

# Historical changes in human activities in the Mediterranean Sea

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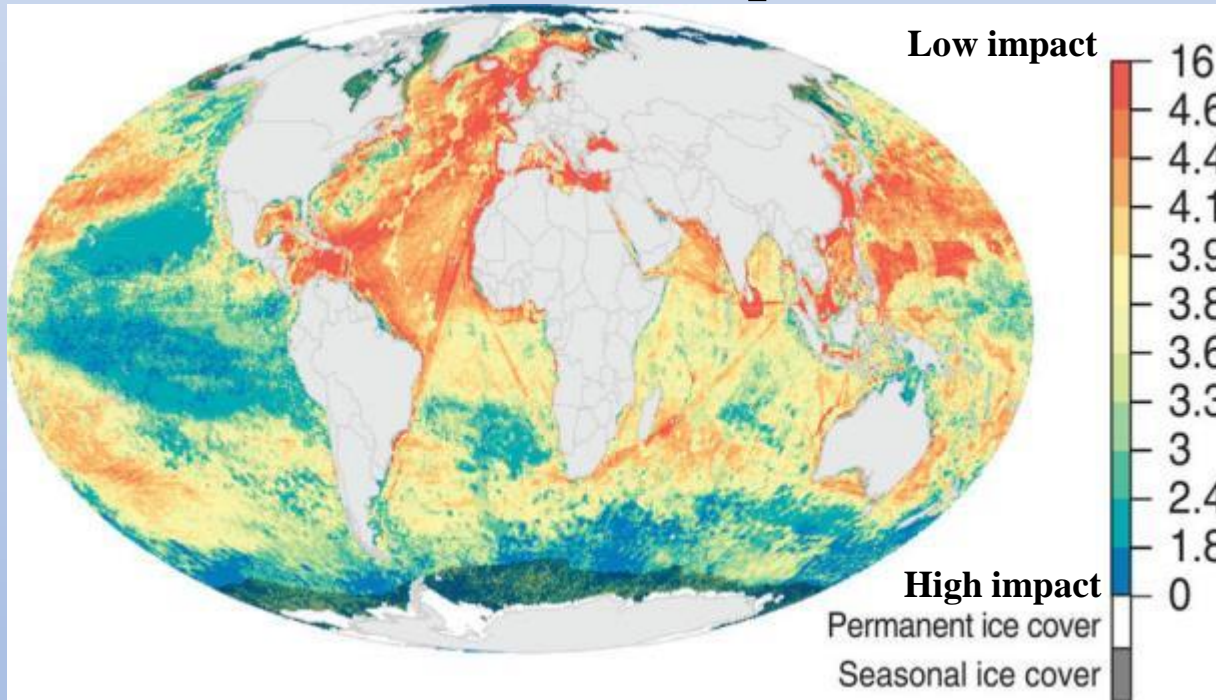
**MARCONS WP1 training school:**

**“CUMMULATIVE EFFECTS ANALYSIS APPLIED TO  
MARINE ECOSYSTEMS”**

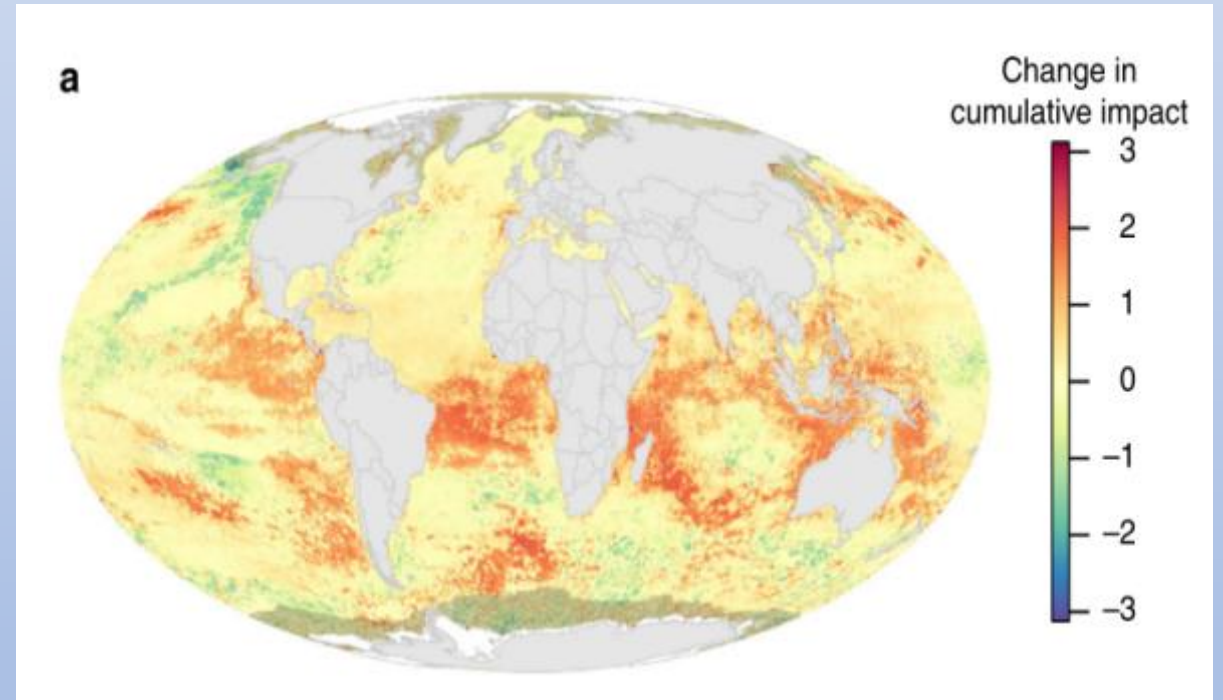
*Hamburg, February 20<sup>th</sup> – 22<sup>nd</sup>, 2018*

# Marine activity Cumulative impacts

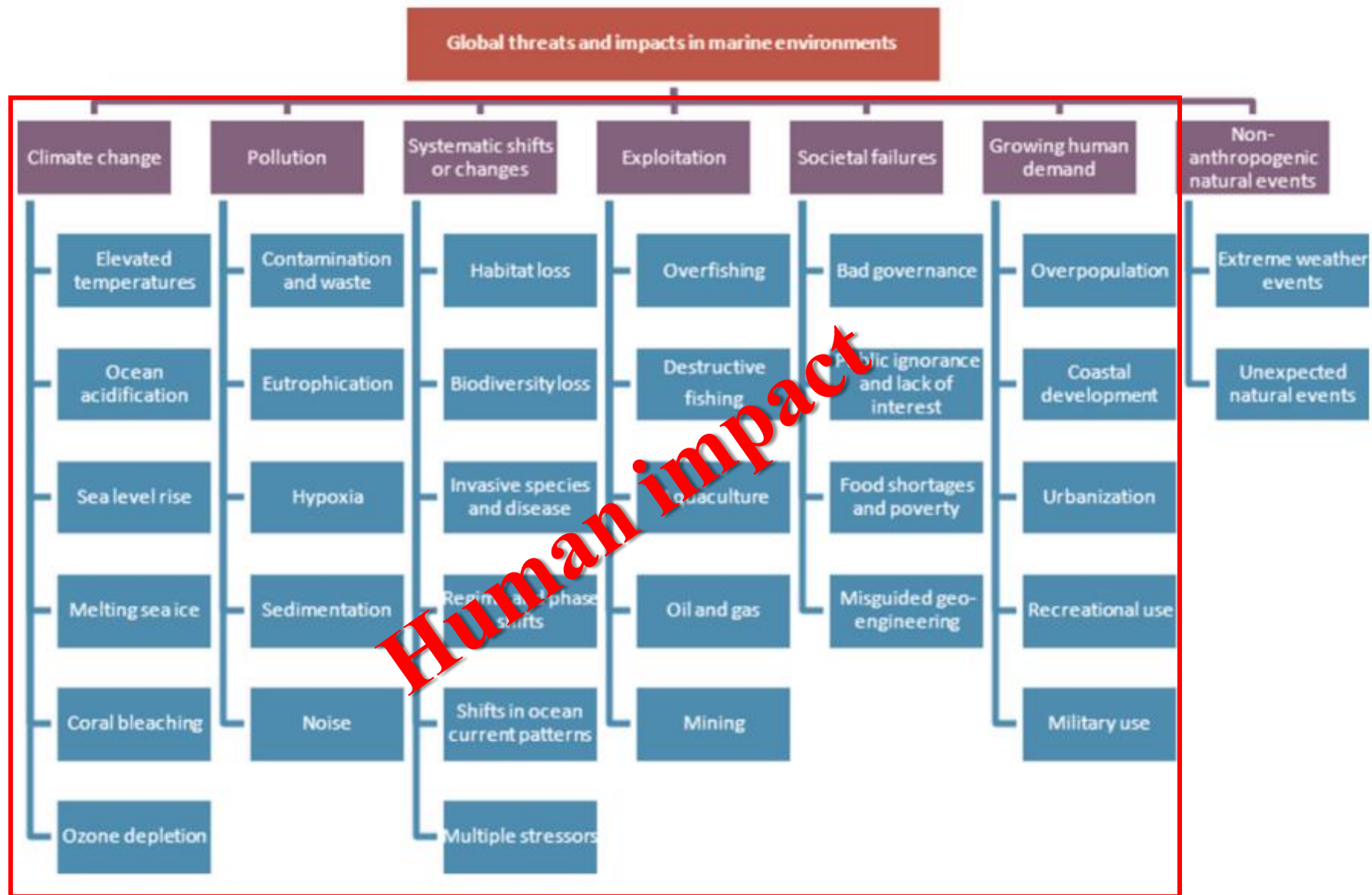
Cumulative impact



Change in Cumulative change



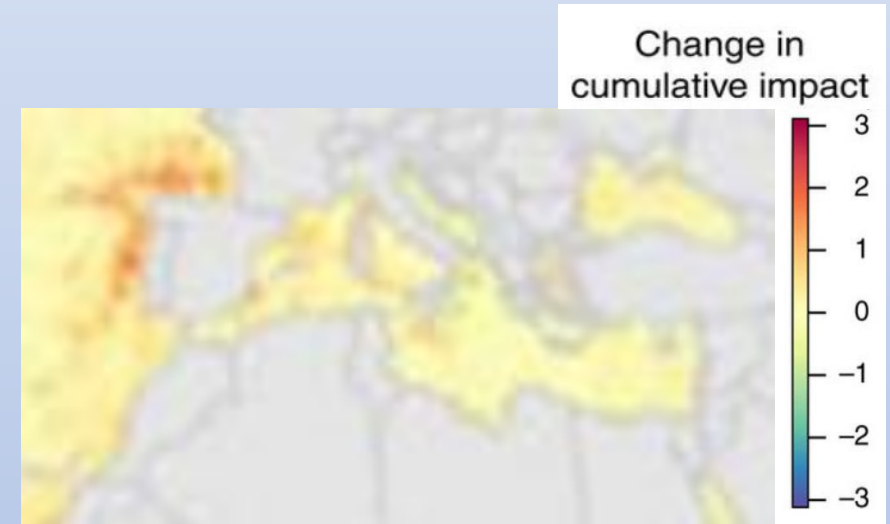
**Nearly the entire ocean (97.7%) is affected by multiple stressors**



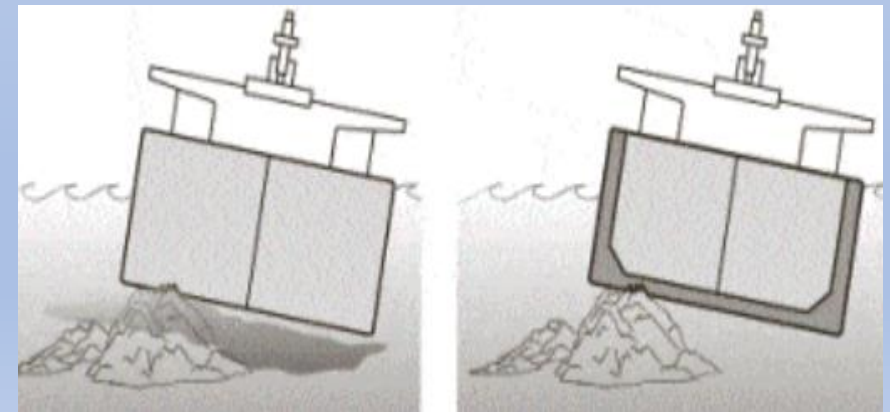
**Human pressures on the ocean are thought to be increasing globally, yet we know little about their patterns of cumulative change, which pressures are most responsible for change, and which places are experiencing the greatest increases**

# Major research objective

❖ Describe temporal and spatial **trends** of changes in human activities in Mediterranean Sea in various spatial and temporal levels.

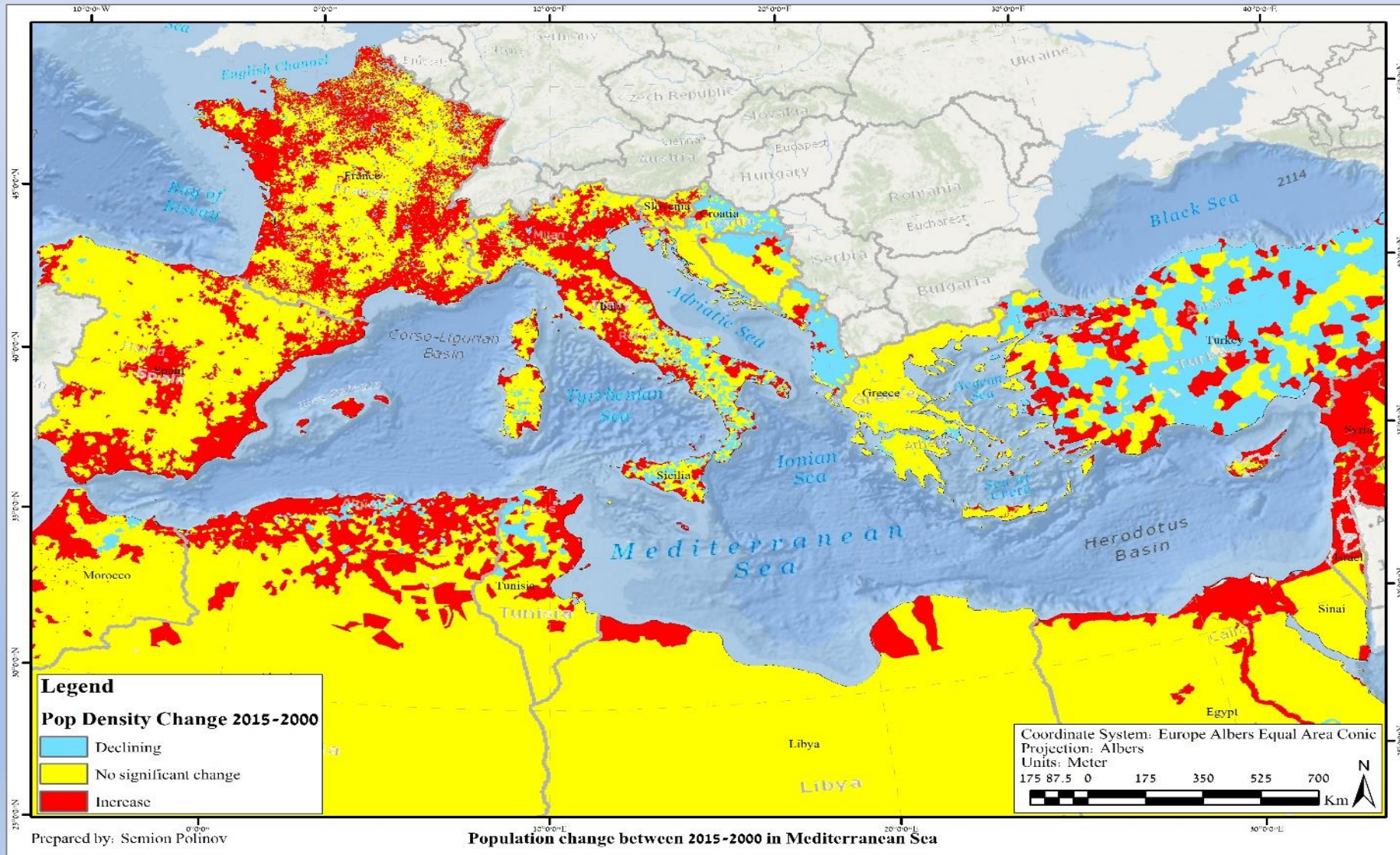


❖ Identifying the factors that affect the spatial and temporal distribution of human activities in the Mediterranean Sea.



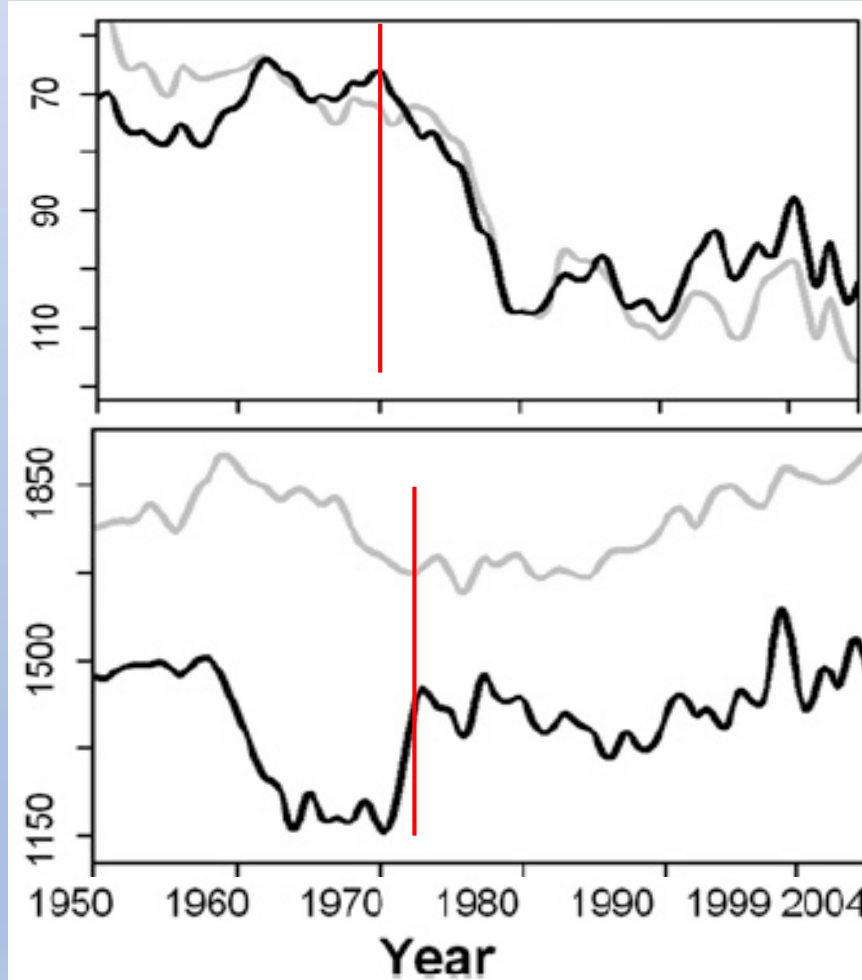


# Changes in population density

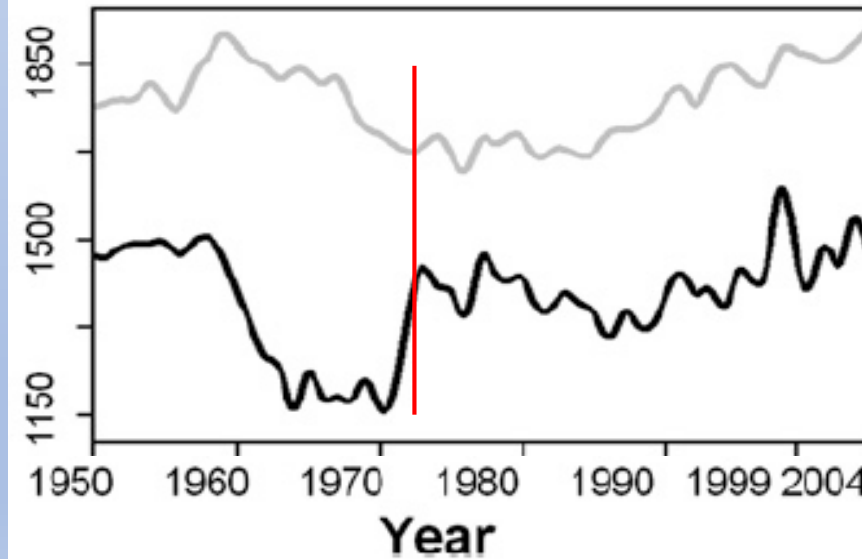


# Fishery (world)

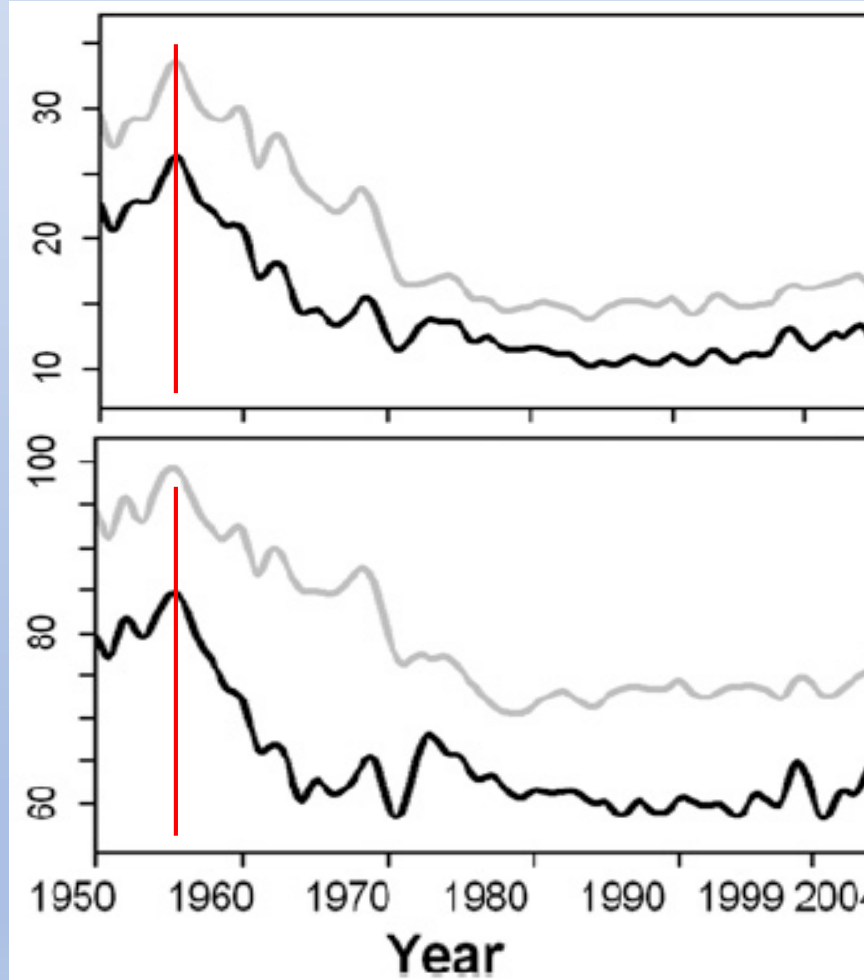
Depth



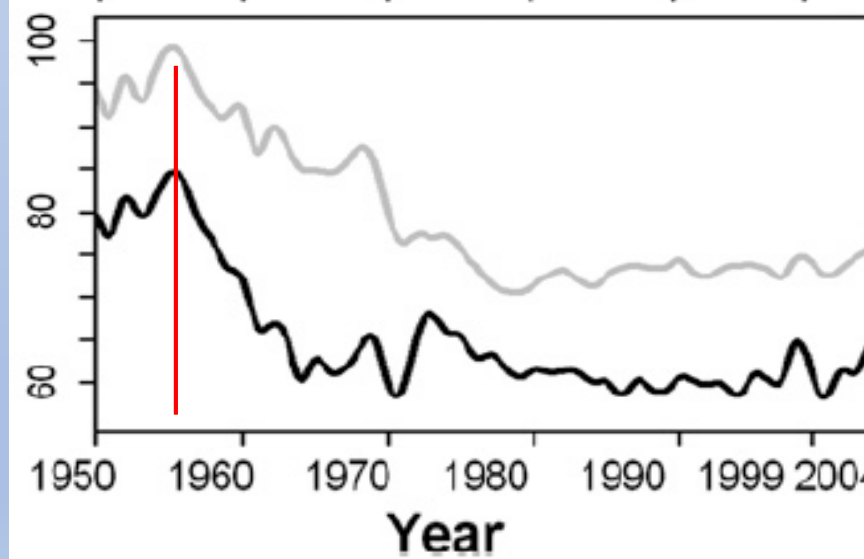
Price \$



Weight



Length

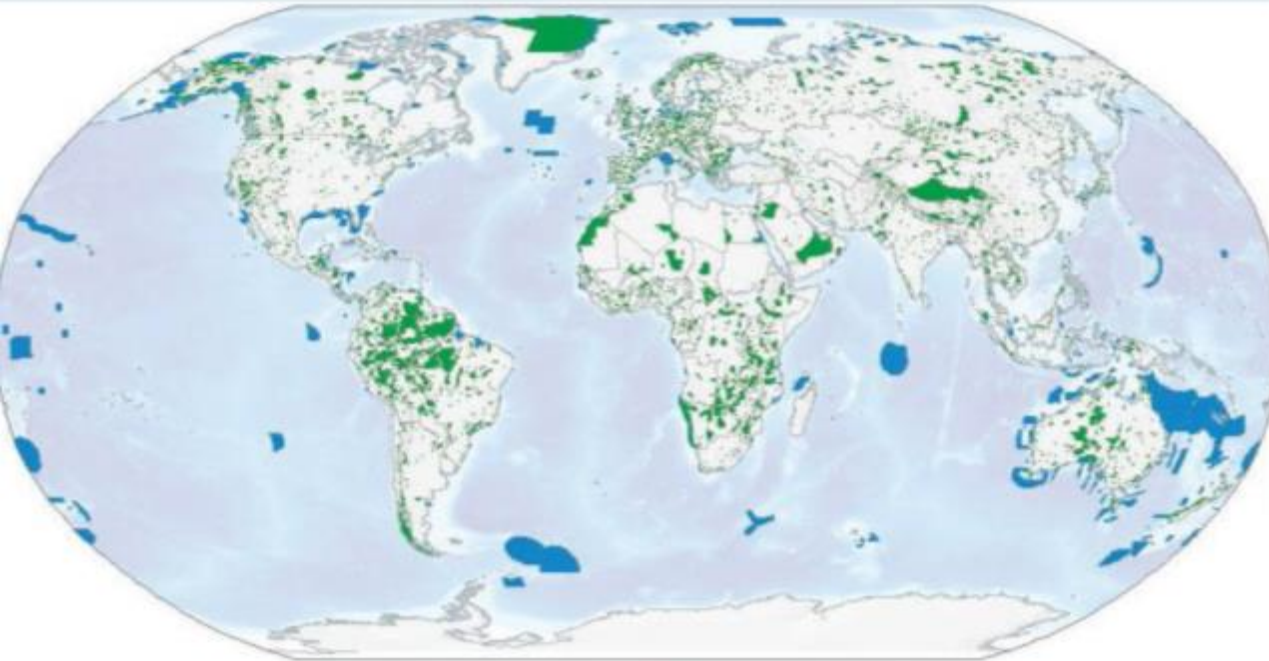


Sethi et al, 2010. Global fishery development patterns are driven by profit but not trophic level.



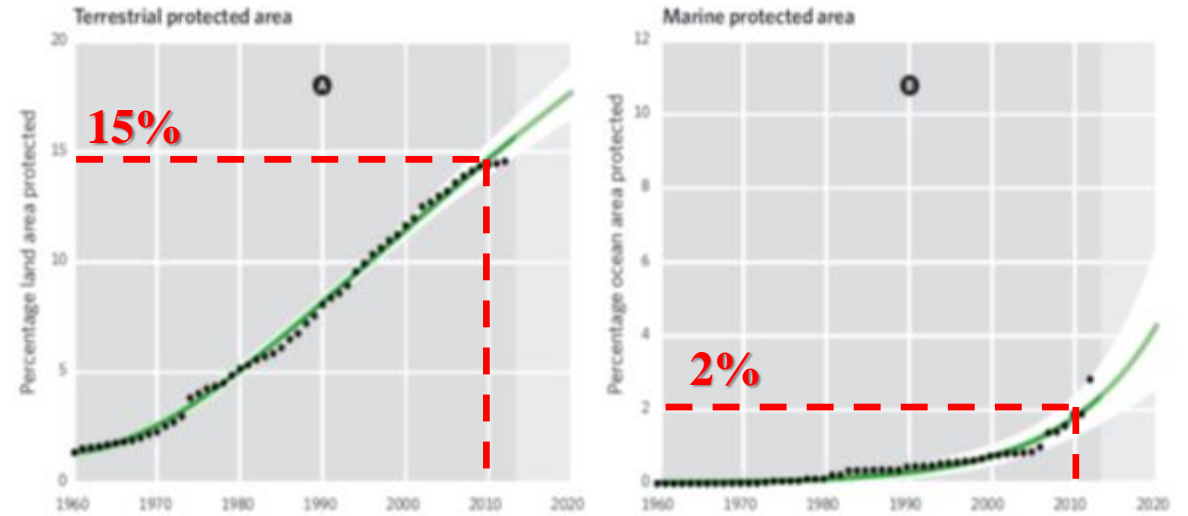
# MPA – marine protected area

Protected areas cover 3.41% of the oceans



Terrestrial protected areas Marine protected areas

As of August 2014,  
Source: UNEP-WCMC



Source: Secretariat of the CBD (2014),  
Global Biodiversity Outlook 4,

# Shipping and alien species



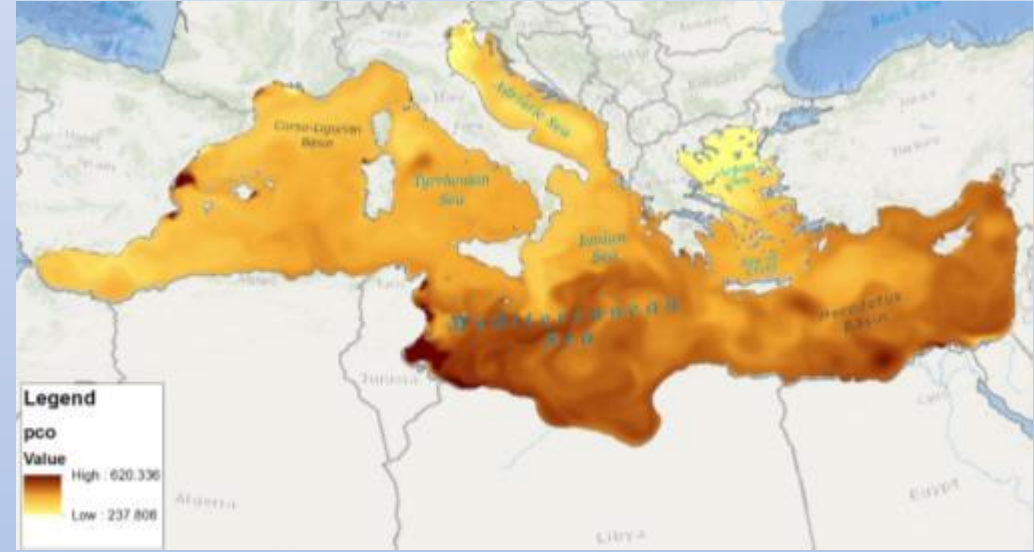
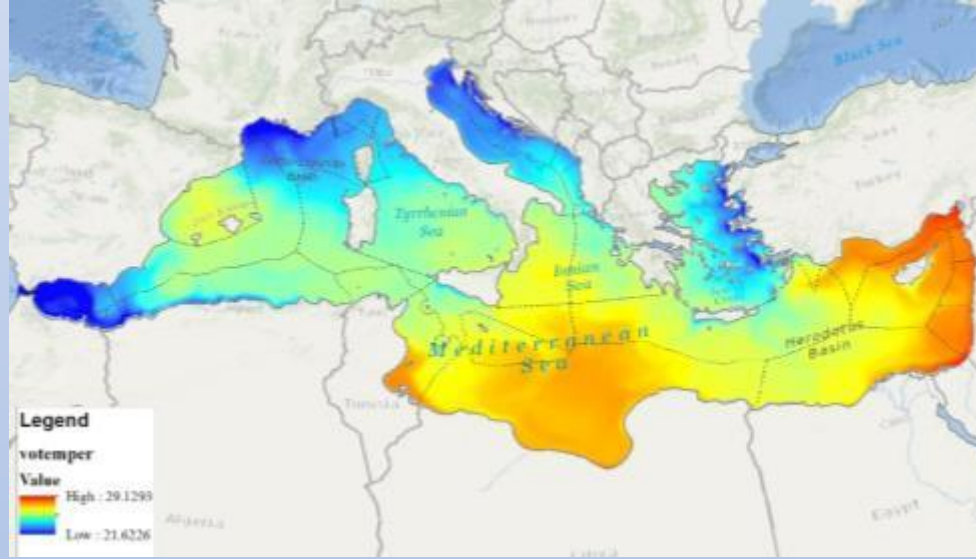


# Oceanographic variables 1950-2018

(<http://www.copernicus.eu>)

Sea Surface Temperature

July 1950

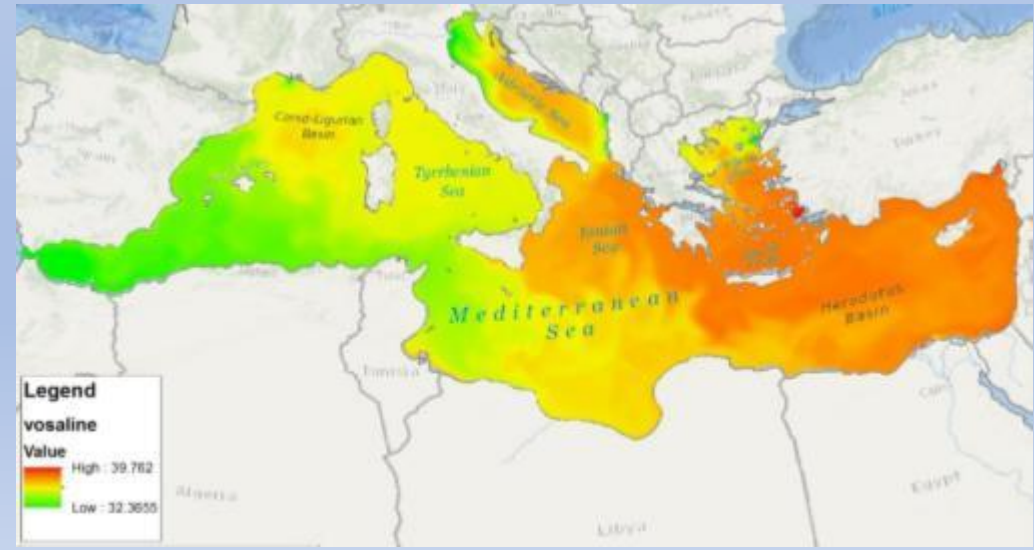
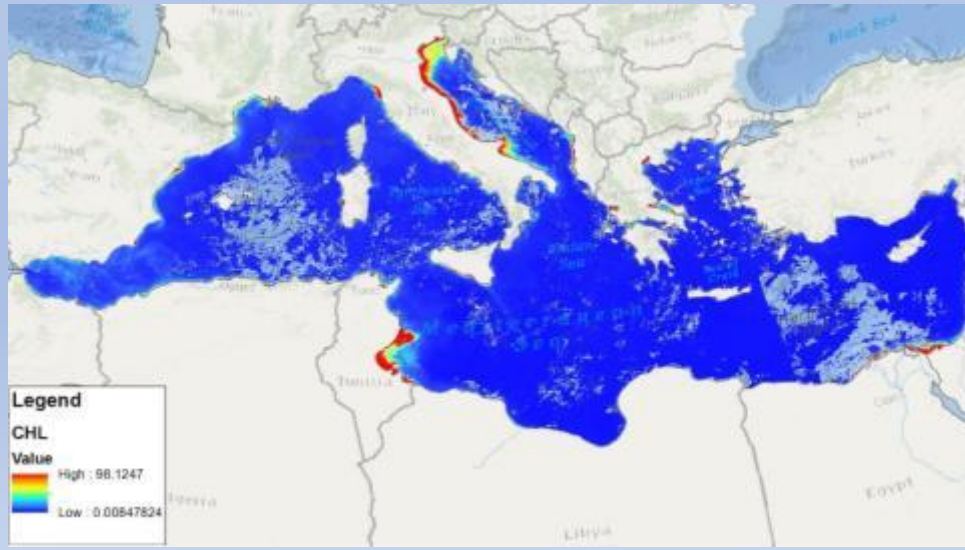


CO<sub>2</sub> Concentration

November 2008

Chlorophyll

November 2013

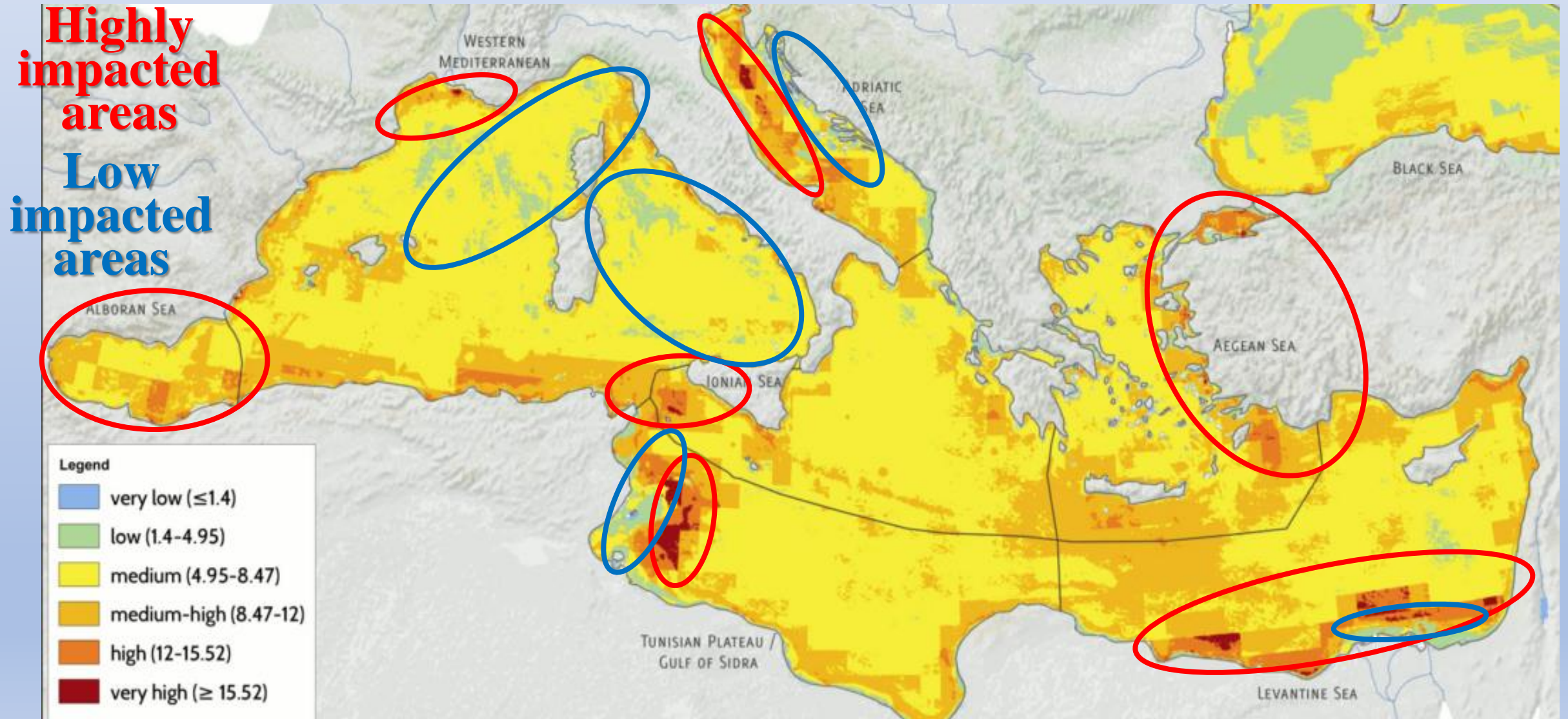


Water Salinity

January 1979

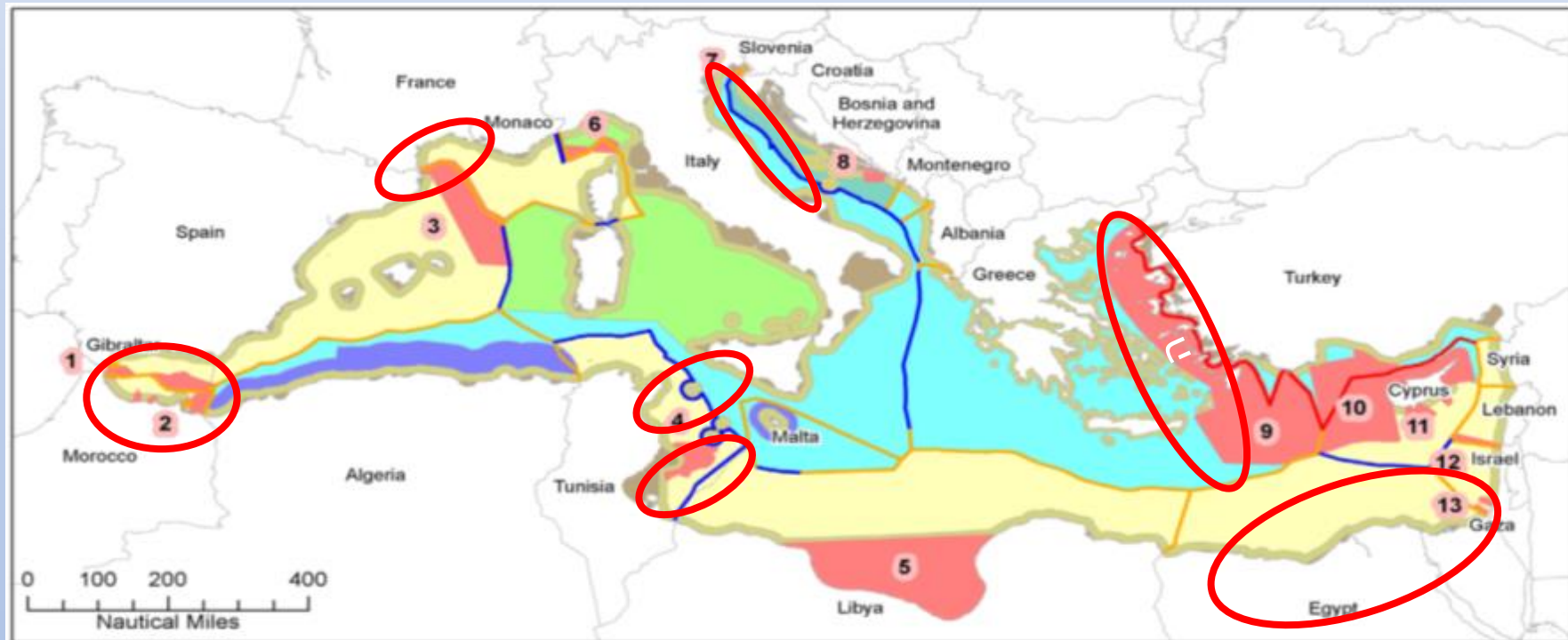


# Spatial distribution of cumulative impacts to marine ecosystems of the Mediterranean 2013



# Is there a consensus regarding the division of sea areas among 22 Mediterranean countries?

**Highly impacted areas**



**Low impacted areas**



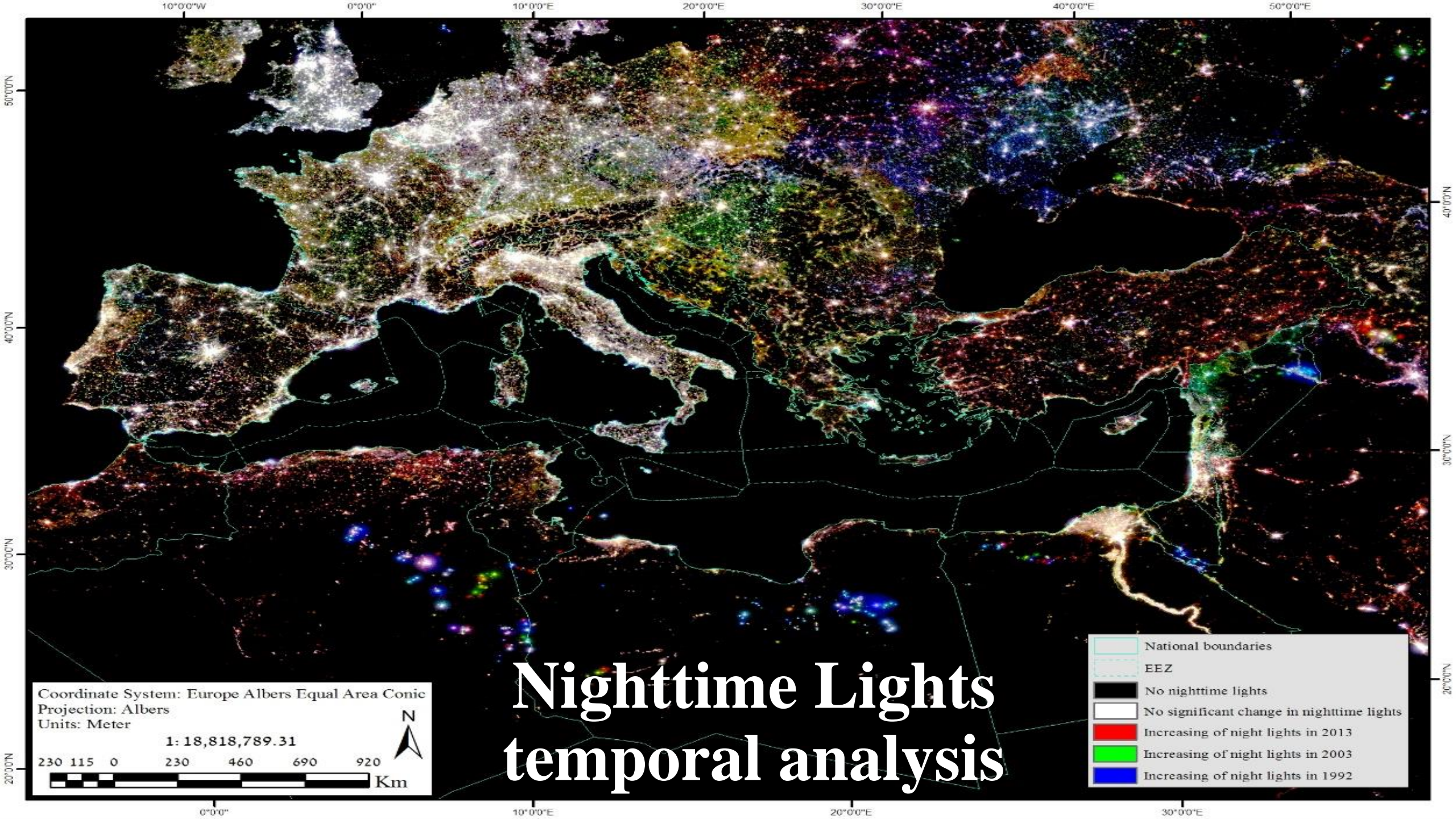
Katsanevakis, S. et al. (2015). Marine conservation challenges in an era of economic crisis and geopolitical instability: The case of the Mediterranean Sea.  
Micheli F, et al. (2013). Cumulative Human Impacts on Mediterranean and Black Sea Marine Ecosystems: Assessing Current Pressures and Opportunities.



# Preliminary Results

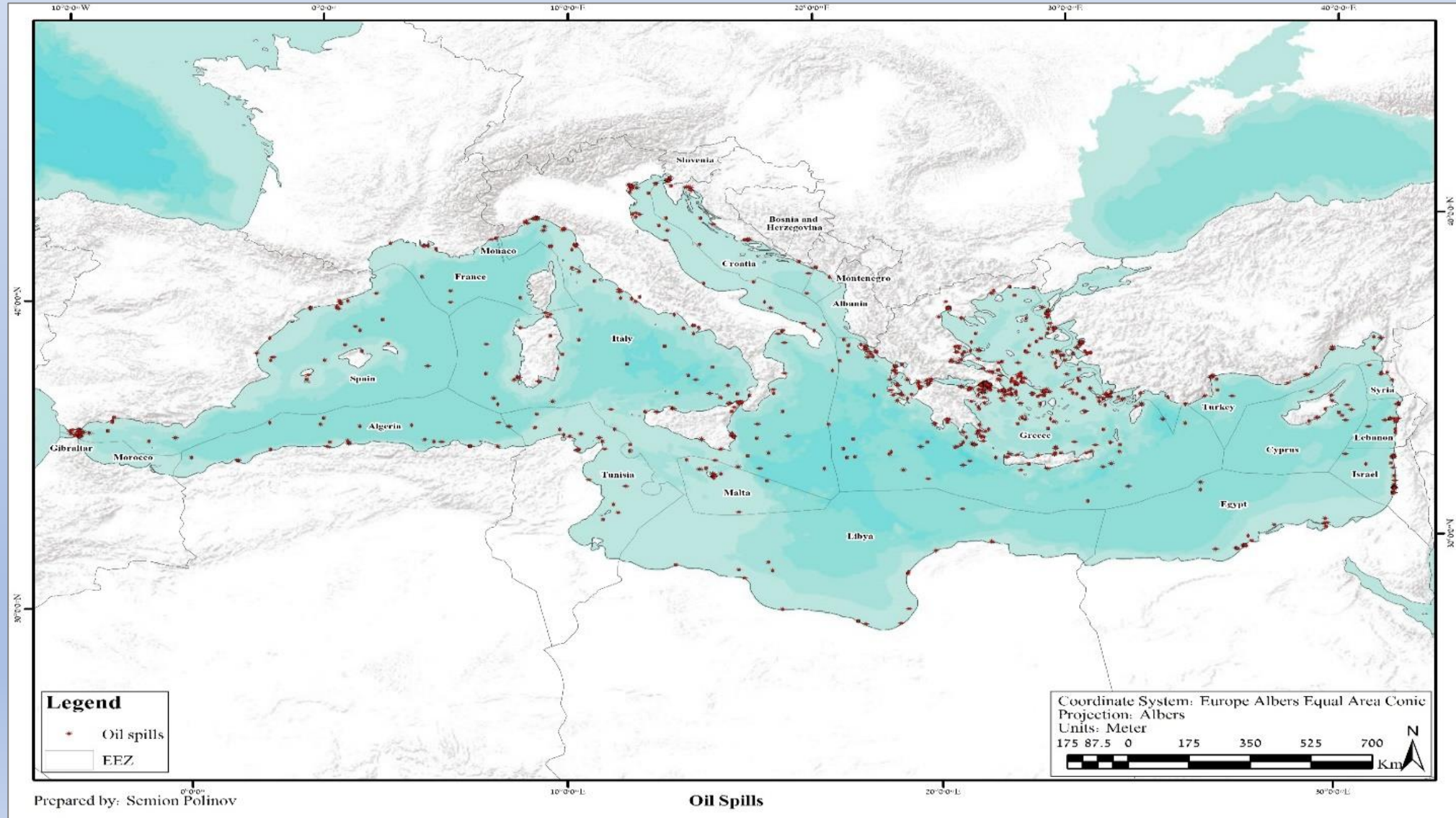






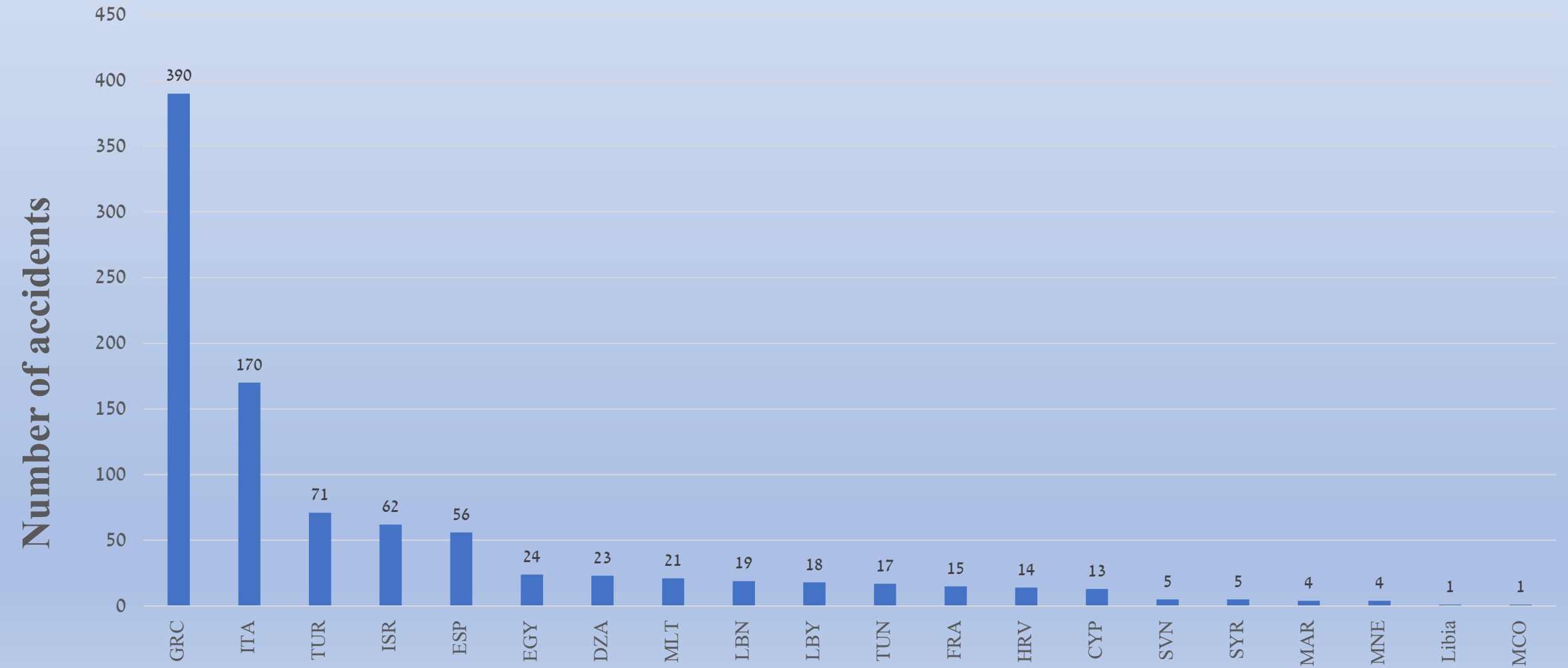


# Oil Spill 1977-2017 (REMPEC)

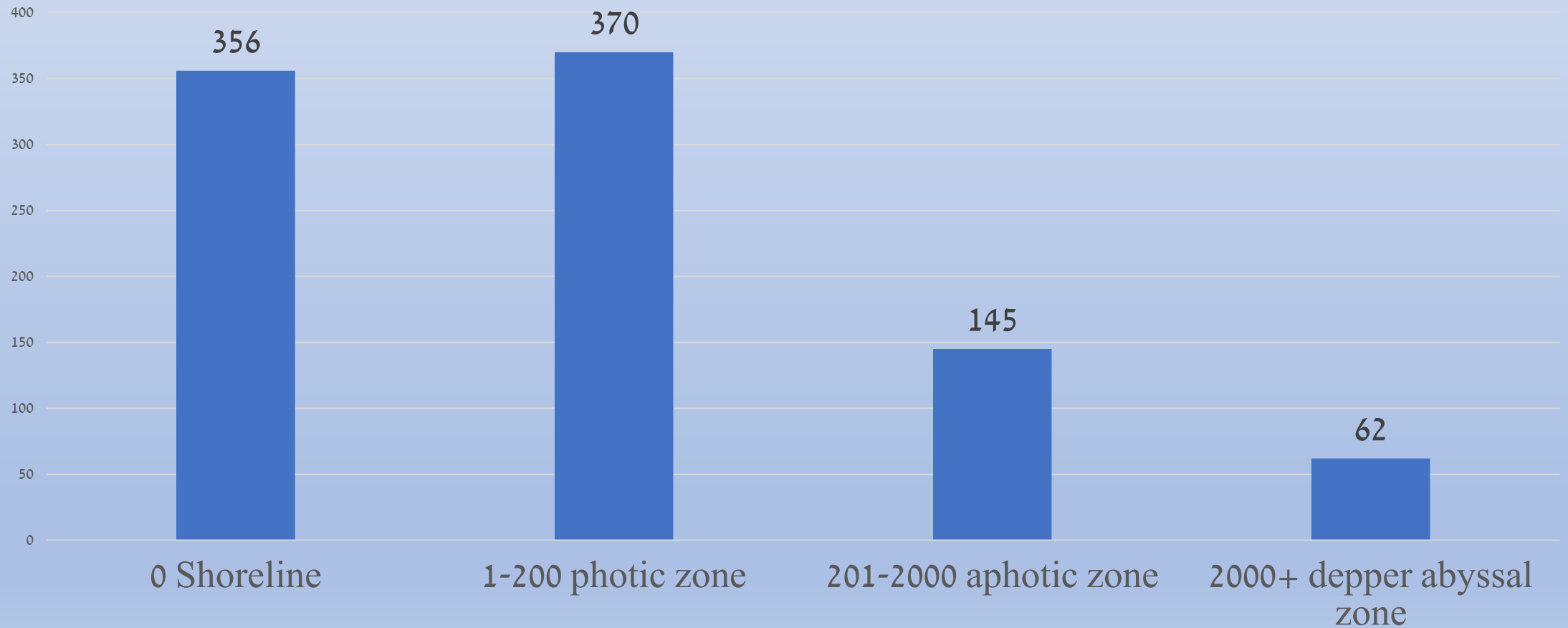




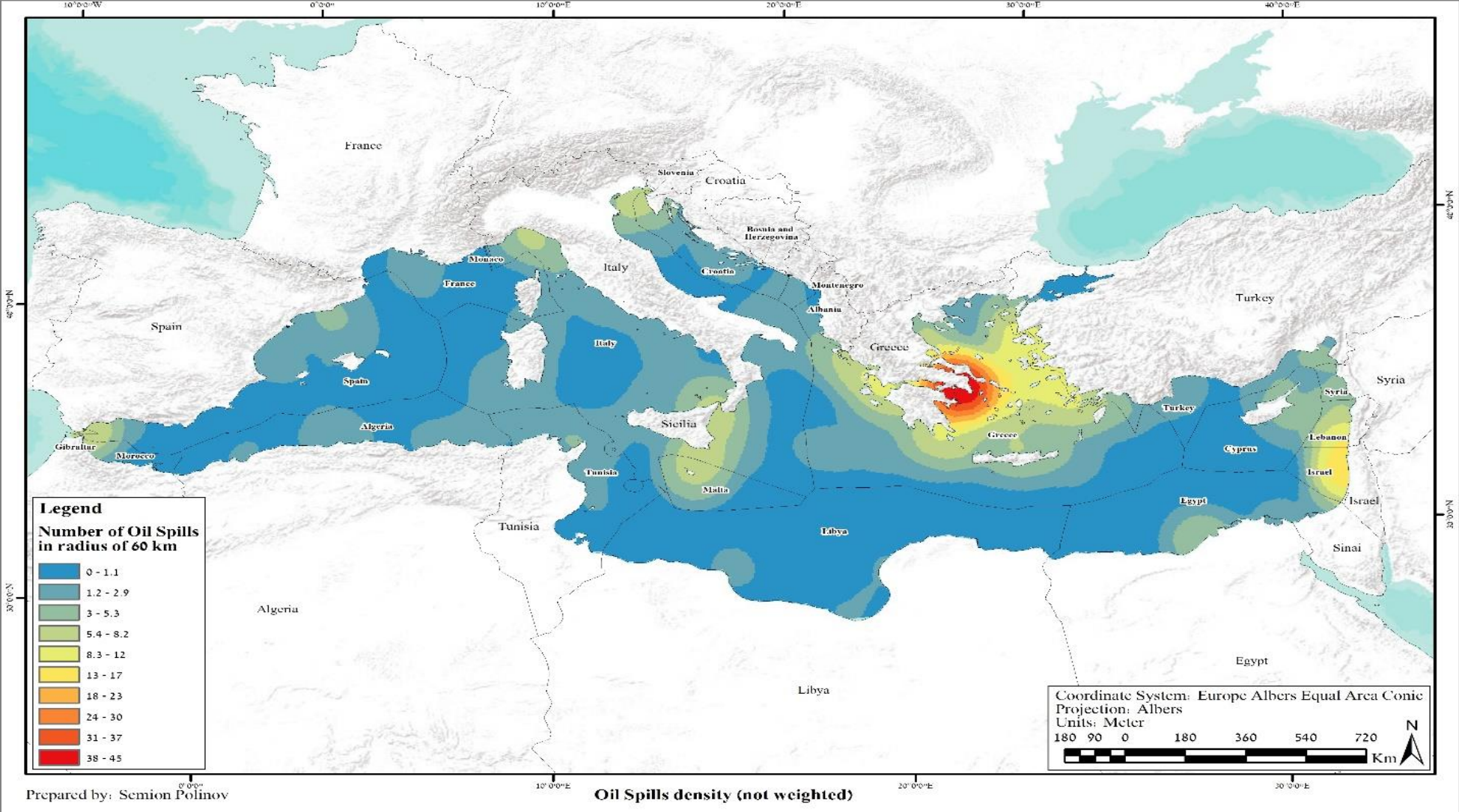
# Oil spills accidents in Mediterranean



# Depth epicenter of spill event

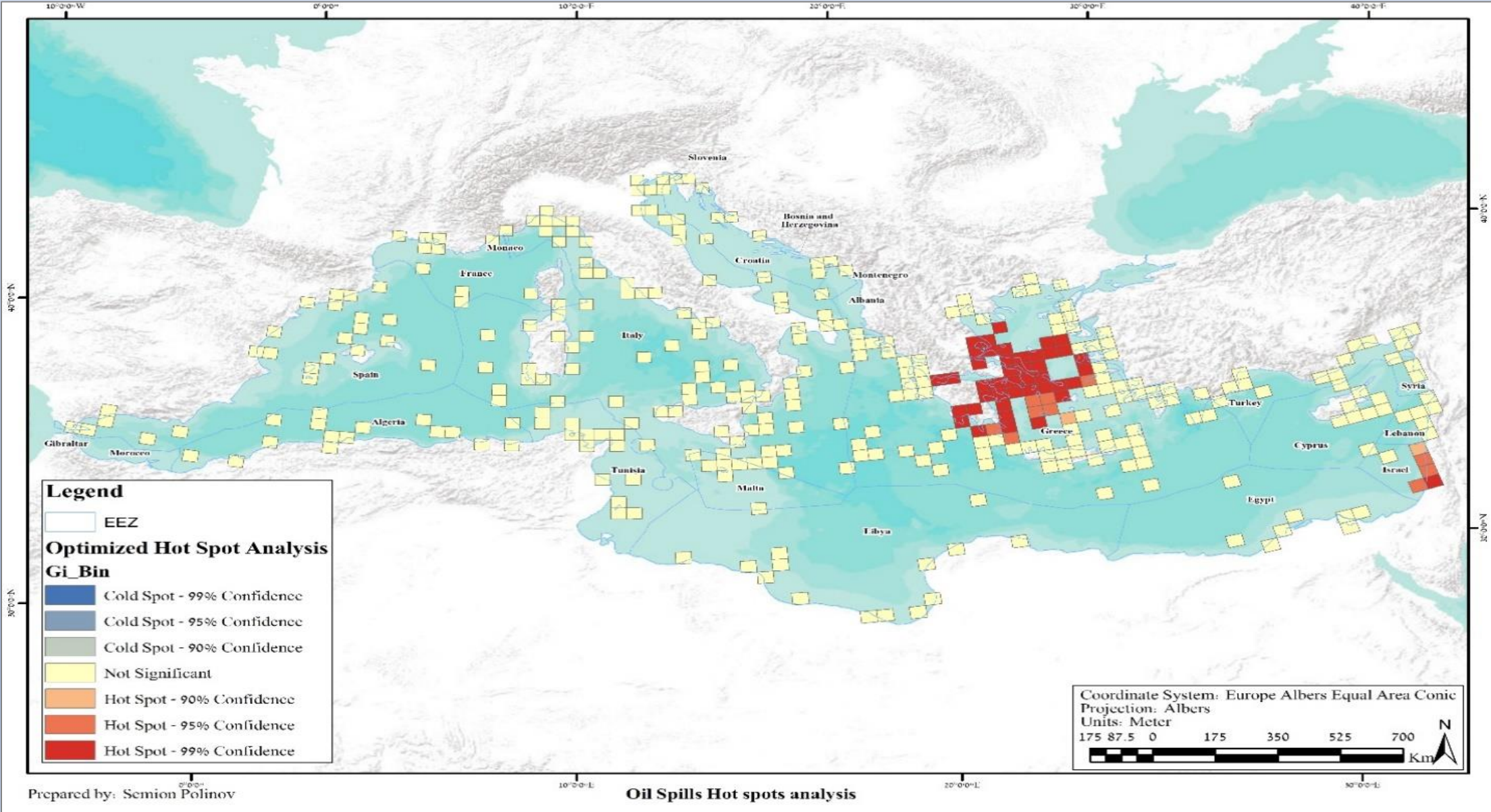


# Oil spill accidents

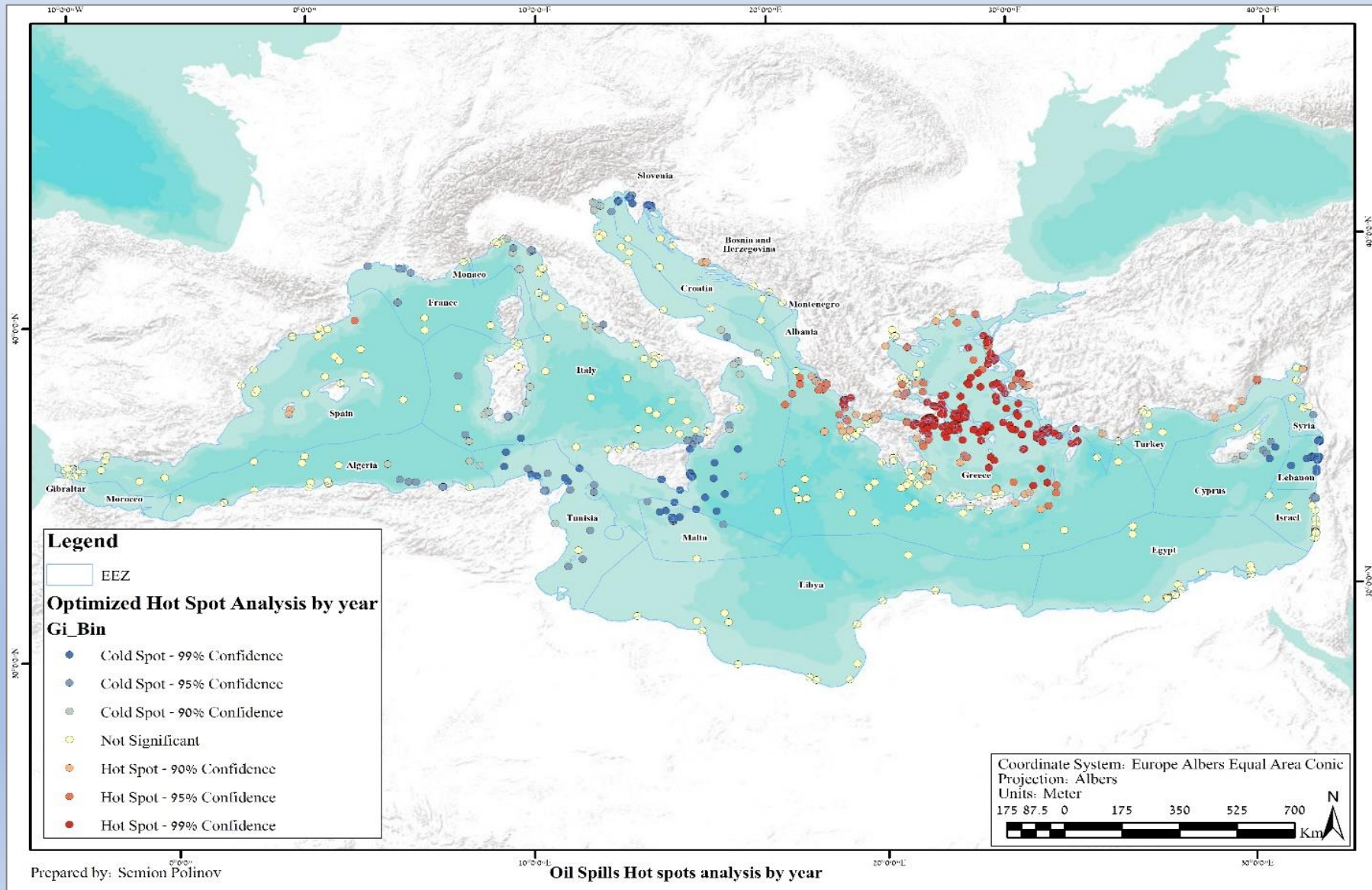




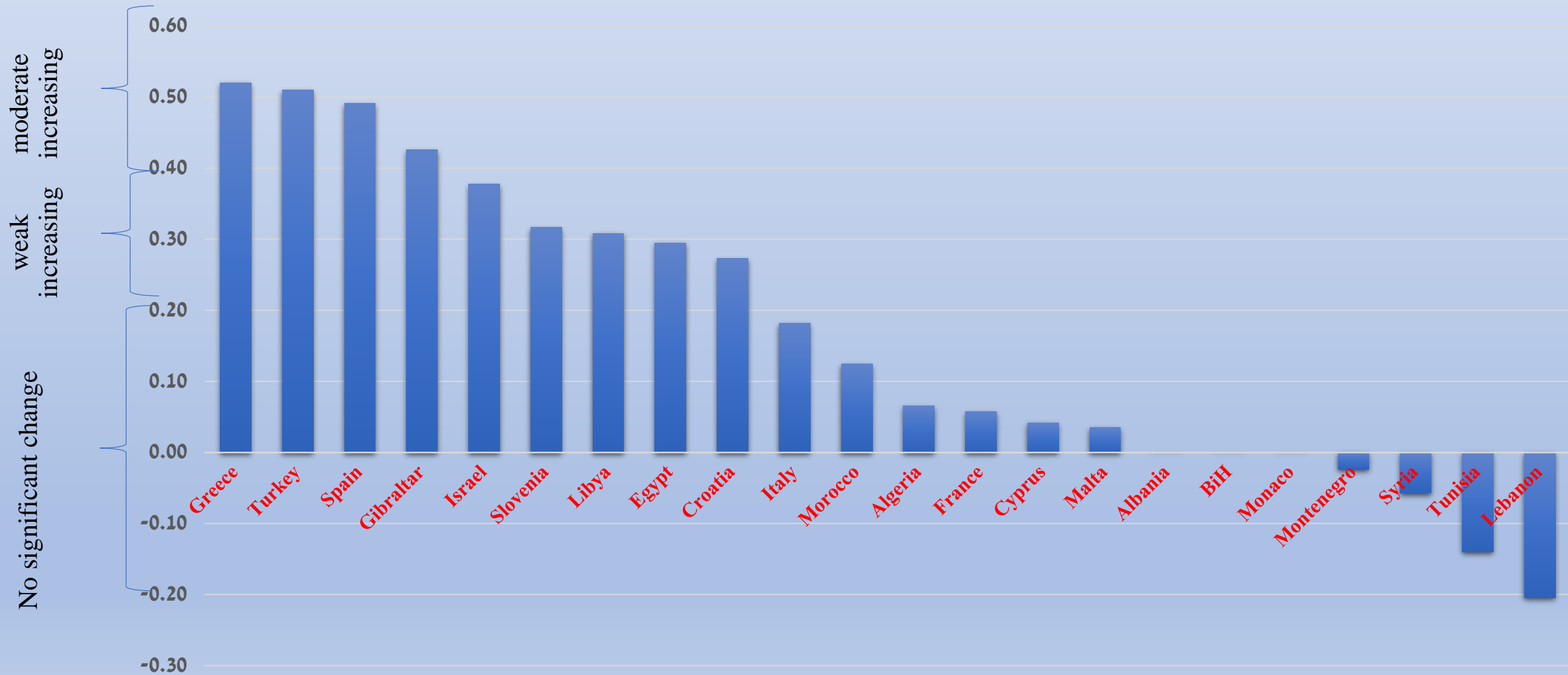
# Spills location hot spot analysis



# Spills location hot spot analysis (by year)



# Oil spills Spearmen Correlation







Thank you for attention

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