ΤΕΙ ΙΟΝΙΩΝ ΝΗΣΩΝ
ΤΕΧΝΟΛΟΓΙΚΟ ΕΚΠΑΙΔΕΥΤΙΚΟ ΙΔΡΥΜΑ ΙΟΝΙΩΝ ΝΗΣΩΝ
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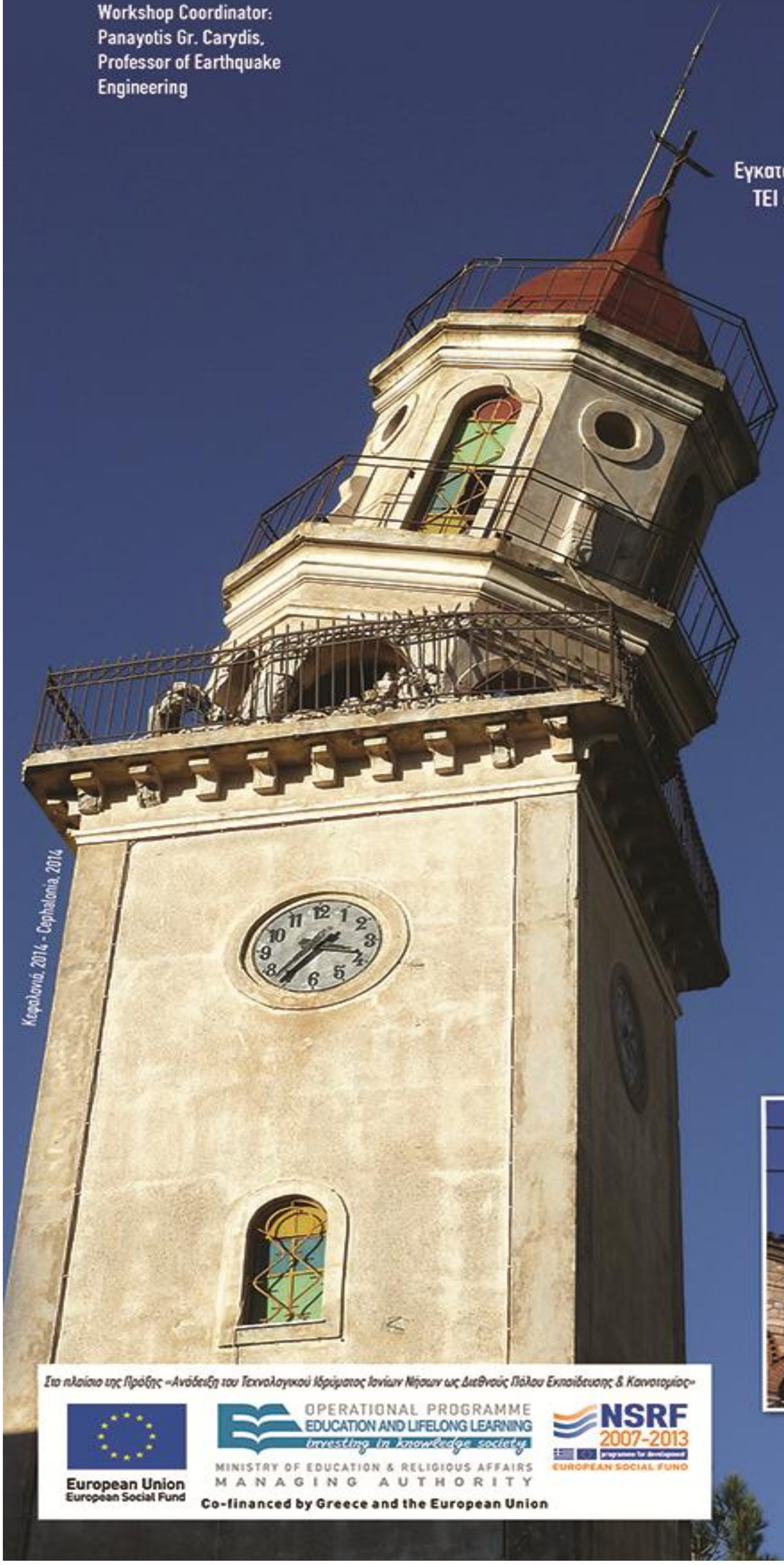
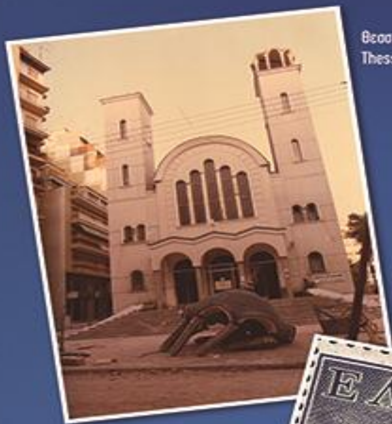
Εγκαταστάσεις ΤΕΙ Ιονίων Νήσων, Λεωφ. Αντ. Τρίτση, Αργοστόλι, Κεφαλονιά
TEI of Ionian Islands Premises, Ant. Tritsis Ave., Argostoli, Cephalonia


Κεφαλονιά, 2014 - Cephalonia, 2014

Καμπαναριά Εκκλησιών μετά από σεισμούς
Belltowers after earthquakes


Θεσσαλονίκη, 1978
Thessaloniki, 1978

Κεφαλονιά, 1953 (γραμματόσημο)
Cephalonia, 1953 (stamp)


Αθήνα, 1999
Athens, 1999

Βρείτε τις 10 ομοιότητες και διαφορές
Find the 10 similarities and differences

Στο πλαίσιο της Πράξης «Ανάδειξη του Τεχνολογικού Ιδρύματος Ιονίων Νήσων ως Διεθνούς Πόλου Εκπαίδευσης & Καινοτομίας»

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THE GEODYNAMIC AND SEISMOTECTONIC SETTING OF CEPHALONIA (IONIAN SEA, WESTERN GREECE) AS FACTOR CONTROLLING THE DISTRIBUTION OF EARTHQUAKE ENVIRONMENTAL EFFECTS AND STRUCTURAL DAMAGE INDUCED BY THE EARLY 2014 EARTHQUAKES (JANUARY 26th and FEBRUARY 3rd, Mw 6.0)

by

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Cephalonia is the largest of the Ionian Islands in Western Greece and is located on the tectonic front of the Hellenic thrust and fold belt developed only a few km east of the Hellenic Trench representing an active plate boundary where the Eastern Mediterranean lithosphere is being subducted beneath the Aegean one. The subduction zone terminates against the Cephalonia Transform Fault Zone connecting the subduction boundary to the continental collision between the Apulian microplate and the Hellenic foreland and playing a significant role in the region's geodynamic complexity.

Historical seismic data indicate that Cephalonia has been repeatedly struck by moderate and strong, shallow earthquakes producing large seismic intensities and causing a large number of human casualties and great economic losses. One more episode in the geodynamic evolution of the island is the early 2014 earthquake sequence comprising two main shocks with the same magnitude (Mw 6.0) occurring successively in short time (January 26th and February 3rd) and space (neotectonic macrostructure of Paliki peninsula in the western part of Cephalonia). According to geological data collected in the field during our reconnaissance immediately after both earthquakes, it is concluded that each earthquake was induced by the rupture of a different pre-existing active fault zone located in Paliki peninsula. Strike-slip displacement can be inferred from the co-seismic surface rupture structures induced by both earthquakes. This coincides with the focal mechanism solutions provided by national and international seismological institutes.

Both earthquakes produced extensive earthquake environmental effects (EEE) mainly in the neotectonic macrostructures of the western Cephalonia and especially in Paliki peninsula, the western part of Aenos Mt and the northern part of Argostoli peninsula. The EEE are classified into primary and secondary. The primary EEE include displacements of tectonic origin (uplift and subsidence) and surface ruptures. The secondary EEE include ground cracks, slope movements, liquefaction phenomena and hydrological anomalies.

The western part of Cephalonia and particularly Paliki peninsula suffered the most damage during both earthquakes. Structural damage was observed in masonry and reinforced concrete (R/C) buildings, monumental structures including monasteries, churches and cemeteries, as well as stonewalls, road network infrastructures and port facilities.

The majority of the buildings constructed with strict earthquake standards after the catastrophic 1953 Cephalonia earthquake sequence showed good performance during both earthquakes since none of them collapsed and no resident was killed or seriously injured. This fact becomes even more important, if we consider that the peak ground acceleration values recorded during both earthquakes are among the largest measured so far in Greece.

The analysis and the comparison of all available data indicates that there is a strong correlation among the pre-existing active fault zones, the detected displacement discontinuities and the spatial distribution of the EEE and structural damage.

BIOGRAPHICAL SUMMARY

Dr. Efthymis Lekkas is Professor of Dynamic Tectonic Applied Geology of the Department of Dynamic Tectonic Applied Geology, Faculty of Geology and Geoenvironment, University of Athens. He has published more than 240 scientific papers on the subjects of Tectonics, Environmental Geology, Seismotectonics, Earthquake Protection, Natural Disaster Management, Geotechnical Engineering, Environmental Land Use Planning, etc., involving research work in Greece, Japan, Taiwan, Italy, Turkey, India, Algeria, Indonesia, Thailand, Pakistan, China, Haiti and New Zealand with hundreds of citations. He is the author and publisher of scientific books and handnotes. He has been a scientific coordinator of more than 150 national and international research projects on the subjects of Earthquake Protection Planning and Organization of Urban Complexes, Reclamation of Sites of Uncontrolled Waste Disposal, Earthquake Protection and Planning of Infrastructure Works, Geotechnical Engineering, Environmental Management, Water Management, etc. He has participated in operational missions dealing with the disasters caused by the earthquakes of Kalamata (1986), Kyllini (1988-1989), Milos Island (1992), Pyrgos (1992), Grevena (1995), Aigio (1995), Athens (1999), Lefkada (2000), Kythira (2006), Andravida (2008), Oihalia (2011) and Cephalonia (2014). He has also coordinated national and international search and rescue missions, technical assistance, scientific research and humanitarian aid in the large scale disasters of San Jose (Central America, 1994), Kobe (Japan, 1995), Dinar (Turkey,1995), Umbria (Italy, 1997), Adana (Turkey, 1998), Chi-Chi (Taiwan, 1999), Izmit and Duzce, (Turkey, 1999), Gujarat (India, 2001), Apulia (Italy, 2002), Bingol (Turkey, 2003), Boumerdes-Zemmouri (Algeria, 2003), the countries of the Indian Ocean (Indonesia, Thailand, India, Sri Lanka, 2004), Kashmir (Pakistan, 2005), Sichuan (China, 2008), Aquila (Italy, 2009), Port-au-Prince (Haiti, 2010) Christchurch (New Zealand, 2011), Tohoku (Japan, 2011), Van (Turkey, 2011) and Emilia Romagna (Italy, 2012). He is the President of the Geological Society of Greece (2012-) and the Vice President of the Earthquake Planning and Protection Organization (2010), the European Center on Prevention and Forecasting of Earthquakes (2011-) and the Special Scientific Committee for the monitoring of Santorini Volcano (2012-).