

IASON SSA

**WP 4 Pressures on the coastal
zone**

**Task 4.1 Pollution sources in the
Mediterranean and the Black Seas
coasts.**

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Driving forces and Pressures

The long civilization (>8.000 yr) and urbanization (more than 500.000.000 inhabitants) exert severe pressures on the coastal marine environment of the Mediterranean and the Black Seas. According to the European Environment Agency, the main human activities and pressures identified are:

- (1) population growth;
- (2) tourism;
- (3) agriculture;
- (4) fishing and aquaculture;
- (5) industry;
- (6) maritime traffic;
- (7) discharge from sewage outfalls; and
- (8) discharge via rivers.

Domestic, industrial and agricultural activities are considered to be the three major pollution sources.

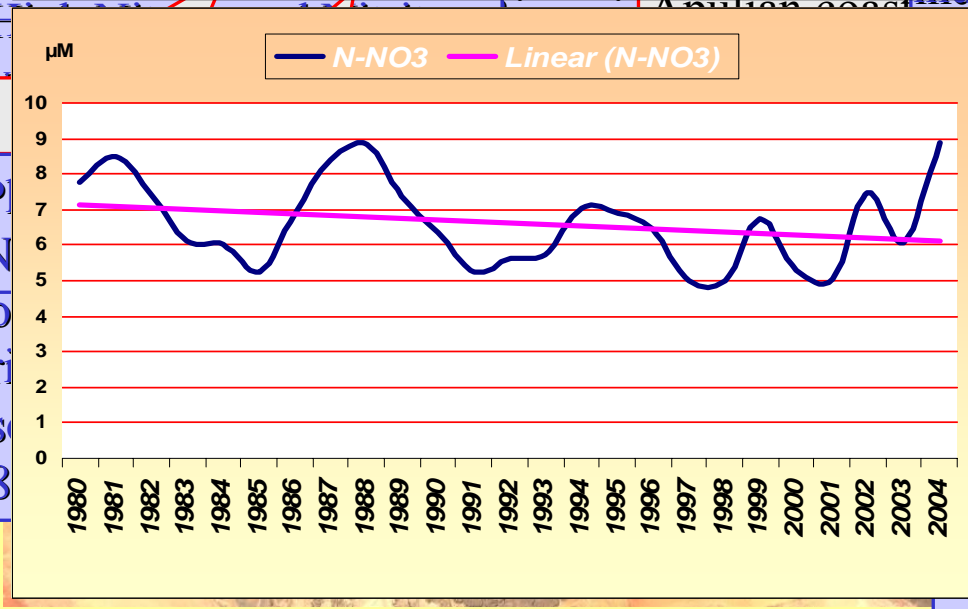
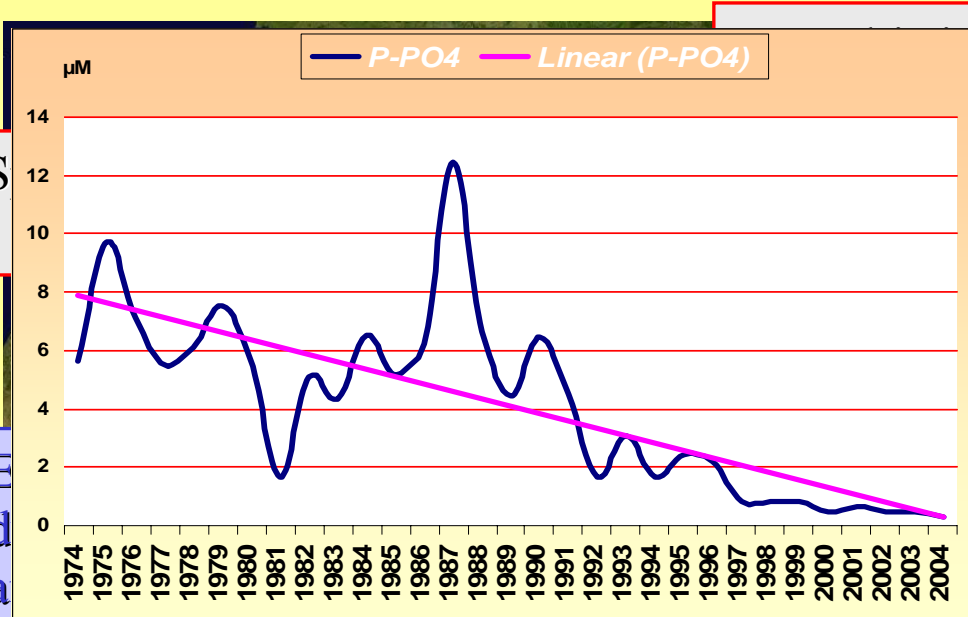
Main aspects of pollution

- Nutrients
- Heavy metals
- Organic contaminants
- Radioactive substances

Nutrients

- Generally, high nitrogen (nitrate-nitrite-ammonia) values represent anthropogenic inputs (domestic, agricultural and industrial), whilst phosphorous comes also from detergents
- Riverine N inputs predominate over atmospheric inputs
- High N and P levels can change N:P ratio, and may lead to toxic or harmful algal blooms (HABs)

Nutrients



Sea

Thessalon

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Influenced by anthropogenic activities, enriched in DIN.

Industrial influence reached the Mediterranean Sea.

enriched in nutrient

nutrient concentrations 2-6

es higher than the

responding oligotrophic

a.

rate: 1.2 μM

osphate: 0.5 μM

nitrate: ~1 μM

osphate near Psyttaleia: ~0.55

μM ~8 Km south: ~0.20 μM

Azov Sea

Nile Delta

Outfall

distance

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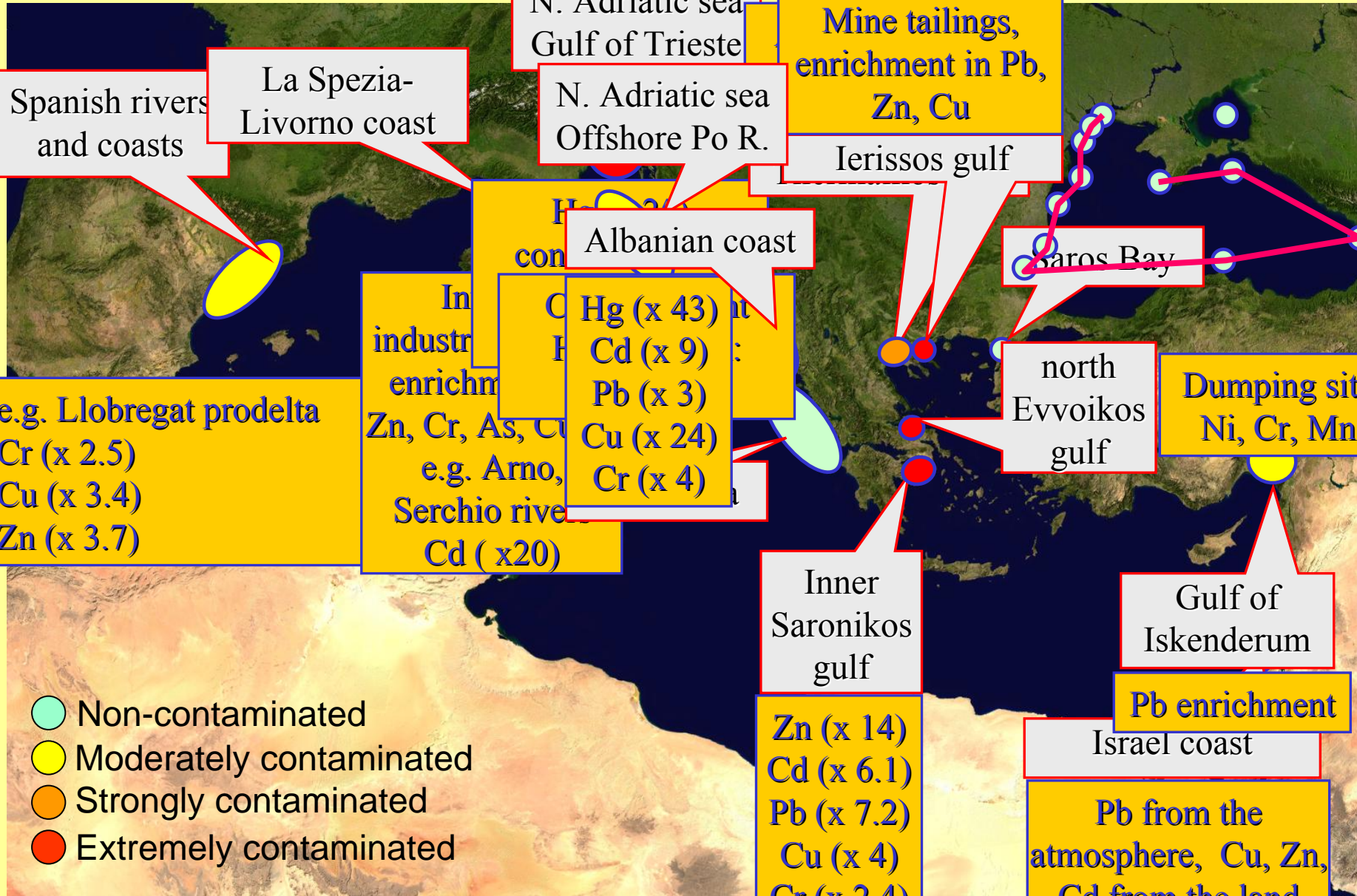
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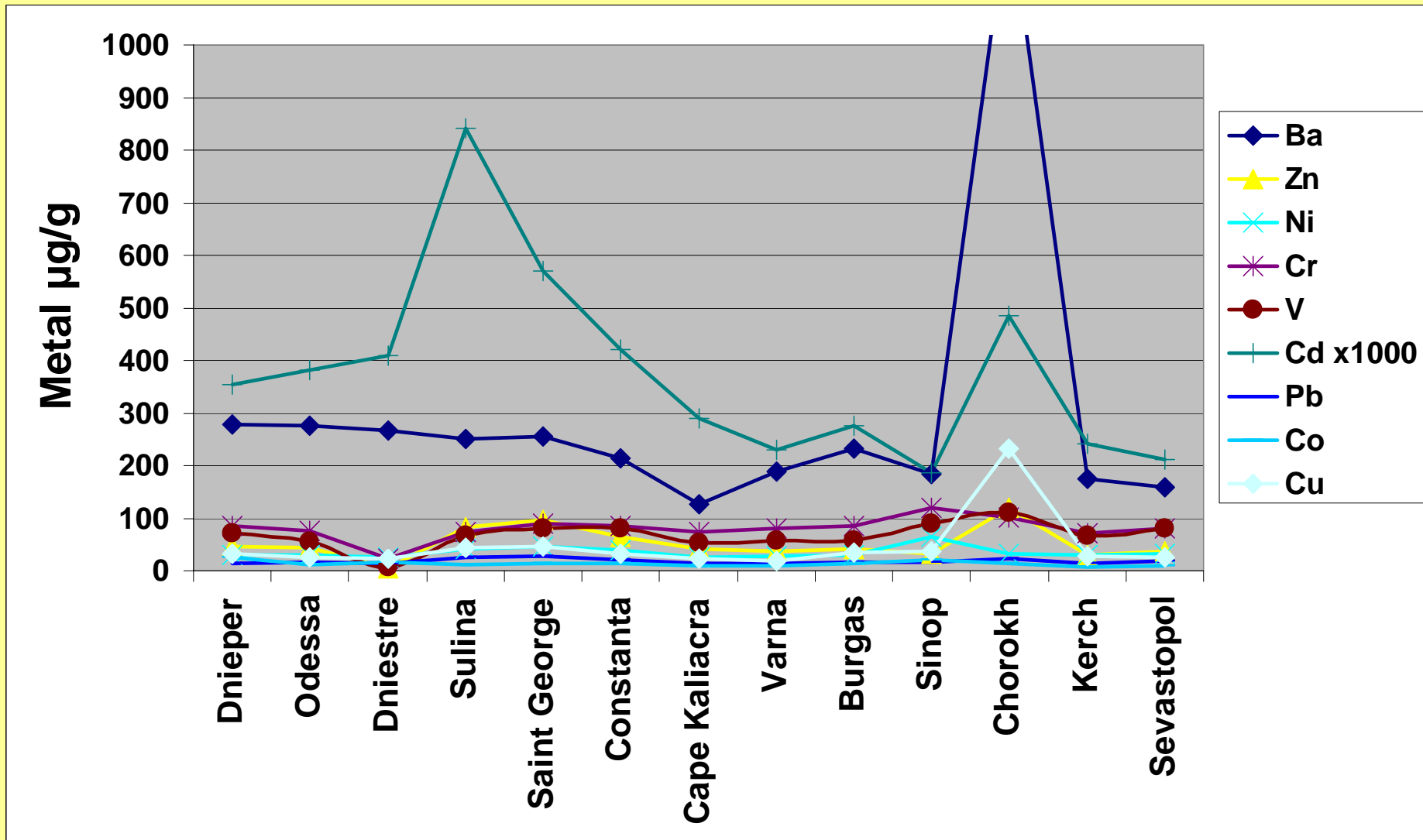
Heavy metals

- The current assessment focuses on heavy metal contents in surface sediments, as the latter are long-term repositories of various substances.
- Methodological differences often do not allow for a direct comparison of heavy metal contents.
- The use of metal Enrichment Factors proved to be the most appropriate pollution assessment method.

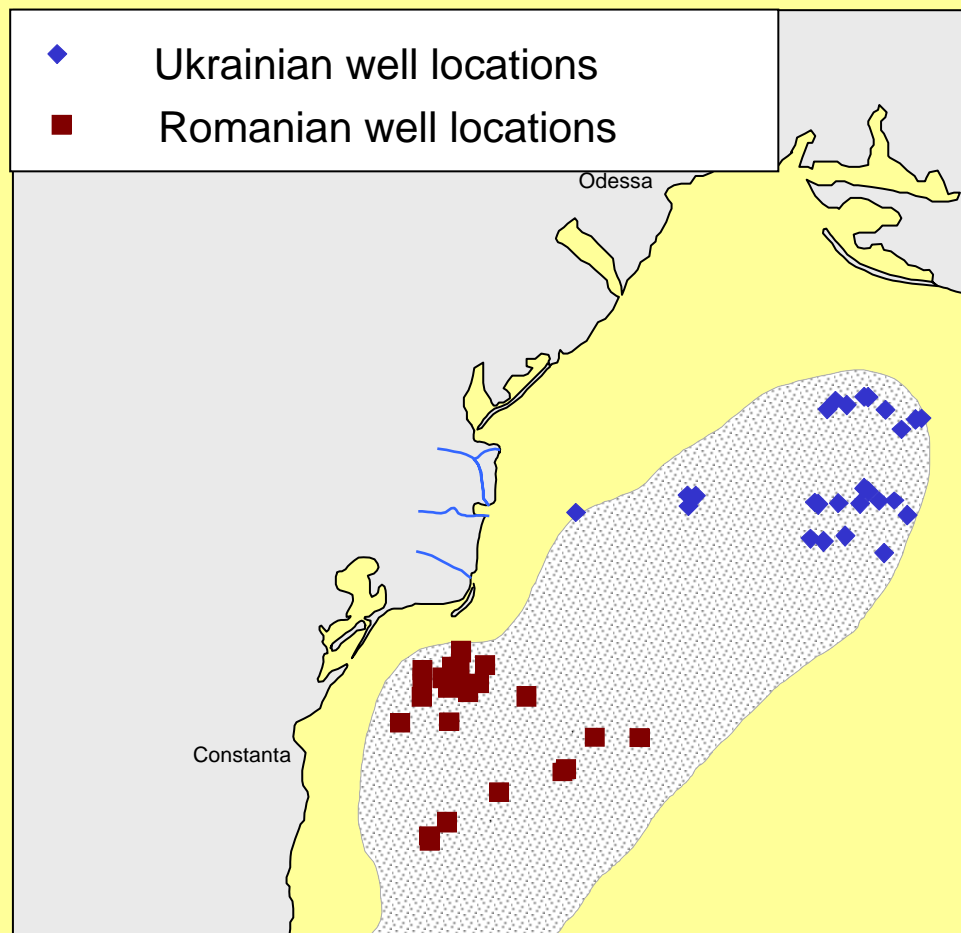
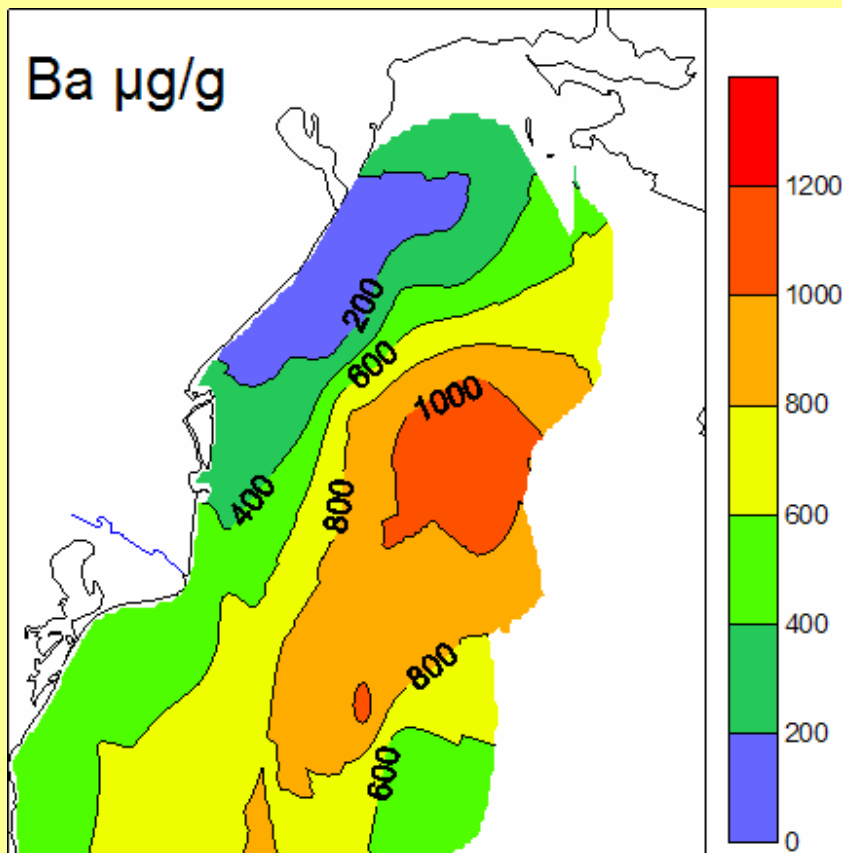
Heavy metals in sediments



Heavy metals-Black Sea Coast (0-50 m depth)



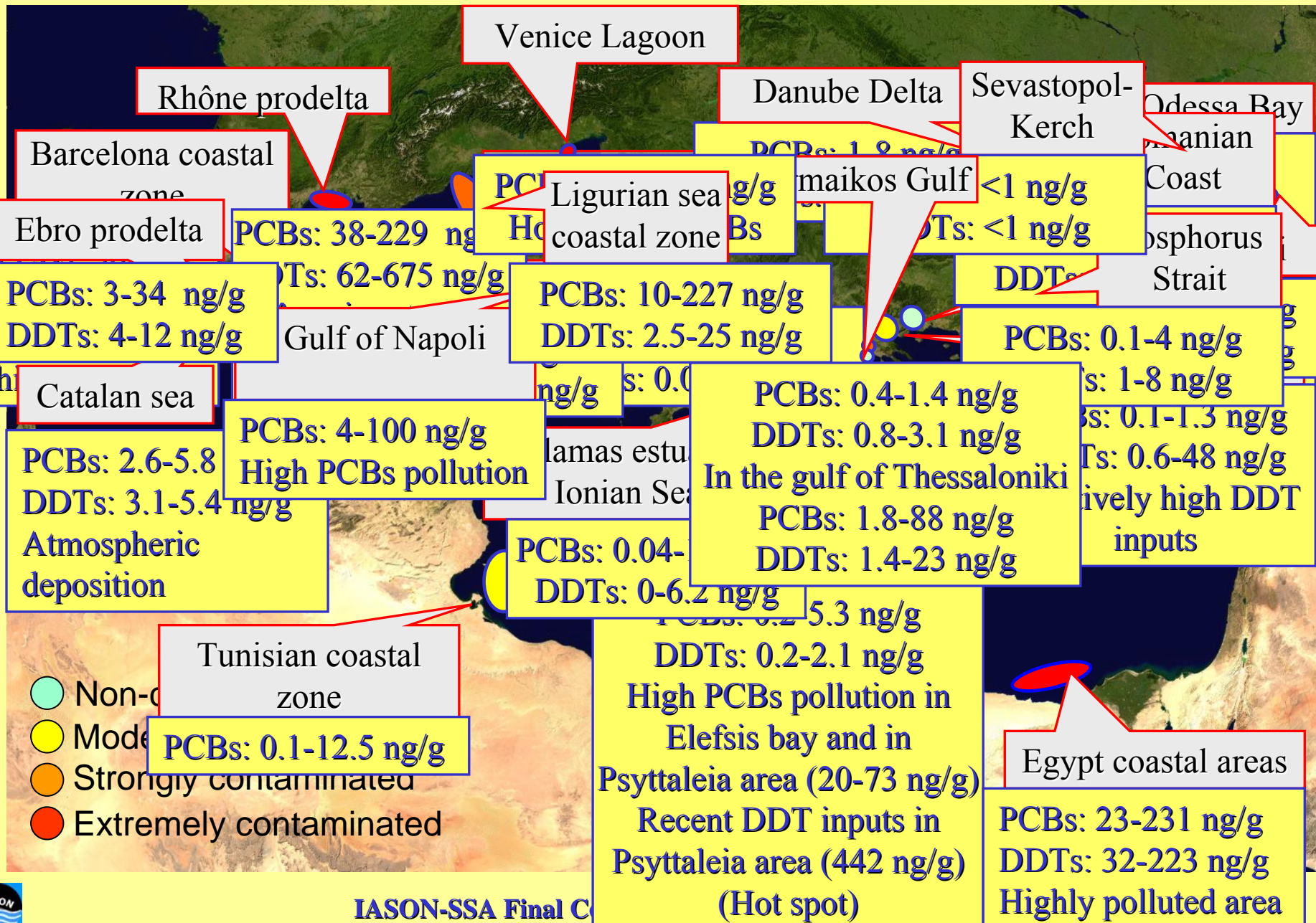
Barium



Organic contaminants I

- Organochlorinated compounds are by far the most important group of the persistent organic pollutants (POPs).
- They are characterised by high resistance to photolytic, biological or chemical degradation, and that's why they were used as transformer and capacitor oils, etc.
- The organochlorine contaminants typically measured are polychlorinated biphenyls (PCBs), DDT and its metabolites (DDE, DDD).
- Atmospheric deposition is predominant, but in the Med and BS riverine and industrial inputs are equally important.
- The production and of PCBs and DDTs has been banned since the mid 1980's in the western European countries.

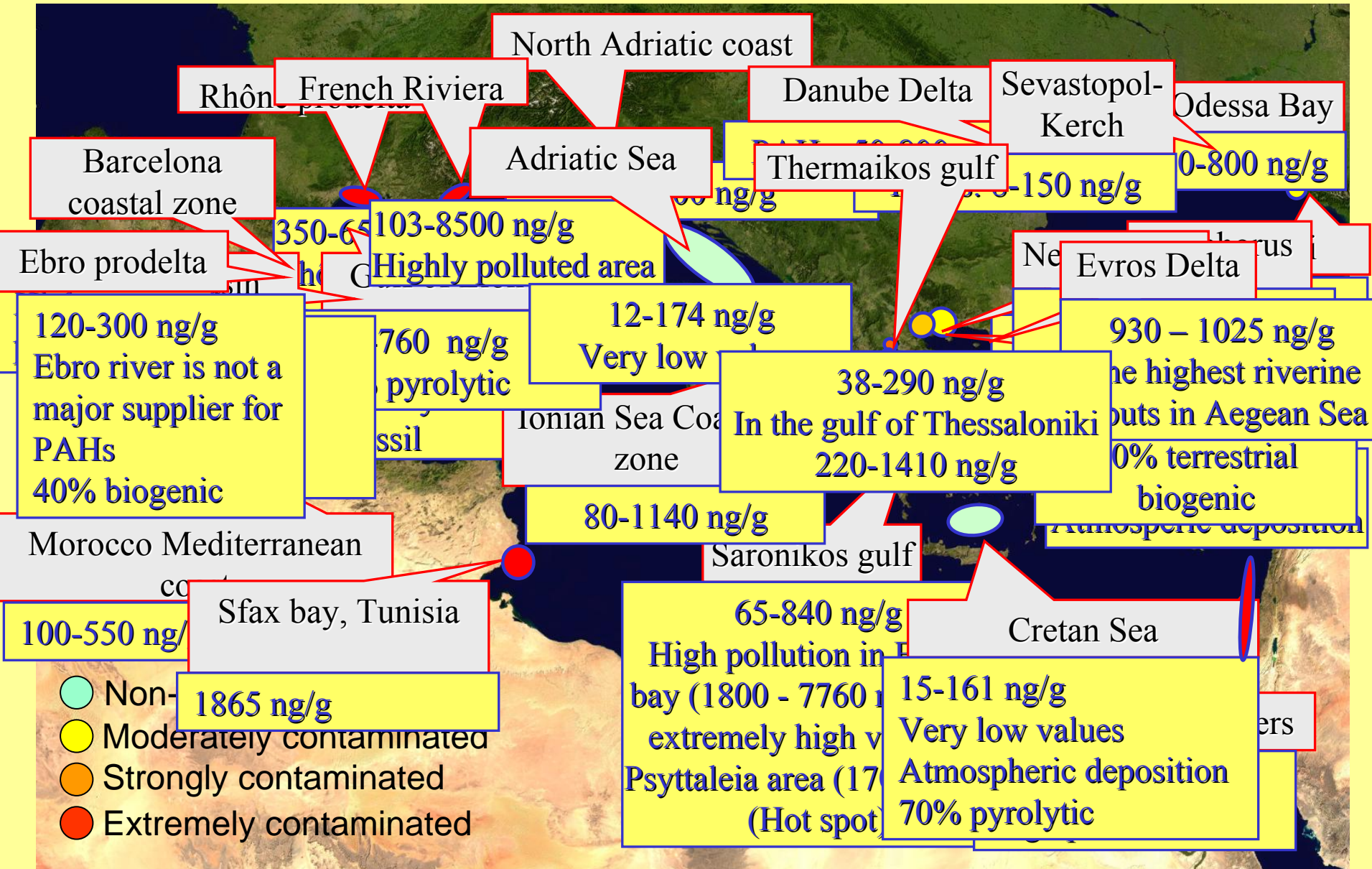
Organochlorinated compounds (PCBs and DDTs) in sediments



Organic contaminants II

- Polycyclic aromatic hydrocarbons (PAHs) are formed mainly as a result of pyrolytic processes, especially the incomplete combustion of organic materials.
- PAHs have received special attention since the 1980's, when they were been recognized as hazardous environmental chemicals, carcinogenic and genotoxic.
- PAHs enter the marine environment by both aquatic and atmospheric pathways.
- Coastal sewage dumping, continental runoff, river outflows and accidental oil spills and sea transportation are the main contributors of PAHs in the coastal sites.

Polycyclic aromatic hydrocarbons (PAHs) in sediments



Radioactive substances

- Radionuclides are classified as “hazardous substances” with potentially harmful effects on environmental and human health.

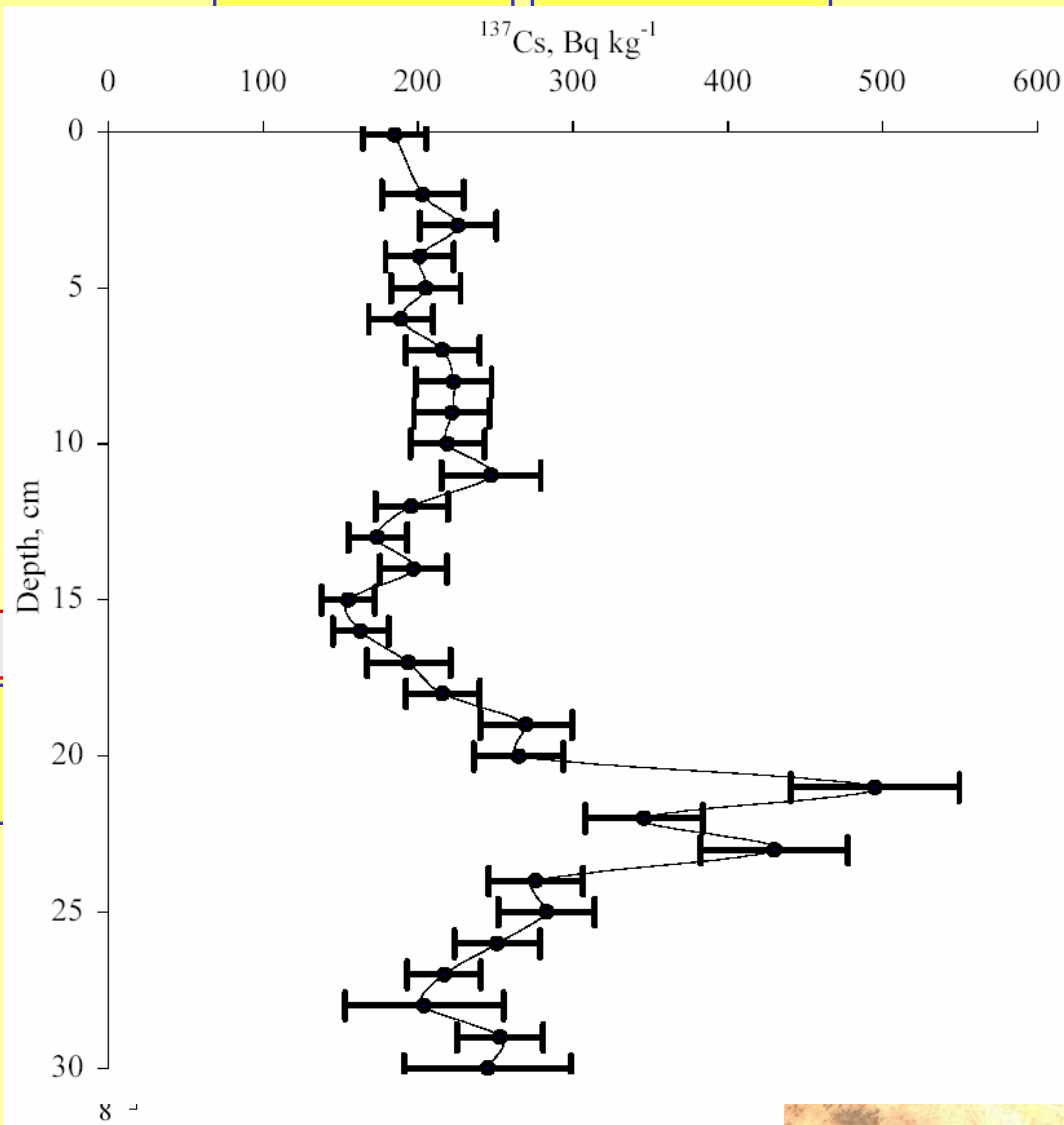
Sources:

- (a) Nuclear weapons tests (e.g. ^3H , ^{14}C , ^{40}Sr , ^{137}Cs , Pu isotopes etc.)
- (b) Nuclear power production (e.g. ^{222}Rn release from mining and milling, etc.)
- (c) Accidents (e.g. ^{137}Cs , ^{90}Sr from Chernobyl, etc.)
- (d) Radioactive waste disposal

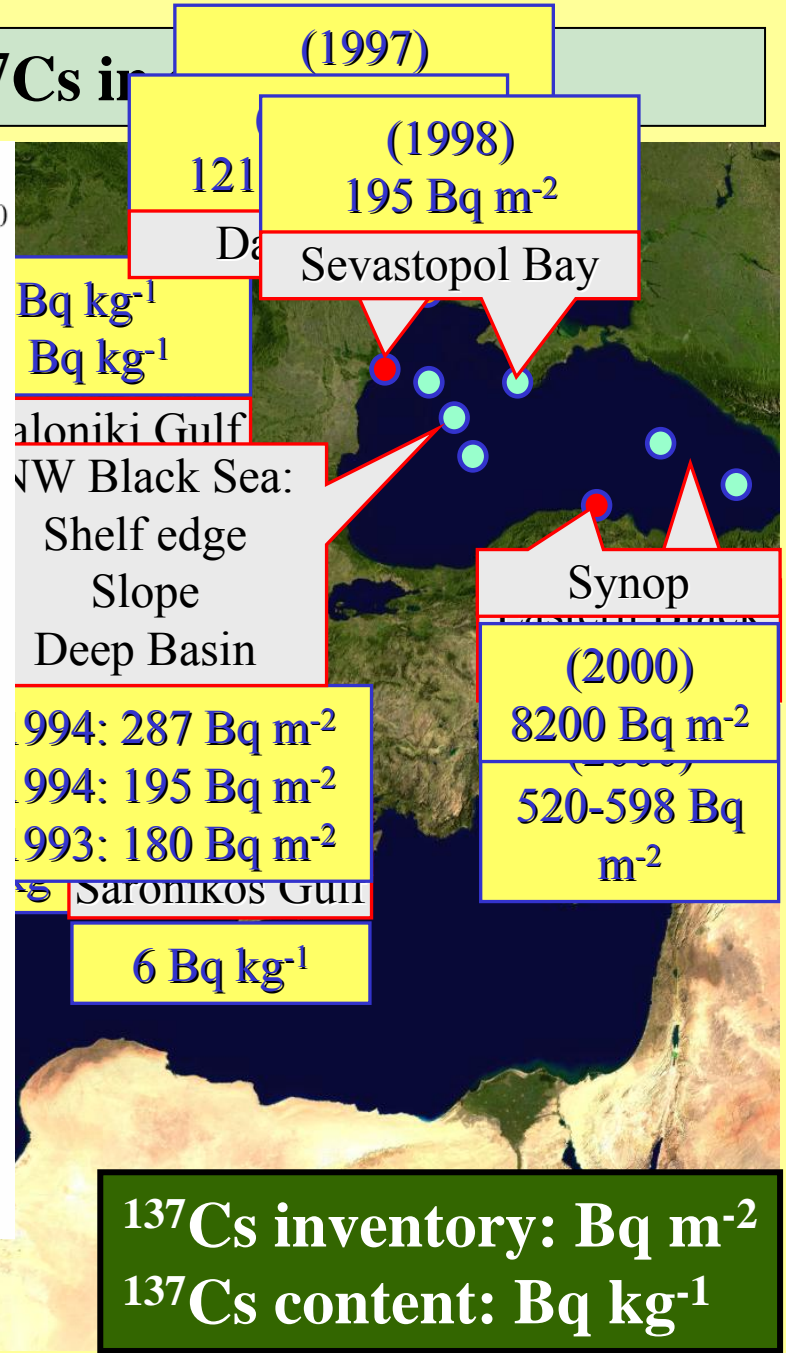
Pathways of introduction into the marine environment:

- (a) Atmospheric fall-out
- (b) River run-off

Radioactive substances: ^{137}Cs in



● Extremely contaminated



Environmental State & Impacts

- **INDICATORS:** Nutrients, heavy metals, organic contaminants, and radioactive substances have been identified as the most important pollution agents in the two seas
- Methodological variations often hinder a direct comparison and ranking of pollution levels between different areas
- In general, there is lack of data from the African coast
- River mouths, industrial and urban centres constitute occasionally environmental ‘hot spots’
- The geographical extent of pollution is generally limited
- The open sea seems to be relatively unaffected
- In many cases contaminant levels decrease over time
- **LINKS TO WP2 & WP3:** Ecosystem functioning, biodiversity changes and impacts on fisheries cannot be directly attributed to environmental pollution, except for the ‘hot spot’ areas

Policy Response

- The implementation of the EU Water Framework Directive will help on the improvement of environmental status of polluted areas
- Regional monitoring projects should be maintained and re-enforced
- Links with north African countries should be further encouraged in order to bridge existing gaps on environmental information