

# Corinth Rift Laboratory School



In the wider region of the Gulf of Corinth for about 30 years a concerted effort has been made to better understand the geophysical processes (e.g. earthquakes, landslides, tsunamis) that take place in the region.

Studies conducted, which were based on GNSS and Earth observation satellites, revealed North – South extension rates across the gulf of up to about 1.5 cm per year during the last 20 years, a phenomenon unique in Europe and the world for areas beyond the tectonic boundaries. The rifting mechanism observed is crucial for the stability of the region as it can lead to submarine slope failures and it has been long identified as a site of major importance due to its intense past geophysical activity. The rifting mechanism observed is crucial for the stability of the region as it can lead to submarine slope failures and possible damaging tsunamis. On land, the same fault system causes landslides. Moreover, the south coast of the Corinth rift is uplifting whereas the north part is subsiding.

The area is studied by research teams from all over Europe and a network, the Corinth Rift Laboratory (CRL), has been established. Researchers and professors from universities and research centres across Europe are participating in this network (<https://nfo.crlab.eu/partners>). For the most complete and thorough study a large number of instruments (seismometers, accelerometers, GPS satellite receivers, tide gauges, tilt-meters etc.) have been installed. In addition to about 40 seismographs, 30 geodesic GNSS stations have been installed in an area of 90 X 70 km. Moreover, almost 100 campaign GNSS point are being revisited over time in order to densify the geodetic measurements. At the same time, data obtained from Earth Observation satellites and ground observations are being used in research projects (<https://nfo.crlab.eu/projects>) and studies (<https://nfo.crlab.eu/publications>) by various research teams, covering a wide scientific field, with a view to an in-depth understanding of the geophysical processes that take place. The recent common work exploiting fully the in-situ and satellite measurements concerns the recent seismic activity at the beginning of the year, demonstrating the awareness, alertness and the high level of activation of the network. This activation is also mirrored to the educational activities presented below.

The Gulf of Corinth is included as a Near fault Observatory (NFO) within the European Plate Observing Systems (EPOS) as Corinth Rift Observatory (CRO) and as a supersite (<https://geogsnl.org/supersites/permanent-supersites/enceladus-hellenic-supersite/>) within Geohazard Supersites and Natural Laboratories Group on Earth Observation initiative.

Since 2016, every year in September, the so-called "School of the Corinth Rift Laboratory" (CRL School) which is the educational component of this natural Observatory, is being held in

the area. So far (2020), around 46 acclaimed professors and researchers from European Universities and Research Centres have participated as lecturers/trainers in this school. About 56 students and 40 secondary education teachers from Greece, Italy, France, Portugal, Spain, Albania, Russia, Turkey and North Macedonia have been trained.

The activities of the School include demonstrations of the operation of an educational seismograph (SEISMO-BOX) and other experiments (e.g. seismic response to the buildings of different height, in scale) to the teachers from the lecturers of the School and then the trained teachers make the demonstration to the teachers and students of a selected school every year, with the presence of the lecturers. Another impact of the relative actions is that a network of exchanges of education and cooperation methodologies has been developed between school units and teachers which additionally are participating with relevant presentations in similar European actions of the European Geosciences Union (EGU-GIFT).

Moreover, it includes educational activities in the field such as visiting seismological stations and arrays, permanent and camping GNSS stations, surface outcrops of marine deposits and seismic fault origin, static and kinematic acquisitions of measurements and off-shore cruise on-board research ship vessel with simultaneous sea bottom sonar scanning. Additionally, presentations/lectures and in-hand classes are being held in the thematic areas of seismology, geodesy, geophysics and geology. The space component is being emerged from each thematic aspect, by means of Earth Observation and geodesy (GNSS) satellites, with simultaneous data acquisitions of this area or of a specific event (e.g. earthquake, landslide), supported by the in-situ measurements and the observations in the field. The hands-on courses, among others, include the processing chain for the production of deformation and land cover maps from satellite EO systems, using stand alone or web-based software (both developed and maintained by ESA) as well as the acquisition and processing of GNSS observations, acquired either from permanent stations, either from in-situ field activities during the school and their analysis in GIS or other tools. Lastly, hands-on courses are also being held for the localisation of the epicentre of real earthquakes, with real data, occurred in the area. CRL School is funded by EGU. This funding covers a daily allowance and accommodation for all the trainees, every year.

The CRL School of 2020 was totally virtual (on-line) due to the restrictions imposed by covid-19 pandemic. The programme of the CRL School 2020 officially has been recognised by the Ministry of Education and Religious Affairs of Greece, General Directorate of Studies of Primary and Secondary Education ( $\Phi 1/\text{ΕΠ}/130837/177417/\Delta 7$ ) for the academic year 2020-2021. The next CRL School will be held between 1-3 October 2021, will be again virtually but it is being planned to have a reality show from the field component. Application for the renewal of the recognition for the year 2021-2022 has been submitted.

Information about the CRL, programs of the past CRL Schools, videos, photos and other material can be found in <http://crlab.eu>.