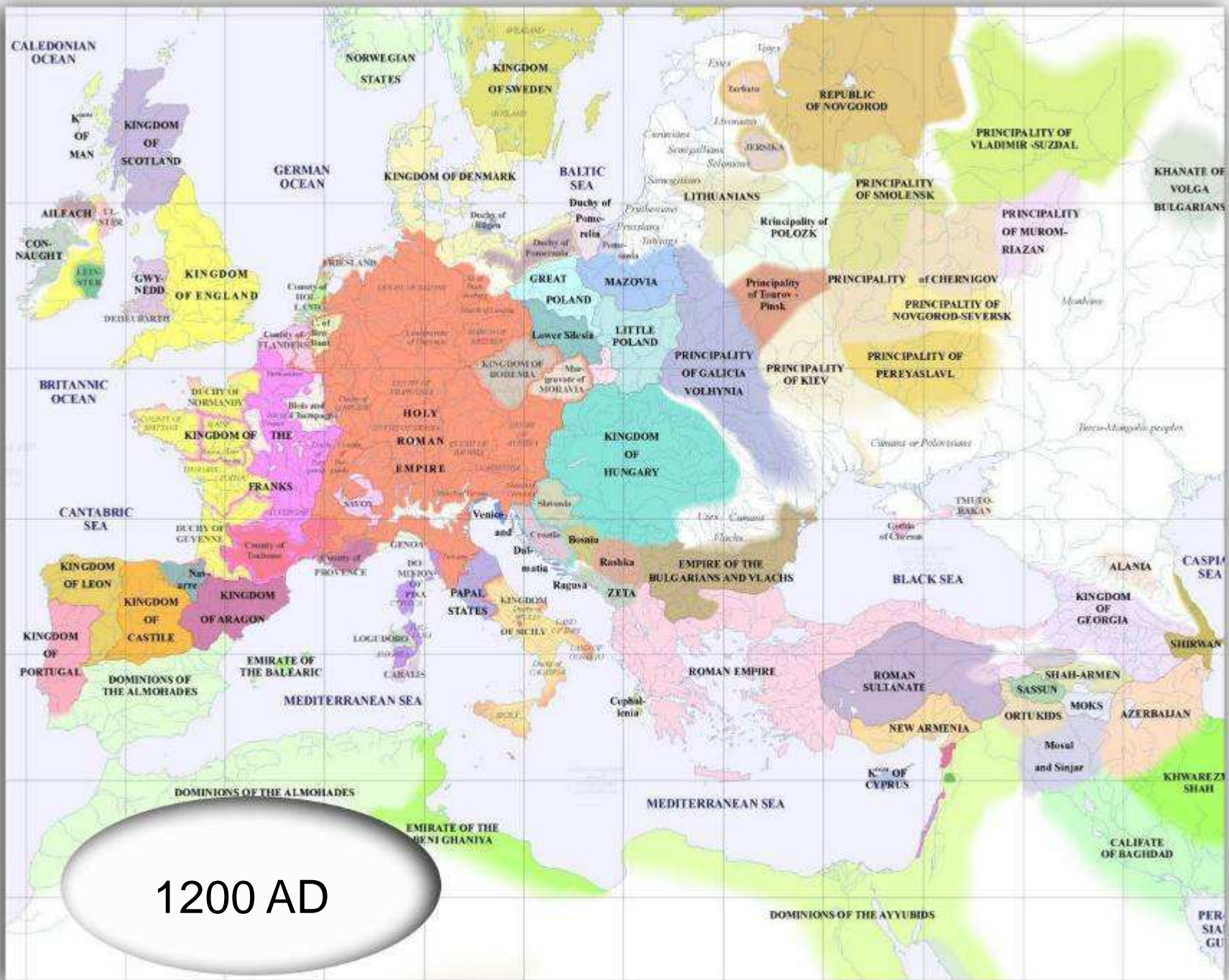
900 AD



1000 AD

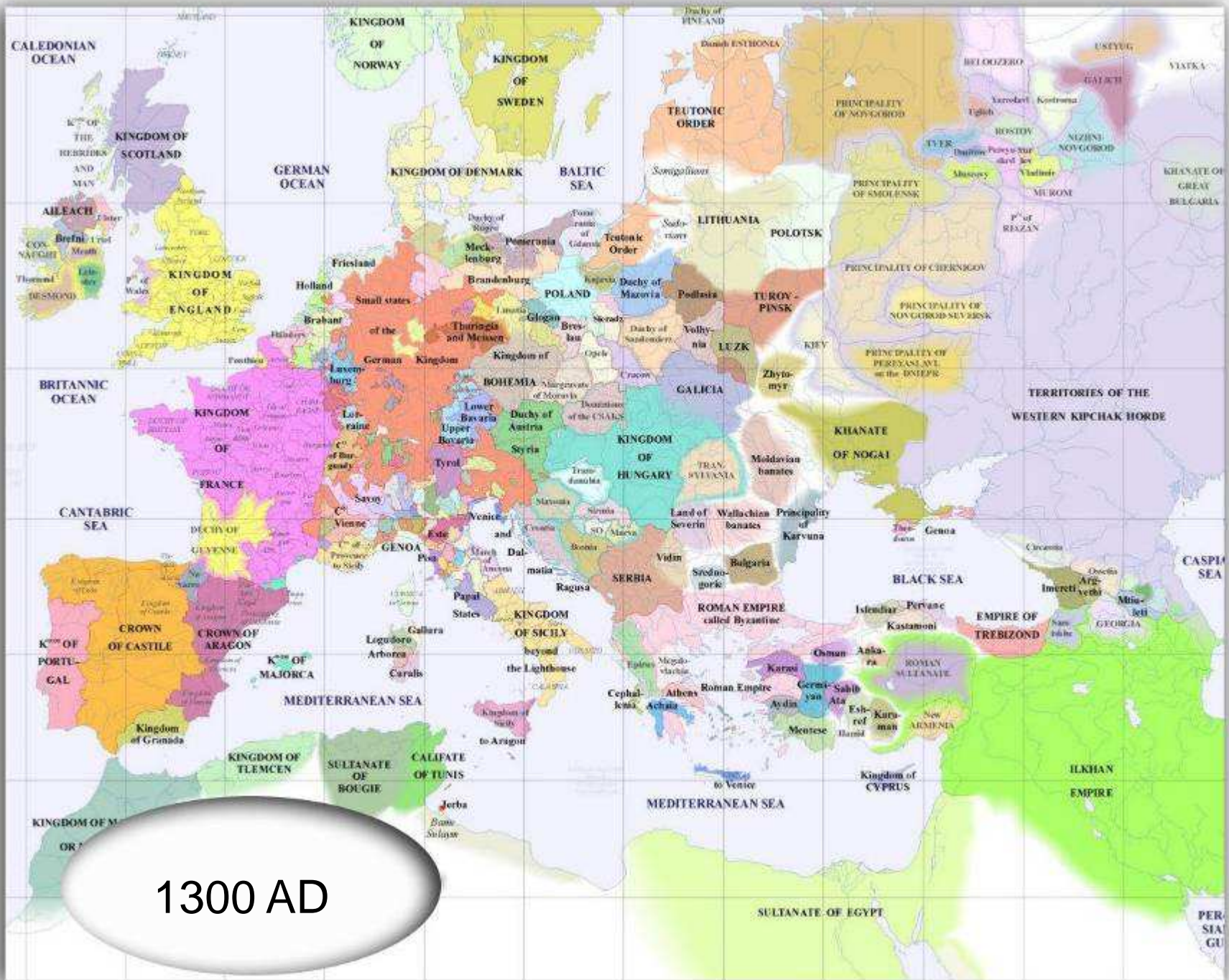


1100 AD

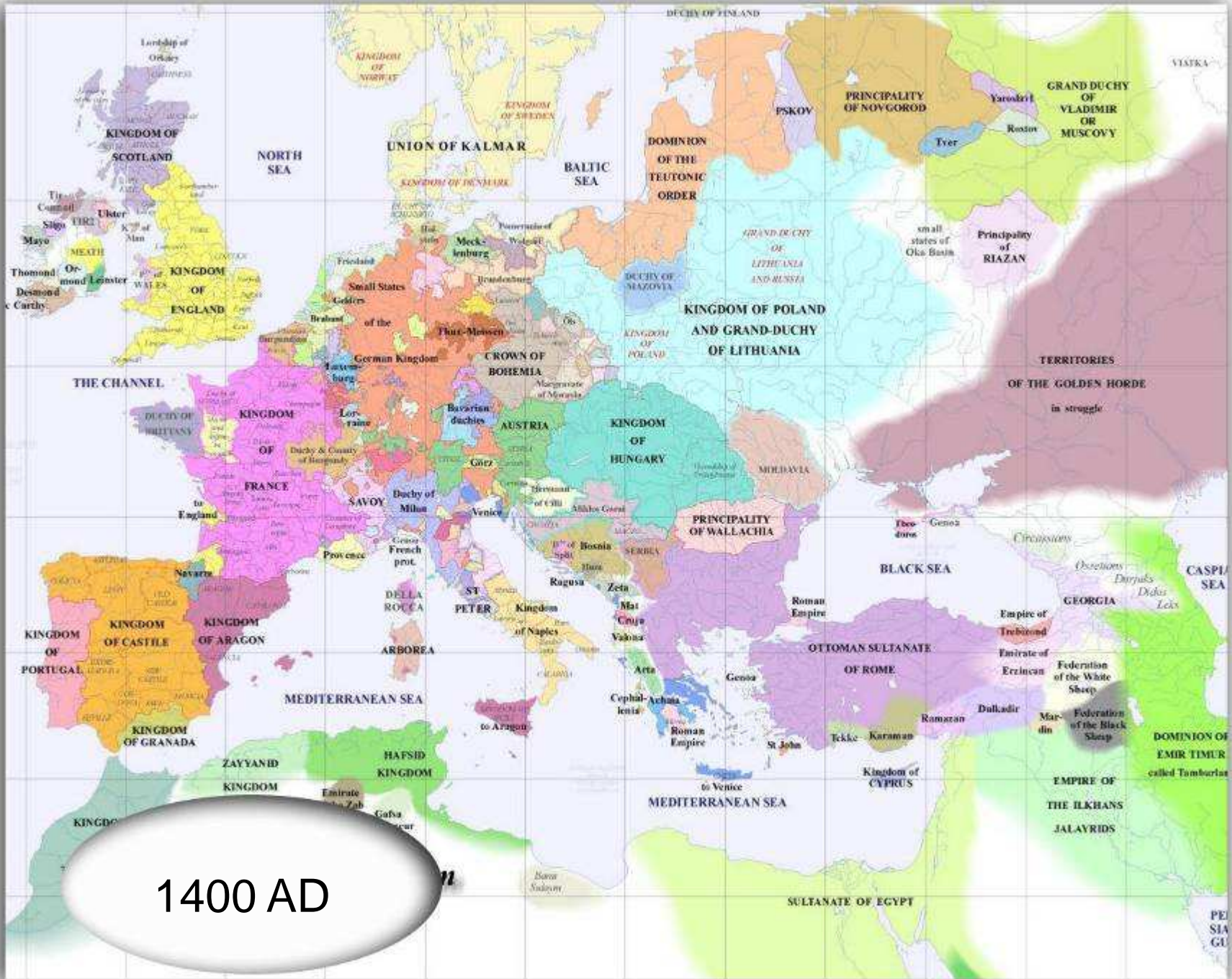


1200 AD

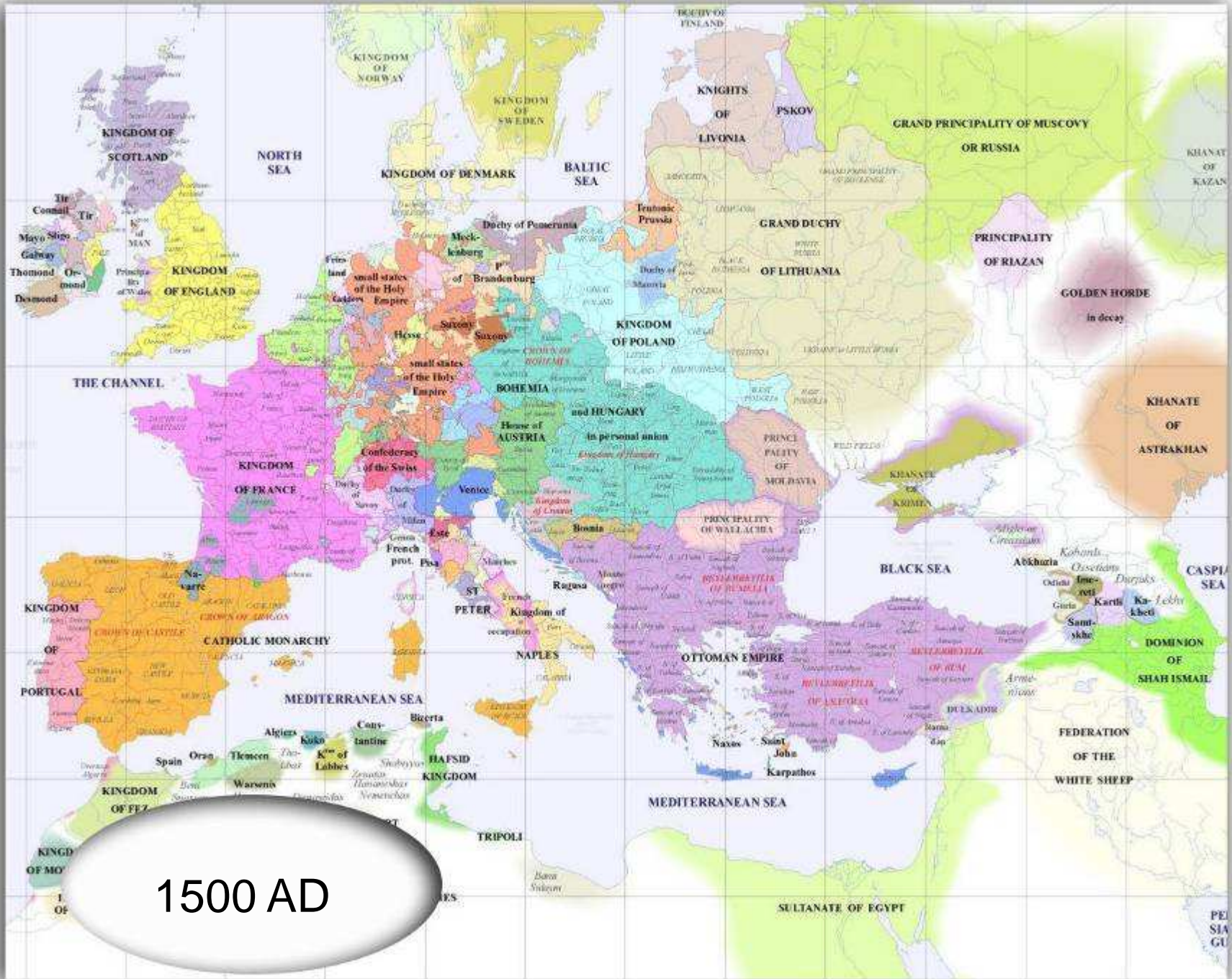




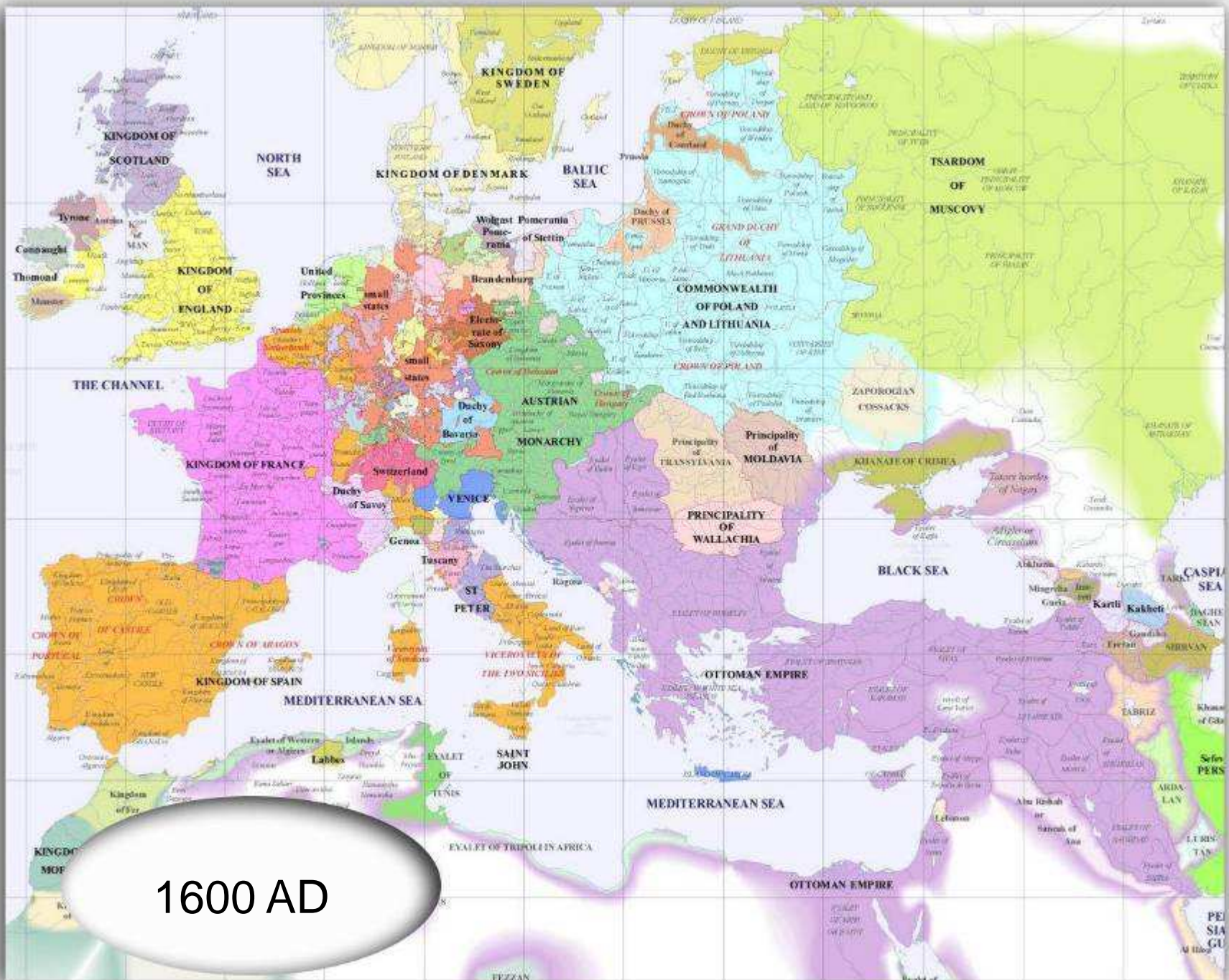
1300 AD



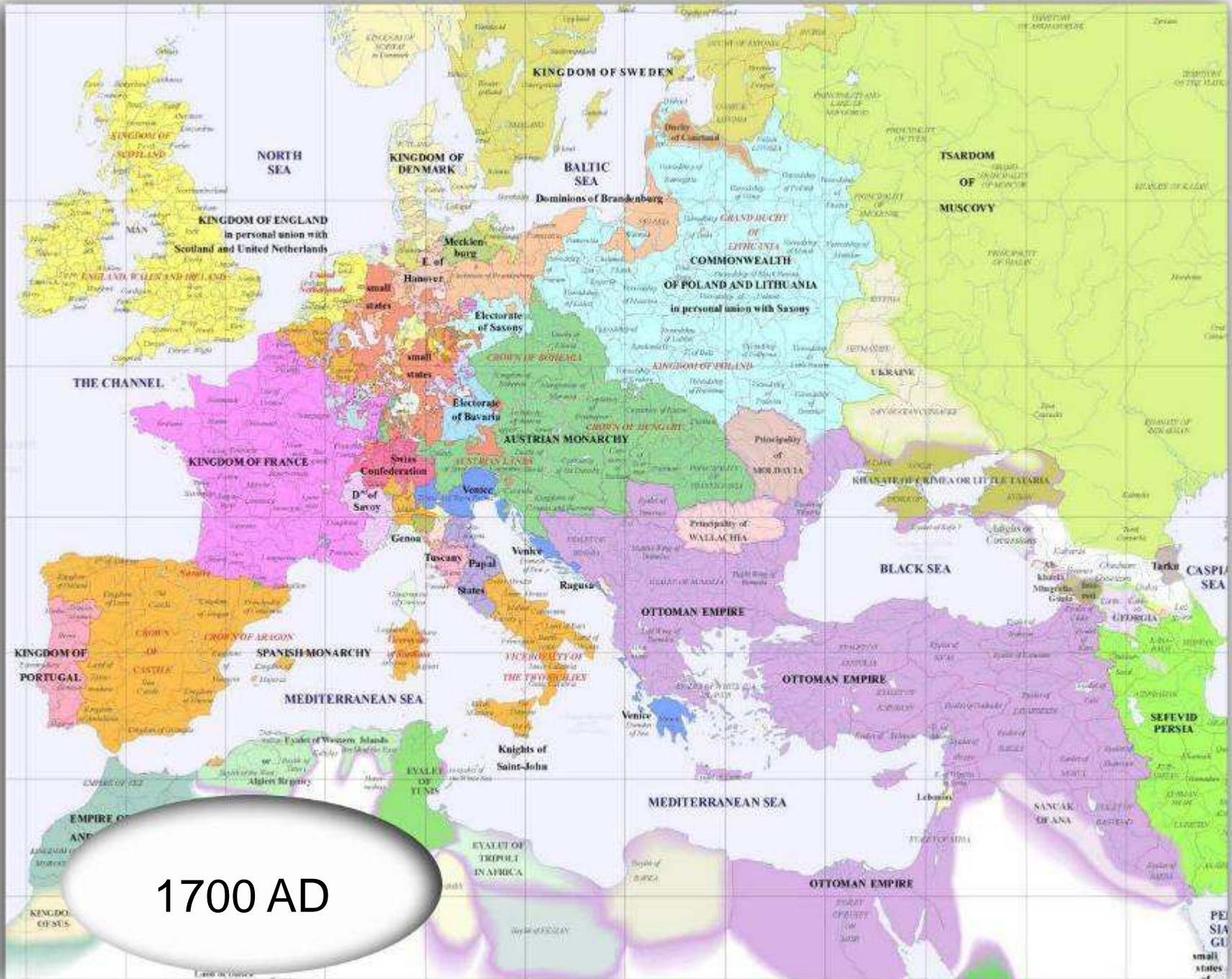
1400 AD



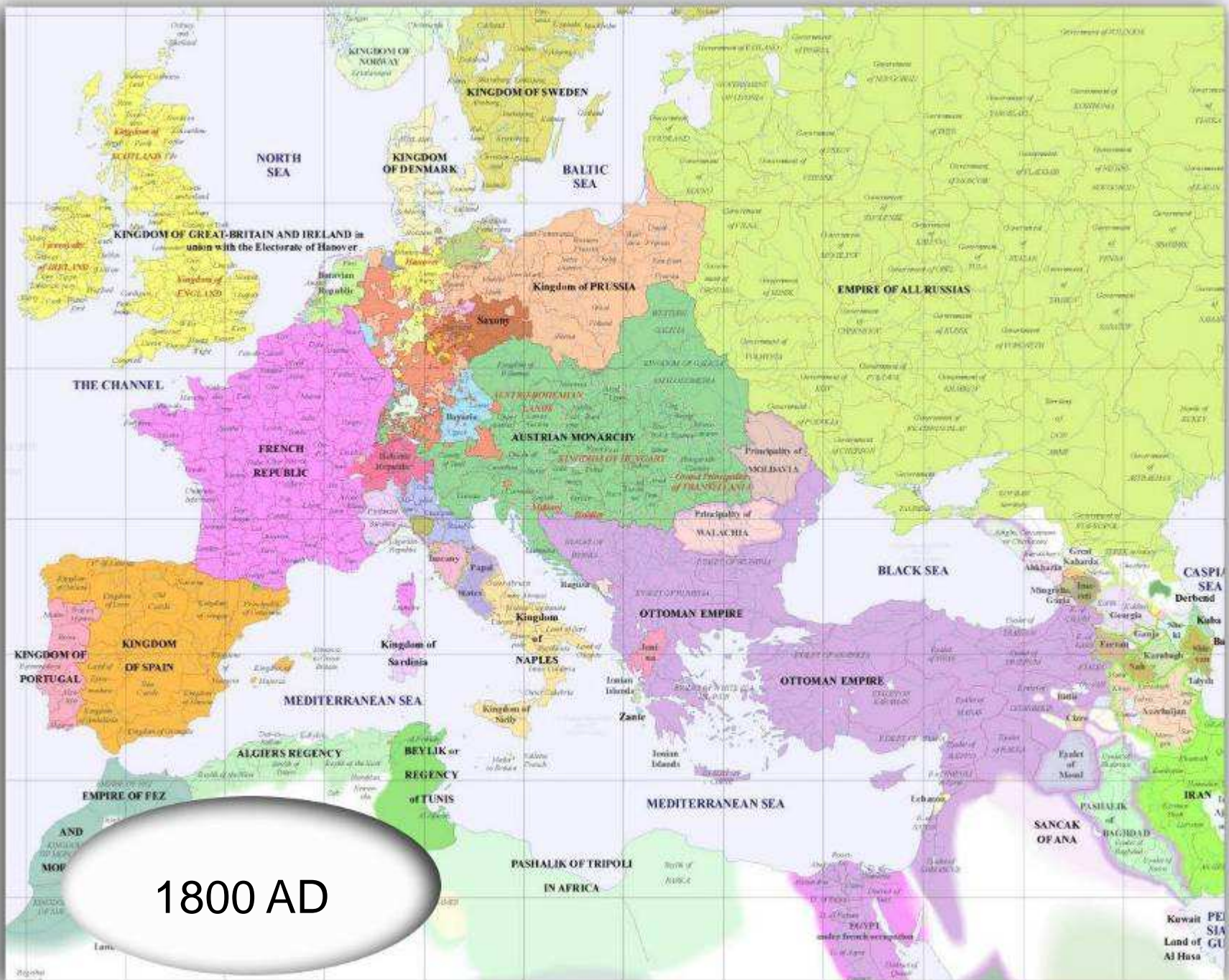
1500 AD



1600 AD



1700 AD



1800 AD

KINGDOM OF GREAT-BRITAIN AND IRELAND in union with the Electorate of Hanover

THE CHANNEL

NORTH SEA

KINGDOM OF DENMARK

BALTIC SEA

Kingdom of PRUSSIA

EMPIRE OF ALL RUSSIAS

FRENCH REPUBLIC

AUSTRIAN MONARCHY

KINGDOM OF PORTUGAL

KINGDOM OF SPAIN

MEDITERRANEAN SEA

Kingdom of Sardinia

Kingdom of NAPLES

OTTOMAN EMPIRE

BLACK SEA

CASPIAN SEA

EMPIRE OF FEZ

ALGIERIA REGENCY

BEYLIK or REGENCY of TUNIS

MEDITERRANEAN SEA

PASHALIK OF TRIPOLI IN AFRICA

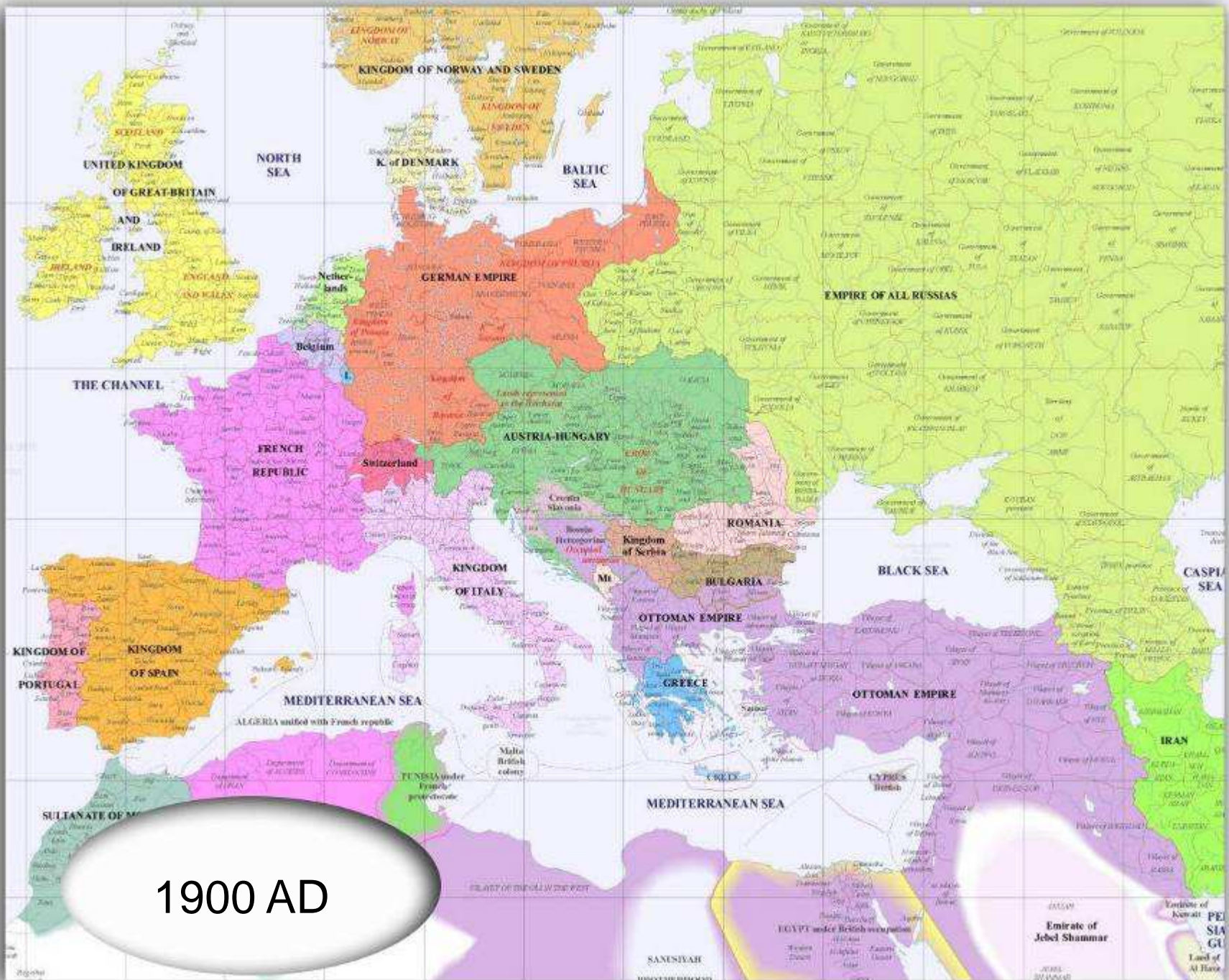
OTTOMAN EMPIRE

SANCAK OF ANA

PASHALIK of BAGHDAD

IRAN

Kuwait PERSIA Land of GU Al Hasa



1900 AD

Are we all going to have a national repository?

2000 AD



# EUROPEAN COUNCIL DIRECTIVE

- into force August 2011
- Member States should establish national programmes
- sharing disposal ?

*“Some Member States consider that the sharing of facilities for spent fuel and radioactive waste management, including disposal facilities, is a potentially beneficial, safe and cost-effective option when based on an agreement between Member States concerned”*

*“Radioactive waste shall be disposed of in the Member State... unless.....to use a disposal facility in one of them”*

# ERDO: 'Dual Track'

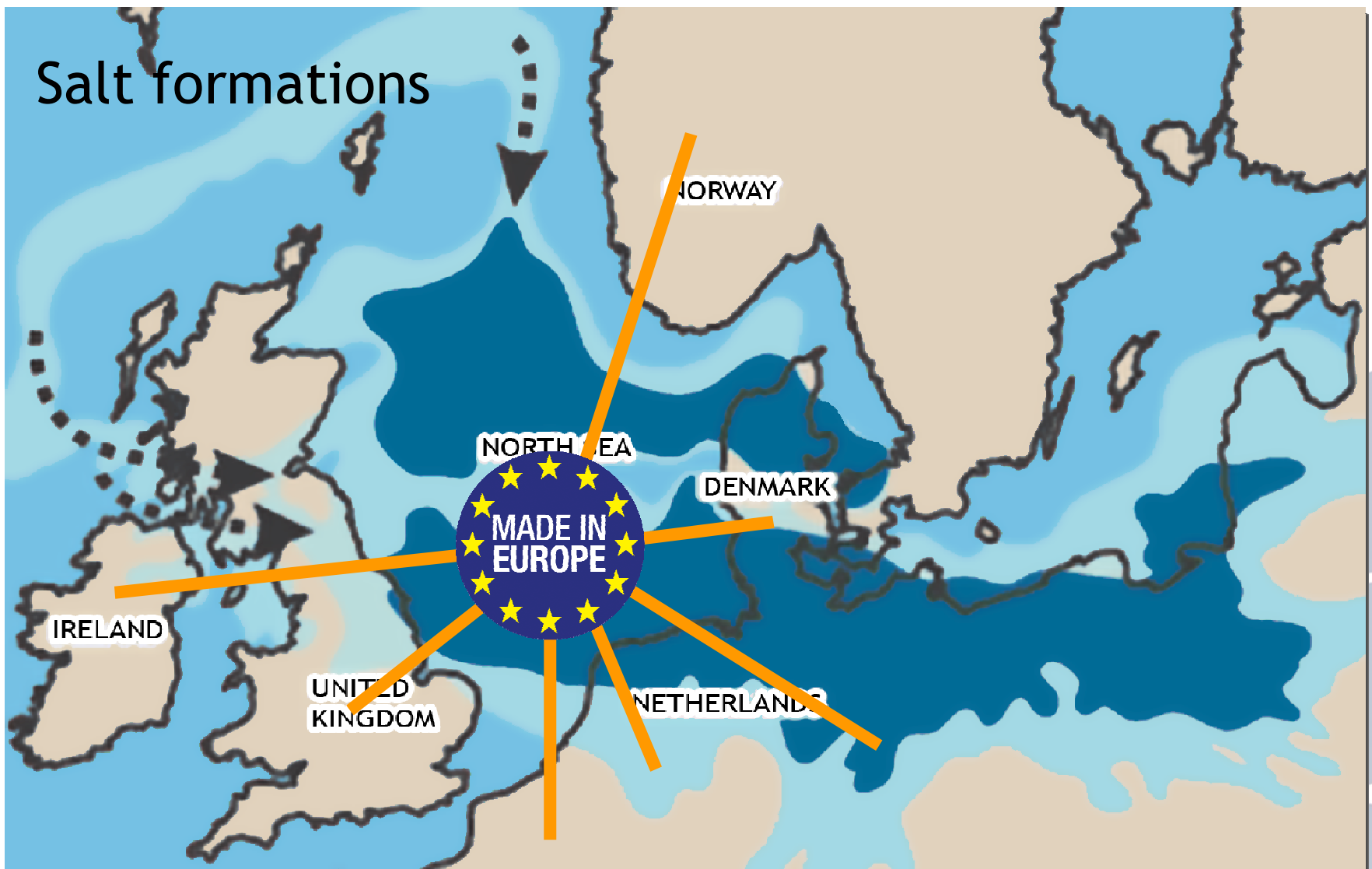
- participating countries **must** have a national programme to seek a national solution
- shared staff, teams, facilities, projects... reduces costs
- membership of ERDO provides prospect of a shared solution
- National and shared 'tracks' run together, nested within each other



ERDO Shared  
Programme

National  
Programme

# NORTH SEA DISPOSAL in SALT?



A large, red, textured wall with a grid pattern. In the center, there is a large green logo that resembles a stylized 'H' or a similar symbol. Overlaid on the wall in large, white, bold, sans-serif capital letters is the word 'COVRA'. In the bottom left corner, a person wearing a blue hard hat and dark clothing is walking, casting a shadow on the wall. The sky is blue and clear.

# COVRA

*Active for the future*

*[www.COVRA.nl](http://www.COVRA.nl)*