



IDROGEO S.r.l. is a company of geology that in recent years has acquired specific skills in the context of geo-engineering.

IDROGEO S.r.l. provides design and consultancy services in the context of geology, hydrogeology, geomorphology, geotechnics, geomechanics, geophysics, soil conservation and related sectors.

The continued cooperation of the professionals of **IDROGEO** S.r.l. with University Departments and Research Institutions makes the structure highly qualified and, at the same time, able to make use of technical experts in Engineering and Geology.

The **IDROGEO** S.r.l. has a staff of professionals that can provide consulting support at the highest level, to satisfy even the most demanding customers.

The strength of the team lies in the fusion of a solid scientific background, proven experience in the field and a constant openness to new technologies.

Special skills are held in study and geomechanical characterization of rock masses. In this field, the **company** has much experience having worked on projects for the safety of the rock slope, quarry's areas and underground environments.

Over the years, **IDROGEO** S.r.l.'s professionals have provided their abilities and professionalism to many Companies and Organizations including:

- Dipartimento di Ingegneria Idraulica, Geotecnica ed Ambientale dell'Università degli Studi di Napoli "Federico II";
- C.U.G.Ri. (Consorzio inter-Universitario per la previsione e prevenzione dei Grandi Rischi);
- Autorità di Bacino della Campania Nord-Occidentale;
- Autorità di Bacino del Sarno;
- Autorità di Bacino Interregionale del Fiume Sele;
- Dipartimento di Scienze della Terra dell'Università degli Studi di Napoli "Federico II";
- CIRIAM (Centro Interdipartimentale di Ricerca in Ingegneria Ambientale)
- AUTOSTRADE PER L'ITALIA S.p.A
- AUTORITA' PORTUALE DI SALERNO
- A.N.A.S. S.p.A.;

ACTIVITY FIELDS

GEOLOGICAL STUDIES FOR THE CONSTRUCTION OF SPECIAL CIVIL WORKS (TUNNELS, DAMS, SPECIAL FOUNDATIONS, ETC) AND TECHNICAL ASSISTANCE TO COMPANIES ENGAGED IN THE CONSTRUCTION

GEOLOGICAL STUDIES FOR THE DESIGN OF ACTIONS FOR THE MITIGATION AND PREVENTION OF GEOLOGICAL HAZARDS (HYDROGEOLOGICAL RISK, HYDRAULIC RISK, COASTAL RISK ECC.)

TERRITORIAL STUDIES OF LARGE AREAS THROUGH THE USE OF GIS SOFTWARE

GEOMECHANICAL ANALYSIS FOR THE CHARACTERIZATION OF ROCK MASSES IN SURFACE AND UNDERGROUND ENVIRONMENTS

GEOGNOSTIC INVESTIGATION TO FOR THE UNDERGROUND CHARACTERIZATION

THREE-DIMENSIONAL GEOMETRIC SURVEYS

INTERFEROMETRIC AND GEOTECHNICAL MONITORING OF THE SLOPES AND STRUCTURE

ENVIRONMENTAL IMPACT ASSESTMENT

GEOLOGICAL STUDIES FOR THE CONSTRUCTION OF SPECIAL CIVIL WORKS (TUNNELS, DAMS, SPECIAL FOUNDATIONS, ETC) AND TECHNICAL ASSISTANCE TO COMPANIES ENGAGED IN THE CONSTRUCTION

IDROGEO S.r.l. is engaged in consulting activities for the design of structures and infrastructures both existing and new construction. **IDROGEO** S.r.l. has clients of national and international relevance and carries out technical consulting services for the realization of roads, tunnels, railway lines, aqueducts and related works like stabilization of embankments, consolidation of rocky walls etc.

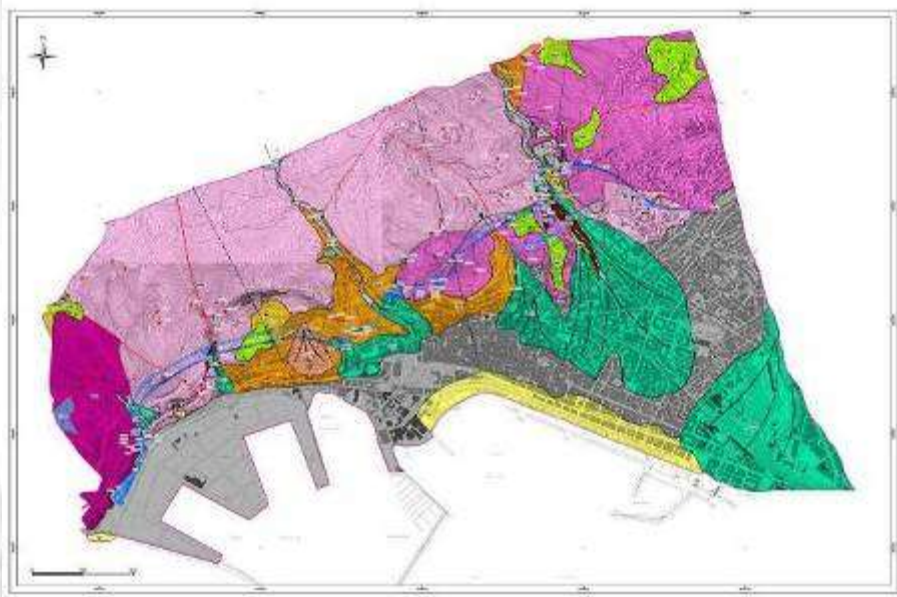
The extensive experience of the professionals who work for this **company** guarantees excellent expertise in the field of geology and for the preparation of thematic maps (geological maps, geolithological maps, geomorphological maps, hydrogeological maps etc.) with a detail related to the type of intervention.

The activities related these studies provide the geological survey, analysis of aerial and satellite imagery (photo-interpretation), the use of digital terrain models, as well as the supervision and/or realization of geognostic investigations (drillings, geomechanical surveys, geophysical surveys etc.).

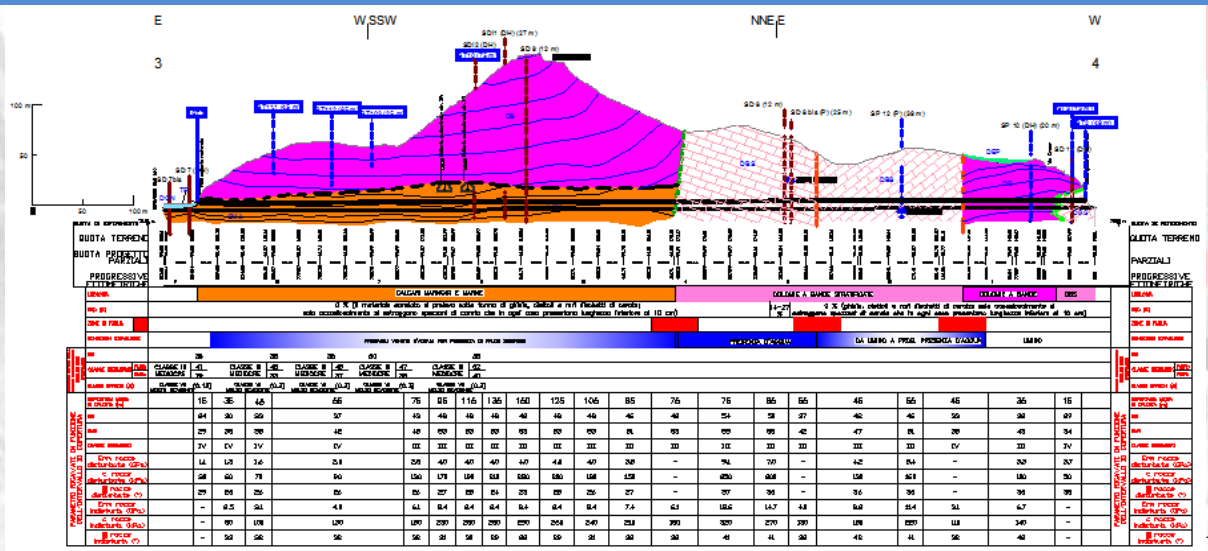
The acquisition, of geological data collection and processing is performed according to the guidelines and standards for the detection and representation of the data and the informatization of the products of the National Geological Service, to ensure homogeneity of the contents and their representation.

The acquired data is processed with GIS software for 3d rendering in order to highlight the interactions between works and geological context and geological hazards (hydraulic risk, landslide risk etc.).

Geothematic maps and profile of the project "Salerno Porta Ovest". Client: Prof. D. Calcaterra; Period: 2009. a) Geolithological map; b) Geological and geomechanical profile; c) Geomorphological map; d) Hydrogeological map



a)



b)

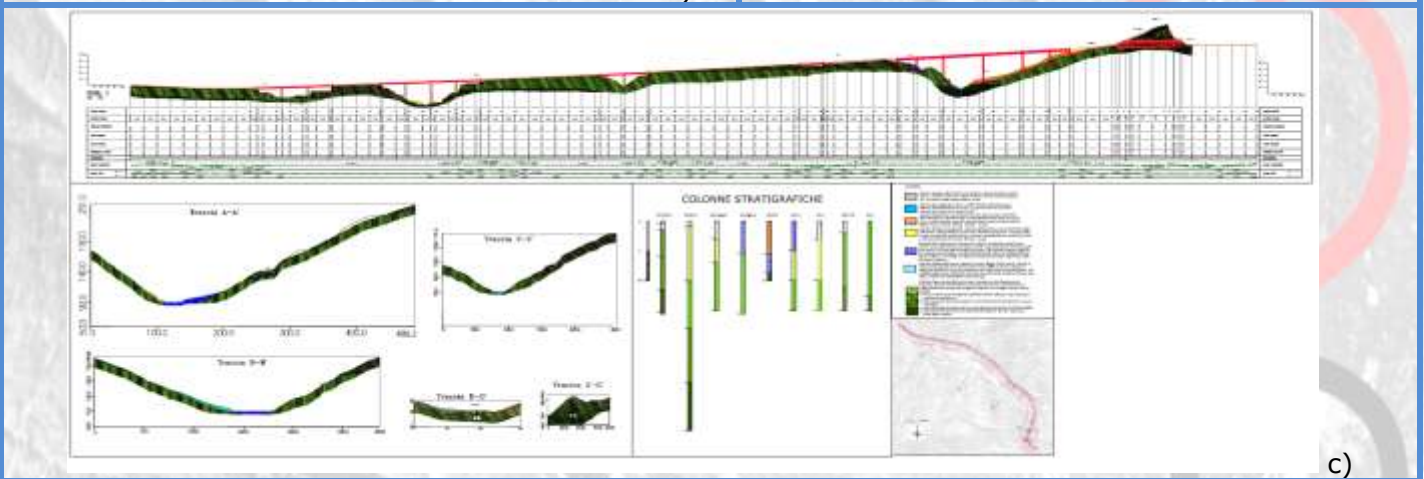
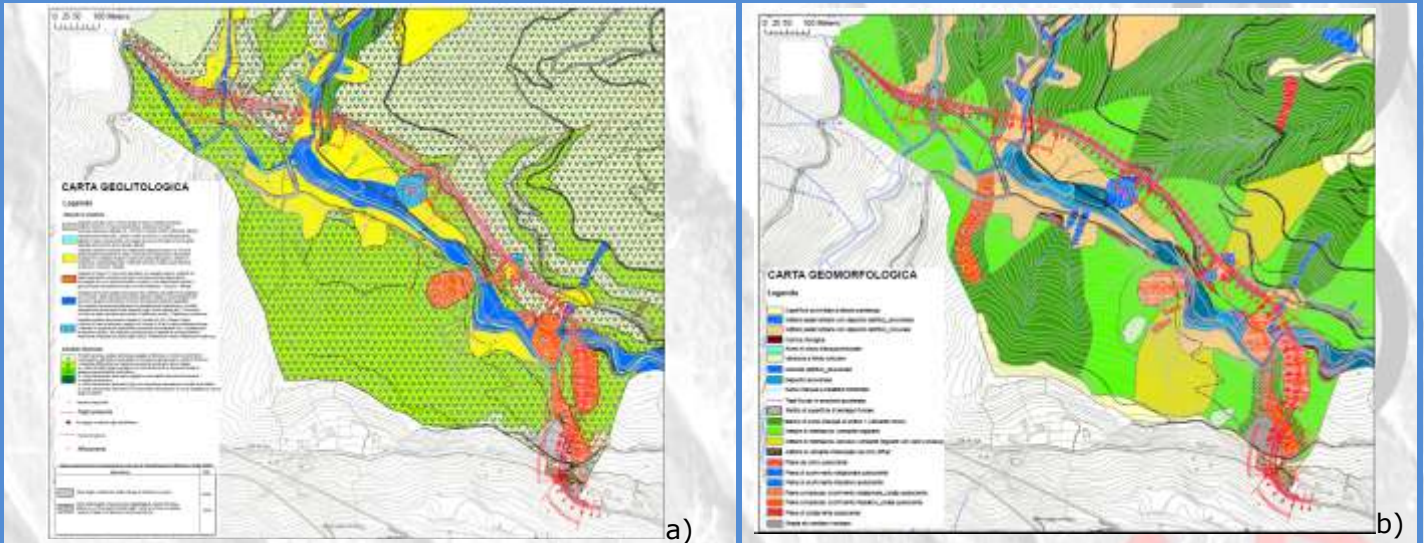


c)

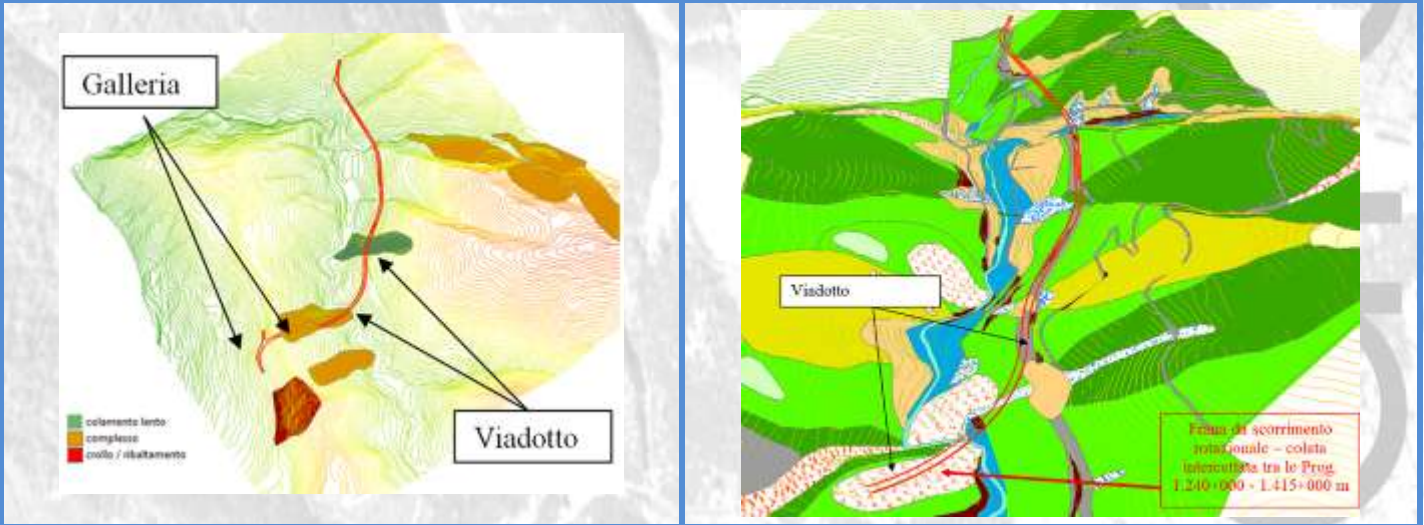


d)

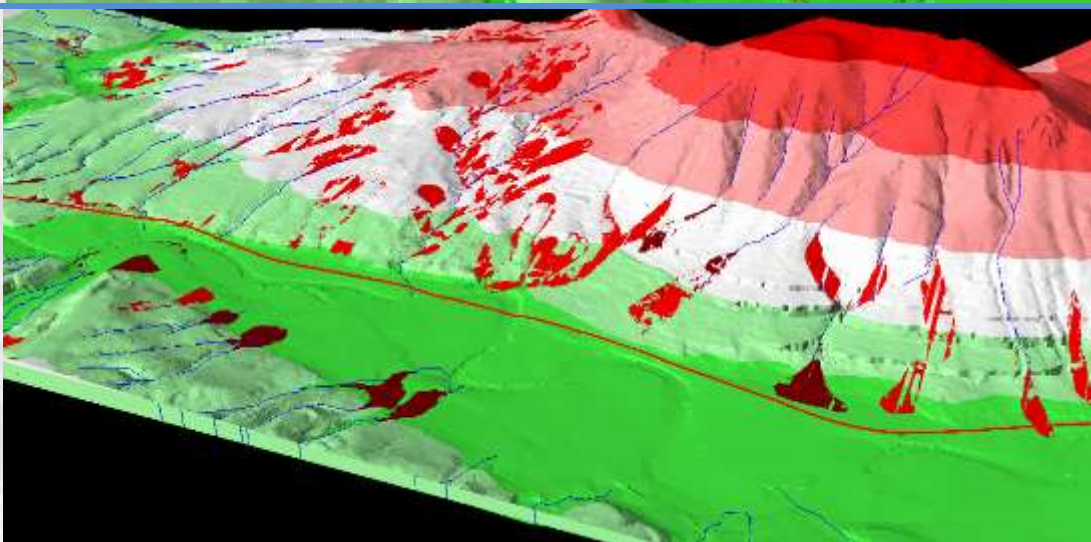
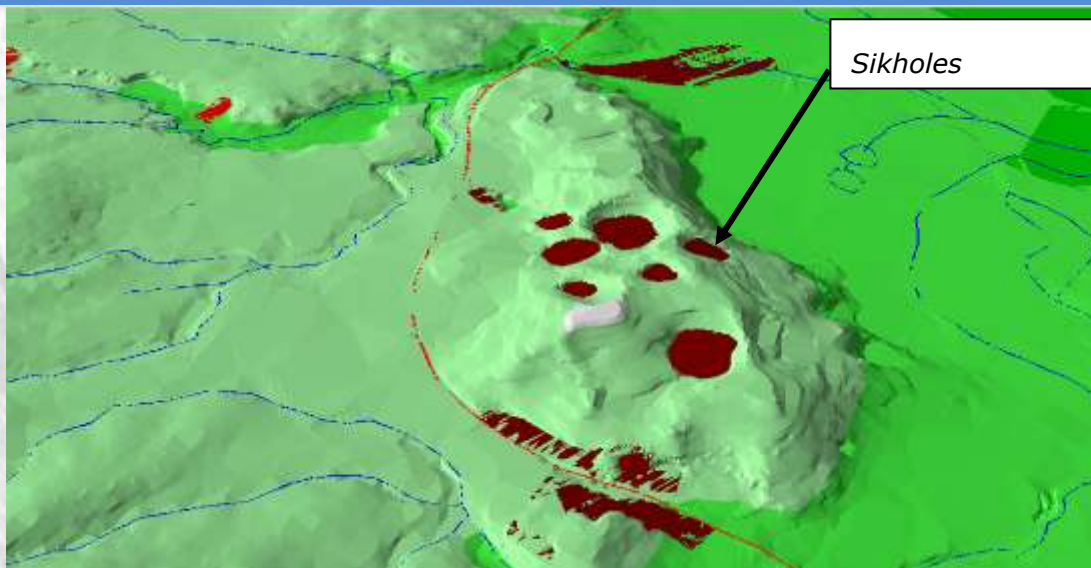
Maps, geomatics profiles and three-dimensional elaborations for the Project "Studio Geologico e Geomorfologico propedeutico alla Progettazione dei lavori di ripristino e completamento della variante lungo la SS 447 di Palinuro tra il km 15+000 ed il km 18+500, per il superamento del tratto in frana fra Ascea e Pisciotta"; Client: Cogenuro s.r.l.; Period: 2011. a) Geolithological map; b) Geomorphological map; c) Geolithological profile



Three-dimensional elaborations of geomorphological setting



Three-dimensional elaborations of geological and geomorphological setting of the Project
 "Consulenza geologica relative al progetto dei lavori di costruzione della Strada Statale 372,
 Telesina"; Client: Progin S.P.A.; Period: 2007.



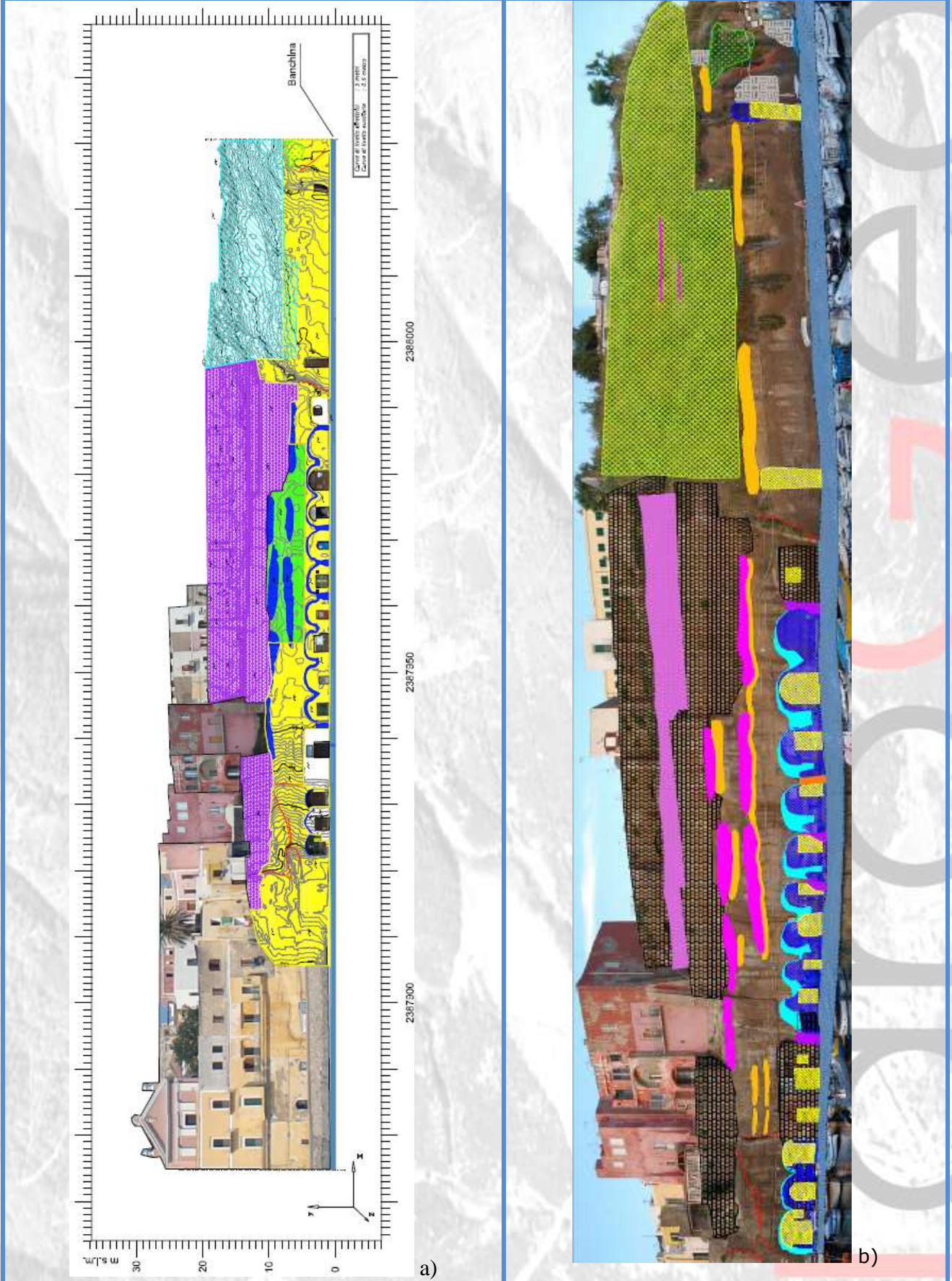
GEOLOGICAL STUDIES FOR THE DESIGN OF ACTIONS FOR THE MITIGATION AND PREVENTION OF GEOLOGICAL HAZARDS (HYDROGEOLOGICAL RISK, HYDRAULIC RISK, COASTAL RISK ECC.)

The assessment of landslide hazard of a slope is based on a criterion of overly mapping. In addition, the study of areas exposed to natural hazards is carried out, as well as on the basis of field surveys, through analysis, numerical modeling and monitoring of instability phenomena.

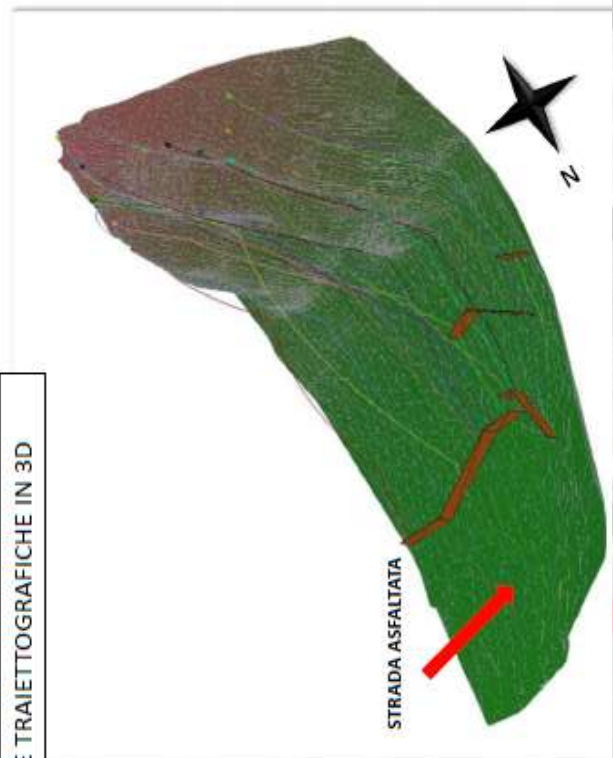
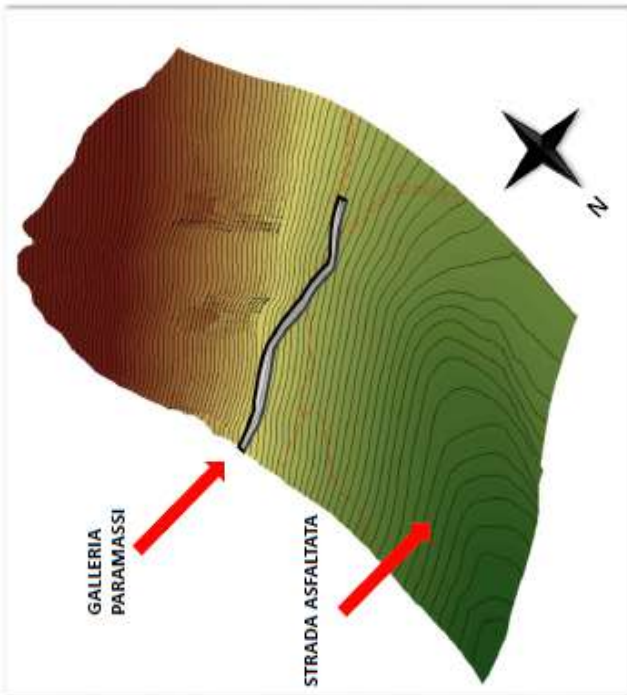
IDROGEO S.r.l. has a high competence in the analysis of slope stability using specialized software for the simulation of numerical models to define the areas potentially at risk (analysis of slope stability limit equilibrium, simulation trajectories rolling of rock blocks etc.).

These analyzes are used to design the works adequately and represent a tool for the prevention of catastrophic events.

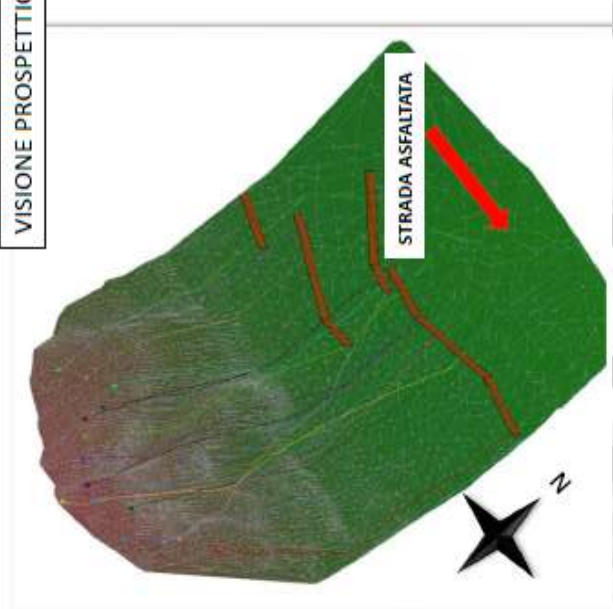
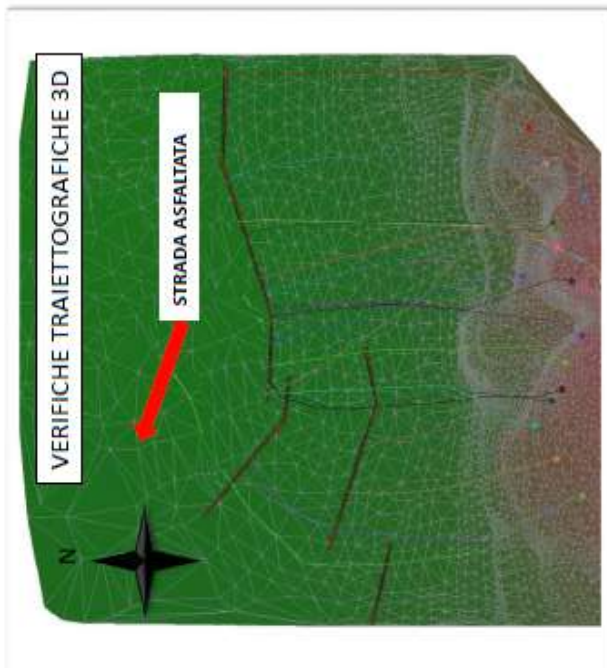
Project "Lavori di messa in sicurezza di alcune aree della parte Nord dell'isola di Ventotene - Sistemazione dell'area dell'ex caserma Granili sul porto romano. Client: Comune di Ventotene. Period: 2011. a) Susceptibility map; b) Photomosaic



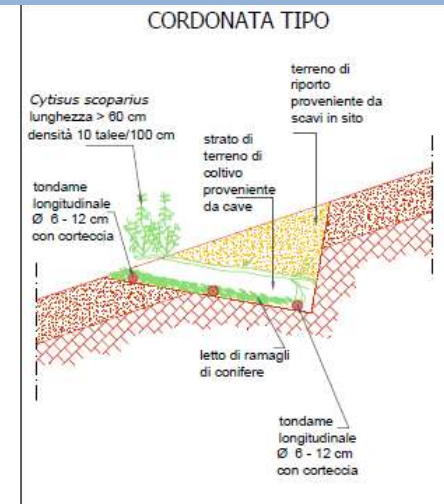
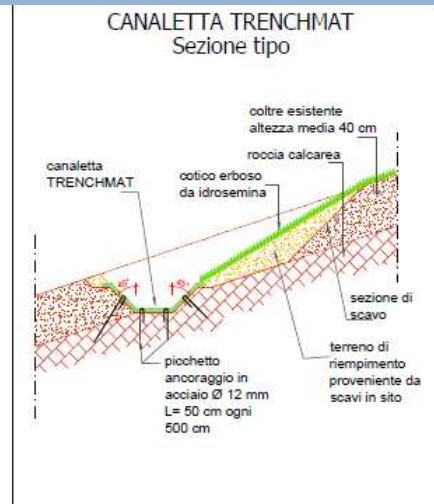
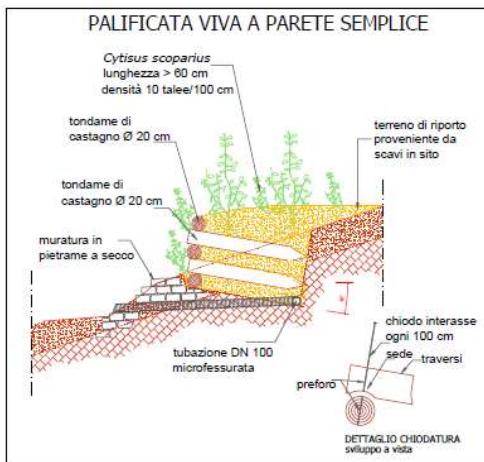
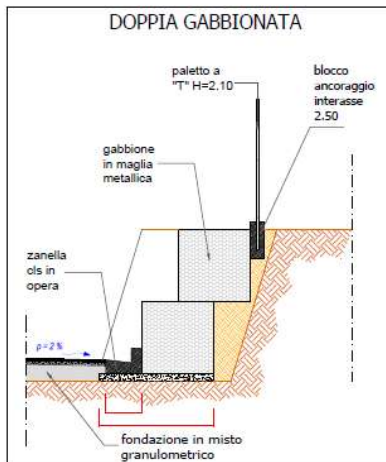
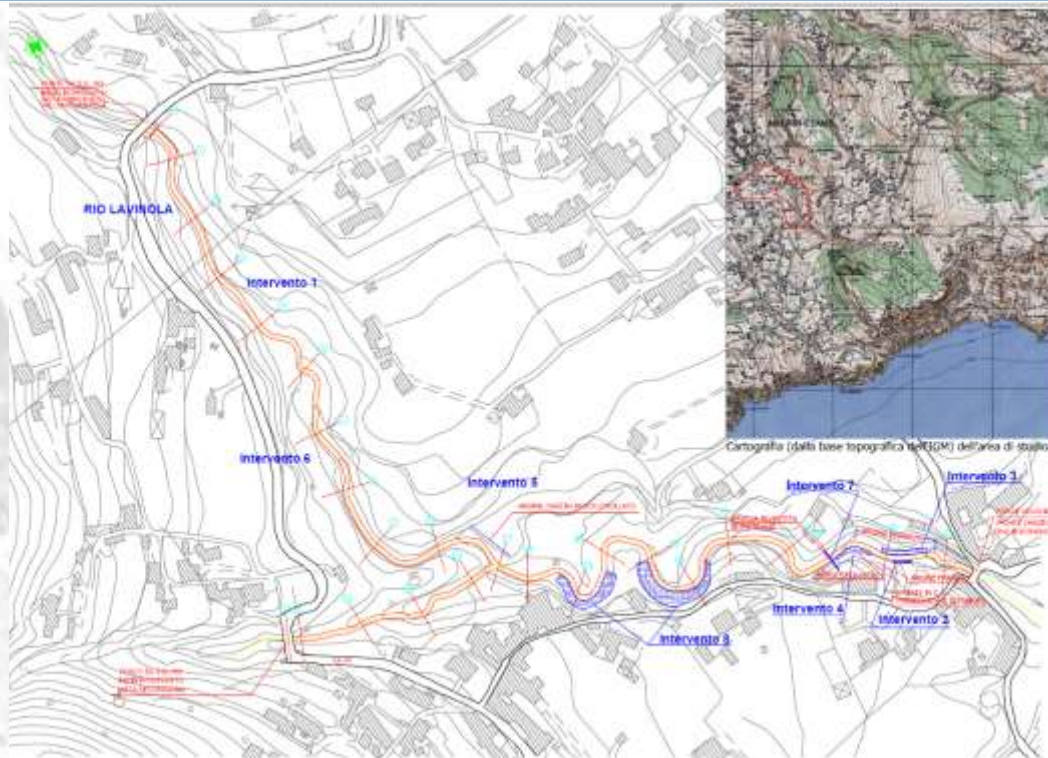
Trajectories simulation of of rocky blocks. Project "Studio di fattibilità relativo alla sistemazione dei movimenti franosi in atto in località San Severino, presso il Comune di Centola". Client: Comune di Centola. Period: 2013



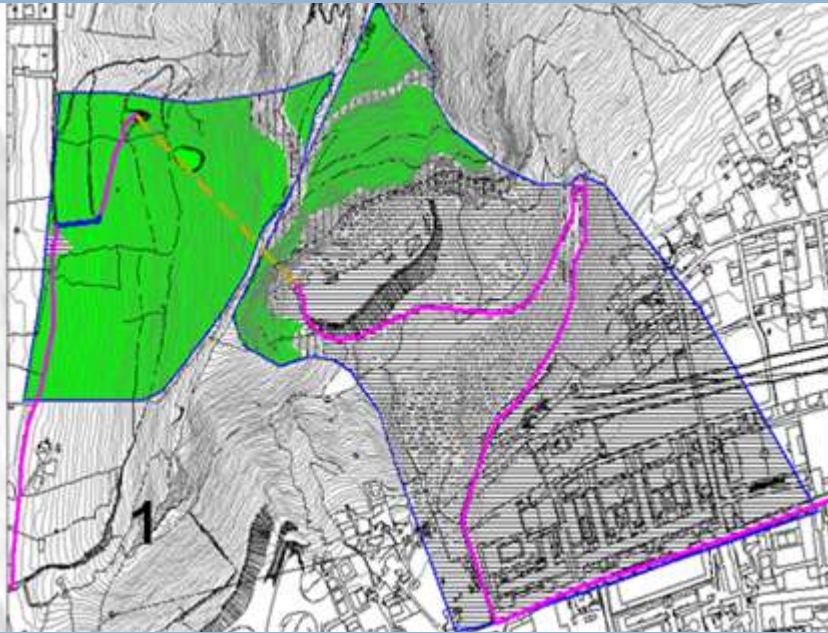
VISIONE PROSPETTICA DELLE VERIFICHE TRAIETTOGRAFICHE IN 3D



Consolidation interventions with naturalistic engineering techniques. Project details of "Progettazione definitiva delle opera di sistemazione idrogeologica del Vallone Ponte Orazio nei Comuni di Meta e di Piano di Sorrento. Client: Comunità Montana dei Monti Lattari. Period: 2006



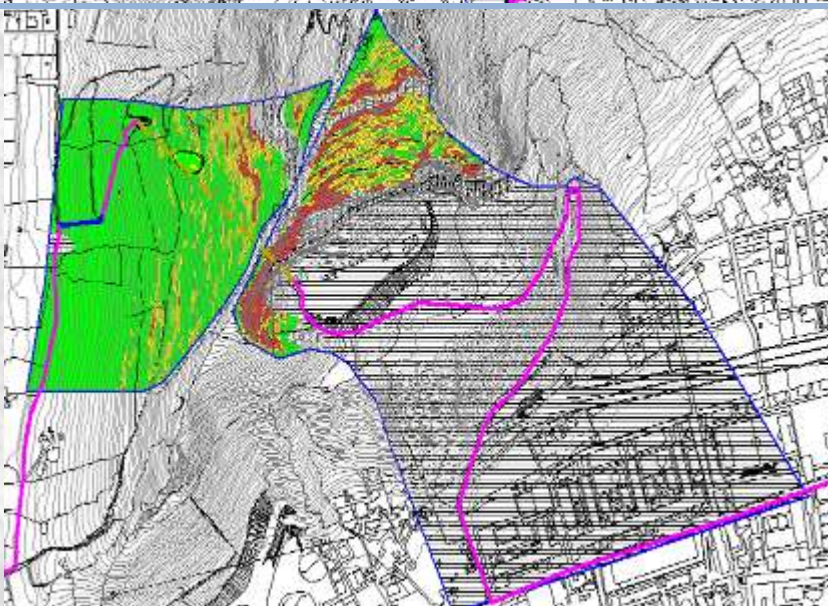
Stability analysis of the slopes. Project "Piano degli interventi di completamento, adeguamento funzionale e messa in sicurezza - Completamento funzionale alimentazione zona occidentale Pianura-Soccavo". Client: ARIN S.p.A. Period: 2007



Fattore di sicurezza F per
 $\gamma = 11.7 \text{ KN/m}^3$
 $H = 1.0 \text{ m}$
 $c = 5.5 \text{ kPa}$
 $\phi = 39^\circ$



Fattore di sicurezza F per
 $\gamma = 11.7 \text{ KN/m}^3$
 $H = 1.0 \text{ m}$
 $c = 3.66 \text{ kPa}$
 $\phi = 39^\circ$



Fattore di sicurezza F per
 $\gamma = 14.7 \text{ KN/m}^3$
 $H = 1.0 \text{ m}$
 $c = 0 \text{ kPa}$
 $\phi = 39^\circ$

TERRITORIAL STUDIES OF LARGE AREAS THROUGH THE USE OF GIS SOFTWARE

A geographic information system (GIS) integrates hardware, software, and data for capturing, managing, analyzing, and displaying all forms of geographically referenced information.

GIS allows us to view, understand, question, interpret, and visualize data in many ways that reveal relationships, patterns, and trends in the form of maps, globes, reports, and charts.

A GIS helps you answer questions and solve problems by looking at your data in a way that is quickly understood and easily shared.

GIS technology can be integrated into any enterprise information system framework.

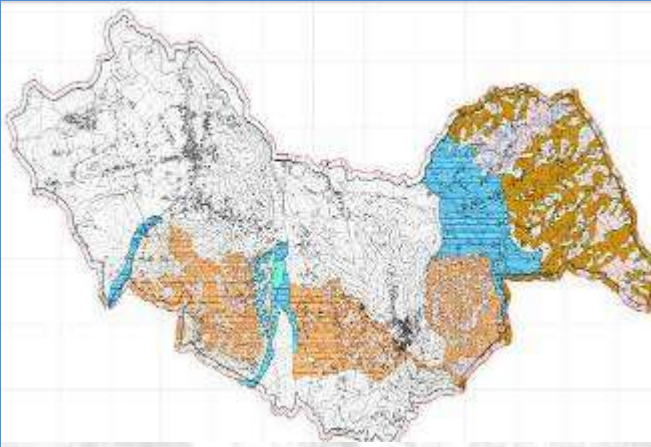
IDROGEO S.r.l. has numerous applications in studies on a wide area using GIS systems aimed at the territorial planning and land protection.

The acquired data are rendered in terms of vector through the use of specific software, while their digitization allows for greater flexibility of updating and a better use of the knowledge acquired than traditional data management systems.

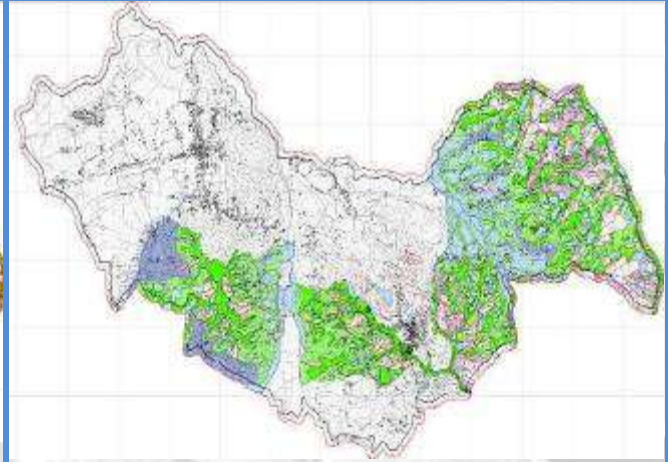
To more realistically analyze the effect of the Earth's terrain, we use three-dimensional models within a GIS software. A GIS can display the Earth in realistic, three-dimensional perspective views and animations that convey information more effectively and to wider audiences than traditional, two-dimensional, static maps.

The study of "vast areas" in a GIS environment is particularly suitable in the preparation of maps for Spatial Planning. This system offers the possibility to put in their relationship between different data on the basis of their common geographical reference in order to create new information from the combination of existing data (topological overlay).

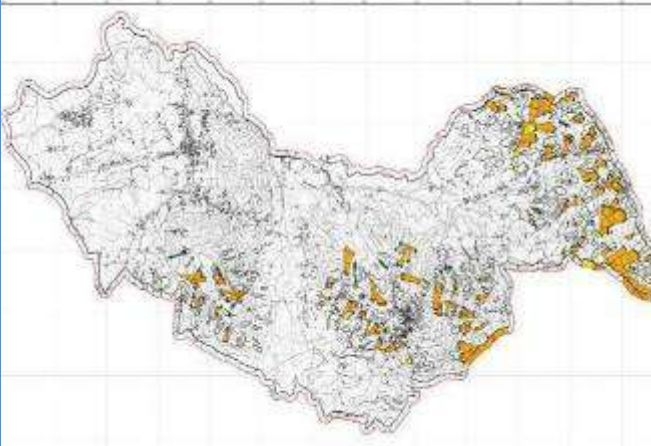
Geothematic maps produced with GIS software . Project "Aggiornamento e rivisitazione del P.A.I dell'Autorità di Bacino Interregionale del Fiume Sele - Regione Campania". Client: ATI Strago- Prof. Ing. Pasquale Versace; Period: 2007. a) Geolithological map; b) Geomorphological map; c) Landslide map; d) Permeability map; e) landslide hazard map



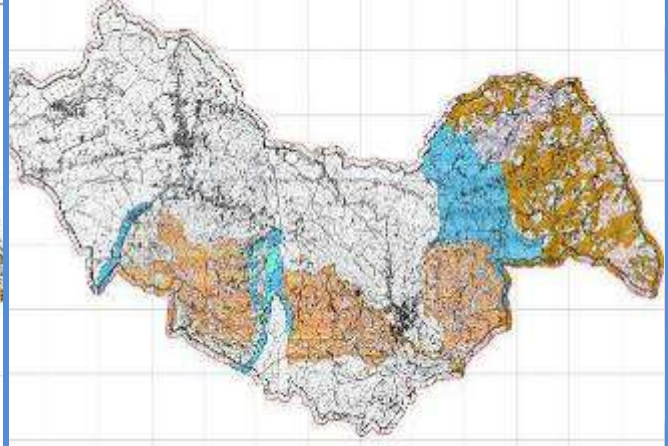
a)



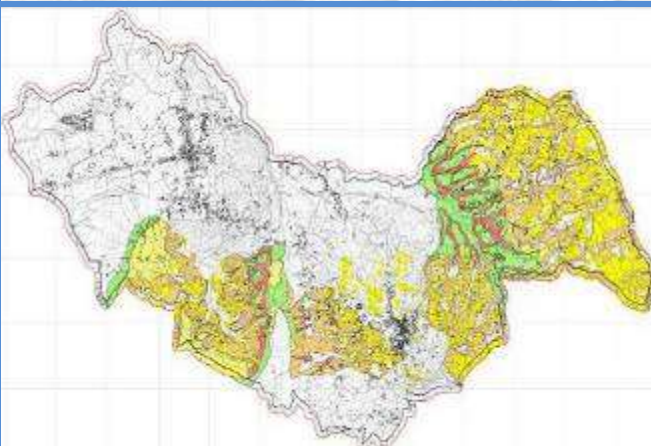
b)



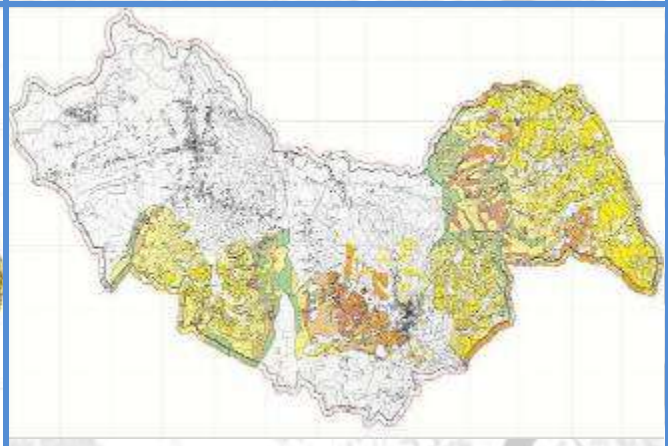
c)



d)

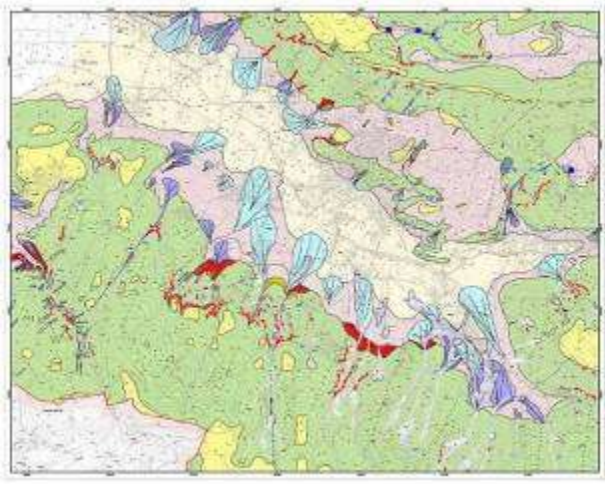


e)

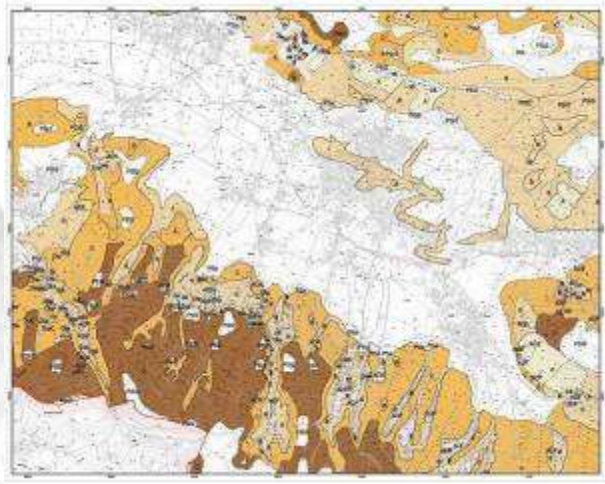


f)

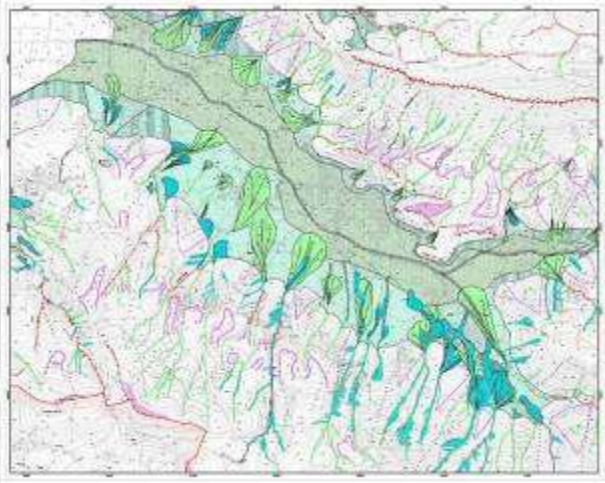
Geothematic maps produced with GIS software . Project "Consulenza alle attività connesse all'aggiornamento e rivisitazione del P.A.I. dell'Autorità di bacino della Campania Nord-Occidentale". Client: Cugri (Consorzio inter-Universitario Grandi Rischi. Period: 2007. a) Geolithological map; b) Covers map, c) Geomorphological map; d) landslide hazard map



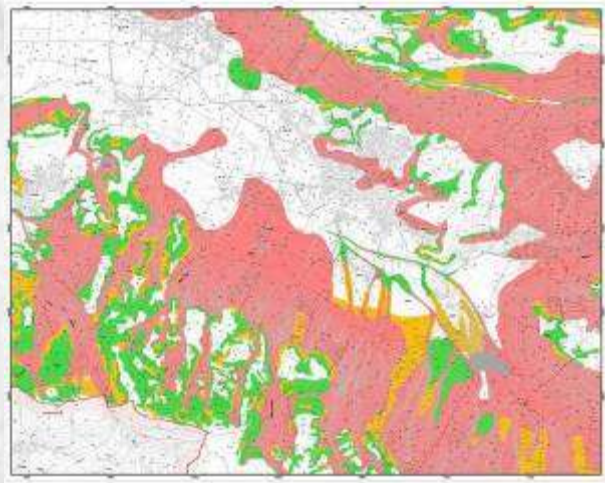
a)



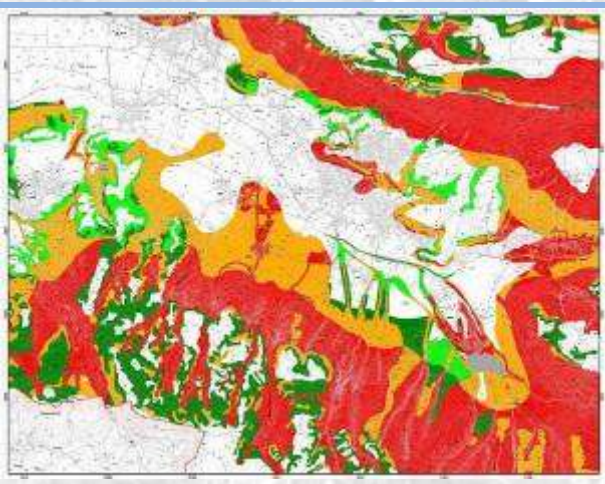
b)



c)

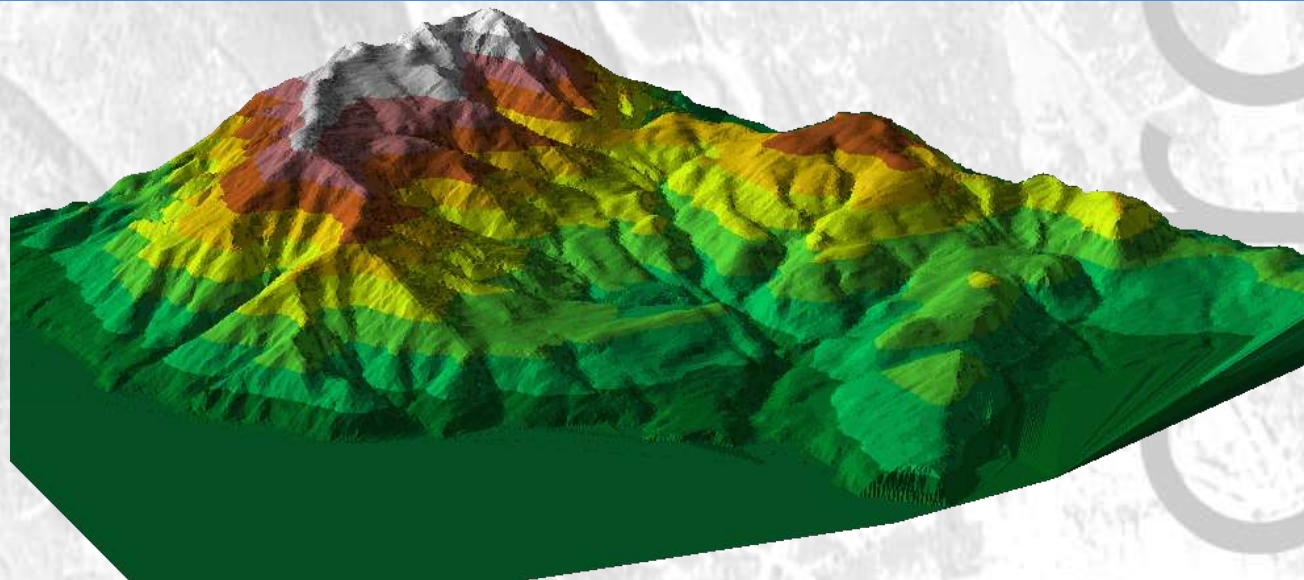
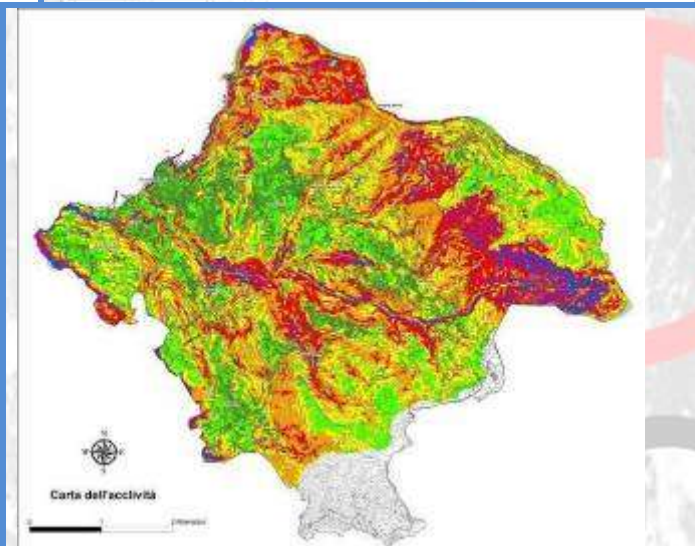
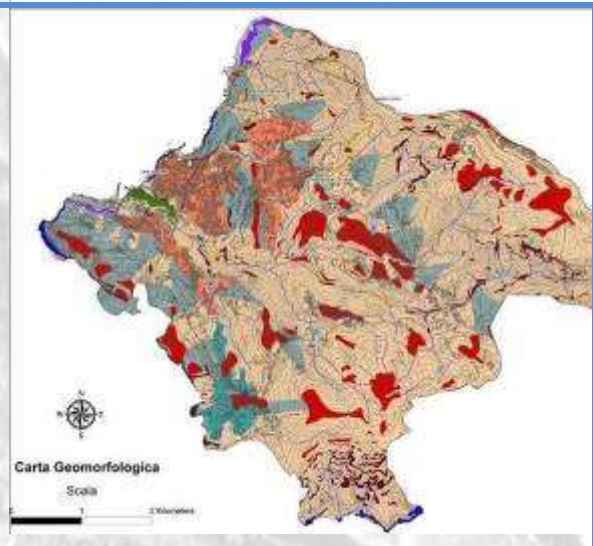
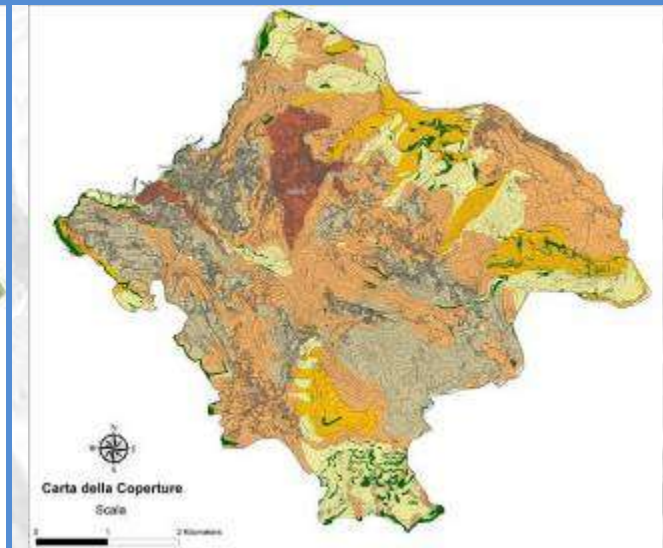
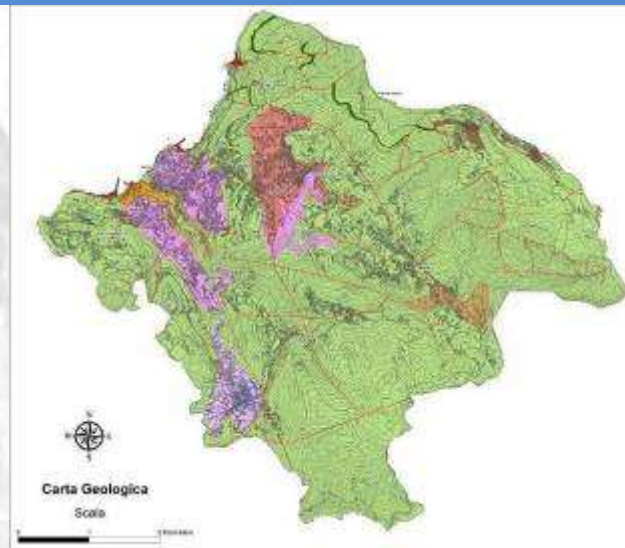


d)

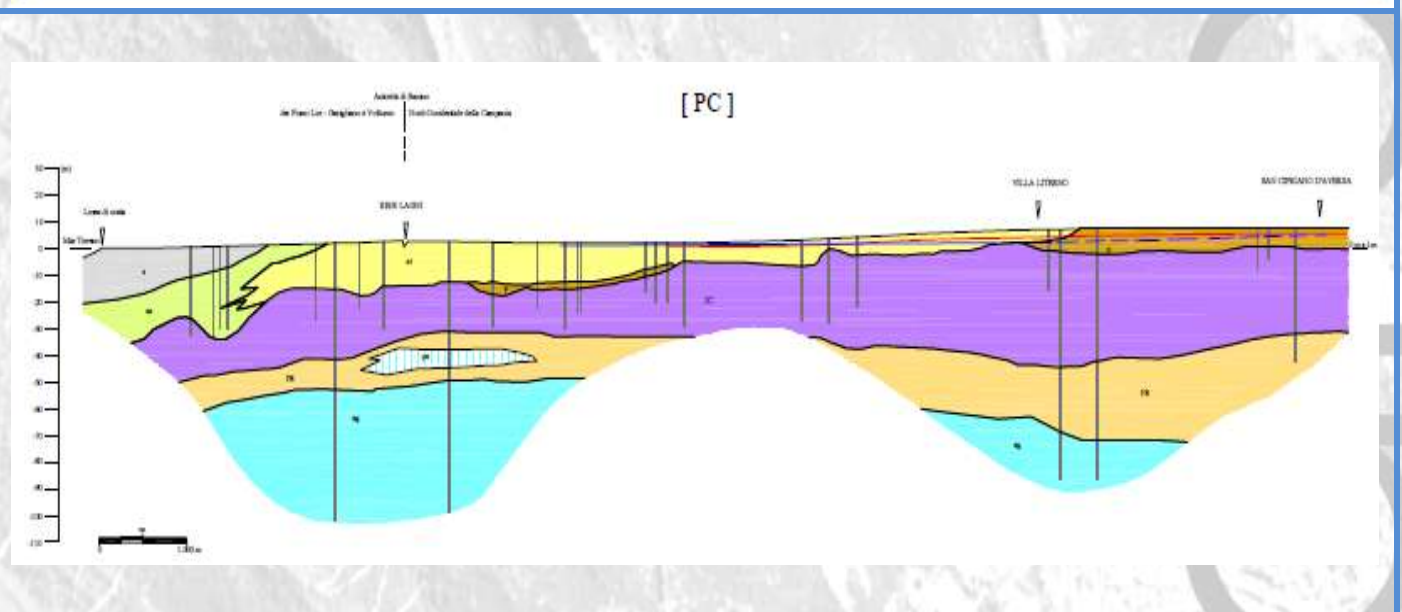
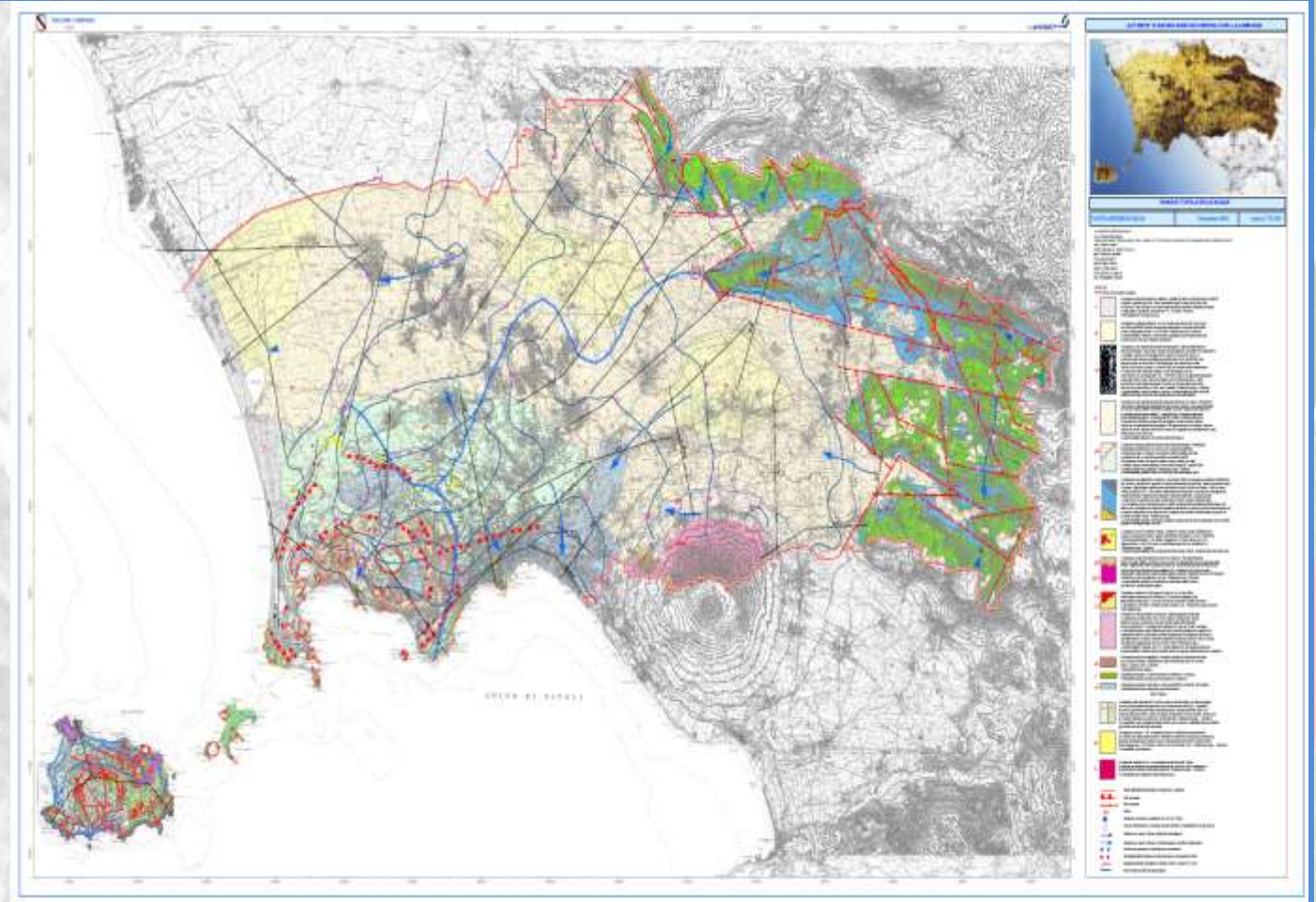


d)

Geothematic maps produced with GIS software . Project "Consulenza alle attività connesse all'aggiornamento e rivisitazione del P.A.I. dell'Autorità di Bacino del Sarno". Client: Cugri (Consorzio inter-Universitario Grandi Rischi). Period: 2006.



Geothematic maps produced with GIS software . Project "Consulenza alle attività connesse alla redazione del Piano Tutela delle Acque dell'Autorità di Bacino della Campania Nord-Occidentale". Client: Autorità di Bacino della Campania Nord-Occidentale. Period: 2002/2003. Hydrogeological map and hydrogeological section



GEOMECHANICAL ANALYSIS FOR THE CHARACTERIZATION OF ROCK MASSES IN SURFACE AND UNDERGROUND ENVIRONMENTS

IDROGEO S.r.l. has a high competence in the realization of geomechanical surveys of rocky walls deriving from the experience gained in recent years. This **company** has performed several works aimed at the consolidation of rock masses, recovery of areas of cava and underground environments.

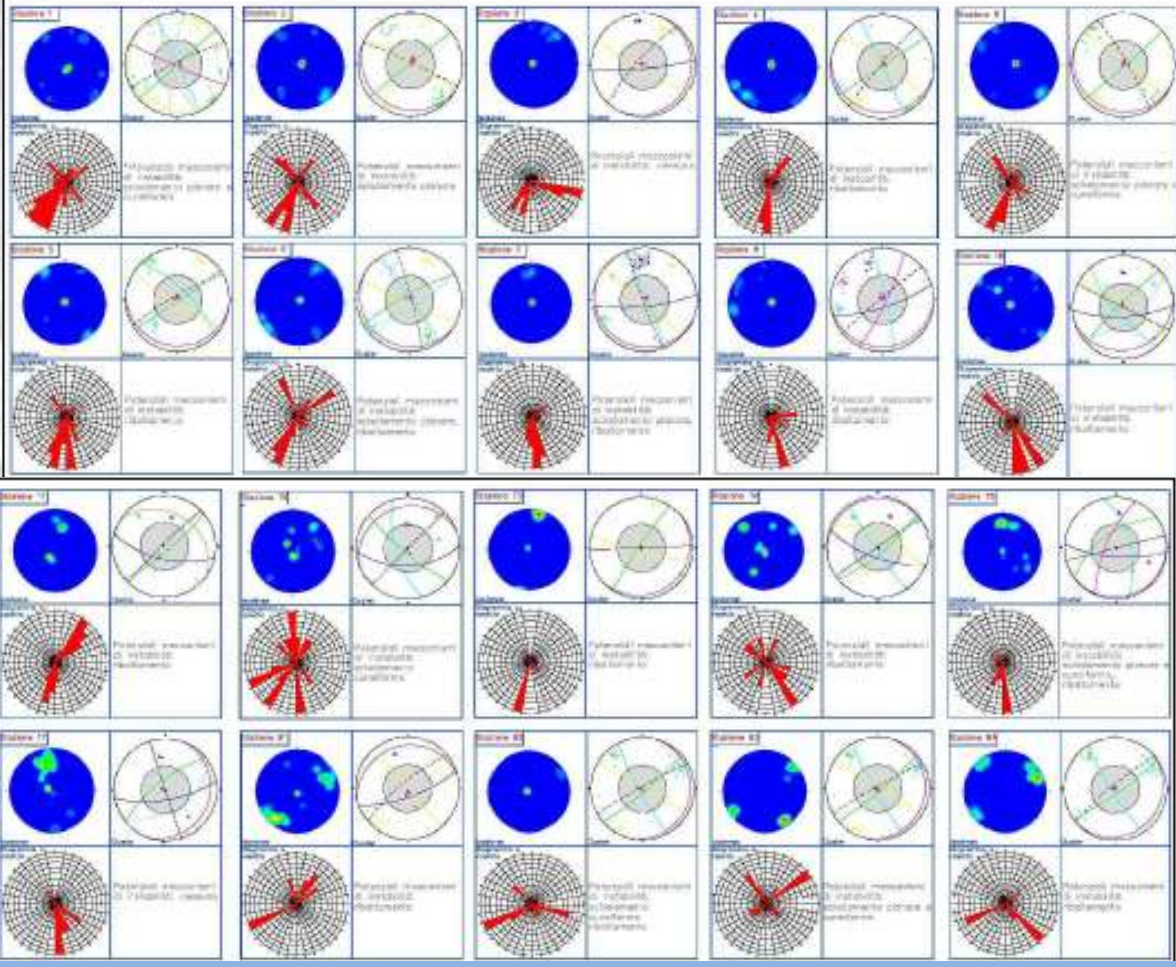
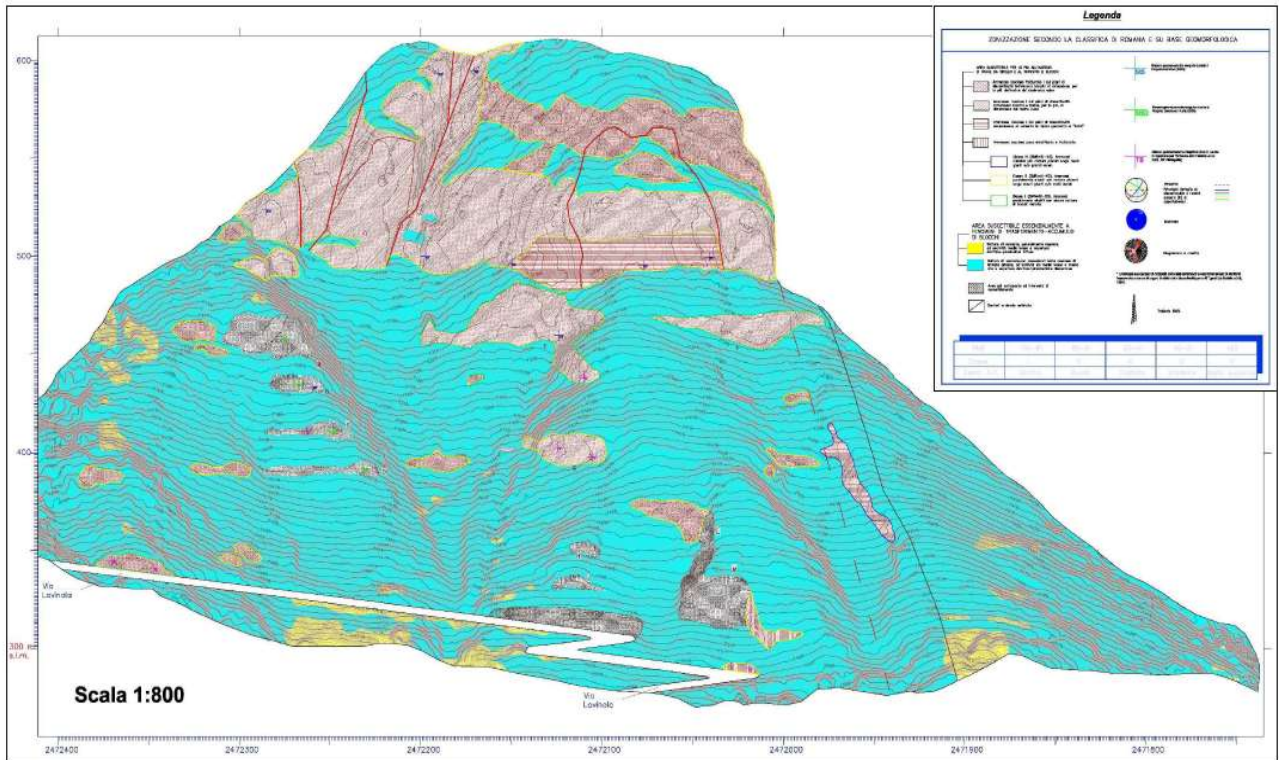
Geomechanical survey of rock masses is done through the creation of detailed geomechanical investigations and geo-structural by means of inspection on a wall with climbing techniques using geological rock climbers.

The geomechanical survey are conducted according to the ISRM. Geomechanical and geo-structural data are subjected to statistical and kinematics analysis through the use of specific software. This procedure allows to define the structural setting of the rock mass, valuation of volume of potentially unstable blocks and resistance of the rock.

We have good experience to classify the rock masses according to Romana classification, Bieniawski classification, Barton classification and GSI classification.

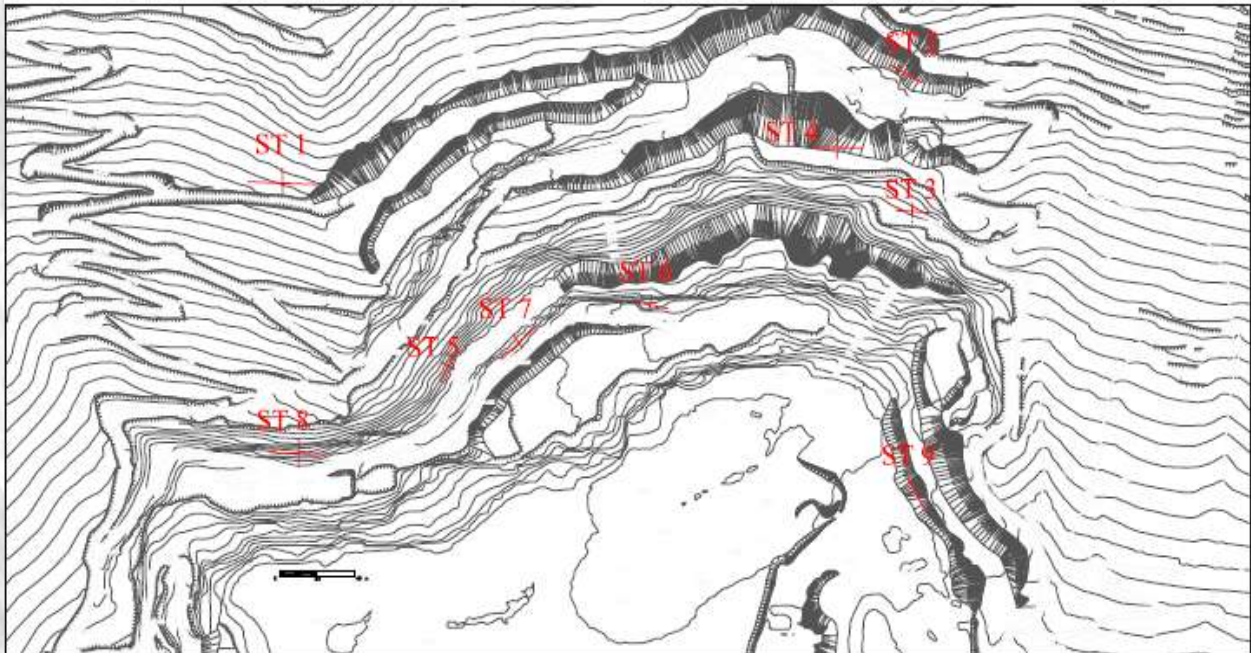
Geomechanical and geostructural data are represented on topographic surveys of detail in plan and perspective view. The three-dimensional topographic surveys are carried out by means of photogrammetric techniques and laser scanner technology.

Map of geomechanical stations and landslide susceptibility map. Perspective view. Project "Disgaggio Massi Pericolanti – Consolidamento Costone e Realizzazione barriera paramassi in Via Lavinola". Client: Comune di Piano di Sorrento.



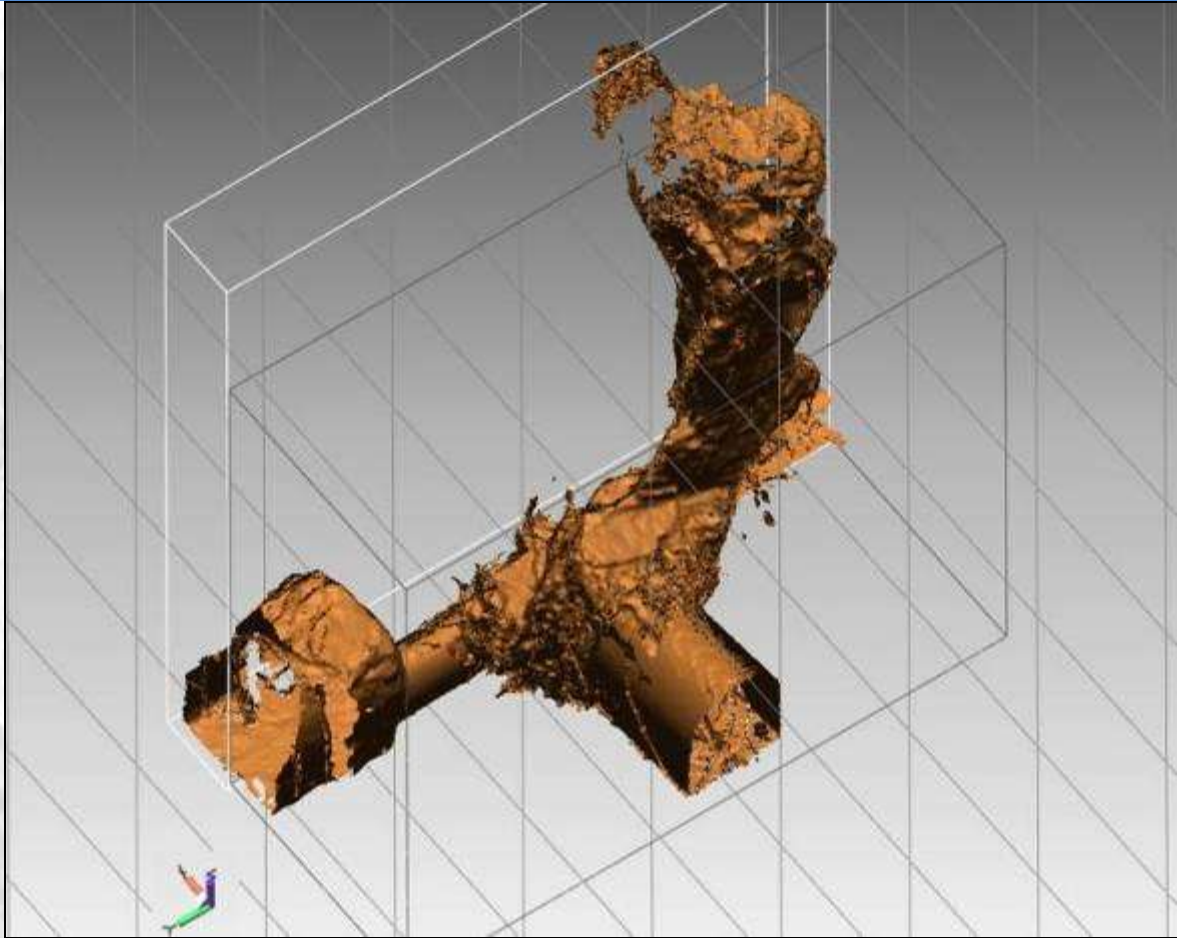
Map of geomechanical stations. Project "Studio geologico/geomeccanico della cava in località Fossa A' Ramma di proprietà della Reggia Cave SUD S.r.l. di Caserta". Client: Reggia Cave SUD s.r.l.. Period: 2009

Carta delle stazioni geomeccaniche



<p>Stazione 1</p> <p>Indicatore Classificazione di ISRM</p> <p>Tabella orientamenti</p> <table border="1"> <tr><th>SC</th><th>TSP</th><th>R</th></tr> <tr><td>1</td><td>1</td><td>1</td></tr> <tr><td>2</td><td>1</td><td>1</td></tr> <tr><td>3</td><td>1</td><td>1</td></tr> <tr><td>TEOR</td><td>1</td><td>1</td></tr> </table> <p>Integratore della struttura Crono-tipi</p>	SC	TSP	R	1	1	1	2	1	1	3	1	1	TEOR	1	1	<p>Stazione 2</p> <p>Indicatore Classificazione di ISRM</p> <p>Tabella orientamenti</p> <table border="1"> <tr><th>SC</th><th>TSP</th><th>R</th></tr> <tr><td>1</td><td>1</td><td>1</td></tr> <tr><td>2</td><td>1</td><td>1</td></tr> <tr><td>3</td><td>1</td><td>1</td></tr> <tr><td>TEOR</td><td>1</td><td>1</td></tr> </table> <p>Integratore della struttura Crono-tipi</p>	SC	TSP	R	1	1	1	2	1	1	3	1	1	TEOR	1	1	<p>Stazione 3</p> <p>Indicatore Classificazione di ISRM</p> <p>Tabella orientamenti</p> <table border="1"> <tr><th>SC</th><th>TSP</th><th>R</th></tr> <tr><td>1</td><td>1</td><td>1</td></tr> <tr><td>2</td><td>1</td><td>1</td></tr> <tr><td>3</td><td>1</td><td>1</td></tr> <tr><td>TEOR</td><td>1</td><td>1</td></tr> </table> <p>Integratore della struttura Crono-tipi</p>	SC	TSP	R	1	1	1	2	1	1	3	1	1	TEOR	1	1
SC	TSP	R																																													
1	1	1																																													
2	1	1																																													
3	1	1																																													
TEOR	1	1																																													
SC	TSP	R																																													
1	1	1																																													
2	1	1																																													
3	1	1																																													
TEOR	1	1																																													
SC	TSP	R																																													
1	1	1																																													
2	1	1																																													
3	1	1																																													
TEOR	1	1																																													
<p>Stazione 4</p> <p>Indicatore Classificazione di ISRM</p> <p>Tabella orientamenti</p> <table border="1"> <tr><th>SC</th><th>TSP</th><th>R</th></tr> <tr><td>1</td><td>1</td><td>1</td></tr> <tr><td>2</td><td>1</td><td>1</td></tr> <tr><td>3</td><td>1</td><td>1</td></tr> <tr><td>TEOR</td><td>1</td><td>1</td></tr> </table> <p>Integratore della struttura Crono-tipi</p>	SC	TSP	R	1	1	1	2	1	1	3	1	1	TEOR	1	1	<p>Stazione 5</p> <p>Indicatore Classificazione di ISRM</p> <p>Tabella orientamenti</p> <table border="1"> <tr><th>SC</th><th>TSP</th><th>R</th></tr> <tr><td>1</td><td>1</td><td>1</td></tr> <tr><td>2</td><td>1</td><td>1</td></tr> <tr><td>3</td><td>1</td><td>1</td></tr> <tr><td>TEOR</td><td>1</td><td>1</td></tr> </table> <p>Integratore della struttura Crono-tipi</p>	SC	TSP	R	1	1	1	2	1	1	3	1	1	TEOR	1	1	<p>Stazione 6</p> <p>Indicatore Classificazione di ISRM</p> <p>Tabella orientamenti</p> <table border="1"> <tr><th>SC</th><th>TSP</th><th>R</th></tr> <tr><td>1</td><td>1</td><td>1</td></tr> <tr><td>2</td><td>1</td><td>1</td></tr> <tr><td>3</td><td>1</td><td>1</td></tr> <tr><td>TEOR</td><td>1</td><td>1</td></tr> </table> <p>Integratore della struttura Crono-tipi</p>	SC	TSP	R	1	1	1	2	1	1	3	1	1	TEOR	1	1
SC	TSP	R																																													
1	1	1																																													
2	1	1																																													
3	1	1																																													
TEOR	1	1																																													
SC	TSP	R																																													
1	1	1																																													
2	1	1																																													
3	1	1																																													
TEOR	1	1																																													
SC	TSP	R																																													
1	1	1																																													
2	1	1																																													
3	1	1																																													
TEOR	1	1																																													
<p>Stazione 7</p> <p>Indicatore Classificazione di ISRM</p> <p>Tabella orientamenti</p> <table border="1"> <tr><th>SC</th><th>TSP</th><th>R</th></tr> <tr><td>1</td><td>1</td><td>1</td></tr> <tr><td>2</td><td>1</td><td>1</td></tr> <tr><td>3</td><td>1</td><td>1</td></tr> <tr><td>TEOR</td><td>1</td><td>1</td></tr> </table> <p>Integratore della struttura Crono-tipi</p>	SC	TSP	R	1	1	1	2	1	1	3	1	1	TEOR	1	1	<p>Stazione 8</p> <p>Indicatore Classificazione di ISRM</p> <p>Tabella orientamenti</p> <table border="1"> <tr><th>SC</th><th>TSP</th><th>R</th></tr> <tr><td>1</td><td>1</td><td>1</td></tr> <tr><td>2</td><td>1</td><td>1</td></tr> <tr><td>3</td><td>1</td><td>1</td></tr> <tr><td>TEOR</td><td>1</td><td>1</td></tr> </table> <p>Integratore della struttura Crono-tipi</p>	SC	TSP	R	1	1	1	2	1	1	3	1	1	TEOR	1	1																
SC	TSP	R																																													
1	1	1																																													
2	1	1																																													
3	1	1																																													
TEOR	1	1																																													
SC	TSP	R																																													
1	1	1																																													
2	1	1																																													
3	1	1																																													
TEOR	1	1																																													

Three-dimensional survey of underground tunnel. Project "Impianto di depurazione di Punta Gradelle - Vico Equense (NA) - Localita' Seiano". Client: INTINI Angelo s.r.l.. Period: 2011.



THREE-DIMENSIONAL GEOMETRIC SURVEYS

IDROGEO S.r.l. performs topographic surveys with high-tech equipment, such as laser scanner and terrestrial photogrammetry. Our **company** is able to acquire and process three-dimensional models of the territory and structures/infrastructure that insist on it.

Terrestrial Laser Scanner is a topographic technique that allows the detection of the 3D point clouds of the surveyed area. The sensor is a near-infrared laser, whose operational principle is based on the measure of the — time of flight.

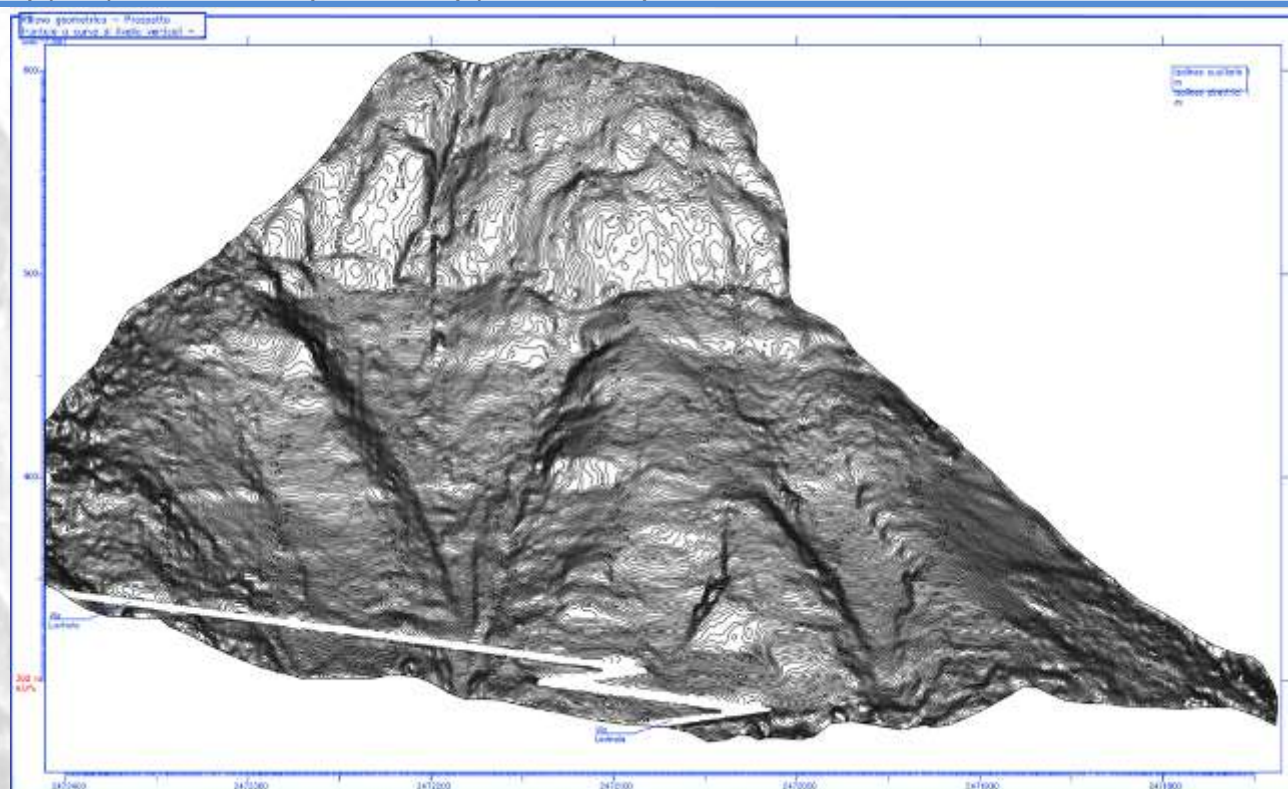
The time of flight is the elapsed time between the emission of the laser impulse and the reception after the backscattering. The local coordinates of the point cloud can be then translated into the geographic reference system by the support of GPS measurements. By the combination with a high resolution digital camera, true colour point clouds can be obtained.

Thanks to its high accuracy, resolution, and quick data collection, we use the Terrestrial Laser Scanner technique to solve problem of rock fall.

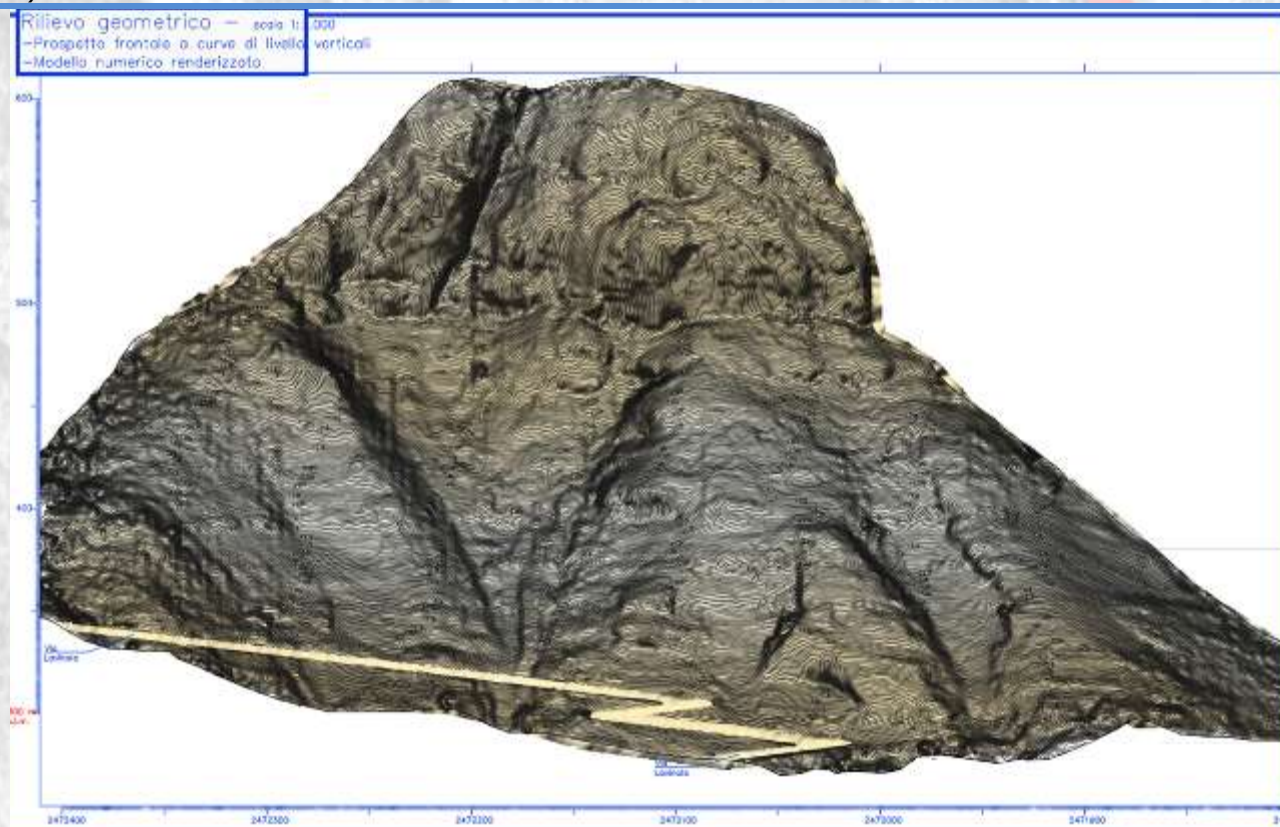
An important limitation of traditional geomechanical surveys often consists in the difficulty (or impossibility) to reach the rock walls; another common problem, especially when dealing with active landslides or heavily fractured rock masses, is the intrinsic danger of the site. The laser scanning technique, on the other hand, allows to remotely, quickly, and accurately measure all the main geometric characteristics of a rock mass. The advantage of using this procedure lies in its capability to investigate all the geomechanical parameters that do not require direct access to the rock mass.

Terrestrial photogrammetry is engaged in measurement, contour delineation or 3D reconstruction with photos captured by a camera located on the ground. Terrestrial photogrammetry has gained wide applications in many fields such as 3D building reconstruction, heritage protection, landslide monitoring etc.

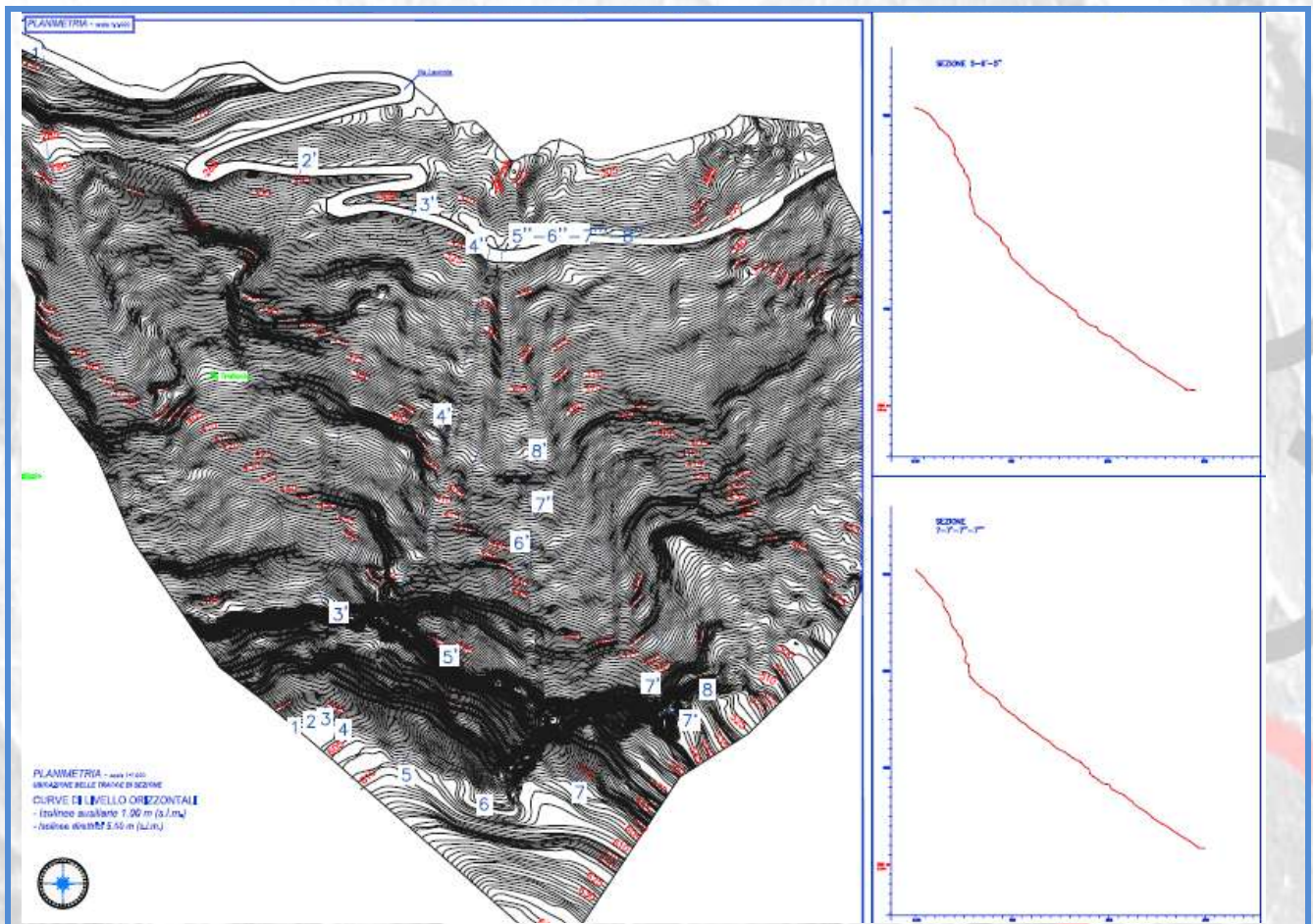
Topographic relief (perspective view). Project "Disgaggio massi pericolanti – Consolidamento costone e realizzazione barrier paramassi in Via Lavinola". Client: Comune di Piano di Sorrento.
a) perspective view; b) render; c) plan view; d) Areas of interventions.



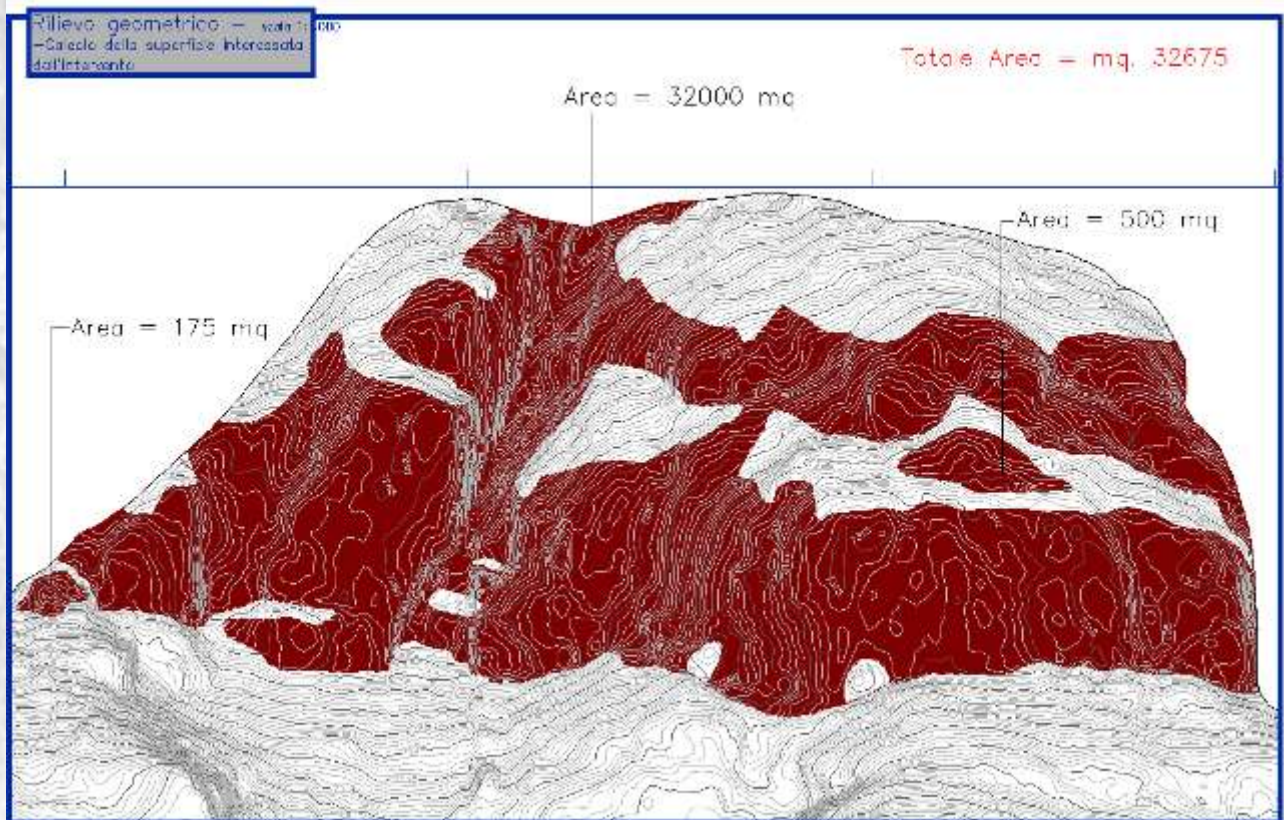
a)



b)

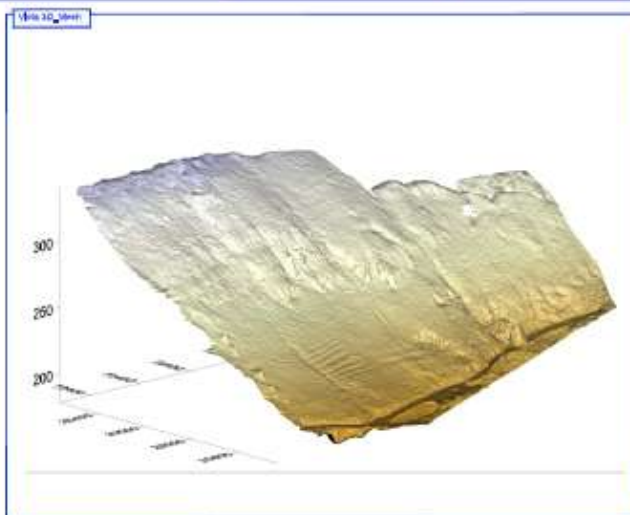
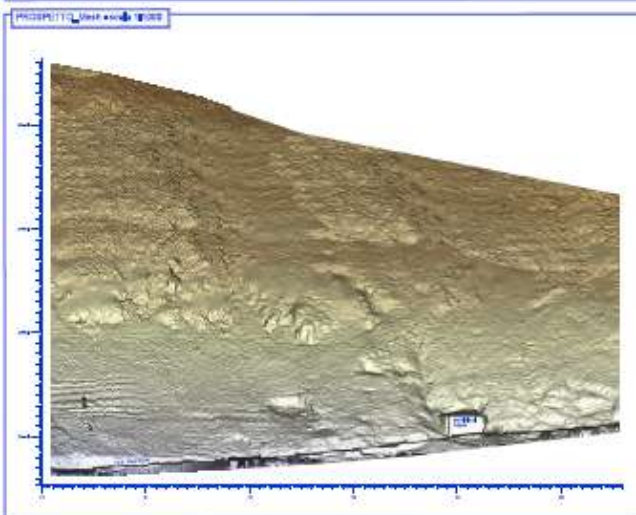
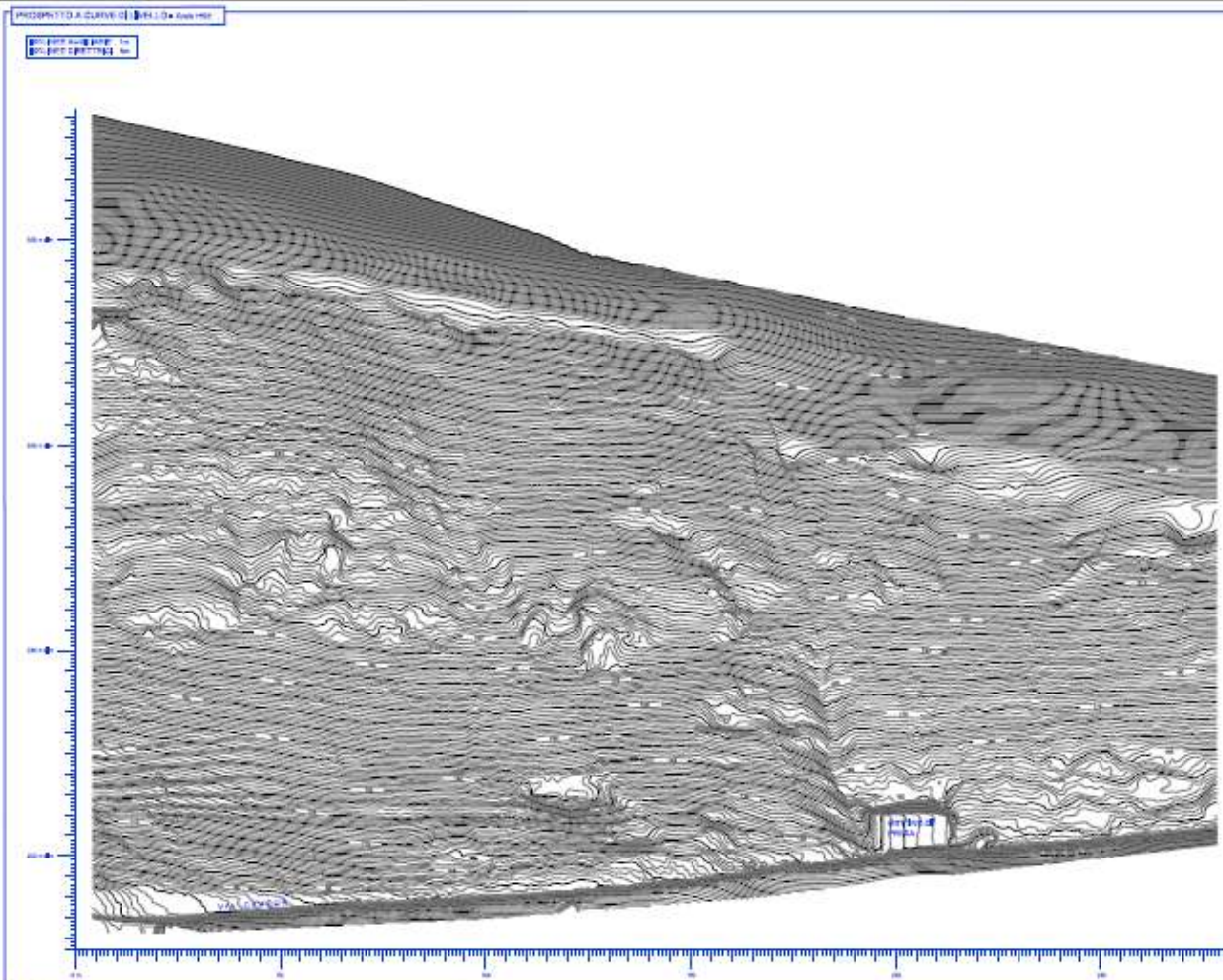


c)



d)

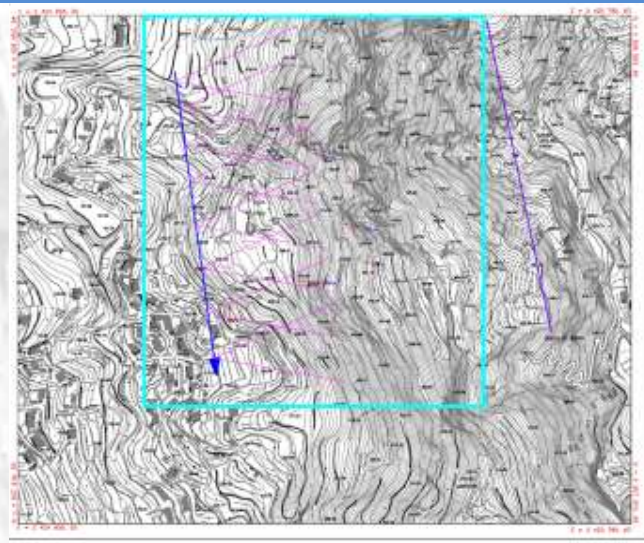
Topographic relief. Project "Rilevi tridimensionali del costone sito nel Comune di Santi Cosma e Damiano (Provincia di Latina) comprensivo di verifiche tralettografiche per il dimensionamento delle barriere paramassi". Client: Impresa Celletti. Period: 2012



Laser scanner survey. Project "Lavori di messa in sicurezza di alcune aree della parte Nord-Est dell'isola di Ventotene- Sistemazione dell'area ex Caserma Granili sul Porto Romano - Progettazione definitiva ed esecutiva. Client: Comune di Ventotene. Period: 2011. Point clouds of tuff cliff

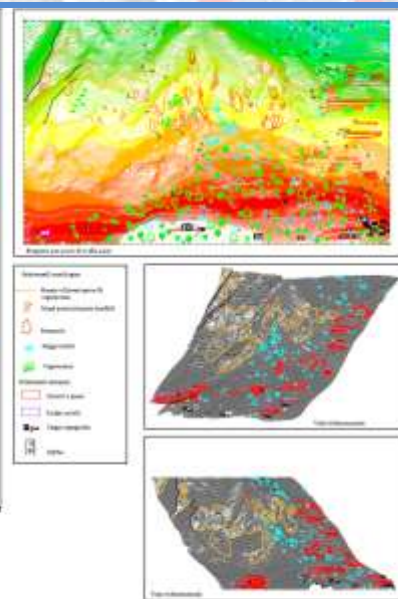
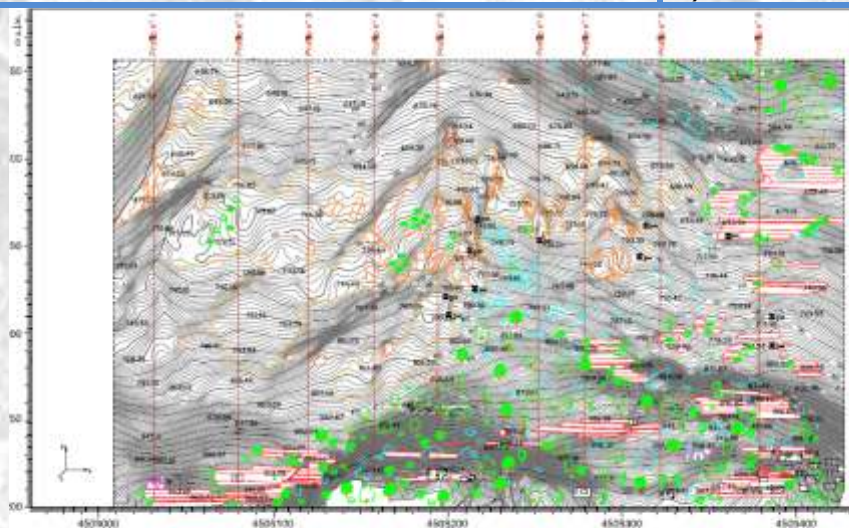


Photogrammetric survey. Project "Realizzazione di indagini geognostiche e prove finalizzate all'aggiornamento del Piano Stralcio per l'Assetto Idrogeologico dell'Autorità di Bacino della Campania Nord-Occidentale". Client: CIRIAM - Centro Interdipartimentale di Ricerca in Ingegneria Ambientale. Period: 2009. a) Study area; b) Photomosaic; c) Perspective view of the area; d) topographic profiles.

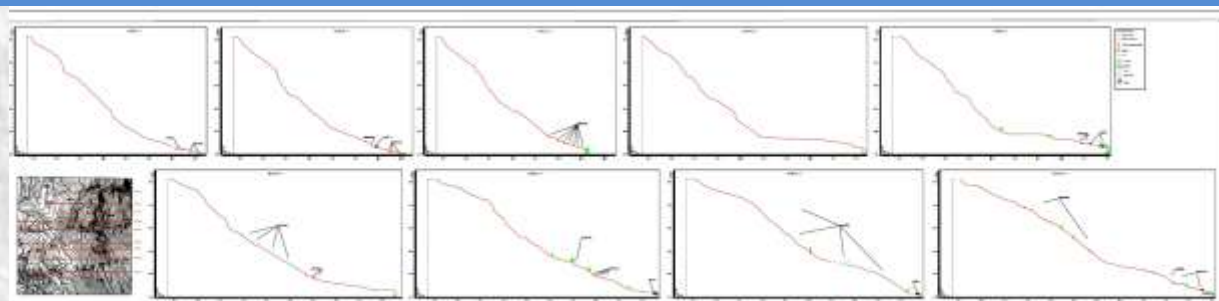


a)

b)



c)



d)

INTERFEROMETRIC AND GEOTECHNICAL MONITORING OF THE SLOPES AND STRUCTURE

The instrument that employs the **IDROGEO** S.r.l. is an IBIS-L, produced and distributed by IDS SPA.

GbSAR is an innovative and advanced "geodetic" instruments based on ground-based radar interferometry aimed at providing accurate measurement of movements over wide areas.

IBIS products have been designed to address the specific needs of the civil engineering, geotechnical and mining markets

This revolutionary approach provides the IBIS users with accurate remote measurements without requiring any contact with the target and in almost all weather conditions.

SAR technique enables the system to provide high cross range resolution exploiting the movement of the physical antenna along a straight trajectory (linear scanner), the SAR process of the data, collected during the movement of the sensor head on the 2 meter track.

The interferometric analysis provides data on object displacement by comparing phase information, collected in different time periods, of reflected waves from the object, providing a measure of the displacement with an accuracy of less than 0.01mm (intrinsic radar accuracy in the order of 0.001 mm.) The displacement is measured in the direction of the line of sight of the system. To calculate the real displacement it is necessary to know the acquisition geometry.

The main advantages of the use of IBIS for monitoring are:

- possibility to carry out the survey without accessing the land/structure but installing the IBIS system in its proximity
- obtain information from all the area illuminated by the antenna beam: the radar measures the local displacement of the scenario by resolving it into pixels of a few square meters
- high displacement measurement accuracy, up to 1/10 mm
- day-night continuous operation
- completely autonomous operation not requiring human intervention
- acquisition frequency of the order minutes for IBIS-L, m/sec for IBIS-S

To process acquisition data we use Guardian software that allows:

- Real time processing with automatic atmospheric corrections
- Alarm generation with user-defined levels and multiple alarm criteria
- Fully georeferenced outputs
- 3D interactive data handling
- User defined zones for alarm generation
- Exportability of outputs to GIS and mine planning software

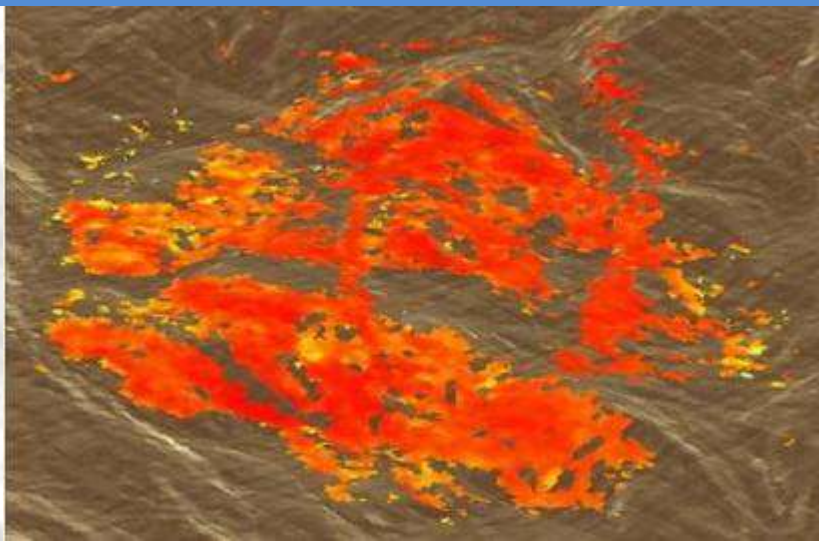
Through the use of this technology is possible to manage data in Early Warning.

The **IDROGEO** S.r.l. is engaged in the development and promotion of early warning monitoring systems of the slopes. An Early Warning system uses automatic processing mode and data transfer, remotely, from a control room, to prevent catastrophic events..

Landslide monitoring of slope located in Costa della Gaveta (PZ), with interferometric technology. a) IBIS-L instrument (produced by IDS) during acquisition of data; b) Displacement map; Displacement map on DTM



a)



b)



c)

IDS IdroGeo Campagne di misura IBIS-L a Potenza

Visualizzazione 3d del versante investigato. In blu delimitazione delle frane, individuate mediante analisi morfologica, in rosso le aree in movimento.

GEOGNOSTIC INVESTIGATION TO FOR THE UNDERGROUND CHARACTERIZATION

The characterization of land from a geotechnical and hydrogeological point of view is the prerequisite to initiate any action that interacts with it. The bearing capacity of foundation soil, the possible presence of water, the behavior as a result of the loads, the rate of consolidation, etc. are variables whose knowledge becomes prior to the implementation of any civil works.

For this reason **IDROGEO** S.r.l. considers the great importance of this category to determine all the parameters involved in these issues and It uses for their determination both direct (stratigraphic surveys, geotechnical testing on-site) and indirect (geoseismic, geoelectric) surveys.

With direct investigations, you can identify litho-stratigraphic succession and geotechnical characteristics of the subsoil through the implementation of drilling, geotechnical testing , monitoring excursion of the water table (piezometric monitoring) or conditions slope instability (inclinometer monitoring), etc.

Geophysical surveys are modern investigation techniques, consisting in the systematic collection of geophysical data for spatial studies. Geophysical surveys may use a great variety of sensing instruments and data may be collected from above or below the Earth's surface. Geophysical surveys have many applications (geology, hydrogeology, engineering, instability of the subsoil, seismic, archeology, etc.).

Furthermore, this type of investigation offers many advantages, such as the opportunity to study areas of considerable extent but also limited portions with a good detail, the speed of execution, low cost, minimal disturbance of the surface and subsoil, facilitating the processes in urban areas, landscape or archaeological environments.

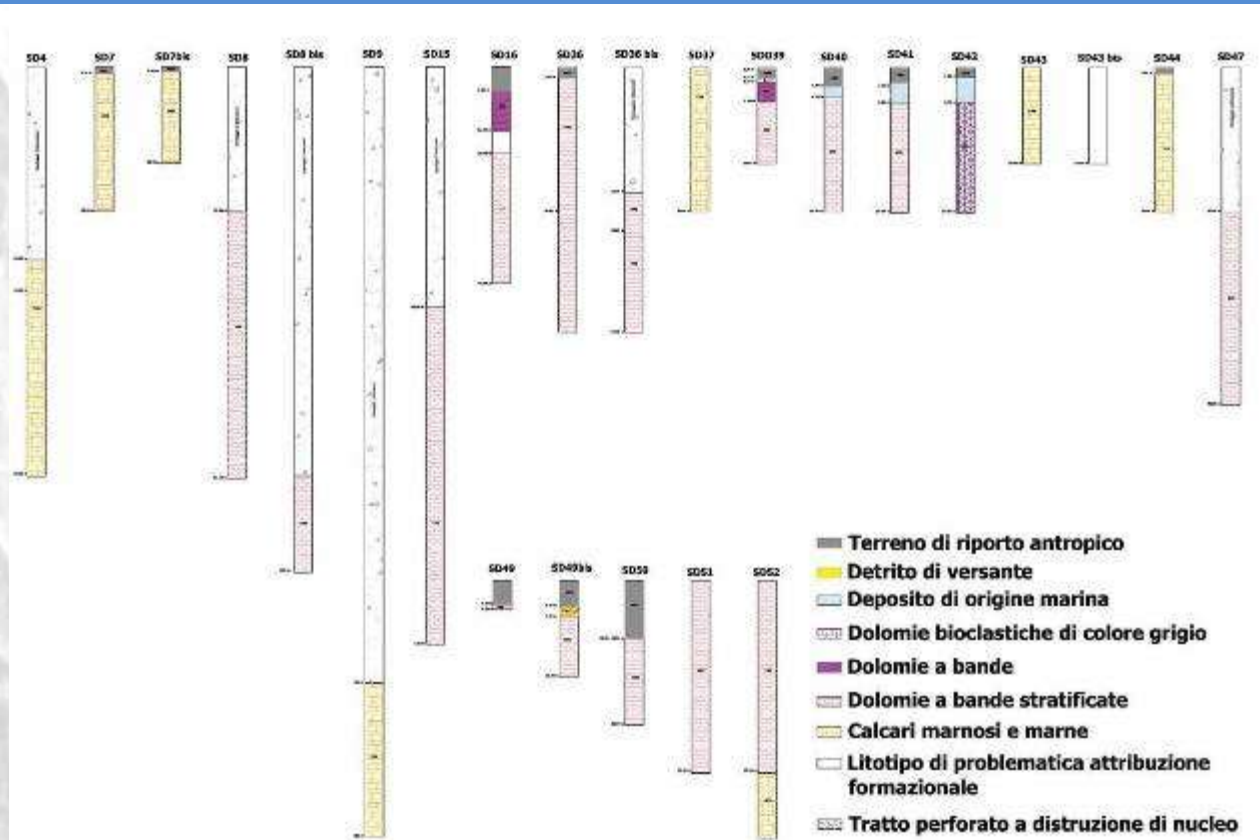
Given the considerable complexity and multiplicity of the phenomena that must be taken into consideration, you can perform a large number of tests both in situ and laboratory. The results of each are often compared, verified or calibrated by the others in a multidisciplinary approach.

The analysis and comparison of the data acquired with direct evidence type with geophysical surveys provide to reach a proper modeling of the ground, giving all detailed and necessary knowledges for design and land use planning.

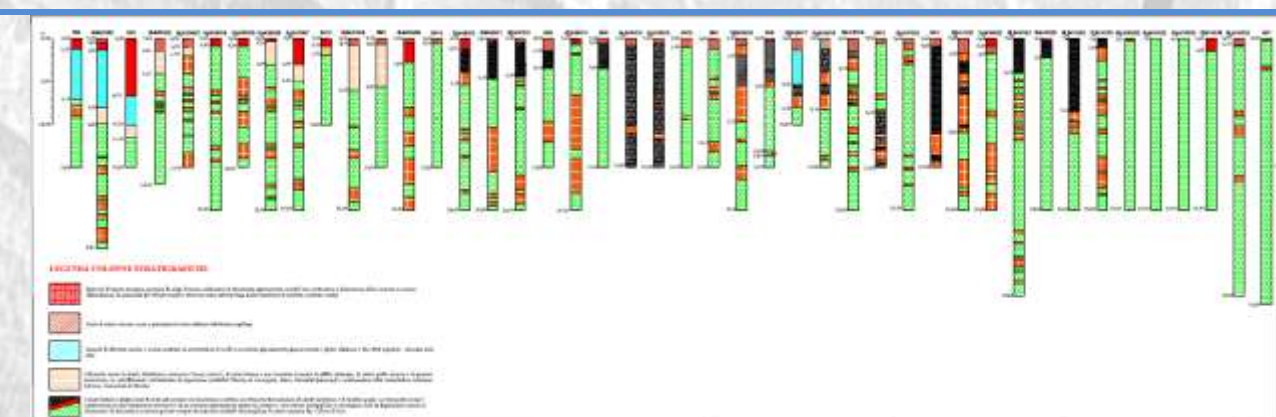
IDROGEO S.r.l.'s experienced exploration consultants are able to realize, audit, review and advise on investigation procedures and data processing, to work on different types of land and structures and according to current law. **IDROGEO** S.r.l. also is able to provide a quick evaluation and planning of the research program in relation to the scope, timing and costs available.

The acquired data is made through technical reports and graphical representations both in detail that in simplified form, in according to the purpose of the investigation and promoting the readability of information to different professionals.

Program investigation example to geological, geomechanical, geotechnical, seismic and hidrogeological characterization of land subsoil trough drilling, undisturbed sample, Standard Penetration Test, lugeon test, seismic refractin, down hole



Project: Salerno Porta Ovest
 Client: Prof. D. Calcaterra
 Period 2009



Project: "Raddoppio Bari-Taranto, Tratta Bari - S. Andrea - Bitetto"
 Client: PROGER
 Period: 2012

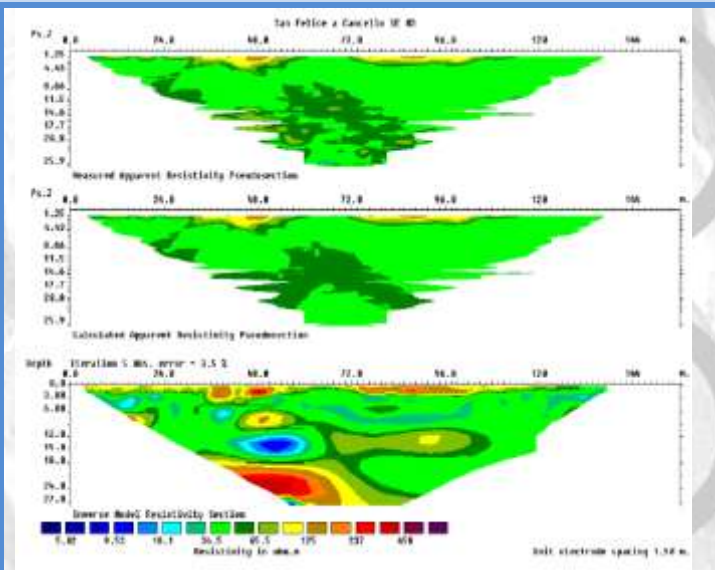
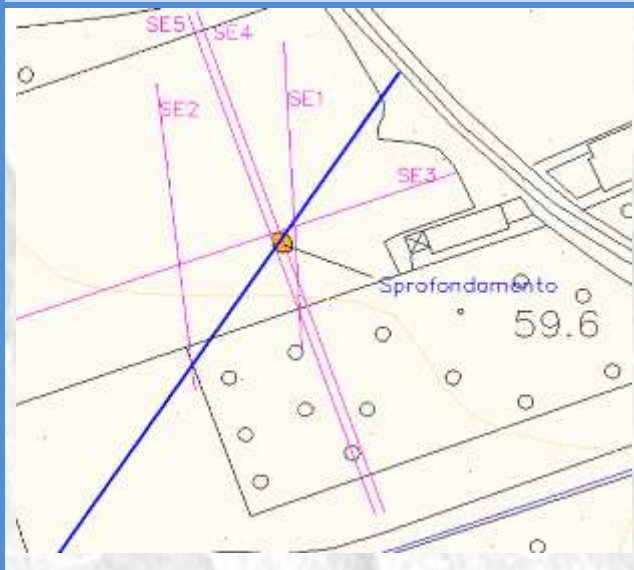
Example of detailed stratigraphic log to the investigation or evaluation of landslide hazard. Project "Realizzazione di indagini geognostiche e prove finalizzate all'aggiornamento del Piano Stralcio per l'Assetto Idrogeologico dell'Autorità di Bacino della Campania Nord-Occidentale"; Client: CIRIAM - Centro Interdipartimentale di Ricerca in Ingegneria Ambientale; Period: 2009



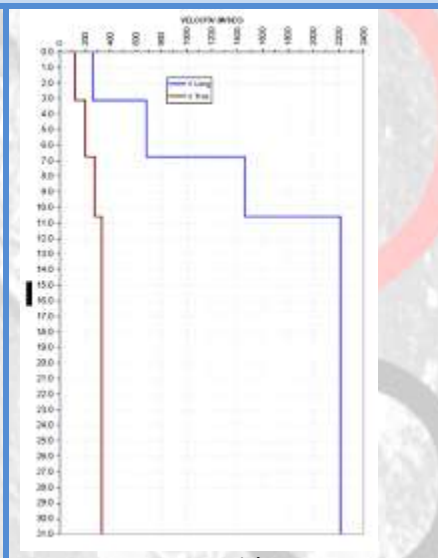
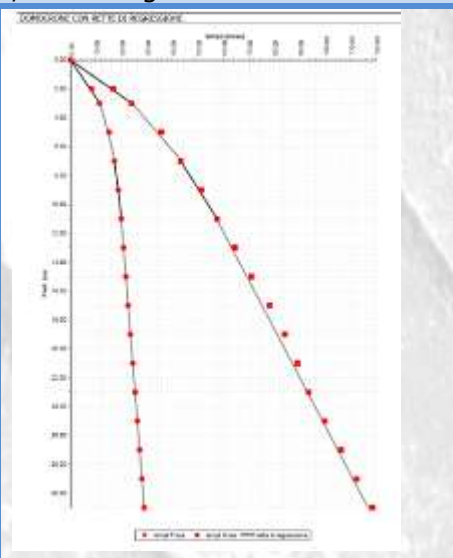
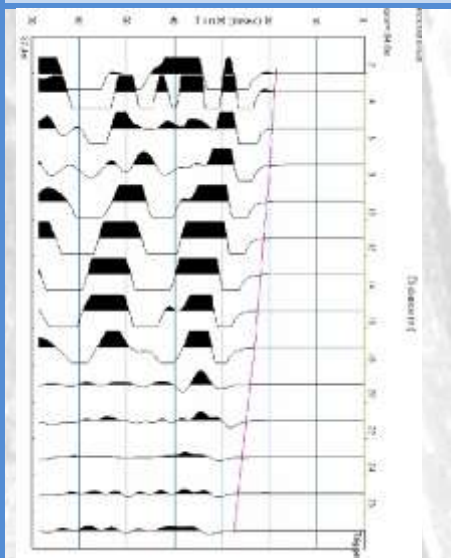
Example of geomechanical stratigraphic log on rocks. Project "Progetto Faro Annualita' 2011"; Client: Dipartimento Di Scienze Della Terra Università Federico II di Napoli, period: 2012



Geoelectric survey (resistivity method) for the evaluation of fluid losses below a water pipeline, where occurred a sinkhole



Seismic survey with down-hole method to seismic characterization of land subsoil and development of the seismic microzonation map, according to current law



Sismogramma

Dromocrone

Modello delle velocità Vp e Vs

PARAMETRI ELASTICI DINAMICI DEI TERRENI

Stato	Sezione	Prof. di inizio (m)	Prof. di fine (m)	Modulo di Young E (kg/cm²)	Modulo di taglio G (kg/cm²)	Indice di Poisson ν	Velocità di Ponda Vp (m/s)	Velocità di taglio Vg (m/s)	Velocità di onde sismiche Vs30 (m/s)	γ (kg/cm³)
1	1	0.0	1.5	227.8	128.9	0.25	578.5	214.2	690.0	18.27
2	2	1.5	4.7	224.2	126.8	0.25	566.8	207.5	676.7	18.31
3	3	4.7	8.08	202.1	104.7	0.28	529.1	191.7	598.6	18.45
4	4	8.08	16.0	202.1	104.7	0.28	529.1	191.7	598.6	18.45

PARAMETRI ELASTICI STATICI DEI TERRENI

Stato	Sezione di Profonda	Modulo di Young E (kg/cm²)	Modulo di taglio G (kg/cm²)	Indice di Poisson ν	Velocità di Ponda Vp (m/s)	Velocità di taglio Vg (m/s)	Velocità di onde sismiche Vs30 (m/s)
1	0.00	20.8	8.3	0.25	13.9	25.0	29.2
2	0.06	65.3	25.5	0.25	42.1	76.0	101.3
3	0.28	138.2	49.7	0.28	82.1	146.0	207.9
4	0.54	200.2	70.1	0.28	109.2	197.0	279.9

Stima dei parametri elastici e dinamici

Categoria sismica	Descrizione geotecnica	Vs30 (m/s)
A	Formazioni sabbie e ghiaie sabbiose... Vs30 > 300 m/s	>300
B	Depositi di sabbie e ghiaie... Vs30 > 180 m/s	180-300
C	Depositi di sabbie e ghiaie... Vs30 > 140 m/s	140-180
D	Depositi di sabbie e ghiaie... Vs30 > 100 m/s	100-140
E	Depositi di sabbie e ghiaie... Vs30 > 70 m/s	70-100
F	Depositi di sabbie e ghiaie... Vs30 > 50 m/s	50-70
G	Depositi di sabbie e ghiaie... Vs30 > 30 m/s	30-50
H	Depositi di sabbie e ghiaie... Vs30 > 20 m/s	20-30
I	Depositi di sabbie e ghiaie... Vs30 > 10 m/s	10-20
J	Depositi di sabbie e ghiaie... Vs30 > 5 m/s	5-10

$$Vs_{30} = 30 \cdot \sum_{i=1}^n \frac{1}{V_i} = 263.4 \text{ m/sec}$$

Determinazione delle Vs30 nell'ambito della vigente normativa sismica

ENVIRONMENTAL GEOLOGY AND ENVIRONMENTAL IMPACT ASSESSMENT

IDROGEO S.r.l. is constantly engaged in the study and analysis of the effects of interaction between environment and structures. It takes care of environmental impact assessment (E.I.A.), studies for the landfills sites localization, Reclamation of Polluted Soil, Environmental Restoration Of Quarries, Mines And Landfill.

The skills acquired in the different fields (geography, geology, hydrology, hydraulics, and more generally of the natural sciences,) are used to achieve high quality levels of environmental protection and to analyze in detail the project's effects on the environment. These studies are realized promoting collaboration with designers and proposing innovative solutions to improve and reduce the environmental impact.

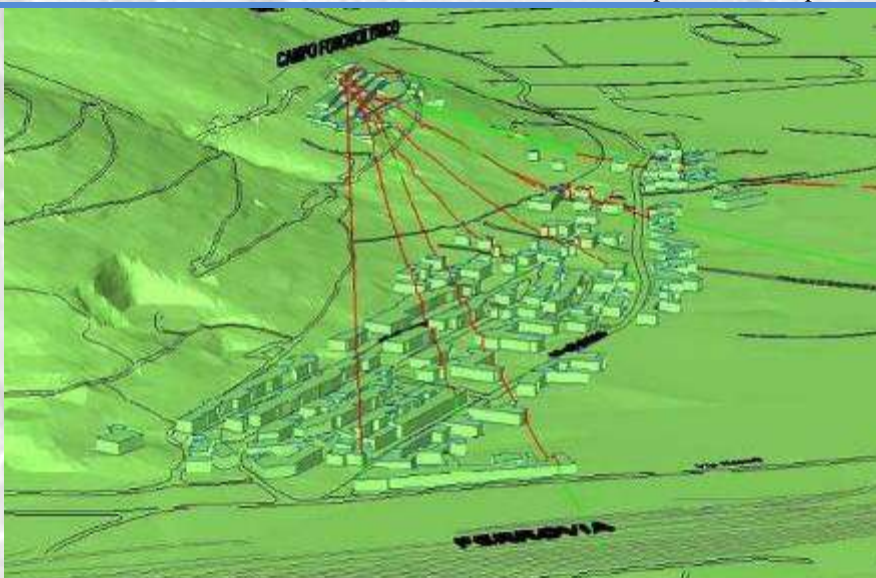
Valutazione di Incidenza (V.I.), Studio di Impatto Ambientale (SIA) e Studio di Compatibilità Idrogeologica per la "Realizzazione di un Campo Fotovoltaico sulla Collina di San Felice a Canello (CE)"; Committente: ARIN S.p.A.; Anno: 2009. a) Rendering delle opere da realizzarsi; b) Valutazione dell'impatto visivo delle opere mediante modellizzazione tridimensionale del terreno (DEM) comprensivo degli edifici



a)

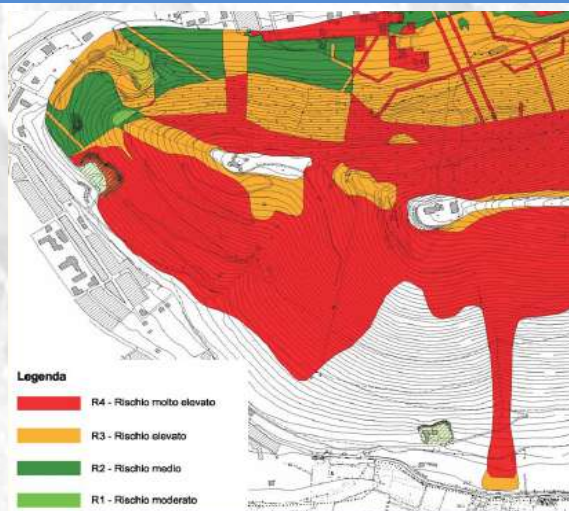


b) Visualizzazione tridimensionale della Collina di Canello, con punto di vista posto da SO

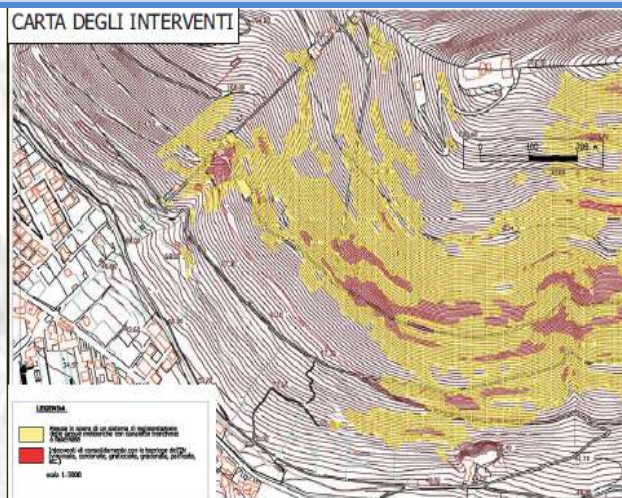


b) Visualizzazione tridimensionale della Collina di Canello, con punto di vista posto da O

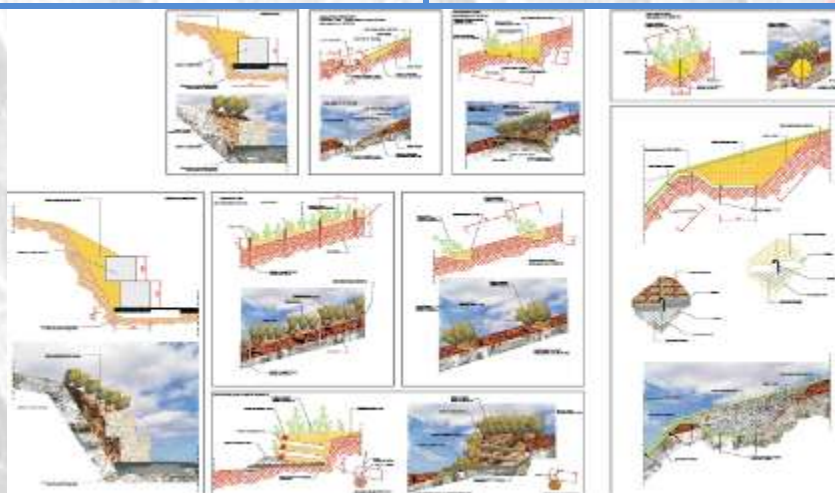
Valutazione di Incidenza (V.I.), Studio di Impatto Ambientale (SIA) e Studio di Compatibilità Idrogeologica per la "Realizzazione del Nuovo Campo Pozzi A.R.I.N. della Collina di San Felice a Canello (CE)"; Committente: ARIN S.p.A.; Anno:2006-2007. Per la mitigazione del rischio ed a protezione delle realizzande scarpate delle aree pozzi sono stati proposti e realizzati interventi di Ingegneria Naturalistica (Vimate vive, Cordonate vive, Geogriglie, Canalette tipo trenchmat, Fascinate vive, Gradinate vive, Palificate vive) minimizzando l'impatto ambientale dell'opera



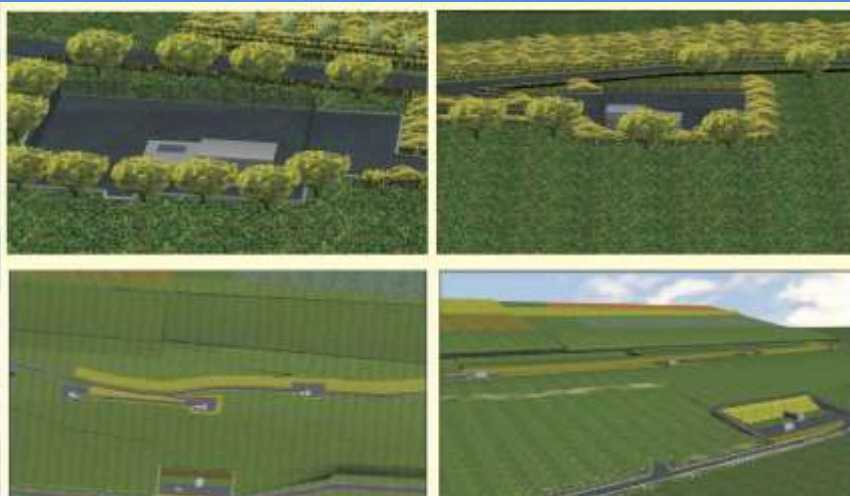
Vincolistica – Carta del rischio frana



Individuazione delle aree da sottoporre ad interventi di mitigazione del rischio frana



Interventi di Ingegneria Naturalistica – Particolari costruttivi



Fotorender delle opere in Progetto