H.F.R.I.
Hellenic Foundation for Research & Innovation

Description of the funded research project

1st Call for H.F.R.I. Research Projects to Support Faculty Members & Researchers and Procure High-Value Research Equipment

ModernGravNet
Εκσυγχρονισμός του Ελληνικού Δικτύου Βαρύτητας
Modernization of the Hellenic Gravity Network

Title of the research project:	**Modernization of the Hellenic Gravity Network**
Principal Investigator:	**Assistant Prof. Vassilios Grigoriadis**
Reader-friendly title:	**ModernGravNet**
Scientific Area:	**Engineering Sciences and Technology**
Institution and Country:	**Aristotle University of Thessaloniki, Greece**
Host Institution:	**Aristotle University of Thessaloniki, Greece**
Collaborating Institution:	**Instytut Geodezji i Kartografii**
Project webpage:	**http://moderngravnet.topo.auth.gr**

Budget: 173,192.66 €

Duration: 30 months

H.F.R.I.
Hellenic Foundation for Research & Innovation

Research Project Synopsis

The gravity and vertical networks belong to the fundamental geodetic networks of Greece and are part of the national infrastructure. Both networks were realized and measured many decades ago following classical methods.

The modernization of the gravity network of Greece is the main goal of the project.

This will be achieved by:

A) Evaluating the existing gravity network with new relative and absolute gravity measurements as well as measurements for the vertical gravity gradient.

B) Evaluating the vertical and the gravity network with new gravity, spirit leveling and GNSS measurements in two test areas in northern and southern Greece.

C) Investigating, in terms of accuracy, the use of the geoid as a reference surface for the vertical network of Greece through the computation of a high accuracy and resolution geoid model for the wider Hellenic area. The latter model will be evaluated allover Greece using GNSS/leveling data as well as with the data obtained in the two test areas in the frame of the project.

D) Preparing a study for the technical and economic aspects of the use of the geoid as a reference surface for the vertical network The study will examine the short-term and long-term benefits and weaknesses.

Project originality

Nowadays, the horizontal position of a point on Earth may be determined with high accuracy. On the contrary, the accuracy of height determination may vary significantly between different countries and areas. In this frame, the study of the Earth's gravity field as well as vertical networks are considered as cutting-edge research.

One of the novelties of the research project is the first-time evaluation of the existing Greek gravity network with relative and absolute gravity measurements. Former studies have depicted problems in the network but it was not possible to justify or study them in depth. Absolute gravity measurements make this now possible as new and accurate values will be used as reference for relative gravity measurements.

Another novelty of the research project is also the conduction of high accuracy heterogeneous measurements (gravity, spirit leveling, GNSS) in two test areas that will be used for the evaluation of different geoid determination methodologies. The selected optimal methodology will also be used for the determination of a new geoid model for the wider Hellenic area.

Last, the use of the geoid as a reference surface for the vertical network of Greece will be evaluated, in terms of accuracy, for the first time along with the existing geodetic networks, i.e., through field measurements and not only theoretically. Moreover, a study on the modernization of the Greek network will be prepared for the first time.

Expected results & Research Project Impact

The expected project results are the high resolution and accuracy geoid model for the wider Hellenic area as well as a study on the evaluation of the existing gravity and vertical network and the prospect of its modernization.

The project results are of great importance both to scientists and engineers. The study on the evaluation of existing networks will present the problems and advantages of the existing networks as well as an estimate of the accuracy that can be achieved from their usage. The gravimetric geoid model, which will become available, will give the opportunity to engineers to assess the benefits of using GNSS in technical works as well as the problems when using the existing geodetic networks. On the other hand, the methodology that will be developed for the geoid determination as well as for the corresponding gravity database will be of scientific interest.

Last, the evaluation of the gravity and vertical network will assist stakeholders (public services and politicians) with decision making for the modernization of the networks as well for setting strategic goals for their long-term management.

The importance of this funding

Funding by HFRI provides the opportunity to young researchers to participate in cutting-edge research and reduce brain-drain. On the other hand, the funding gives an opportunity to new professors to gain experience in managing research projects.

Moreover, the HFRI funding has made it possible for the research team to conduct cutting-edge research in geodesy and especially to carry out field measurements that will lead to a wealth of data that can be used both not only for the needs of the present project but also for post-project research activities.

H.F.R.I.
Hellenic Foundation for Research & Innovation

COMMUNICATION

185 Syggrou Ave. & 2 Sardeon St. 2
171 21, N. Smyrni, Greece
+30 210 64 12 410, 420
communication@elidek.gr
www.elidek.gr