

Development of innovative Data Science tools for tourism applications

DOTTORATO DI RICERCA XXXVII CICLO
Fisica (Dottorato Industriale)

Maria Enrica Mazzella, PhD geologist



Education and Work



2000-2006 Degree in Geological Sciences - University of Naples "Federico II"

"Morphotectonic analysis of marine terraces of the Middle-Holocene Pleistocene in the area between Trebisacce and Amendolara (northern Calabria) calculation of deformation rates"

2007-2010 Doctor in Geology - PhD - University of Naples "Federico II" in collaboration with INGV Catania and OSV Trieste

"Active tectonics in the southern peri-Tyrrhenian sector through the integration of geodetic and geological data"

2011 - 2012 Internship ISPR A - Rome

"3D modeling of structures in marine areas (Ionian Sea)" using the software Move 2009

2013 - 2014 Research fellow - University of Perugia

"Geological reconstructions of the subsoil aimed at the exploration and production of energy resources"

International Papers

Quaternary International 206 (2009) 78–101



Contents lists available at ScienceDirect

Quaternary International

journal homepage: www.elsevier.com/locate/quaint



Raised coastal terraces along the Ionian Sea coast of northern Calabria, Italy, suggest space and time variability of tectonic uplift rates

E. Santoro^a, M.E. Mazzella^b, L. Ferranti^{b,*}, A. Randisi^c, E. Napolitano^b, S. Rittner^d, U. Radtke^d

^aDipartimento di Scienze Geologiche, Università di Catania, Italy
^bDipartimento di Scienze della Terra, Università di Napoli, Italy
^cIstituto per l'Ambiente Marino Costiero, CNR, Napoli, Italy
^dGeographisches Institut, Universität zu Köln, Germany

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Contents lists available at ScienceDirect

Tectonophysics

journal homepage: www.elsevier.com/locate/tecto



Active transpression in the northern Calabria Apennines, southern Italy

L. Ferranti^{a,*}, E. Santoro^b, M.E. Mazzella^a, C. Monaco^b, D. Morelli^c

^aDipartimento di Scienze della Terra, Università di Napoli, Italy
^bDipartimento di Scienze Geologiche, Università di Catania, Italy
^cDipartimento di Scienze Geologiche, Ambientali e Marine, Università di Trieste, Italy

Geophysical Journal International

Geophys. J. Int. (2011)

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Strain and stress fields in the Southern Apennines (Italy) constrained by geodetic, seismological and borehole data

M. Palano,¹ F. Cannavò,¹ L. Ferranti,² M. Mattia¹ and M.E. Mazzella²

¹Istituto Nazionale di Geofisica e Vulcanologia, Sezione di Catania, Piazza Roma 2, 95123 Catania, Italy; E-mail: mimmo.palano@ct.ingv.it
²Dipartimento di Scienze della Terra, Università degli Studi di Napoli "Federico II", Largo San Marcellino, 10, Napoli, Italy

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Deformed Pleistocene marine terraces along the Ionian Sea margin of southern Italy: Unveiling blind fault-related folds contribution to coastal uplift

Enrico Santoro,¹ Luigi Ferranti,¹ Pierfrancesco Burrato,² Maria Enrica Mazzella,¹ and Carmelo Monaco³

AGU PUBLICATIONS

Tectonics

RESEARCH ARTICLE

10.1002/2014TC003624

Key Points:

- High-resolution marine geophysics data document active oblique contraction
- Blind fault segments underlying shallow-crustal folds are modeled
- Reactivation of a passive continental margin drives active tectonics

Supporting Information:

- Readme
- Figure S1

An active oblique-contractional belt at the transition between the Southern Apennines and Calabrian Arc: The Amendolara Ridge, Ionian Sea, Italy

Luigi Ferranti¹, Pierfrancesco Burrato², Fabrizio Pepe³, Enrico Santoro^{1,4}, Maria Enrica Mazzella^{1,5}, Danilo Morelli⁶, Salvatore Passaro⁷, and Gianfranco Vannucci⁸

¹Dipartimento di Scienze della Terra, dell'Ambiente e delle Risorse, Università degli Studi di Napoli Federico II, Naples, Italy, ²Istituto Nazionale di Geofisica e Vulcanologia, Rome, Italy, ³Dipartimento di Scienze della Terra e del Mare, Università di Palermo, Palermo, Italy, ⁴Now at Robertson, CGG Company, Wales, UK, ⁵Now at INTGEOMOD, Perugia, Italy, ⁶Dipartimento di Scienze Geologiche, Ambientali e Marine, Università di Trieste, Trieste, Italy, ⁷Istituto per l'Ambiente Marino Costiero, Consiglio Nazionale delle Ricerche, Naples, Italy, ⁸Istituto Nazionale di Geofisica e Vulcanologia, Bologna, Italy



IntGeoMod
From Science into Business and Education



Integrated Geologic Modeling (Int.Geo.Mod. - IGM) Spin-off project winner of the "Start Cup Ed. 2008" award, IGM takes shape with the aim of giving a productive impact to an idea born in the context of university research , integrating an academic reality (the Section of Structural Geology and Geophysics of the Department of Earth Sciences of the University of Perugia) with an entrepreneurial reality (the IGR Snc of Flavio Buratti & C.) with the aim of promoting contact between university research structures, the productive world and local institutions, to develop the territory, spread know-how and encourage new technologies.

Our main business lines are:

- export academic knowledge to the business world by organizing dedicated and customizable advanced training courses;
- develop research and development projects in the field of new technologies, modeling of the subsoil and for the use of georesources;
- work on the territory with institutions in order to enhance and preserve it, through the presentation of development projects on European funds, with the support of our technological infrastructures.



by-Way (™) is the technological infrastructure created by IGM that allows you to create applications for IOS and Android mobile devices, functional to promote the area, guide tourists in visits to cultural attractions and museums, allow the use of trails and cycle paths.

by-Way (™) allows you to create native APPs that simultaneously use all the sensors of a mobile device (GPS, Bluetooth, Camera, compass and accelerometer), with map, navigator, proximity notifications, high automation and management of large datasets functions of thousands of remote tourist information. Our APPs support the inclusion of people with sensory disabilities thanks to the automatic audio guide functions and are continuously updated.

Structure of the platform



The operation of the application is based on the relationship of three infrastructures:

- ✓ the **Database** with the information and contents that populate the app;
- ✓ the **backend system**, responsible for the synchronization of multimedia contents (texts, audio, video, models, colors, general graphics, remote notifications, news etc.);
- ✓ the native **AR-App**, installed on the user's device, responsible for the notification processes, content delivery, sensor management, navigation, and 3D simulation of the routes;

Main features



Thanks to an integrated system of functions (Augmented Reality, iBeacon sensors, GPS, etc), the App delivers ITA / ENG contents about the neighboring points of interest automatically through a proximity marker recognition system with inclusion / exclusion logics.

The integrated audio guide, contactless use and online / offline content management make it unique and inclusive.

GPS



iBEACON



AR



TOUCHLESS



INCLUSIVE



ON/OFFLINE



Aim of the platform

The purpose of the designed application is to integrate the historical-cultural, naturalistic-environmental heritage to facilitate tourist use, improve the attractiveness of a territory and increase competitiveness on the market.

How?

By creating an advanced outdoor guide, which can provide the visitor with all the main textual, auditory and visual information of the cultural itineraries of the city he is visiting and which at the same time proposes a different and more curious route for the visitor, using at the same time technologies that allow him to contextualize to the visitor the place he visits (image recognition, AR and geographical positioning).

Augmented reality allows the enrichment of human sensory perception through information, generally manipulated and digitally conveyed, which would not be perceptible with the five senses.

Some projects

Todi: redevelopment and enhancement of the architectural and historical / cultural heritage of the Temple of Santa Maria della Consolazione for the improvement of its tourist use

Arrone: Design and production of information material and software for the tourist and educational use of the Church of San Giovanni Battista

Spoleto "museum connections: between valleys and mountains, villages and cities": creation of an augmented reality App for the use of tourist and environmental attractions

Perugia: realization of an urban trekking app with augmented reality for the enhancement and monitoring of tourist flows



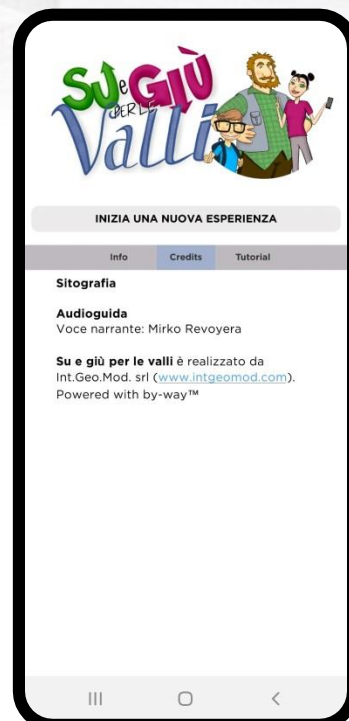
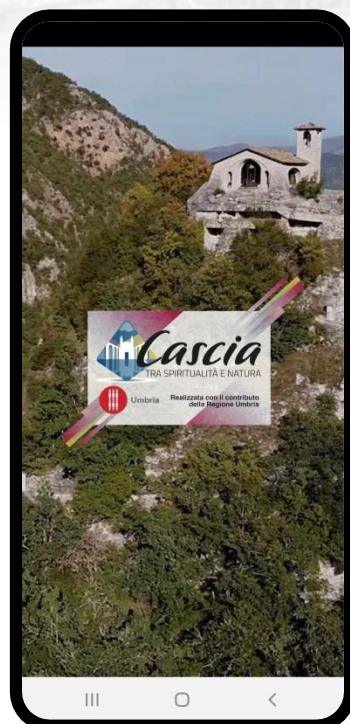
Work in progress

Monteleone di Spoleto: realization of the mine path and development of an App to support tourists / hikers

Cascia tra spiritualità e natura: redevelopment and increase in accessibility of routes for the development of sustainable outdoor tourism

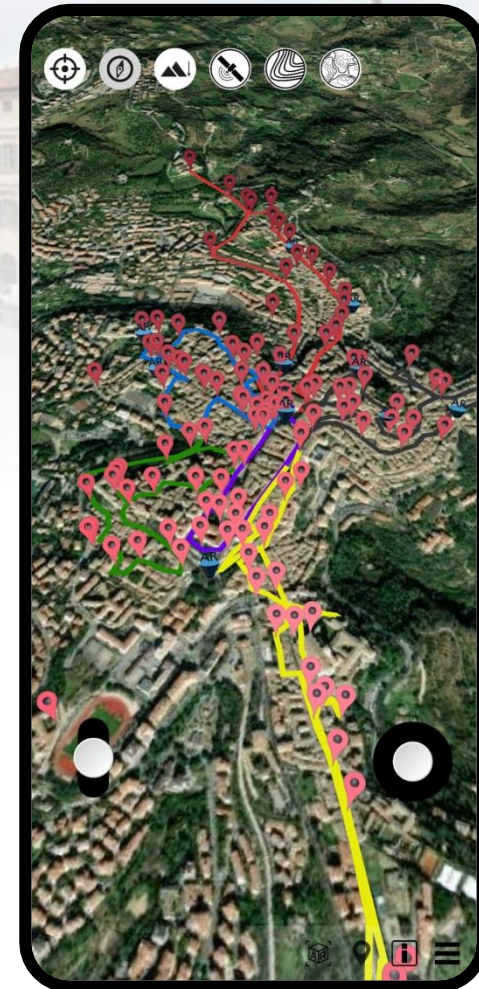
Sant'Anatolia di Narco: **Su e giù per le Valli** is a graphic and audio novel for children to tell stories about the nature of the Valnerina

Foligno: creation of a network of cultural attractions through the creation of cultural and thematic itineraries



The project

Here a data-science project is proposed in order to develop predictive analysis tools on urban tourist flows. In this sense, the basic infrastructure is already in production on large databases, where the geolocated points of interest and the corresponding metadata are accessible in a pseudo-standardized form and provide the basic elements for the operation of the tourist access application developed by the SME Int.Geo.Mod. srl.



Methodology

It is intended, as a starting point for the proposed project, to add a user profiling component to the applications created, according to the anonymization criteria provided for by the law on privacy and access limits.

By crossing geo-referenced data, frequencies of use and profile data, it will be possible to create an enlarged reference database for a high-level analysis capable of interpreting tourist flows on a predictive basis.

It will therefore be possible to create specific metrics that can direct flows according to external constraints such as, degree of accessibility of the particular point of interest, level of crowding, specificity of the user, events of particular interest or other.



Actions

It is possible to identify a 3-stage development of the project:

- 1) the analysis of the state of the art and the small-scale preparation of "data mining" tools for the interpretation of the heterogeneous amount of data available. The approach based on the "clustering method" (Xia, Jianhong (Cecilia) & Ciesielski, Vic & Arrowsmith, Colin. (2005). Data mining of tourists spatio-temporal movement patterns: A case study on Phillip Island) will be investigated and adapted the peculiarity of the application discussed;
- 2) creation of the production infrastructure in which to carry out the analysis of flow patterns on a large scale and provision of feedback tools based on the correlation between flows, availability of local services and commercial segments;
- 3) discovery of tourism potential, through semiotic analysis of user profiles with predictive tools of data science (learning models based on neural networks, the so-called "machine learning").

Aim of project

In the final phase of the project, study the unexpressed tourist potential in order to enhance the marketing strategies of a place or a particular point of interest, even on a personalized basis (Arefieva, V., Egger, R., & Yu, J. (2021). A machine learning approach to cluster destination image on Instagram. *Tourism Management*, 85, 104318)

- **addressing the user and improving the use of the application itself and the promoted goods;**
- **improve its product and provide the client with an important decision-making tool in the field of tourism marketing;**
- **predict scenarios, follow changes in behavior and implement appropriate market decision-making strategies.**

Thanks

**Int.Geo.Mod. Srl
Integrated Geologic Modeling
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**Address: Via Mario Angeloni 80/b
06124 Perugia - Italy**

E-Mail: e.mazzella@intgeomod.com

Website: www.intgeomod.com

Facebook: www.facebook.com/intgeomod/