"TELEMACHOS": Operational Seismic Risk Management System of the Ionian Islands Region
Beneficiaries of the "TELEMACHOS" Project

**Project Team Coordinator:**
Tsoukas Dionysios – Vice Governor of Regional Energy and Environment

**Lead partner:**
Region of the Ionian Islands - Independent Civil Protection Directorate: Head Konstantinos Karidis

**Partners:**
Ionian University: Associate Professor Markos Avlonitis
National & Kapodistrian University of Athens: Professor N. Voulgaris
National Observatory of Athens – Geodynamic Institute: Research Director G. Drakatos
Earthquake Planning & Protection Organization: Dr. A. Kourou
WP Structure

• WP1  Risk Analysis and Evaluation (NKUA)
• WP2  Development of Innovative System (IU)
• WP3  Structuring of Operational Response System (IIR)
• WP5  Procurement & Installation of Scientific Instruments (IU)
• WP7  Monitoring of precursors (NOA)
• WP8  Procurement of Specialized Software (NKUA)
• WP9  Educational & Public Awareness Actions (EPPO)
• WP10 Procurement & Installation of Operational Response Equipment (IIR)
WP1 Risk Analysis and Evaluation (NKUA)

• T 1.1. Processing of Topography Satellite & GIS Basement data
• T 1.2. Geological maps
• T 1.3. Neotectonic maps
• T 1.4. Seismicity maps
• T 1.5. Maps of associated Geodynamic phenomena
• T 1.6. Soil response maps
• T 1.7. Seismic hazard assessment
• T 1.8. Response of traditional and historical buildings
• T 1.9. Building stock vulnerability assessment
• T 1.10. Network and infrastructure vulnerability assessment
• T 1.11. Vulnerability assessment of monuments and cultural landmarks
• T 1.12. Data management and updating
T 1.1. Processing of Topography Satellite & GIS Basement data
T 1.2. Geological maps  T 1.3. Neotectonic maps

• Geodatabase including vector and raster layers

**Vector layers**
- Topographic data
- Geology formations
- Road networks
- Building stock
- ............

Contours

Geological Formations
Geodatabase Raster Data

- Color aerial photograph mosaic (2010) resolution 0.5m
- DEM resolution 5m
- Panchromatic aerial photograph mosaic (1996) resolution 1m
- Satellite images Planet resolution 3m
- Panchromatic aerial photograph mosaic (1945) resolution 1m
T 1.1. Processing of Topography Satellite & GIS data
PS  Interferometry Velocity Field
Continuous GNSS/GPS stations in Western Greece
(Daily processing by NKUA)

Networks:
- NKUA
- NOA
- CRL
- Metrica SA
- Hellenic Cadastre

Time Series from PONT GNSS site (Lefkas island)
T 1.5. Maps of associated geodynamic phenomena
Co-seismic ground deformation
T 1.4. Seismicity maps – General seismicity
T 1.4. Seismicity maps – Earthquake sequences
1.5. Maps of associated geodynamic phenomena

Co-seismic ground deformation

Co-seismic displacement maps (in mm) of 5/2/2019 earthquake event using Sentinel 1 IW SLC pairs of both orbital mode

Descending pair 30/01/2019 and 05/02/2019

Ascending pair 30/01/2019 and 05/02/2019

Epicenter
WP2 Development of Innovative System (IU)

• T 2.1. Definition of the Innovative System Specifications
• T 2.2. Design and Development of a low cost strong and weak ground motion monitoring network
• T 2.3. Design and Development of a seismological data management system for a large array of sensors
• T 2.4. Development of stochastic algorithms for real time seismological data processing
• T 2.5. Software development for seismic risk mitigation decision support
• T 2.6. Standardized information dissemination system for authorities, stakeholders and general public
T 2.2 Design and Development of a low cost strong and weak ground motion monitoring network

- A low-cost system for detection and monitoring
- Innovative by using low cost mems of accelerometer sensors and velocity sensors
- Easily expandable - Easy to use
- Portable (easily transported to the measurement field)
- Energy autonomous
- Data storage on usb stick
- Ability to compress and send data for remote monitoring
Low cost strong and weak ground motion monitoring field tests
Current recording systems have great configuration and parameterization features, such as:

- Changing Arduino UNO R3 microcontroller with Raspberry Pi (model b+)
- Use a faster and a higher A/D converter (at least 24bit - sampling rate> 1Khz)
- Using a better low cost acceleration sensor aiming at more accurate measurements.
- Adding a lead component battery charged by a solar panel for almost complete energy autonomy.
WP3 Structuring of Operational Response System (IIIR)

• T 3.1. Drafting of Operational Response Plans
• T 3.2. Emergency Response Drills and Simulations
WP7 Monitoring of precursors (NOA)

• T 7.1. Tsunami hazard maps and simulations
• T 7.2. Radon emission monitoring
Zakinthos October 26, 2018 Mw 6.8 Tsunami
WP9 Training & Public Awareness Actions (EPPO)

• T 9.1. Development of standardized training and information material
• T 9.2. Training activities for agencies and stakeholders
• T 9.3. On site and e-learning training of instructors
• T 9.4. Training and tutoring focused on the tourist industry
WP5, WP8 & WP10  Infrastructure Procurement

WP5 (IU)
• 7 Complete seismic stations to be distributed in the Ionian islands
• 1 GPS station to be installed in Ithaca

WP8 (NKUA)
• GIS Server and extensions software to support the development and operation of the innovative system

WP10 (IR)
• Computing equipment for Data Center support
• Communication equipment for Field operations support
• Equipment and tools for NGO’s and Agencies
Statue of Telemachus carved by Ludwig Cauer in 1890, displayed in a niche at the foot of the Trillertreppe in the old part of Saarbrücken