



International Action for Sustainability of the Mediterranean and Black Sea EnvirOnmeNt



The **IASON SSA Results and Ways to Achieve them**

Evangelos Papathanassiou
Hellenic Centre for Marine Research
(HCMR)

"Black Sea Ecosystem 2005 and Beyond", Istanbul, 8-10 May 2006





FP6 - Global Change and Ecosystems Specific Support Action

- **Coordinator:** **HCMR**
- **Contract Number:** **515234**
- **26 Partner Organisations (EU member States, Associated States, NIS, USA)**
- **Total Cost:** **613.550 €**
- **EU Contribution:** **452.550 €**
- **Project's Duration:** **18 months (Start January 2005)**



Overall Objectives of IASON SSA

- Provide comprehensive state-of-the-art information regarding:
 - the current state of the marine and coastal environment of the Mediterranean and Black Sea system,
 - the carrying capacity of the system, and
 - the marine resources.
- Contribute to the preparation of future activities (FP7 etc.), with a view to build a platform for cooperation with partners from EU Member States, Associated States and Newly Independent States

End Users: the scientific community, policy makers and the public



Themes

- ✓ **Ecosystem Functioning**
- ✓ **Resources: current state and trends**
- ✓ **Pressures on the Coastal Zone**
- ✓ **Management Policies**



A Science Plan for the Region



Ecosystem functioning

What we know, **what we miss.....**

- Patterns and changes in marine biodiversity are poorly known, with unexplored areas, ecosystems & groups
- The loss of coastal habitats a major global concern
- **There is a lack of studies concerning the coupling of biodiversity with ecosystem functioning, productivity and economic profitability**
- **There is little information on the effects of fishing gear on biodiversity**
- **There is a lack of long-term data and comparative datasets/methodology, analysis, reference sites**



Ecosystem Functioning

1. There should be a coordinated effort to collate existing info by building a Mediterranean and Black Sea database. Help by existing and future projects
2. Comparative studies are needed concerning fishing gear effects: protected areas vs. fished areas, in specific habitats
3. There is a need to define common protocols and to test the old and new tools (indicators) throughout the Med and Black Sea areas
4. New bacterial patterns: There is a unique opportunity in area because of huge bacterial biodiversity to search for new strains and processes which may affect the entire planet



Marine living resources



- Knowledge of fisheries in the two regions needs to be improved.
- The quality of fishery statistics still one of the main weaknesses and the production of good quality statistics is a major priority
- The collapse of fish stocks worldwide is indicative of management failure to sustain natural resources and should be changed (since it is clearly ineffective)
- In aquaculture, precise definitions of carrying capacity for fish-farms in the area are needed.





Biotechnology

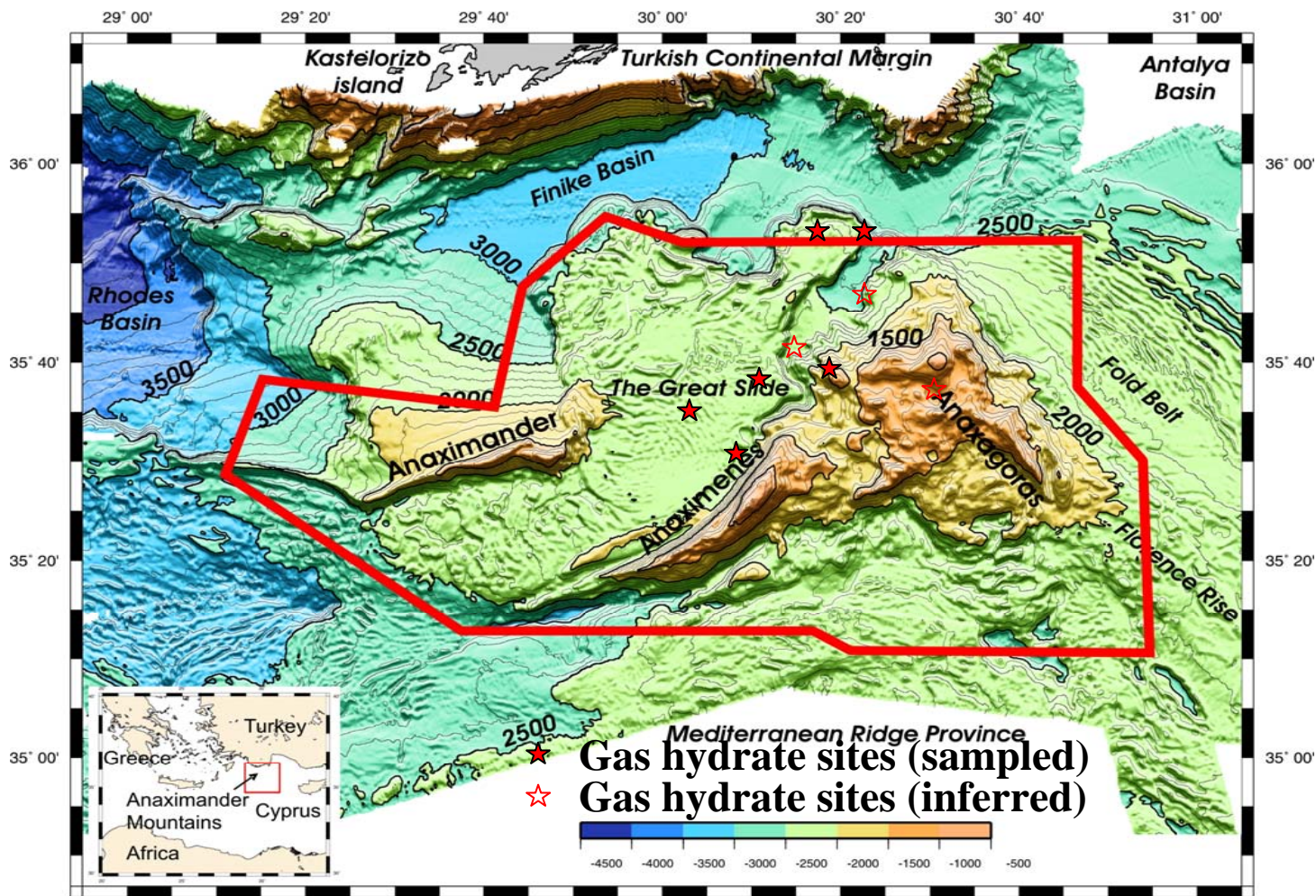
- Development of DNA taxonomy system
- Further research into microbial and macrobial faunas from hydrothermal vents and cold seeps, part of a new discipline called “Ecogenomics”
- Genetic studies on influence of hydrographic, climatic and anthropogenic factors in marine species

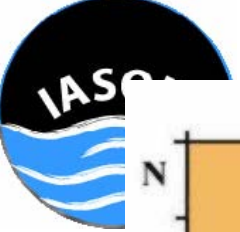




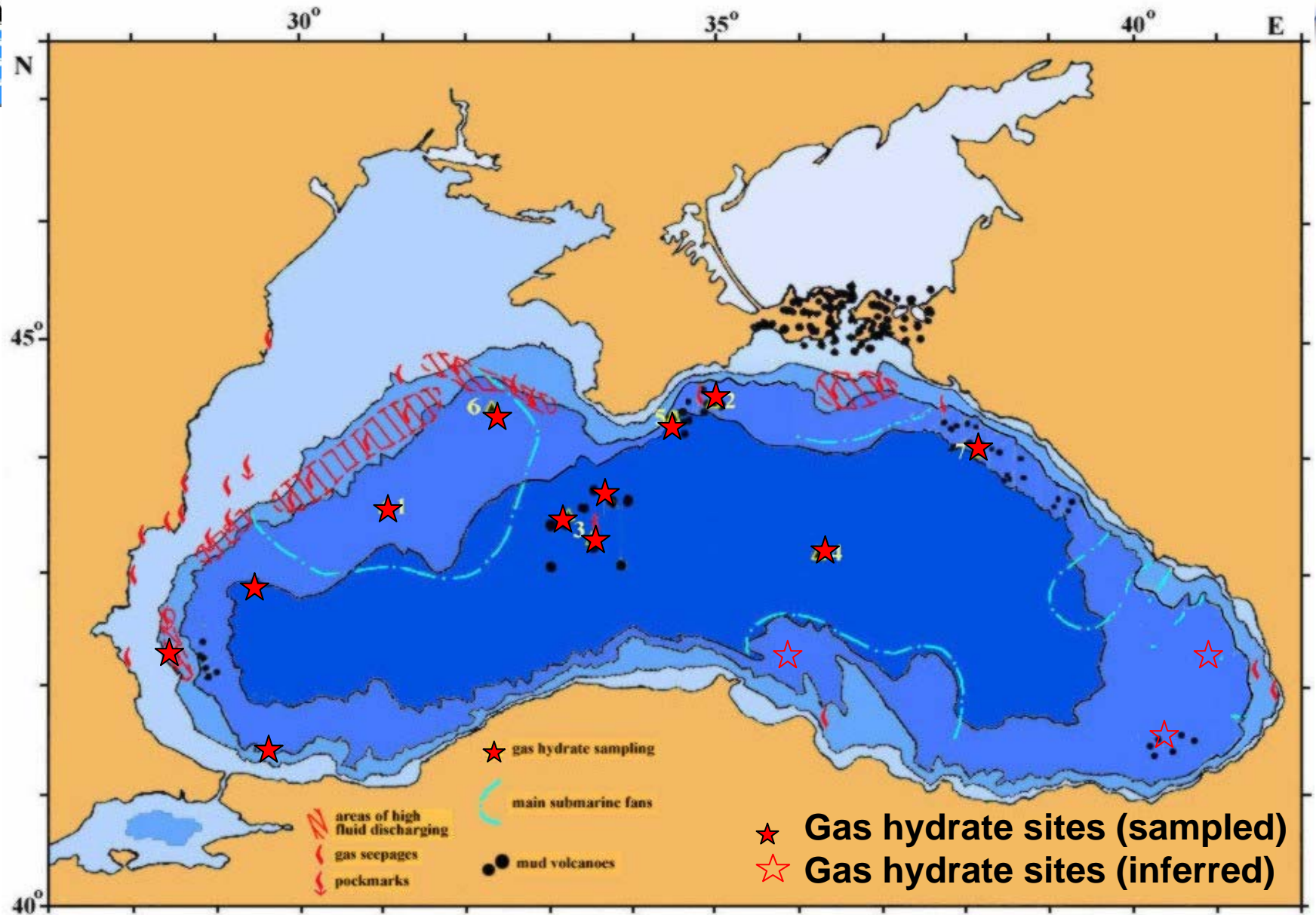
Non-living Resources

Mud volcanoes comprise the largest gas seepage features on continental margins and they are considered as the surface expression of buried hydrocarbon accumulations at depth.





Map of sites in BS with gas hydrate activities



“Black Sea Ecosystem 2005 and Beyond”, Istanbul, 8-10 May 2006



Gas Hydrates

Significant questions :

- 1. Which is the role of sub-surface methane and other gases to global climatic changes?** particular those related to marine geochemical cycles;
- 2. Which is the relative importance of sea-floor seepage as indicators of hydrocarbon fields below the surface?**
- 3. How Gas hydrates behave as proxies for old climatic conditions?**
- 4. How gas seepage and gas hydrates induce slope instability**

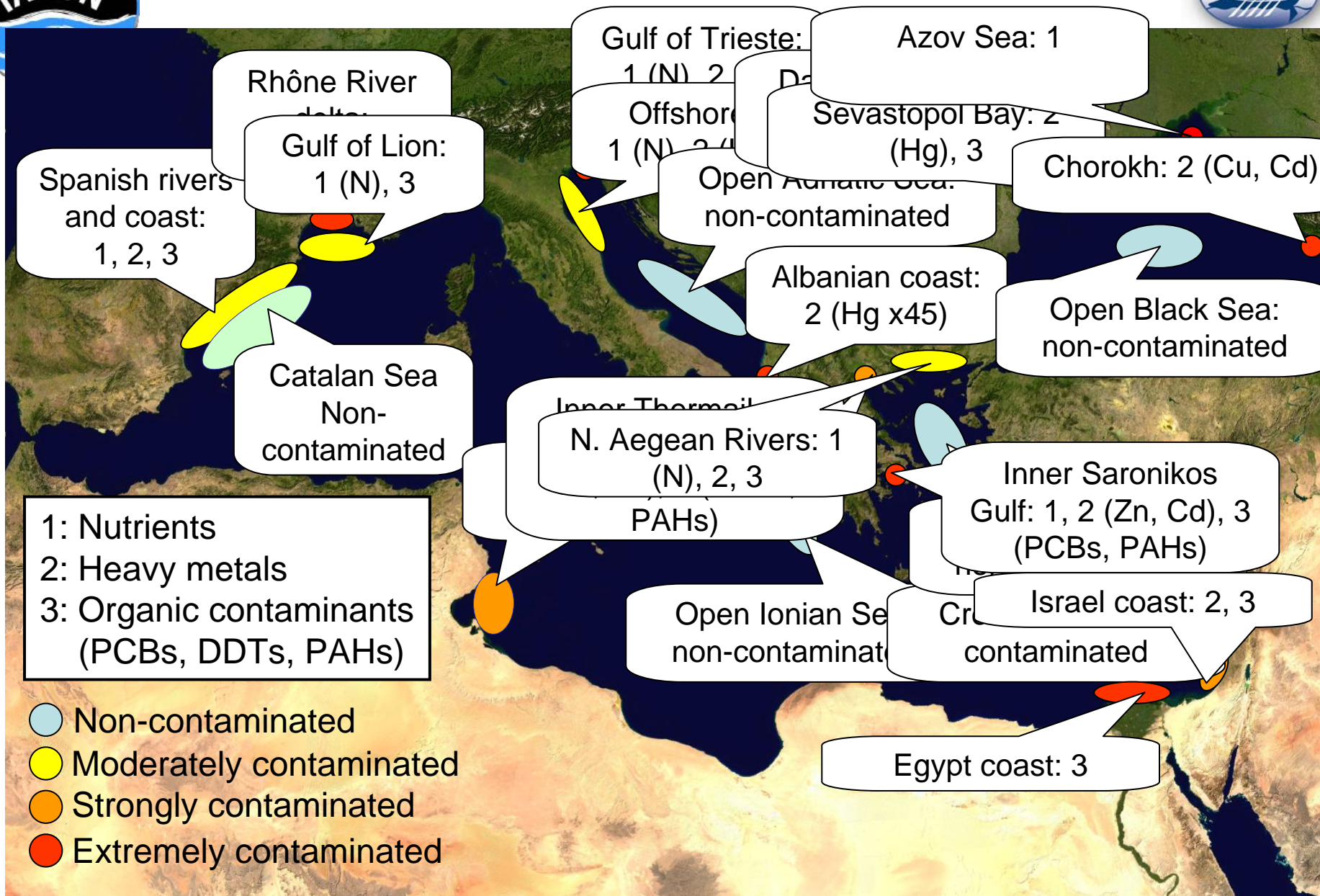
Ecosystem research on mud volcanoes must be made....



Threats and Hazards to the coastal zone

1. Pollution

- Problems of microbial pollution in the coastal zone persist and are mainly related to urban waste water
- Changes in productivity are linked to anthropogenic nutrient loads
- The spatial distribution of **heavy metal pollution and organic pollutants**, is not well studied although first approach taken by UNEP/MAP and BSC is successful.
- The processes, pathways and fate of pollutants are not well known (many past data exist but not the pathways...)
- The geographical imbalance of data is more acute.
- There are large stretches of coastal zones, with sparse records.





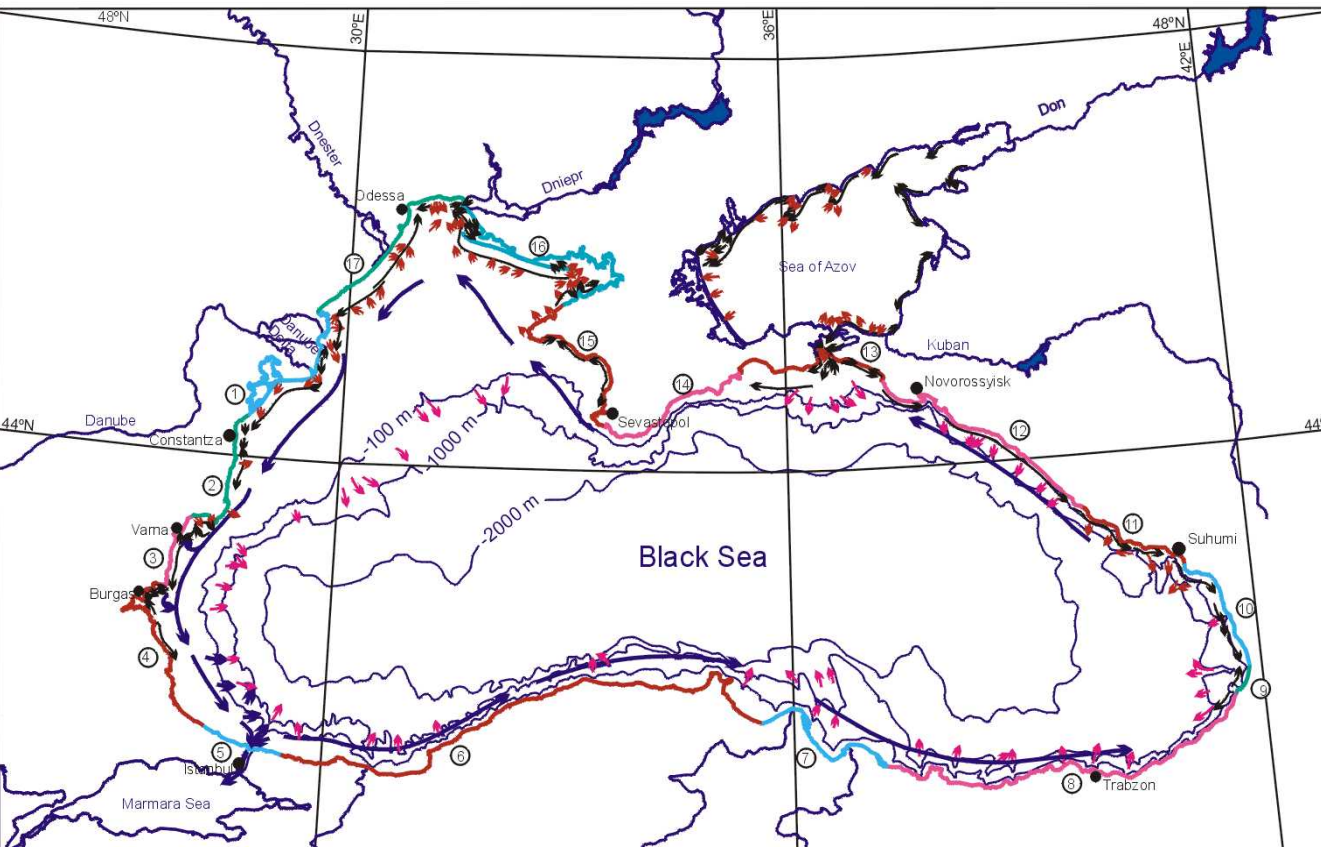
Threats and Hazards to the coastal zone



2. Erosion

Coastal erosion is a major problem (no standard solution has yet been found)

ZONATION OF THE BLACK SEA COASTAL ZONE
Sediment movement systems



- ↖ sediment drift system in the coastal zone
- ↙ suspended matter flows in the off shore zone
- ↗ sources of sediments for the littoral drift system
- ↘ main terrigenous sediment supply system of the deep sea zone

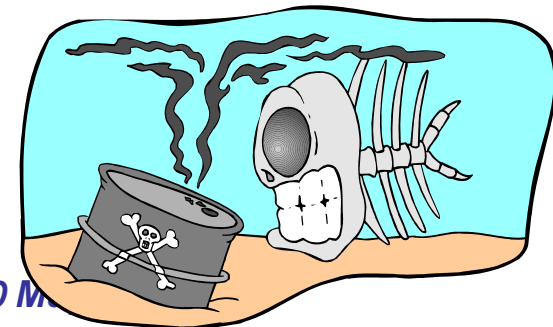
Name of littoral section

- ① Danube Delta or Northern Zone
- ② South Dobrogean Zone
- ③ Frangensko - Stara Planina
- ④ Burgas - Istrandza
- ⑤ Pre-Bosphorous Zone
- ⑥ Western Pontidae Zone (Isfendyar Daglari)
- ⑦ Samsun Zone
- ⑧ Eastern Pontidae Zone
- ⑨ Batoumi Zone
- ⑩ Rioni Depression Zone
- ⑪ East Caucasian Zone (Mzimta River-Kodori River)
- ⑫ West Caucasian Zone (Kudepsta River-Anapa)
- ⑬ Taman - Kerch Zone (Anapa-Feodosia)
- ⑭ South Crimean Zone (Feodosia-Balaklava)
- ⑮ West Crimean Zone (Balaklava-Bakal)
- ⑯ Karkinit - Dniepr Zone
- ⑰ N-W Black Sea Zone



Hazards and Threats

- Scarcity of data is probably the main issue in the two regions.
- Ecological indicators are needed to capture complexities of coastal systems which must be regularly monitored
- Sources of pollution must be identified (e.g. non-point sources in agriculture) and the biological effects of long-range pollutants must be ascertained.
- Research and data on virus contamination is required on a basin scale.
- Monitoring capabilities of some countries have to be improved.





Management, Policy & Socio-economics

Joint efforts and activities of both natural and social sciences is a prerequisite for developing a successful management system

- **Challenges:**

- how to ensure sustainable utilisation of the natural resources,
- how to avoid the creation of thresholds that will seriously hamper sustainability

- **Problems:**

- coastal zones in both areas are heavily influenced by inland activities, especially subsidised agriculture
- policy and coastal zone management are sectoral, so decision-making remains fragmented



Science, Policy and Economy

Long Way to go.....

- **Lack of integration of science, policy and economy** results in substantial financial and environmental loss
- Thresholds concept is the cornerstone of sustainability and are regional specific (e.g. response to P differs right across Med.); **continuum of thresholds across regions is required**
- **Threshold values are needed. have to be defined** to formulate sustainable development policies for coastal areas and **be used** as a starting point for negotiating with other users
- **There is a need to define economic costs and value of goods and services** provided by coastal areas (estimated at twice global GDP)



Steps taken, Prime Results and how to Achieve them...



- In accordance to the relative call, **IASON was the “nucleus” and created the platform for.....**

Sub-Priority 3: Global Change and Ecosystems

Research area III: Biodiversity and ecosystems



Topic III-2: Assess and forecast changes in the Mediterranean and Black Seas Ecosystems and their ability to provide services

Budget: Overall: 16,000,000€
Requested: 9,998,000€



SESAME Consortium



- 48 Partners, including two companies
- 380 participating Scientists
- 21 countries
 - 10 from EU (Belgium, Cyprus, Spain, France, Germany, Greece, Italy, Malta, Slovenia and UK),
 - 4 Associated Candidate Countries (Bulgaria, Romania, Turkey and Croatia),
 - 1 Associate State (Israel),
 - 3 non-EU Mediterranean (Egypt, Tunisia and Lebanon),
 - 3 NIS (Russia, Ukraine and Georgia)
- JRC
- External cooperation: USA University of Miami, WHOI and URI
- Provisions for Subcontracting: Morocco and Syria



Main Questions in SESAME



- **What were the mechanisms involved and what can be learnt from the changes observed during the past decades?**
- **Presuming that the SES ecosystems are likely to exhibit major changes or shifts in their regimes during the coming decades, which ecosystem components are most likely to be affected?**
- **Which functions are pertinent to the ecosystems' ability to sustain tourism, fisheries, ecosystem stability and mitigation of the climate change? Which changes occurred to them during the past decades and which are likely to occur in the next fifty years?**
- **What are the economic values of these ecosystem functions supporting tourism, fisheries, ecosystem stability and mitigation of climate change and how can we compare and assess the scenarios on the basis of the benefits and costs of protecting the above mentioned functions?**



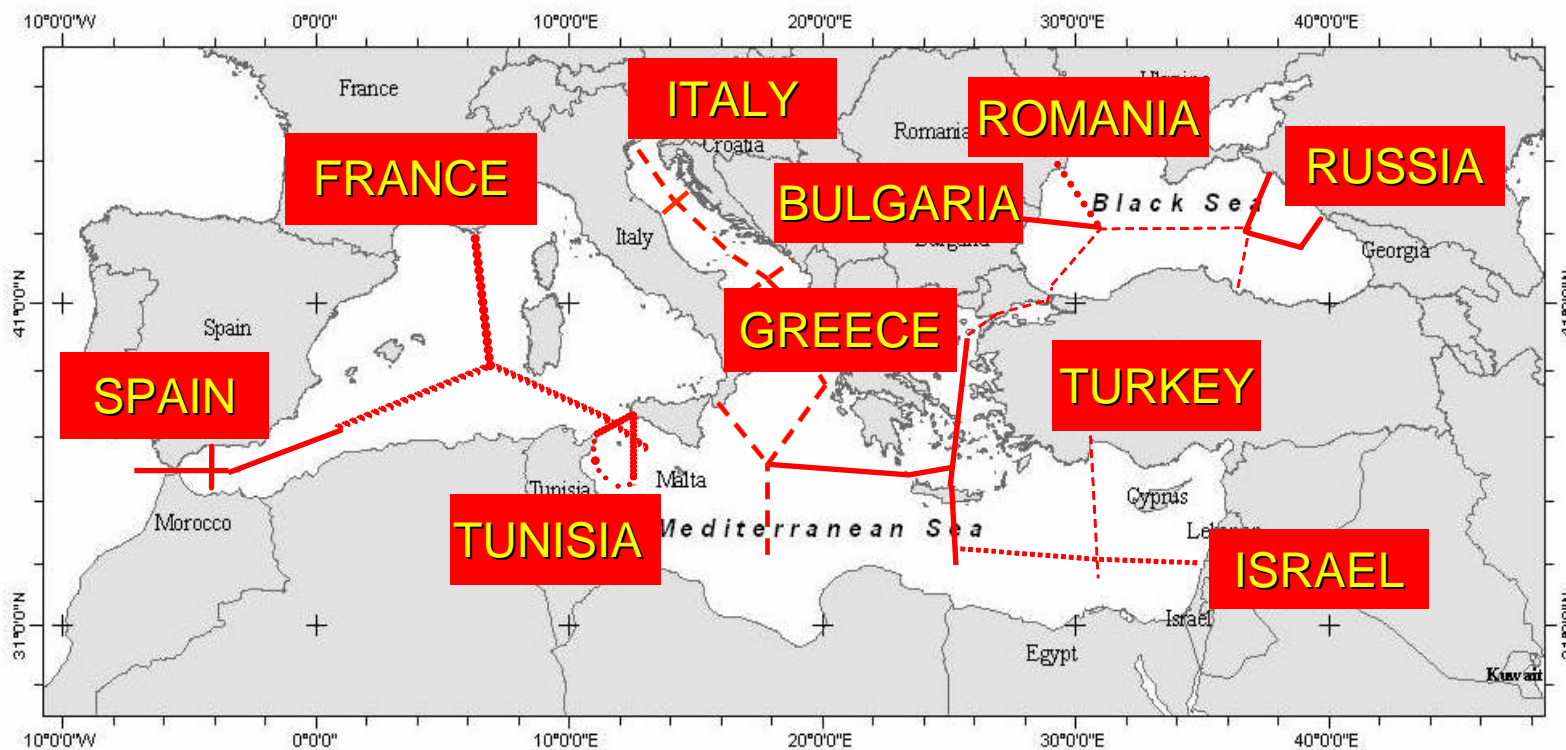
Scientific Objectives of SESAME

- 1. To assess the changes or regime shifts** in the SES ecosystems over the last 50 years and assess the potential mechanisms that relate these changes to changes in natural and anthropogenic forcings.
- 2. To assess the current status of the SES ecosystems** through analysis of existing and newly collected data as well as through model simulations.
- 3. To predict changes in the SES ecosystem responses** to likely changes in climate and anthropogenic forcings during the next five decades.
- 4. To assess and predict changes in the ability of the ecosystems to provide goods and services** (with potentially high societal importance).
 - **Goods:** tourism and fisheries
 - **Services:** ecosystem stability through conservation of biodiversity, and mitigation of climate change through carbon sequestration in waters and sediments

“Black Sea Ecosystem 2005 and Beyond”, Istanbul, 8-10 May 2006



Transects of the expeditions in March-April and August-September 2008 for SESAME



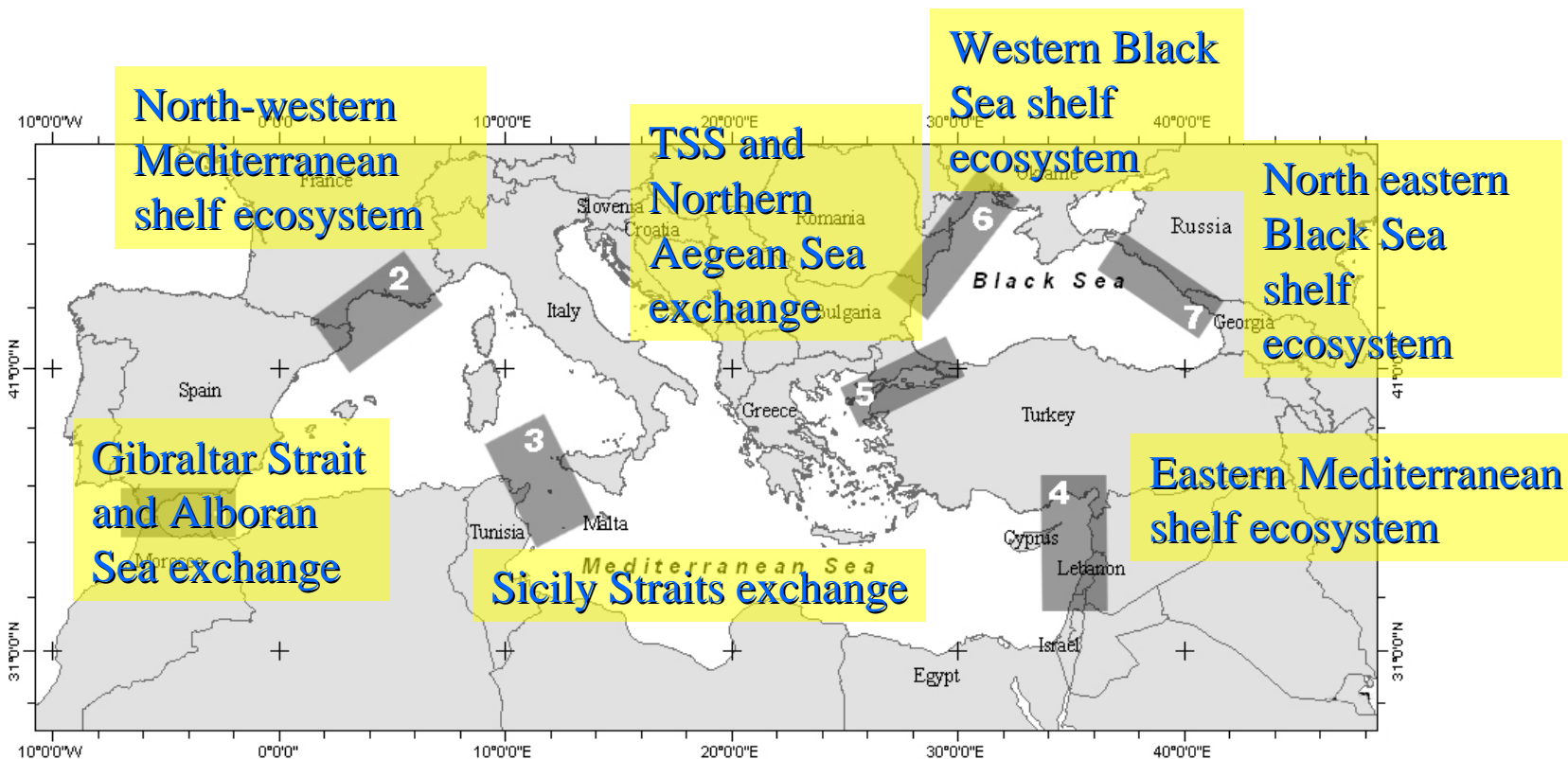
WOCE type stations in the Med and Black Sea

“Black Sea Ecosystem 2005 and Beyond”, Istanbul, 8-10 May 2006



Data collection for model definition and validation in sub-regional seas

- Accumulate scientific knowledge on selected sub-regional SES ecosystems to enable the correct representation of active physical / biogeochemical processes in the sub-basin to basin scale models.
- Define model features and control variables.
- Supply initial / boundary conditions and validate the models.





SESAME's Impact

- Will set, for the first time, a joint and coordinated study of the SES and will establish a modelling and observational network beyond country and basin borders
- Will effectively mobilize large human and material resources in the two basins (*Develop the critical mass*)
- Will provide innovative research in observational and numerical modelling fields and will contribute further to socioeconomic research using international collaboration in the field of marine ecosystems (*Multidisciplinarity*)
- Will bridge the gap between natural and socioeconomic sciences in view of the assessment of the ecosystems' ability to provide goods and services (*Integration*)
- Will provide primary and higher education opportunities in the region (*Education*)

**We are going forward to
meet the challenges**

