

**LABORATORY OF MARINE GEOLOGY
AND PHYSICAL OCEANOGRAPHY**

DEPARTMENT OF GEOLOGY

UNIVERSITY OF PATRAS

26500 PATRAS - GREECE

TEL/FAX: 2610-996275

e-mail: gpapathe@upatras.gr



LABORATORY FACILITIES

The Laboratory has at its disposal highly sophisticated instruments, which can be used for the acquisition of: (i) Hydrographic and Marine Geophysical data, (ii) Oceanographic and environmental data and (iii) Benthic and Geotechnical data.

RESEARCH VESSEL



A 16m long vessel, suitable modified, is available for marine remote sensing surveys.



1. Marine Geological surveying

1.1. Marine Geophysical Surveying

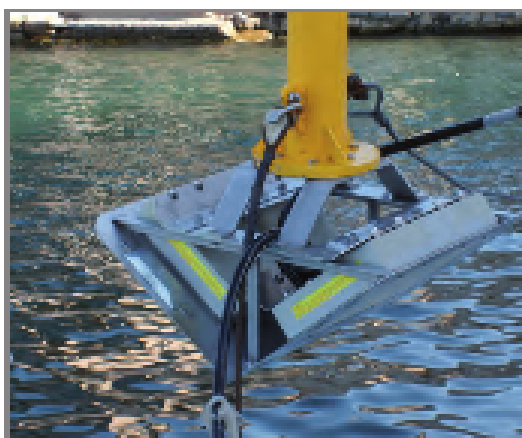
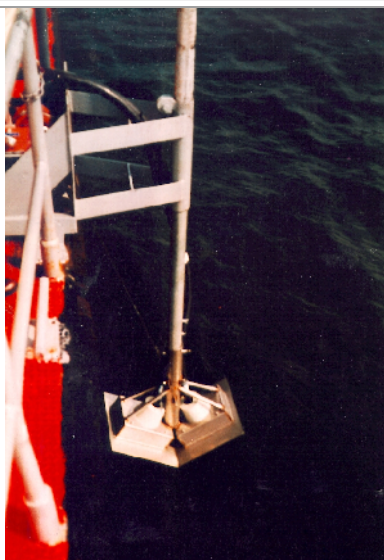
1. Multi-beam echosounder (MBES) Elak Nautic Seabeam 1185 (600 m maximal depth)
2. Subbotom profiler Kongsberg GeoPulse Plus-GeoAcoustics Universal Sub-Bottom-Profiler. Digital Chirp and Pinger Sub-Bottom Profiler with 4 transducers.
3. Subbotom profiler 3.5kHz Pinger, O.R.E.-Geopulse with 4 and 9 transducers.
4. Subbotom profiler Sparker S.I.G. (50 to 1500 joules)
5. Bolt Airgun (10 to 40 inch³)
6. S.I.G. Hydrophones:
 - a) 1 channel, 4 cells.
 - b) 1 channel, 8 cells
 - c) 2 channels, 4, 8, 12 cells
7. Geopulse Transceiver/Receiver and KEMO Receiver, analogue recorders E.P.C. 1600, 1650 and E.P.C. - G.S.P. 1032.
8. Digital Acquisition System Triton Imaging Inc
9. Edgetech 4200 SP digital towfish dual frequency with 200m armoured tow cable capable of operating in water depth up to 600m and 4200-P Topside Processor with Discover Software.
10. E.G&G. 272 TD towfish with 50m, 200m and 600m double armoured tow cable capable of operating in water depth up to 300m and Edgetech 4100 P Topside Processor with Discover Software.
11. Remote operated vehicle (R.O.V) Benthos MKII - Operational depth 300 m
12. Marine magnetometer Overhouse type SeaSPY (Marine Magnetics)
13. Single-beam hydrographic echosounder Elac Nautic Hydrostar 4300



MARINE GEOPHYSICAL SURVEYING

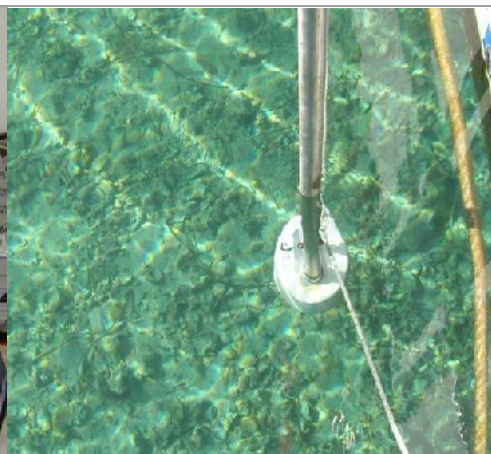
BATHYMETRIC SURVEYS

MULTI-BEAM ECHOSOUNDER (MBES)



Multi-beam echosounder (MBES) Elac Nautic Seabeam 1185 (300 m maximal depth - can be upgraded to 600 m)

HYDROGRAPHIC ECHOSOUNDER ELAC Nautic

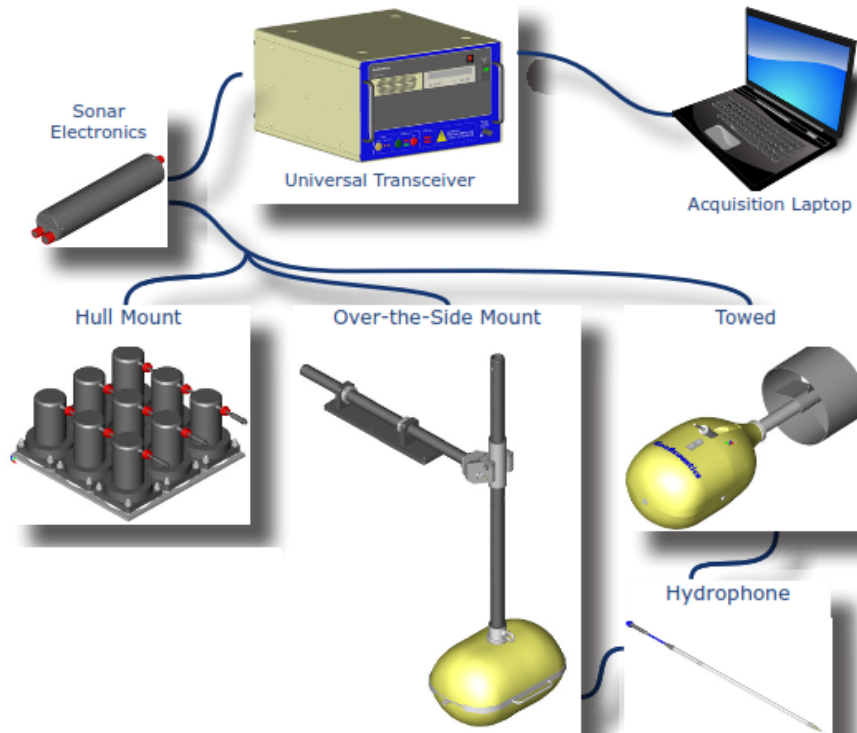


Digital hydrographic dual frequency single-beam echosounder **Elac Nautic
Hydrostar 4300**



SUBBOTOM PROFILERS

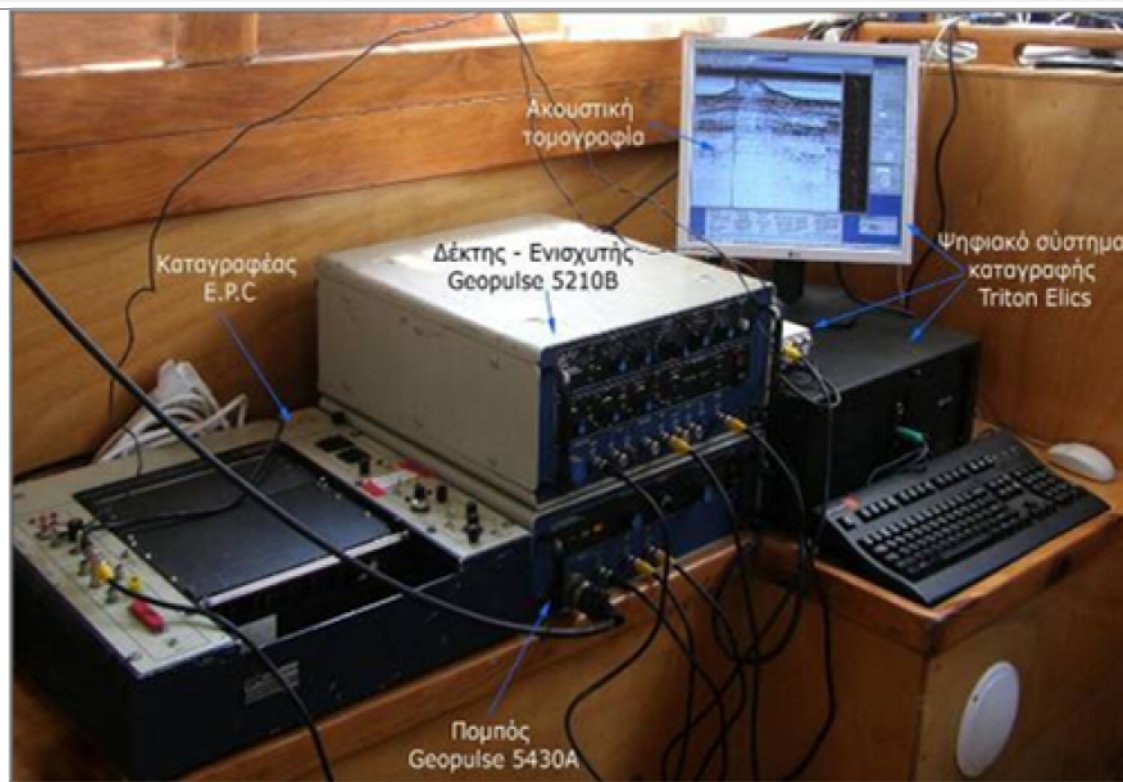
SUBBOTOM PROFILER 'CHIRP' KONGSBERG GEOPULSE PLUS



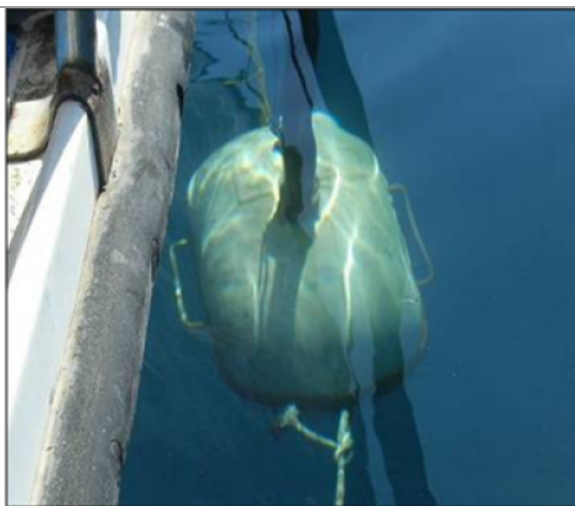
Kongsberg GeoPulse Plus-GeoAcoustics Universal Sub-Bottom-Profiler. Digital Chirp and Pinger Sub-Bottom Profiler with 4 transducers.



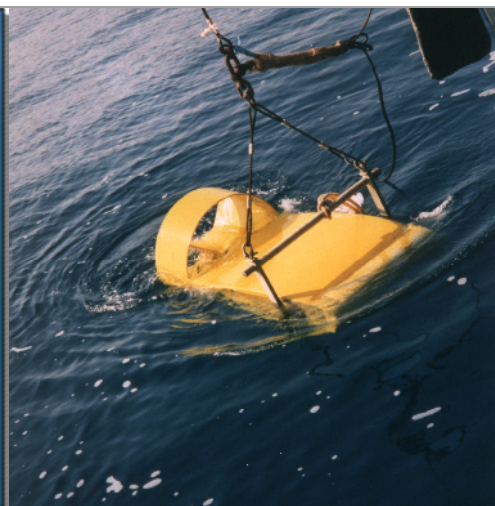
SUBBOTOM PROFILER 3.5kHz



Geopulse Transceiver/Receiver and Digital Acquisition System
Triton Imaging Inc



ORE Pinger with 4 transducers



ORE Pinger with 9 transducers



**SUBBOTOM PROFILER
SPARKER (SIG Sparker System 2000AB)**



S.I.G. Sparker 2000A and 2000B



S.I.G. Hydrophones



Geopulse Receiver and Digital Acquisition System
Triton Imaging Inc



Bolt Airgun (10 to 40 inch³)



**SIDE SCAN SONAR SYSTEM
Edgetech 4200 SP**



Edgetech 4200 SP digital towfish dual frequency with 200m armoured tow cable capable of operating in water depth up to 200m and 4200-P Topside Processor with Discover Software.

**SIDE SCAN SONAR SYSTEM
EG&G 272 TD with 4100 P Topside Processor**



Edgetech 4100 P Topside
Processor with Discover Software



E.G.&G. 272 TD towfish



**MARINE MAGNETOMETER
OVERHOUSER MARINE MAGNETOMETER
SeaSPY**

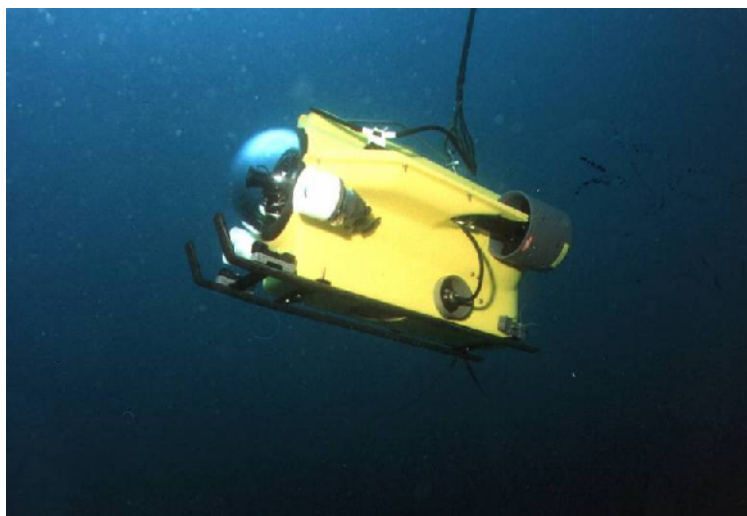


Overhouse SeaSpy Magnetometer



Digital Recording system

REMOTED OPERATED VEHICLE



Benthos MKII (R.O.V)



1.2. Global Position System (G.P.S.)

1. G.P.S Hemisphere Vector VS101 GPS Compass with two multipath-resistant antennas, differential including L-band, Beacon and SBAS (WAAS, EGNOS, MSAS, etc.) for differential GPS positioning with 0.5m accuracy
2. G.P.S Hemisphere V100 with antennas, differential including SBAS (WAAS, EGNOS, etc.) with 2m accuracy and optional beacon differential (D.G.P.S.).



G.P.S Hemisphere Vector VS101
GPS Compass






G.P.S.Hemisphere V100

1.3. Acquisition and processing softwares

1. Navigation software: Hypack HYPACK®: Hydrographic Survey and Processing Software
2. Navigation software TritonNav - TritonImaging Inc.
3. HYSWEEP for the calibration, data collection and data processing of multibeam sonar data
4. Subbottom profiler acquisition and processing software Cheasapeake Sonar Wiz 5
5. Subbottom profiler acquisition software SB-logger - TritonImaging Inc.
6. Subbottom profiler processing software SB-Interpreter - TritonImaging Inc.
7. Side scan sonar acquisition software Discover 4200 - Edge Tech.
8. Side scan sonar acquisition software Discover 4100 - Edge Tech.
9. Side scan sonar processing software TritonIsis - TritonImaging Inc.
10. Software for mosaics of sss data in GIS environment TritonMap - TritonImaging Inc.
7. Marine magnetometer acquisition software SeaLink - Marine Magnetics.

1.4. Sediment Samplers

1. Gravity Corer 3m long (enthos)
2. Box Corer
3. Day Grab
4. Van-Veen (Hydro-Bios)
5. Corer (KC Kajak)

Sediment Samplers		
		
Gravity Corer	Box Corer	Day Grab



1.5. Laboratory analysis

1.5.1. Grain Size analysis

1. Sieves Analysis for coarse grain sediments
2. MasterSizer 2000 (particle size analyzer) for fine grain sediments

1.5.2. Geotechnical analysis

1. Shearbox - For the determination of the consolidated drained shear strength of a soil material in direct shear.
2. Front Loading Oedometers - for determining the rate and magnitude of consolidation of soil.
3. Casagrande system
4. Vane test

2. Oceanographic/ Environmental surveying

2.1. Multi-parameter seawater sensors

1. SI 600XL [Conductivity, Temperature, D.O., pH, ORP with 80 meter cable for real time]
2. Insitu troll 9500 [Conductivity, Temperature, Pressure, (optical) D.O., Turbidity, pH, ORP with 100 meter cable for real time]
3. Aanderaa RCM9 MK II Multi-parameter seawater sensor (Conductivity, Temperature, Pressure, D.O., Turbidity) and current meter

2.2. Current meters

1. Aanderaa RCM9 MK II Multi-parameter seawater sensor (Conductivity, Temperature, Pressure, D.O., Turbidity) and current meter
2. Aanderaa RCM7 (x2)
3. Acoustic Doppler Current Profiler (A.D.C.P.) Teledyne RD Instruments

2.3. Seawater Samplers

1. Variety of seawater samplers

2.4. Tide Gauges

1. Van Essen tide gauges

2.5. Gas measurements

1. Methane Sensors METS – Franatech for insitu measurements and with a data logger for monitoring.
2. H₂S Sensor AMT – Sea & Sun Technology for insitu measurements and with a data logger for monitoring.



RESEARCH/INDUSTRIAL PROJECTS

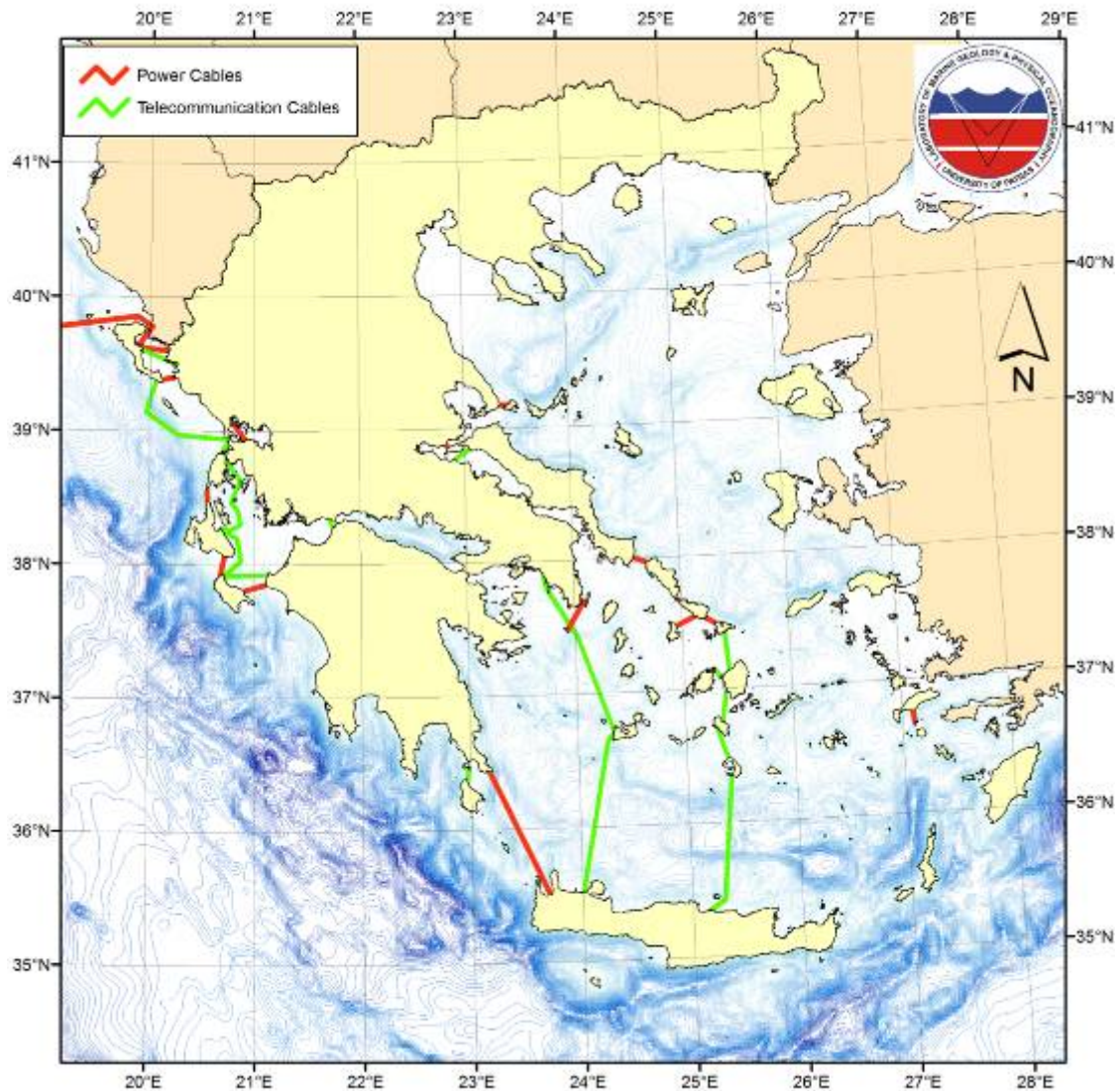
EUROPEAN PROJECTS (FP5, FP7, LIFE, INTERREG)

1. 2002-2004: **ASSEM** Array of Sensors for SEabed Monitoring of geohazards. (Fifth Framework Programme) *European Union*
2. 2005-2008: **PYTHAGORAS-II**, Operational Programme “Education”, E.U./European Social Fund
3. 2007-2008: INTERREG III A GREECE-ITALY (AXIS III, MEASURE 1). **GoW – Water Governance** Implementation of means aimed at improving the water governance and the coastal ecosystem protection.
4. 2009-2012: **HYPOX**. In situ monitoring of oxygen depletion in hypoxic ecosystems of coastal and open seas, and land-locked water bodies (FP7-ENV-2008-1)
5. 2012-2015: **APREH** - Interdisciplinary aquaria for the promotion of environment and history, *European Territorial Cooperation Programme Greece-Italy 2007-2013*.
6. 2012-2015: **SASMAP** - Development of tools and techniques to Survey, Assess, Stabilise, Monitor And Preserve underwater archaeological sites (FP7) *European Union*
7. 2014-2015: **LIFE AMMOS ENV.E-4 – Life Environment & Eco-innovation**
8. 2014-2017: **CYCLADES Life** - *CYCLADES "Integrated monk seal conservation in Northern Cyclades" LIFE12 NAT/GR/000688*

INTERNATIONAL RESEARCH PROJECTS – HYDROCARBON PROSPECTING

9. 2012-2013: Low temperature methanation in geologic environments.
PETROBRAS
10. 2014-2016 Hydrocarbons and CO₂ evolution in mafic and ultramafic rocks.
GasConsult International Inc.USA





POWER CABLES

- 1988 Marine Geological investigations of the seafloor in the Kythera Straits (S.W. Aegean) for the selection of the most suitable route for the laying of submarine power cables between Peloponnesos and Crete.
Client: Public Power Corporation (P.P.C.) of Greece.
- 1990 Evaluation of the oceanographical and geological conditions which prevail in the Otrando straits for the submarine power link between Italy and Greece.
Client: Public Power Corporation (P.P.C) of Greece and Energia-Electricita (ENEL) of Italy.



- 1990 Marine geological survey in the Otranto Straits for the submarine power link between Italy and Greece (in co-operation with Pirelli).
Client: Public Power Corporation (P.P.C) of Greece and Energia-Electricita (ENEL) of Italy.
- 1992 Marine geological investigations of the seafloor in the Tinos-Syros and Tinos-Mykonos Straits (Aegean Sea) for the selection of the most suitable route for the laying of submarine power cables.
Client: Public Power Corporation (P.P.C) of Greece.
- 1992 Marine geological investigations of the seafloor in the Ahladi-Aidipsos and Actio-Preveza Straits for the identification of geological and man-made hazards prior to the laying of submarine power cables.
Client: Public Power Corporation (P.P.C) of Greece.
- 1993 150kV Submarine Power Link: Evia-Andros-Tinos-Mykonos. Land and Marine Survey.
Client: Asso-Divers and Akti Engineering.
- 1993 66kV Submarine Power Link Syros-Tinos-Mykonos. Land and Marine Survey.
Client: Asso-Divers and Akti Engineering.
- 1994 Marine geological/geophysical investigations of the seafloor in the Zakynthos Channel (Ionian Sea) for the selection of the most suitable route for the laying of submarine power cables.
Client: Public Power Corporation (P.P.C) of Greece.
- 1995 Kefalinia-Zakynthos submarine power link: Cable inspection and seafloor mapping for the burial of the cables.
Client: Public Power Corporation (P.P.C) of Greece.
- 1996 Marine geological/geophysical investigations of the Skiathos Straits for the selection of the most suitable route for the laying of submarine power cables.
Client: Public Power Corporation (P.P.C) of Greece.
- 1999 Marine geological/geophysical investigations of the seafloor in the Otranto Straits for the laying and burial of the Italian-Greek submarine power cable.
Client: Public Power Corporation (P.P.C) of Greece and Energia-Electricita (ENEL) of Italy.
- 2000 Marine geological/geophysical investigations in the Killini-Zakynthos strait for the submarine power link between the Greek mainland and Zakynthos island.
Client: Pirelli.
- 2001 Marine geological/geophysical investigations for the laying of power cables between Keratsini and Psytallia, Greece.
Client: Akti Engineering.
- 2010 Marine geological/geophysical investigations for the laying of power cables between Lavrio and Ag. Georgios Isl., Greece
Client: Akti Engineering.
- 2012 Marine geological/geophysical investigations for the laying of power cables between Neapoli and Kythera., Greece
- 2014 Desktop study for the selection of the most suitable route for the laying of submarine power cables between Attiki and Crete.
Client: Public Power Corporation (P.P.C.) of Greece.



TELECOMMUNICATION CABLES

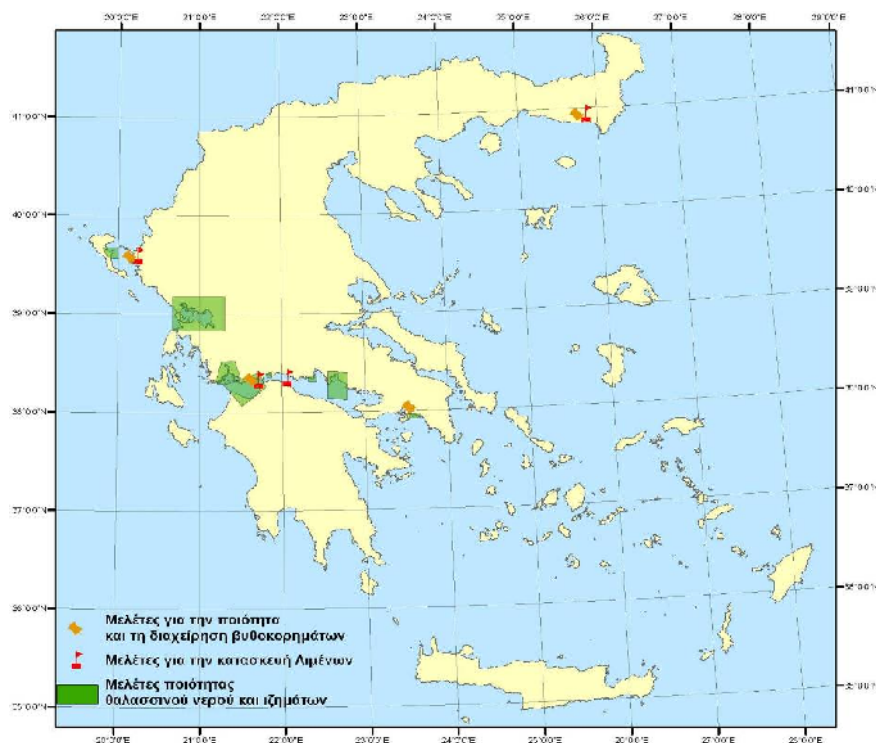
- 1994 Marine geological/geophysical investigations of the seafloor for the identification of geological and man-made hazards prior to the laying of telecommunication cables between Igoumenitsa-Corfu, Preveza-Corfu and Patras-Krioneri.
Client: Akti Engineering.
- 1995 Marine geological/geophysical investigations of the seafloor for the identification of the geological and man-made hazards prior to the laying of telecommunication cables between Athens-Crete (Chania).
Client: Akti Engineering.
- 1997 Marine geological/geophysical investigations of the seafloor for the identification of geological and man-made hazards prior to the laying of telecommunication cables between Arkitsa and Aedeos, Greece.
Client: Akti Engineering.
- 1997 Marine geological/geophysical investigations of the seafloor for the identification of geological and man-made hazards prior to the laying of telecommunication cables between Lechena-Zakynthos-Kefallinia-Lefkada-Preveza, in the Ionian sea.
Client: Akti Engineering.
- 1998 Marine geological/geophysical investigations of the seafloor for the identification of geological and man-made hazards prior to the laying of telecommunication cables between Mykonos-Naxos-Paros-Ios-Santorini and Crete, islands in the Aegean sea.
Client: Akti Engineering.
- 2001 Marine geological/geophysical investigations for the laying of power cables between Keratsini and Psytallia, Greece.
Client: Akti Engineering.
- 2010 Marine geological/geophysical investigations for the laying of power cables between Lavrio and Ag. Georgios Isl., Greece
Client: Akti Engineering.
Client: Akti Engineering.

PIPELINES

- 1991 Marine geological/geophysical survey for the laying of pipelines between Thassos Platform and Keramoti, N. Aegean sea.
Client: Akti Engineering.
- 1993 Marine geological/geophysical survey for the laying of the municipal outfall of Patras.



- Client: Patras water and Sewage Authority.
- 1995 Marine geological/geophysical survey for the laying of the municipal outfall of Corfu, Greece.
Client: Akti Engineering.
- 1999 Marine geological/geophysical survey for the laying of the municipal outfall of Patras, Greece.
Client: Edafomechaniki E.P.E.
- 2000 Revithousa gas pipeline: Seafloor mapping and pipeline inspection.
Client: Akti Engineering.
- 2008 Marine geological/geophysical survey for the laying of pipeline between Salamina Island and N. Peramos.
Client: IANTD.
- 2008 Marine geological/geophysical survey for the laying of pipelines between Attiki and Evoia.
Client: GuD Geotechnik und Dynamik GmbH.



HARBOURS

- 1993 Marine geological/geophysical survey for the construction of the new Patras Harbour.
Client: Triton Engineering Consultants.



- 1997 Marine geophysical investigation along the coastal zone of Tolophonas-Eratini in the gulf of Corinth for the study of the coastal collapse induced by the 1995 Aegion earthquake.
Client: A.D.K. Engineering Consultants.
- 1999 Marine geophysical survey for the dredging of Galaxidi bay, Corinth Gulf.
Client: Marnet.
- 2000 Marine geological/geophysical survey for the construction of the new Aegion Harbour.
Client: Mohlos A.E.
- 2008 Marine geological/geophysical survey for the dredging of Alexandroupolis Harbour.
Client: ELTER A.T.E.
- 2008 Marine geological/geophysical survey for the dredging of Igoumenitsa Harbour.
Client: ELTER A.T.E.
- 2009 Marine geological/geophysical survey for the construction of Kimi Harbour
Client: Municipality of Kimi
- 2009 Marine geological/geophysical/hydrographic survey for the construction of Strofades Island, Ionian Sea.
Client: The Holy Metropolis of Zakynthos and Strofadon

OCEANOGRAPHIC/ENVIRONMENTAL SURVEYS

- 1987 Distribution of the red-mud slurry discharged by a bauxite processing factory on the seafloor of the Corinth Gulf.
Client: Viotia County Council.
- 1993 Patras Outfall Investigations: water quality, water circulation patterns and modelling effluent dispersion.
Client: Patras water and Sewage Authority.
- 1994 Marine Environmental study of Bauxite tailing in the Gulf of Corinth.
Client: Aluminium Hellas (Peshiney).
- 1997 Erosion along the Aegialia coastal zone caused by earthquake and wind induced waves.
Client: Achaia County Council.
- 2001- 2003 Patras municipal outfall water quality monitoring.
Client: Patras Water and Sewage Authority.
- 2002-2004: Array of Sensors for SEabed Monitoring of geohazards. Oceanographic Surveys on Patras and Corinth Gulfs.
Client: European Union
- 2003 Marine Environmental study of the dredging material of Patras Harbour.
Client: .L.P.A. A.E.
- 2004 Marine Environmental study of the dredging material of Pireaus Harbour.
Client: .L.P. A.E.
- 2008 Marine Environmental study of the dredging material of Igoumenitsa Harbour.



LABORATORY OF MARINE GEOLOGY AND PHYSICAL OCEANOGRAPHY DEPARTMENT OF GEOLOGY UNIVERSITY OF PATRAS	JUNE 2015
--	-----------

Client: ELTER A.T.E.

2009-2011 Marine Environmental study of Pamvotida lake (Ioannina)

Client: Prefecture of Ioannina

2010-2011 Marine Environmental study of Amvrakikos Gulf

Client: Prefecture of Preveza

