



# NEREIDS

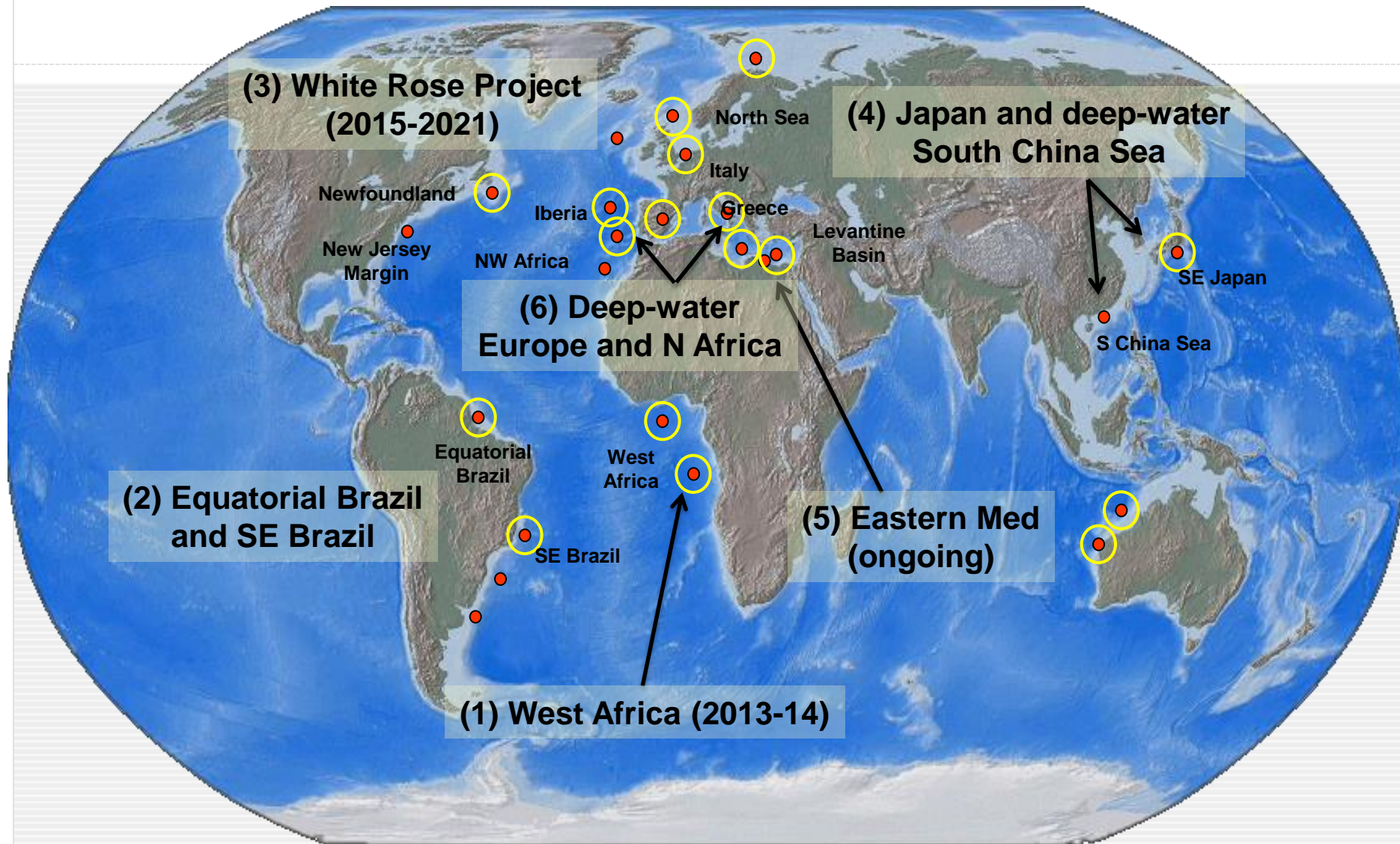
## Embracing Innovation for Preparedness in Civil Protection & Marine Pollution



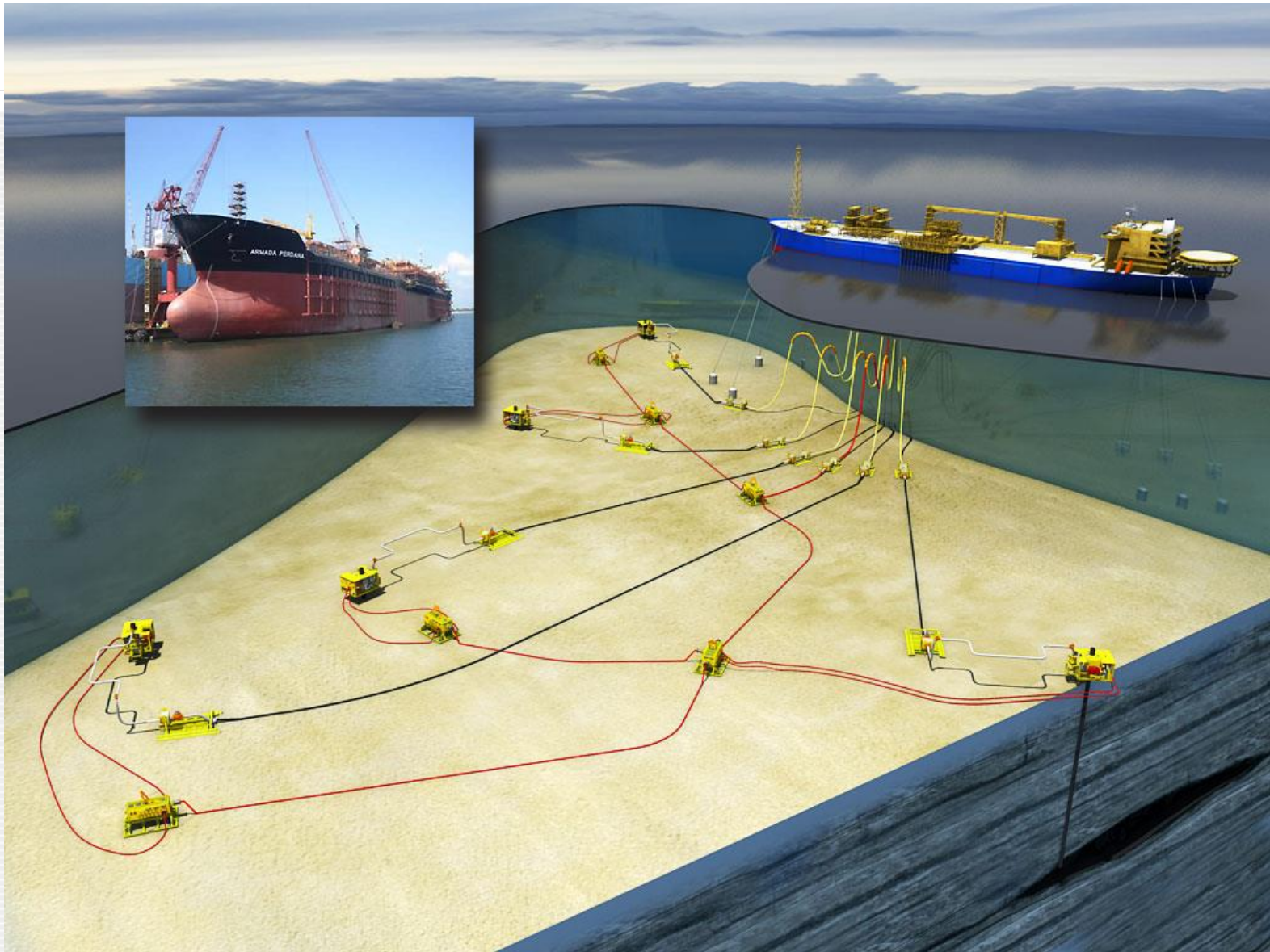
### Recent Hydrocarbon Discoveries in the Eastern Mediterranean Sea: Can Industry Spur Innovation and Improvements in Civil Protection?

**Tiago M. Alves<sup>1</sup>, E. Kokinou<sup>2</sup>, G. Zodiatis<sup>3</sup>, R. Lardner<sup>3</sup>, C. Panagiotakis<sup>2</sup>,  
H. Radhakrishnan<sup>3</sup>**

# Where FPSO's are replacing platforms



# Floating Production Storing & Offloading (FPSO)



*Paz Flor (Total): 1.9 Mboe of capacity (Daewoo Shipbuilding)*

# Presentation Outline



## **Summary**

- The aims and objectives of NEREIDS
- Coastline susceptibility in South Crete
- Coastal 'zones' in terms of oil spill susceptibility

## **Stage 1 – Crete as a first case study**

- Distribution of oil platforms and current number
- Oil spills under perspective
  - ✦ Weight vs. volume
  - ✦ Average volume per platform, per year

## **Stage 2 - North Sea stats on oil spills**

## **Stage 3 - Cyprus: Involvement of industry and civil protection**

**The final result - Use of scientific data to train civil protection and industry stakeholders**

**Conclusions and application of the project at a regional level**



# **PART 1**

## **CRETE AS ONE OF THE KEY CASE-STUDIES IN NEREIDS**



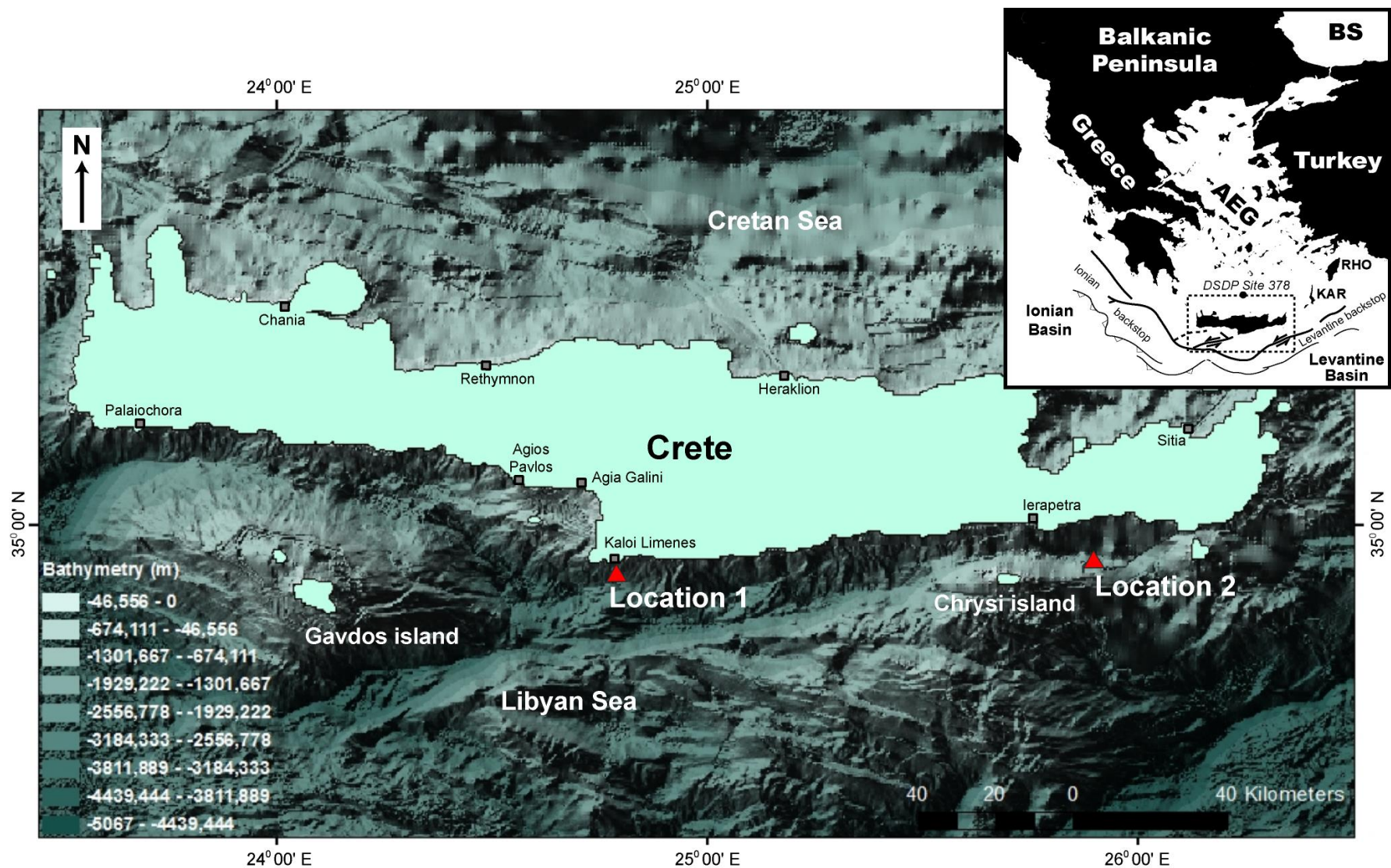
# Previous Oil Spills in Greece (source ITOPF)



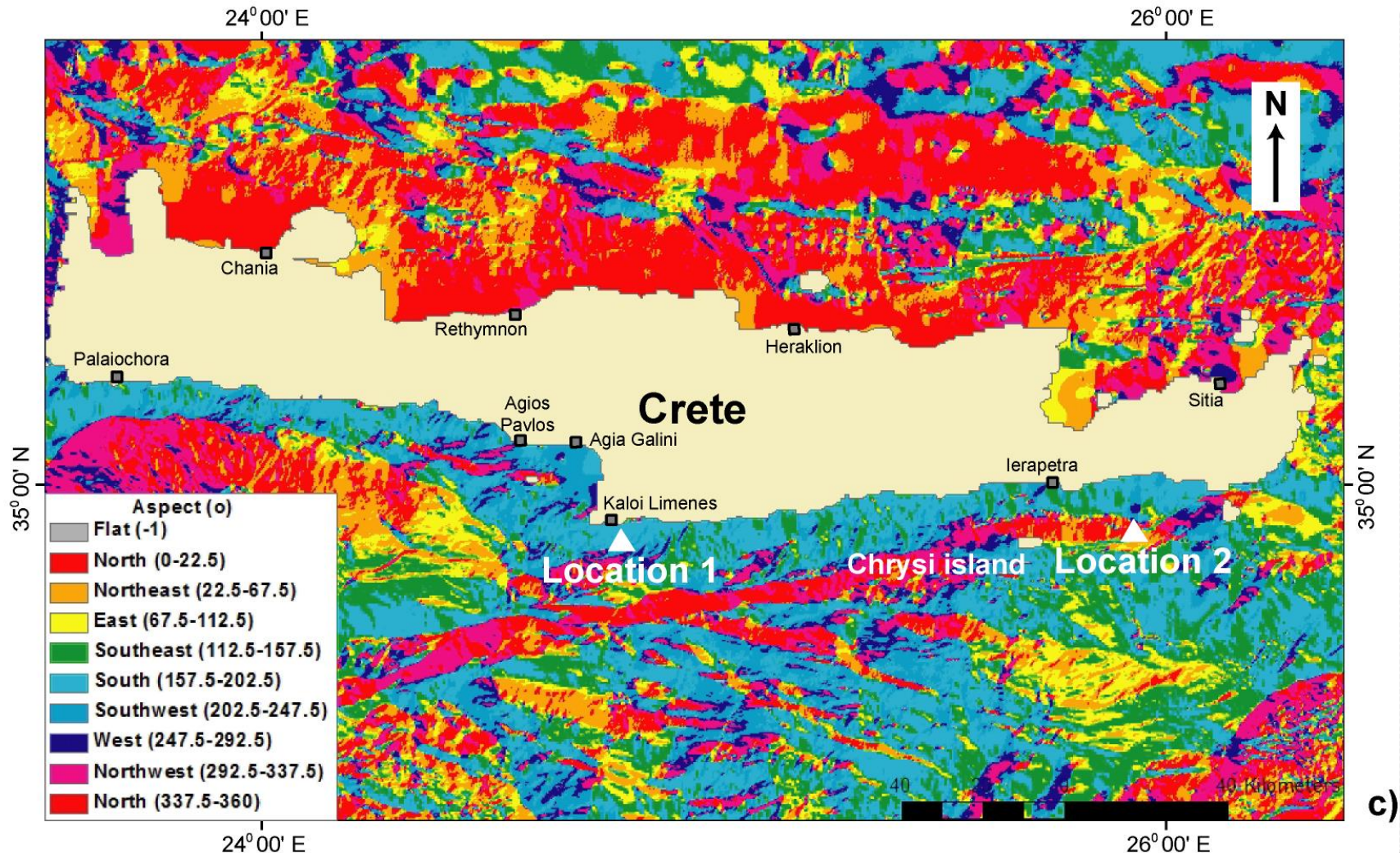
- Grounding of the MESSINIAKI FRONTIS (1979) – S Crete
- Sinking of the IRENES SERENADE (1980)
- Grounding of the ILIAD (1993), Pylos Harbour
- Collision of the GEROI CHERNOMORYA (1992) – 8,000 tonnes of crude oil spilt
- Collision of LA GUARDIA (1994) with refinery supply pipes spilt 400 tonnes of heavy crude oil in Aspropyrgos
- The KRITI SEA (1996) spilt 300 tonnes of Arabian light crude oil whilst Isthmia.
- Explosion of SLOPS (2000) suffered in the port of Piraeus.
- M/V EUROBULKER X (2000) leaked 500 tonnes of fuel oil/diesel oil in Lefkandi, central Greece

**Important: Shipping accidents predominate in the accident databases**

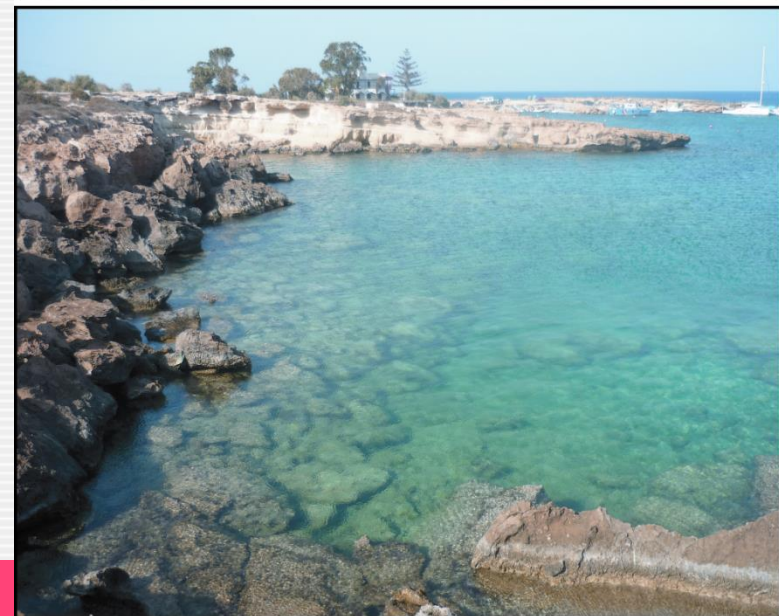
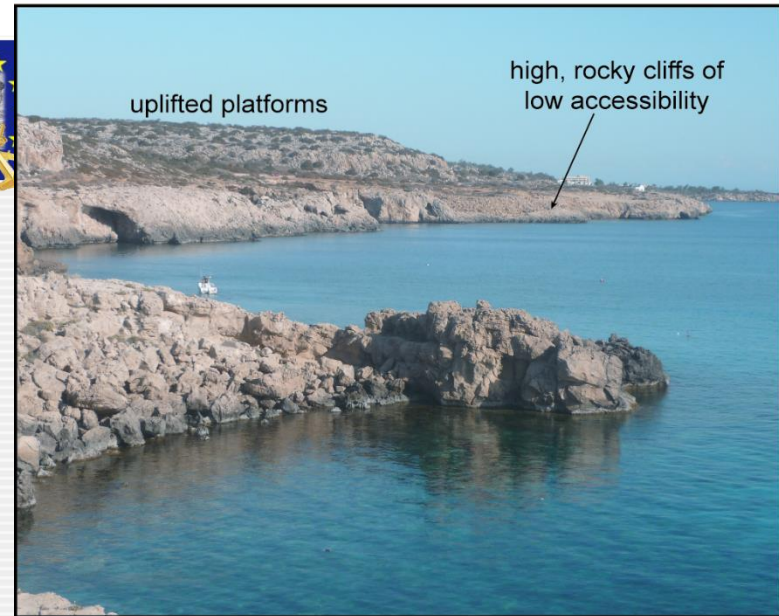
# Step 1: Bathymetric data (0.25 s grid)



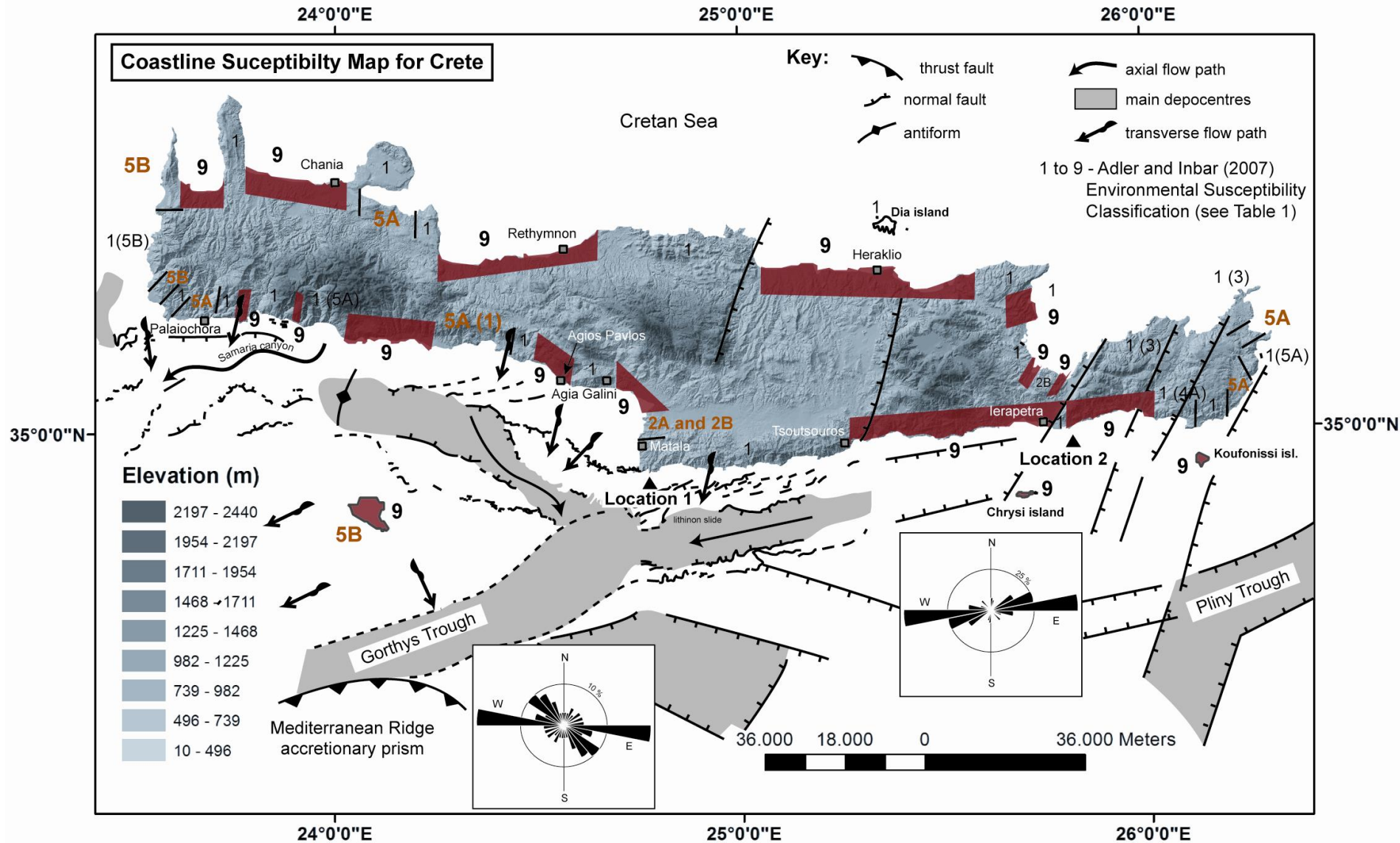
# Step 1(e): Offshore slope aspects



# Step 2: Susceptibility (Adler and Inbar, 2007)

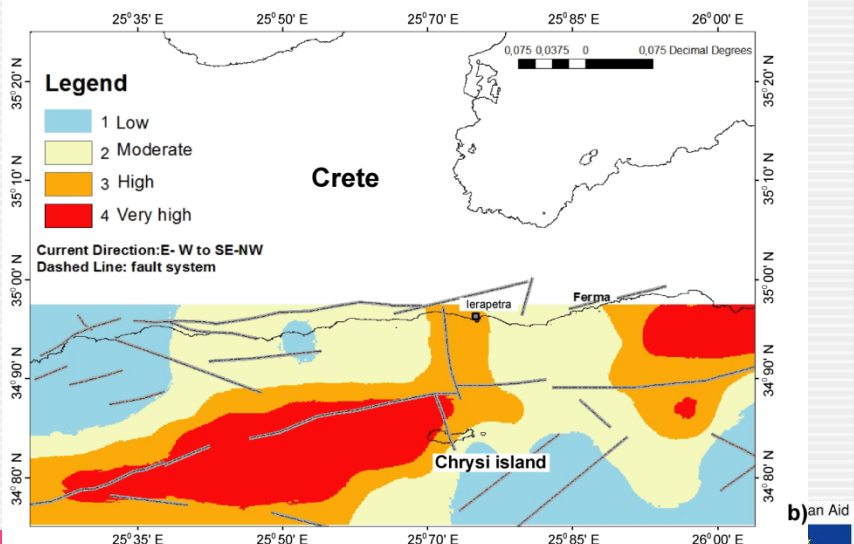
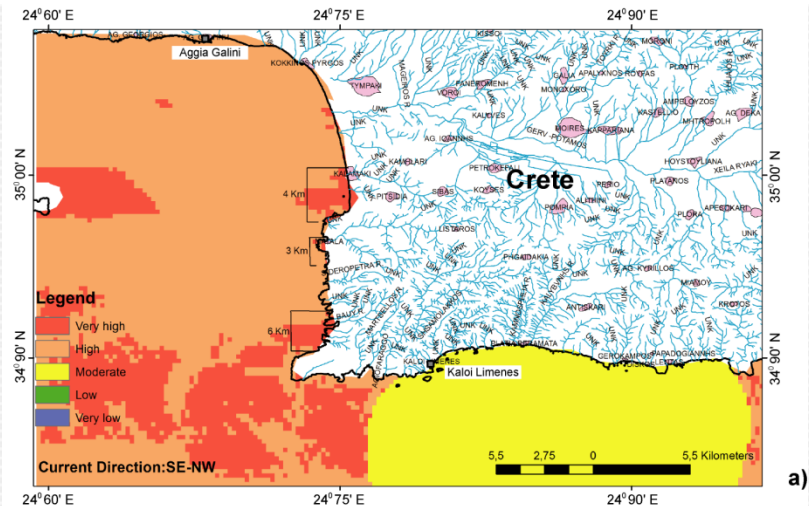
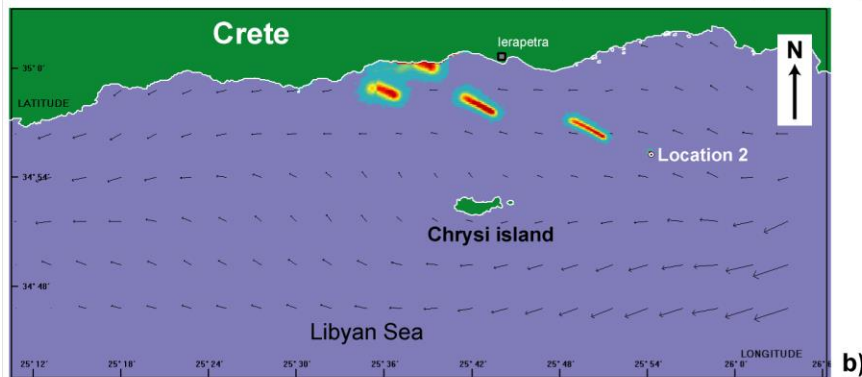
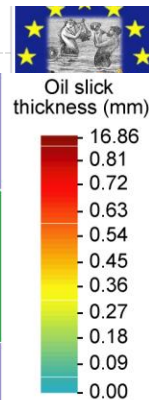
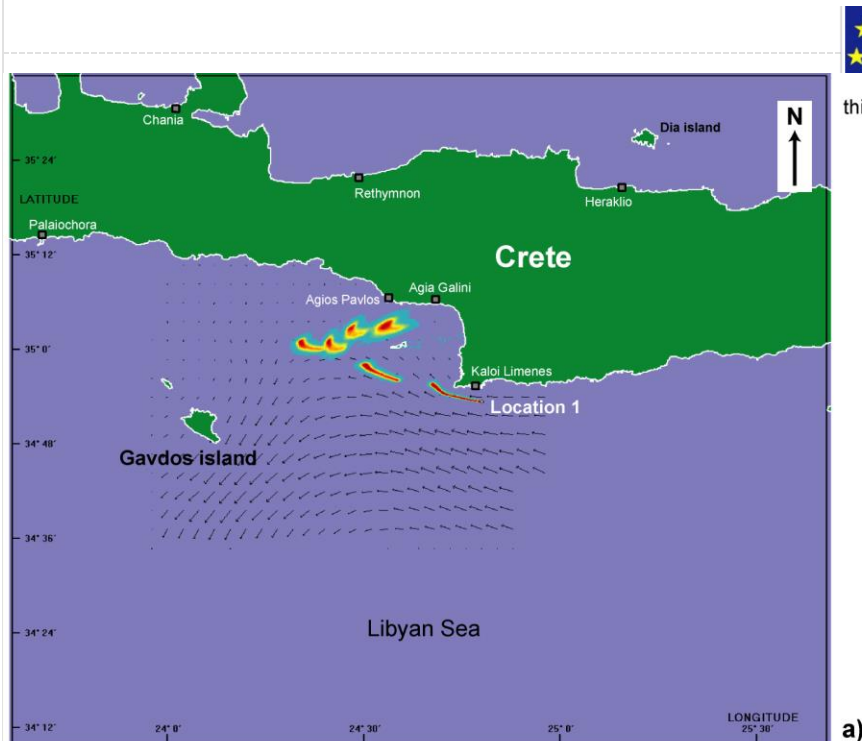


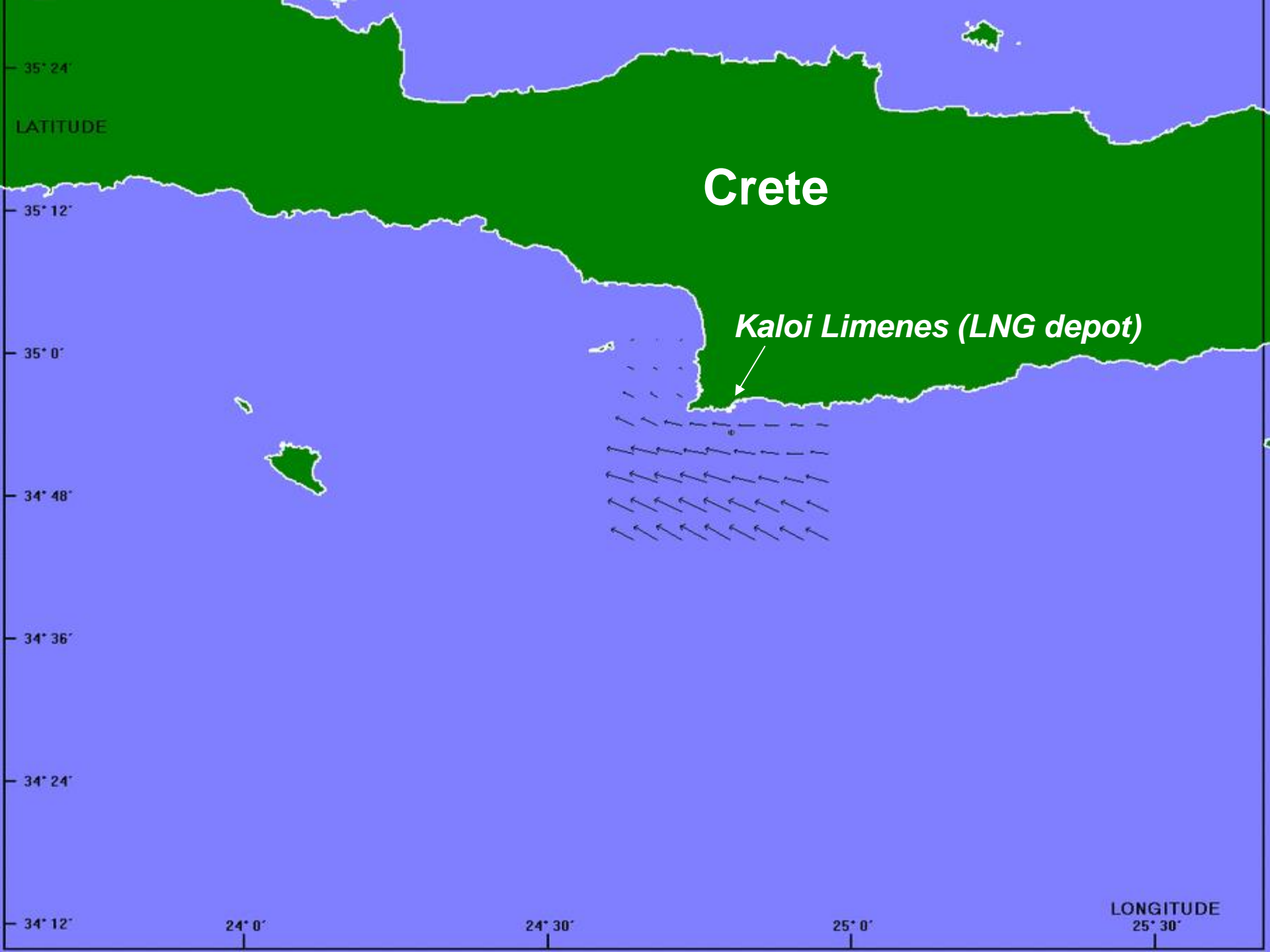
# Step 2: Coastline susceptibility map



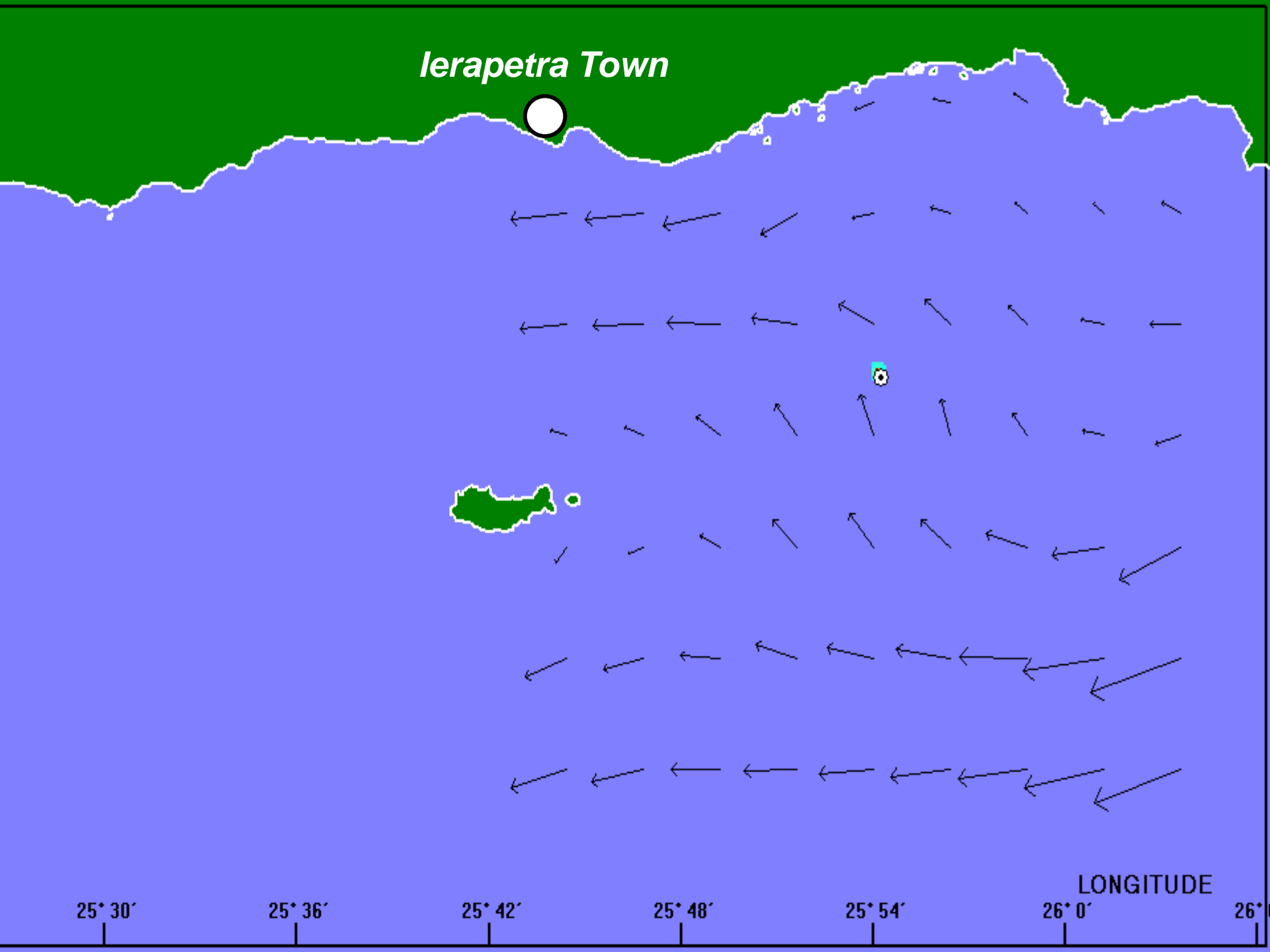
# Step 3: Final Deliverables

## Real-Time Dispersion models and hazard maps





*Ierapetra Town*

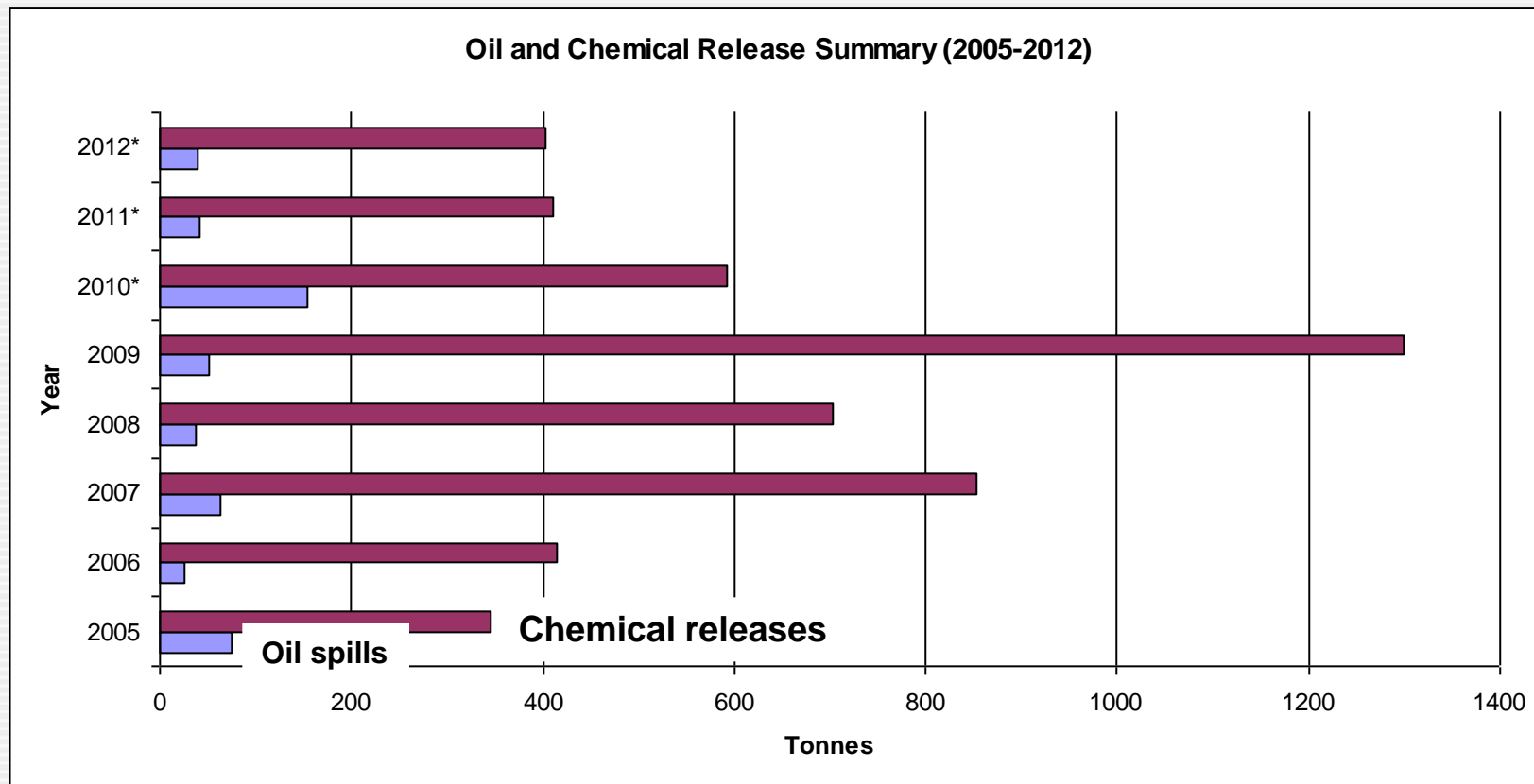




## **PART 2**

# **THE NORTH SEA CASE-STUDY (20<sup>th</sup> vs. 21<sup>st</sup> Century)**

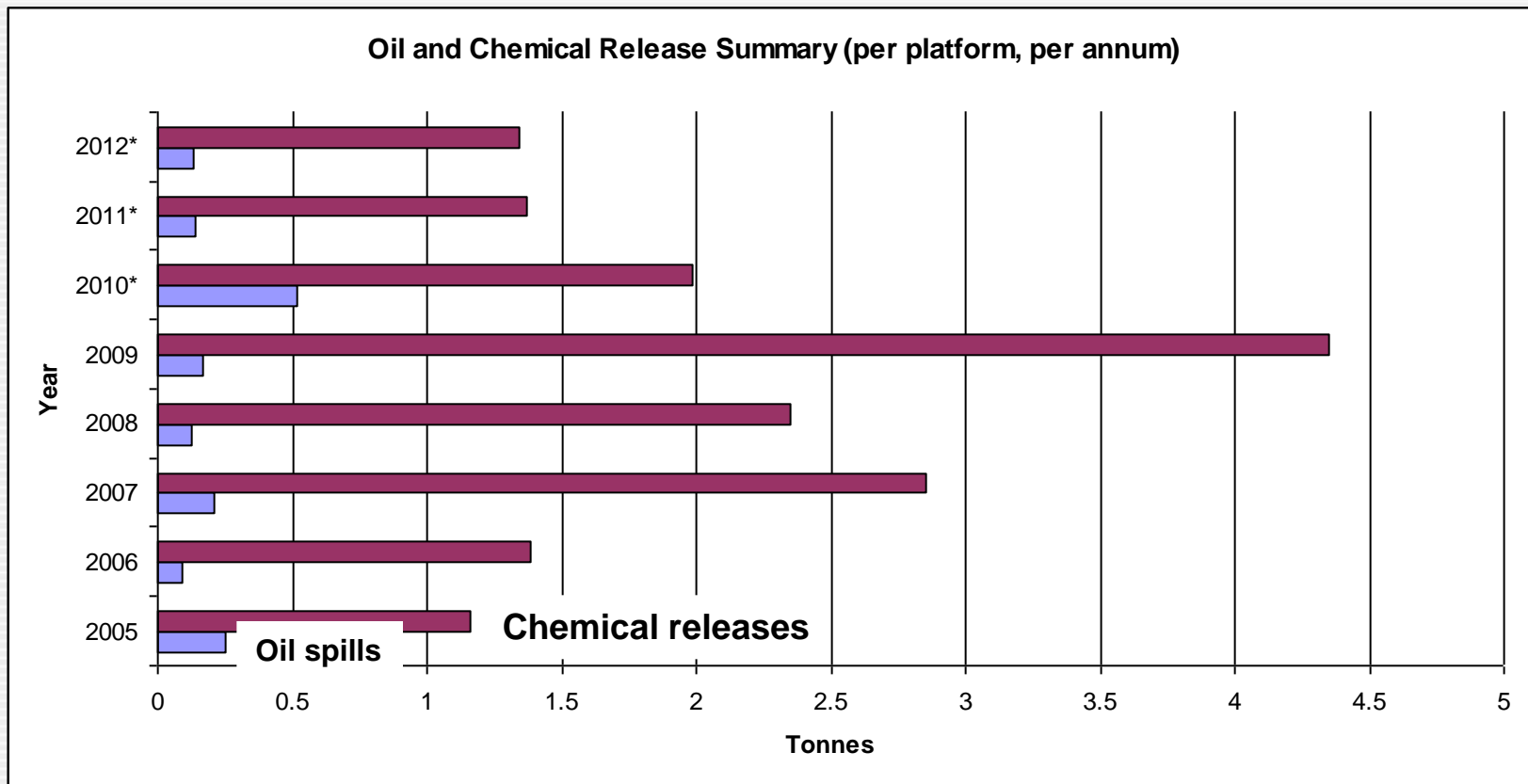
# Oil spills in perspective: 2005-2012 weight



**For 299 active platforms as of March 2014 (i.e. excluding pipelines)**

Source: Department of Energy & Climate Change (2013)

# 2005-2012 weight per platform, per annum



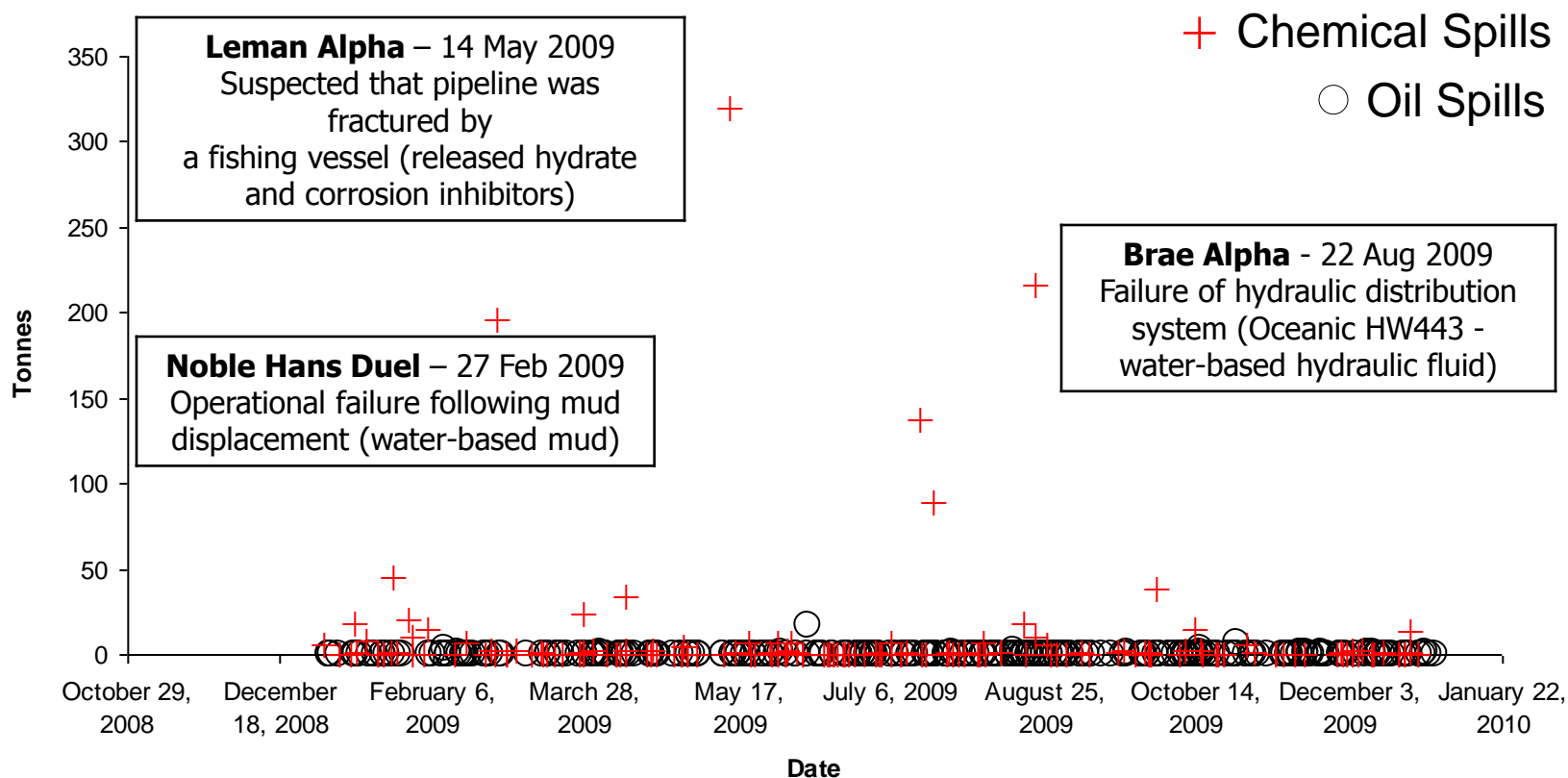
**For 299 active platforms as of March 2014 (i.e. excluding pipelines)**

Source: Department of Energy & Climate Change (2013)

# Some year-on-year data (2009)



Oil and Chemical Spill Records (2009)



Source: Department of Energy & Climate Change (2013)



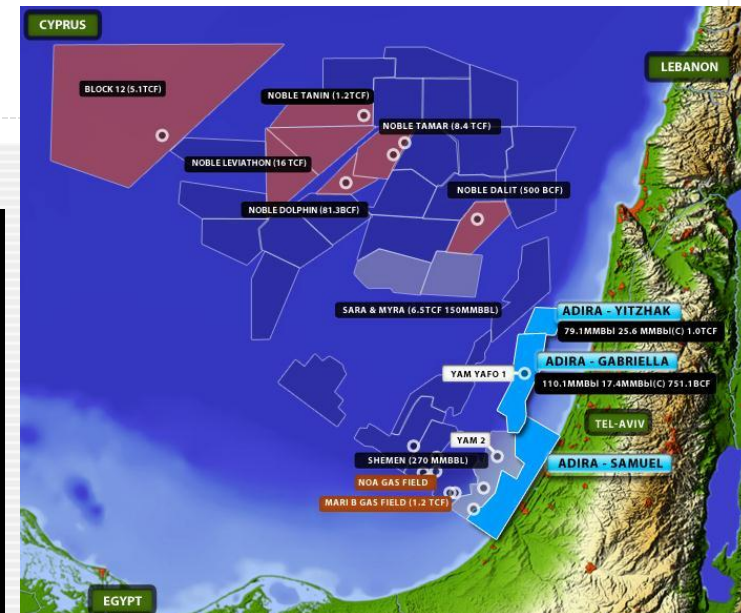
# **PART 3**

## **The Cyprus case-study**

### **(after Zhor and Aphrodite)**

# Cyprus as a gateway to Middle East LNG

## Model Parameters



Used the CYCOFOS 6-h current database

The first 16 hours, the sea currents were directed South and SW

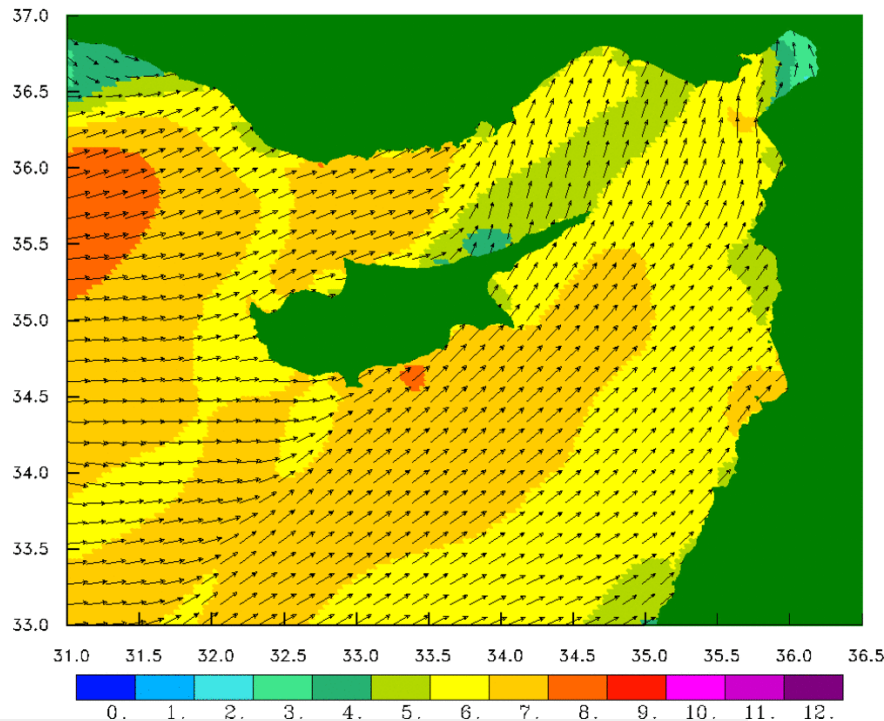
On the 2nd day of the incident, i.e. on the 5<sup>th</sup> December, the currents were directed N and NE

# Environmental data for offshore Cyprus

SKIRON model (UOA)

04/12/2012 at 09UTC

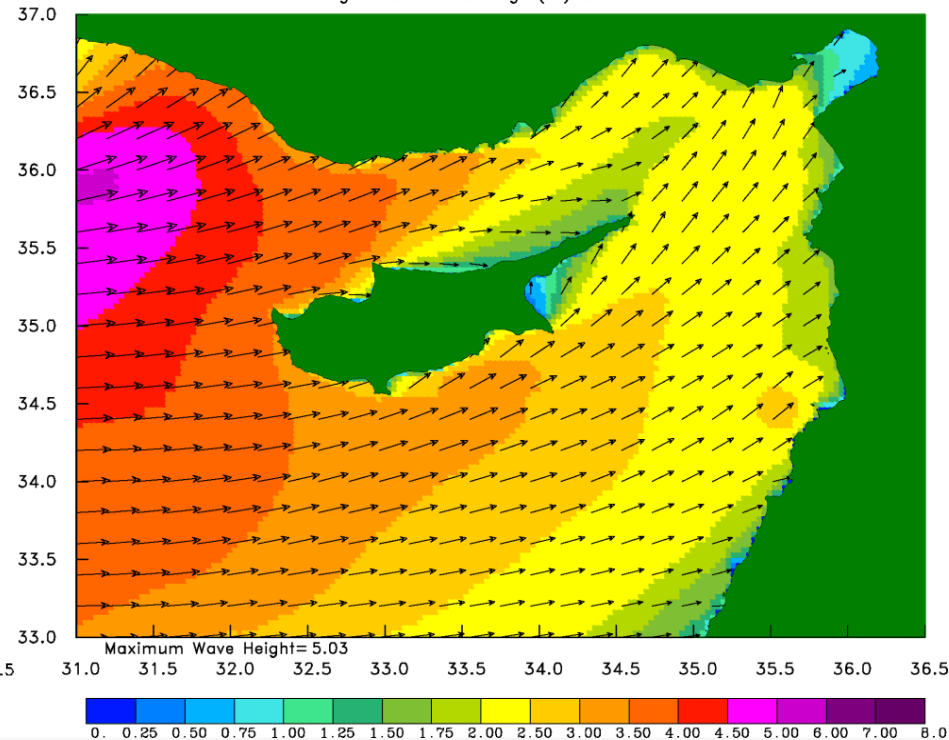
Wind Speed(Bf) and Direction



Cyprus Oceanography Center

4/12/2012 at 09 UTC

Significant wave height(m) and direction



**Used the SKIRON hourly wind fields**

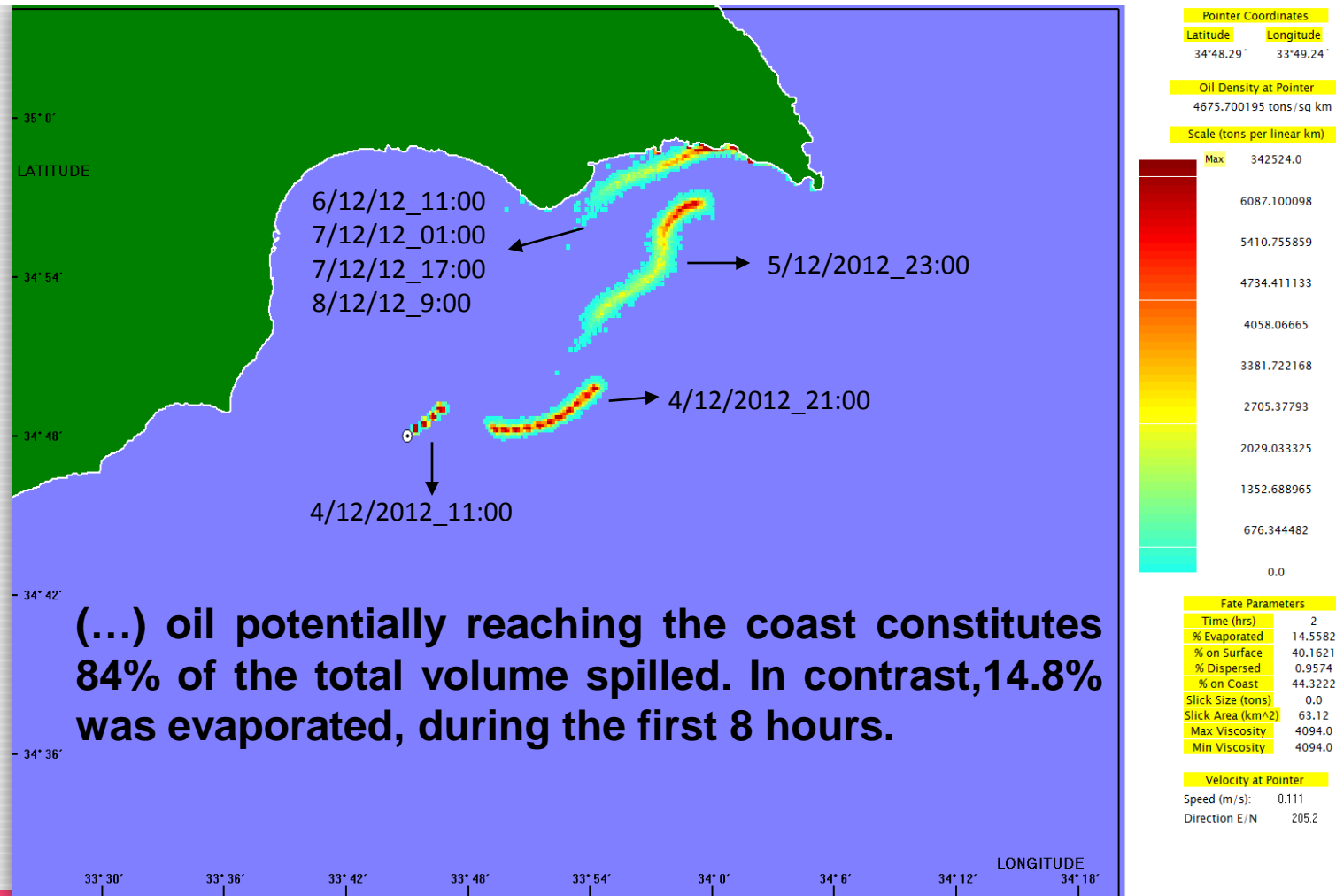
The first 16 hours, the wind was from the West, SW and South. On the 2nd day of the incident, i.e. on the 5<sup>th</sup> December, the wind was blowing from the SW

**Used the CYCOFOS**

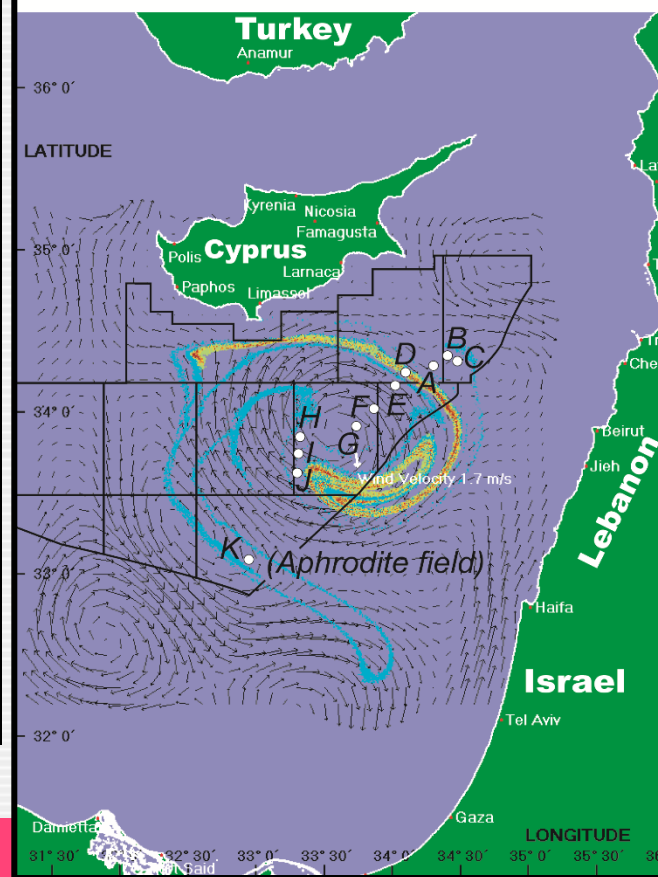
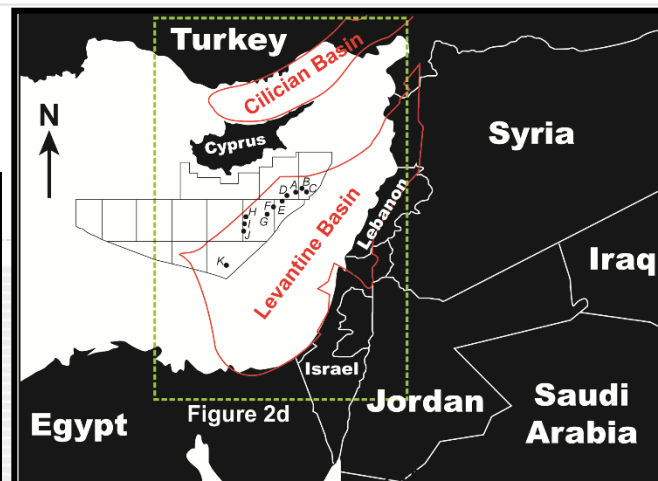
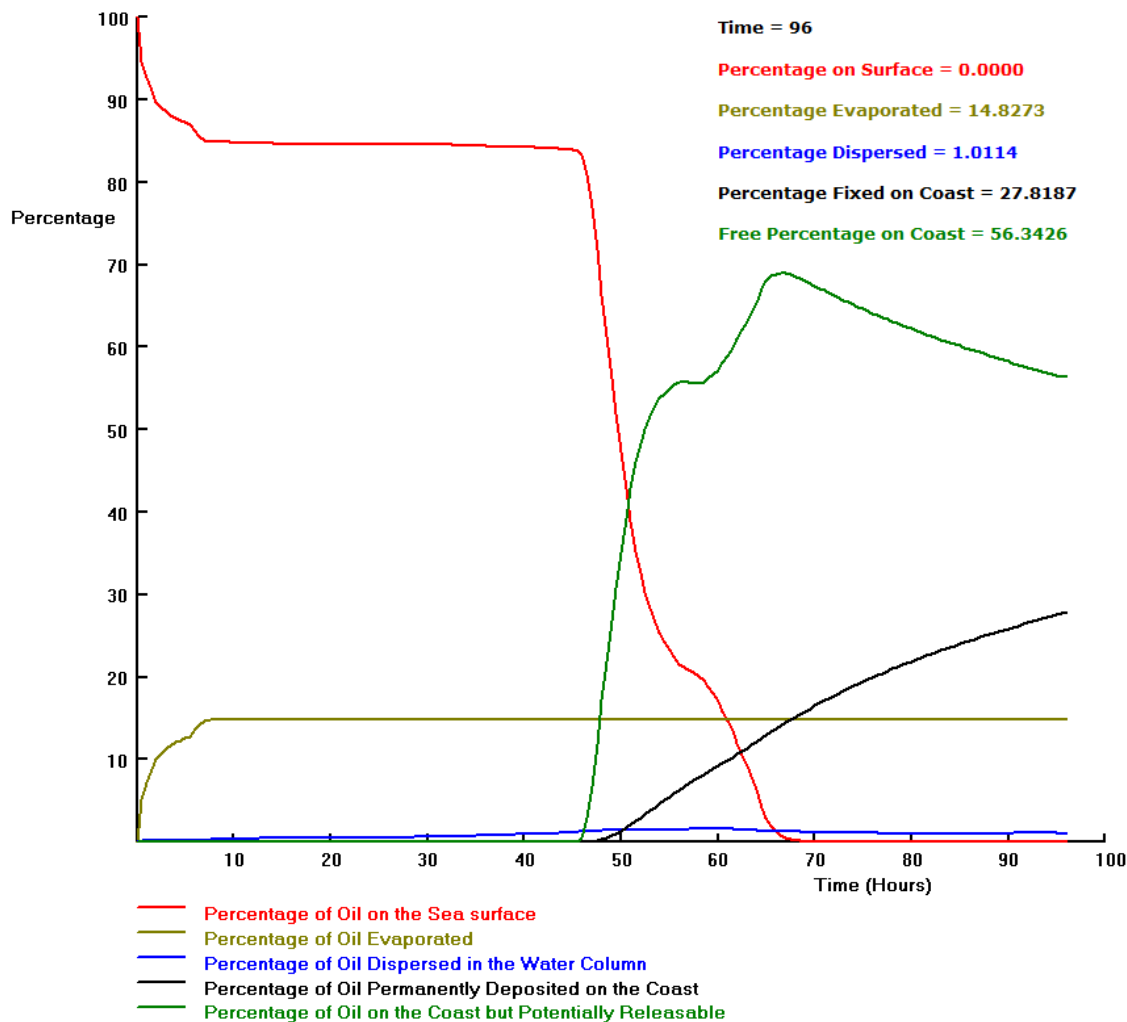
**3-hourly significant wave height**

# MEDSLIK: Baseline modeling

Superimposed oil spill predictions for 96 hrs starting from 4/12/2012 at 9:00 UTC, at selected time intervals



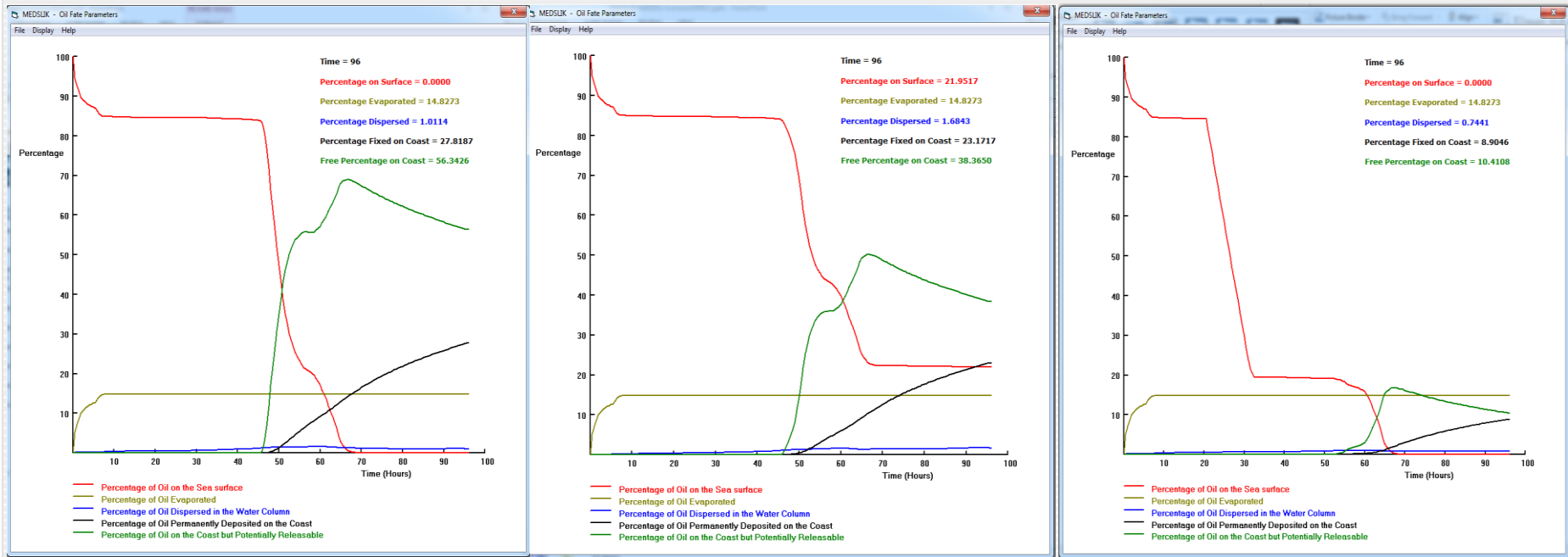
# Outputs: Accident Scenarios



# Comparison of modeling results

Due to the currents, winds and wave action, the shape of the oil spill dispersion covers a large area, which impact the entire shoreline of Ayia Napa.

Therefore, in order to assist the response agencies, MEDSLIK simulated the oil dispersion using virtual booms and chemical spray.



**Oil Fate parameters without any prevention measures**

**Oil Fate parameters after using booms**

**Oil Fate parameters after using chemical spray**

The oil permanent fixed on the coast constitute 84% of the total amount of the oil spill volume. Using booms during response measurements, the oil at the coastline is 61% of the total oil spill volume. Using chemical spray, the oil at the coastline is decreased down to 19% of the spill volume.



# **The present and the (near) future**

# 1 - Table Top Exercises and Training



**Hellenic Coast Guard**

**Civil Protection Greece**

**National Response System**

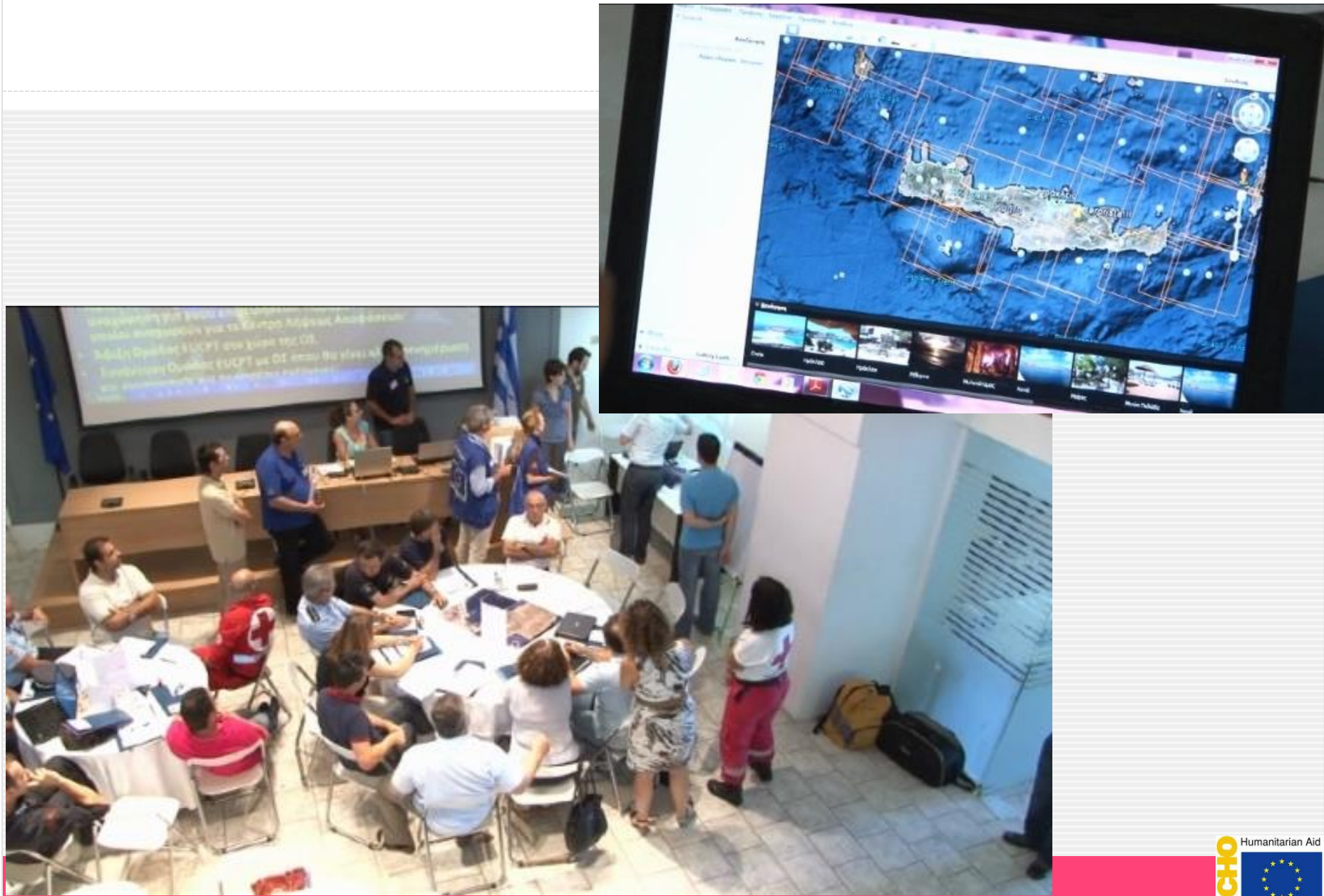
**Hellenic Red Cross**

**Johanniter International**

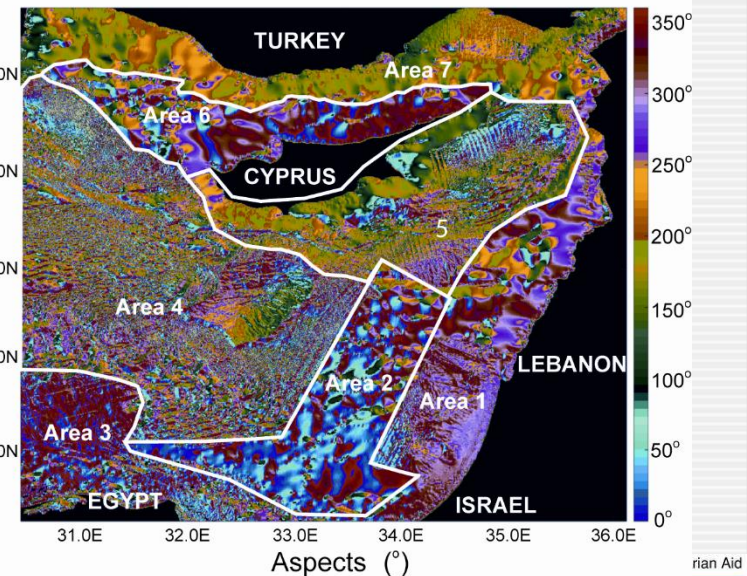
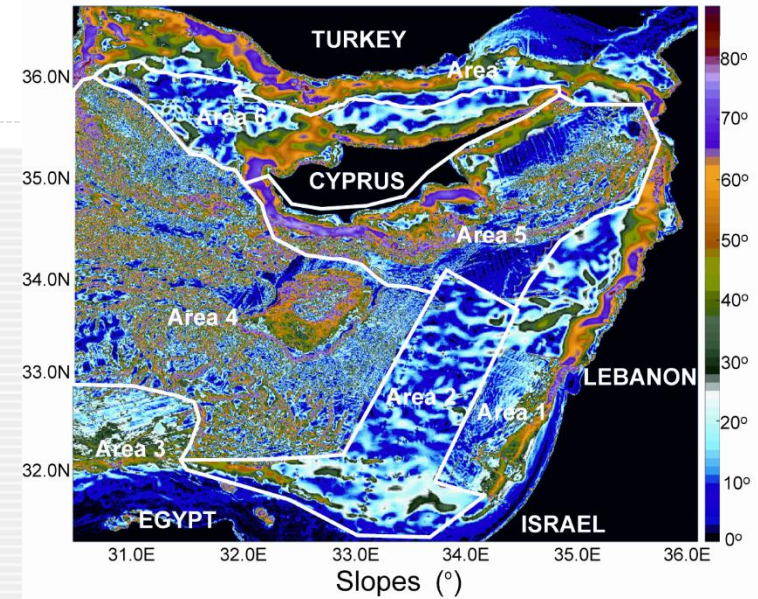
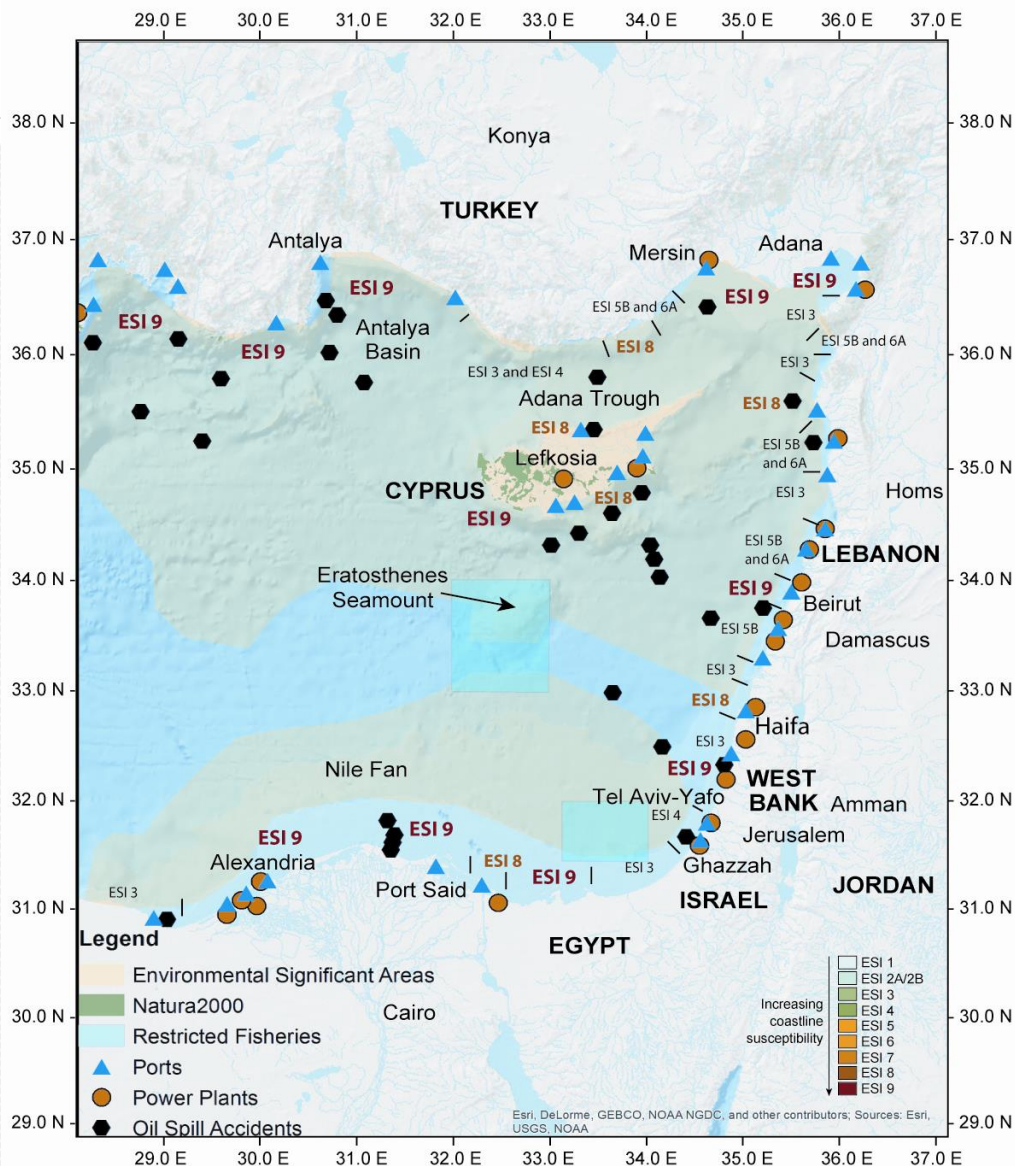
**(as an observer)**



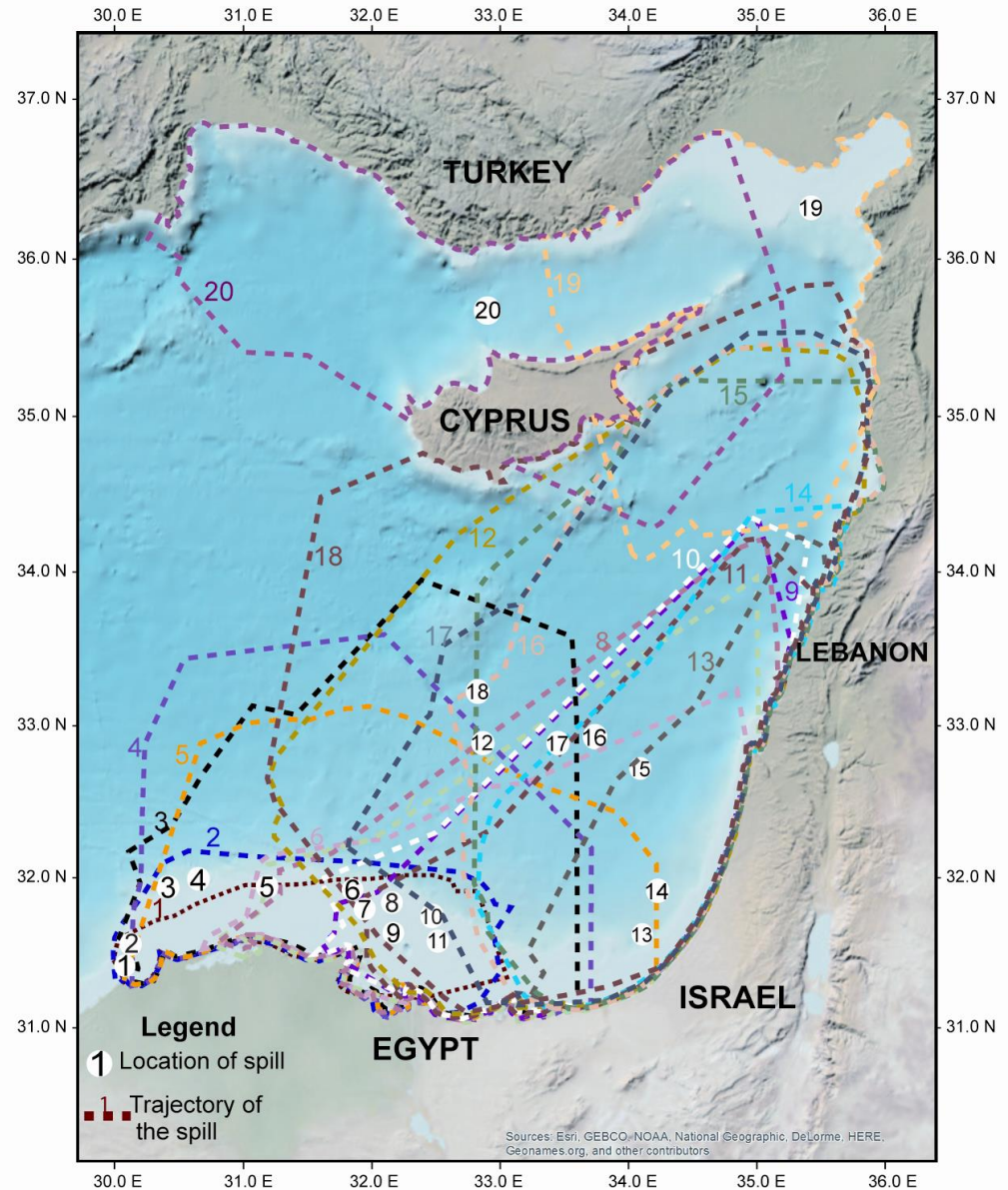
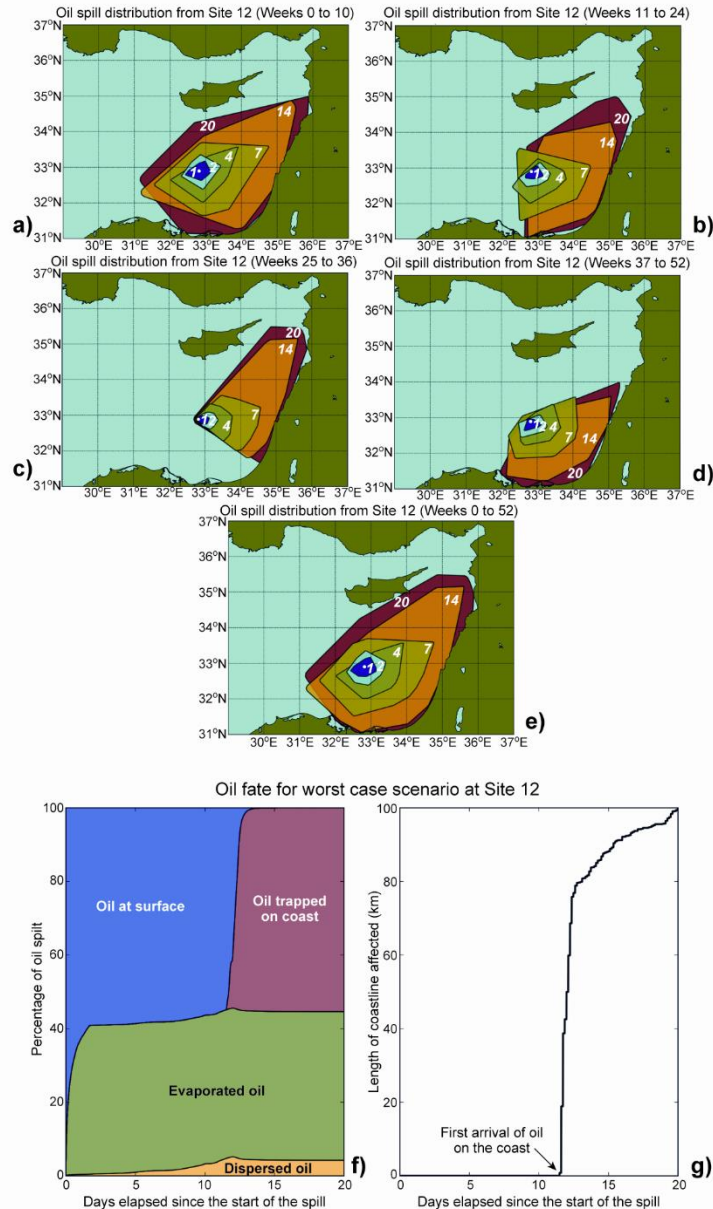
## 2 – Training of ‘Top Brass’ decision-makers



# 3 – Oil spill modeling for the entire E Med



# 4 – Oil spill movement and reaction times



# 5 - Web and database link neighbor countries



NEREIDs

NEREIDs Project

Participants

Advisory Board

Scenarios

Events

News

Contact

## NEREIDs: Embracing Innovation for Preparedness in Civil Protection & Marine Pollution

The "Deepwater Horizon" oil **spill** in the Gulf of Mexico highlights the value of cross-border civil protection and marine pollution preparedness, cooperation, and training, given the current oil and gas drilling activities in SA Mediterranean and the devastating economic and ecological effects of a technological disaster in coasts of such unique natural beauty.

The NEREIDs proposal aims to strengthen civil protection and marine pollution preparedness and cooperation among Greece and Cyprus, building on international standards, best practices, and innovative Information and Communication Technologies (ICT). An eLearning platform building on innovative concepts of **online games**, mobile technologies & apps will train professionals and volunteers in plans and best practices supported by R&D in Greece, UK, and Germany.

Risk assessment techniques supported by cooperation of marine research centres in Greece, Cyprus and the UK, and an incident database including descriptions of incidents in a standard format will provide the basis for Skills development on cross-border cooperation and synergies, the Host Nation Support (HNS) guidelines, and collaboration among professionals and Red Cross and Johanniter-Unfall-Hilfe volunteers.

Two table-top exercises, multiple information days, and a final conference organized by civil protection & marine pollution authorities, will provide engagement opportunities for members of the European Civil Protection Mechanism (ECPM). Three evaluation workshops will support co-operative design of training material for skills development and knowledge retention.



### Links

DG ECHO

POSEIDON

NEREIDs Project | powered by FORTH-ICS

**MSL**  
**250**

**Aqua Control**

Water Treatment



# Water Treatment Solutions



**Meydansolutions Ltd.**

# HOW IT WORKS

# MSL 250

## Aqua Control

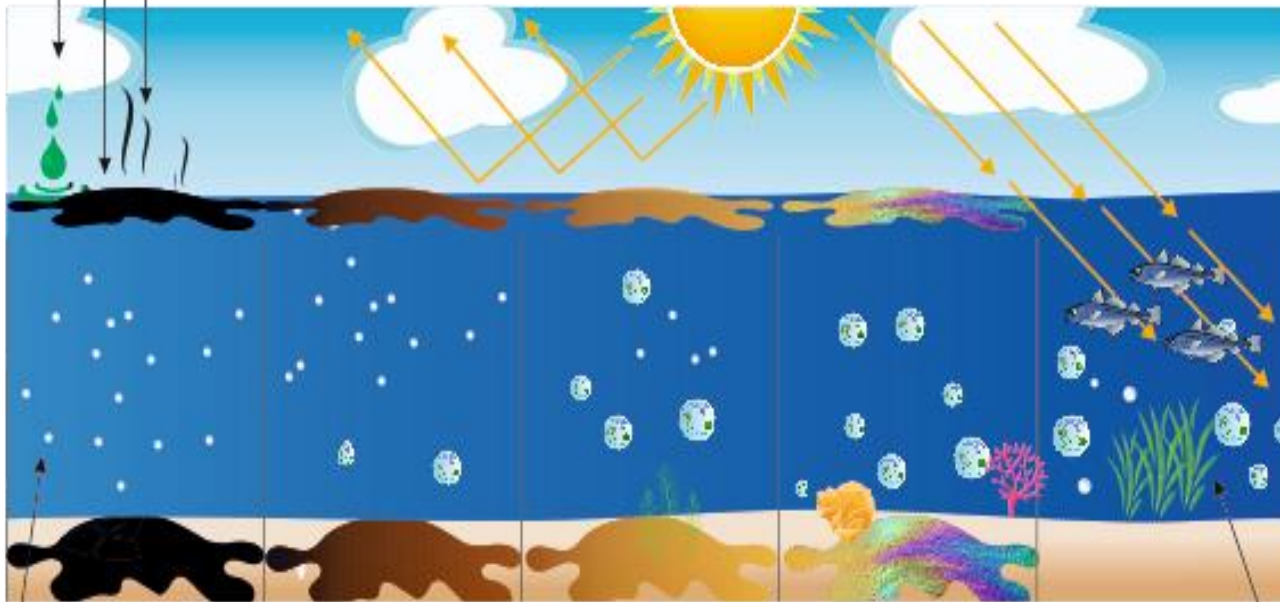
## Water Treatment

It works for oil at sea surface and at the water column, as well as old oil that was stuck on the sediment

MSL 250 Aqua Control

Oil Spill  
CO<sub>2</sub>

Water flow direction



Stage 1  
black

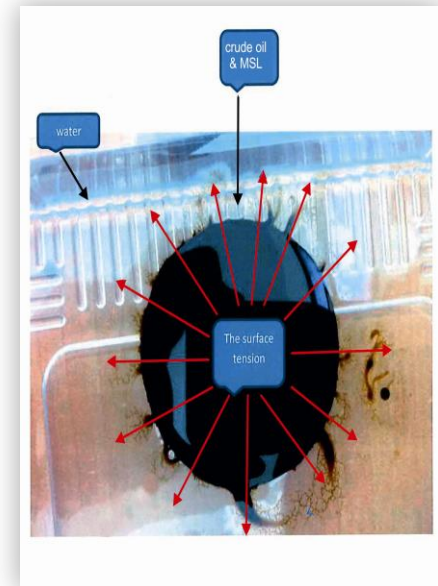
Stage 2  
brown

Stage 3  
light brown

Stage 4  
sheen

Stage 5  
clean

Biological marine components, Phytoplankton, Zooplankton, Bacteria, Microorganisms, sodium chloride, Algae, Fish & different marine fauna, Minerals & bottom soil component.



# Conclusions



- There is a need for clarifying plans and responsibilities among the various agencies that are involved in such disasters as well as signing Agreements between the various Authorities and agencies in order to avoid confusion and losing valuable time.
- Some authorities have lack of experience in such accidents. They should repeat the Exercise for more practice.
- Regarding the activation of the Union Protection Mechanism, the majority concluded that the 4 management teams / modules that were requested for assistance are considered too many for such an incident. Two teams should be enough.
- In Cyprus, Civil Defence is responsible for training its volunteers for marine pollution response. There are also other volunteer teams in Cyprus that should update their plans and training in case they want to assist in marine pollution incidents.
- In Cyprus, Civil Defence activates and updates all volunteer teams. After the activation they work under Fisheries' Dept. coordination which has the leading role based on the special plan for marine pollution response.