GEOMAP srl

SOCIETÀ DI INGEGNERIA

PRESENTATION

Geomap Srl is a limited-liability company established in Florence. Italy, in 1989, whose main purpose is the provision of services and the realization of studies in the fields of applied geology, land and environment, research and evaluation of natural resources, geographic information systems and thematic mapping.

Geomap Srl was born as a natural evolution of Geomap SA, first and Geomap Studio Geologico later, whose activity started in 1958 with Prof. Enrico Marchesini and the geologists Sergio Bemporad, Carlo Conedera, Pietro Dainelli, Alessandro Ercoli and Paolo Facibeni,

Since January 16, 2014, Geomap was transformed into **Geomap Srl –Società di Ingegneria**, adding the activities of this legal entity to its corporate purpose (feasibility studies, research, consultancy, project design and supervision, technical and economic adequacy, assessments, environmental impact studies).

The activity of Geomap covers all the steps of collection, management, analysis, evaluation and presentation of geographical data. This activity is carried out through field surveys, elaboration of existing documentation, interpretation of aerial and ground photos, processing and interpretation of satellite imagery and other remotely-sensed data, design, realization and updating of geodatabases, acquisition and elaboration of spatial data, map production, technical assistance and professional training.

Innovation through tradition is the company **vision** of Geomap. The journey started in 1958, carried on having as main objectives the quality of provided services and the respect of professionality. It proceeds further with the perspective of a continuous innovation, intended as both the application of new technologies and the exploration of new markets, leaving untouched the sound principles that always have characterized Geomap activities.

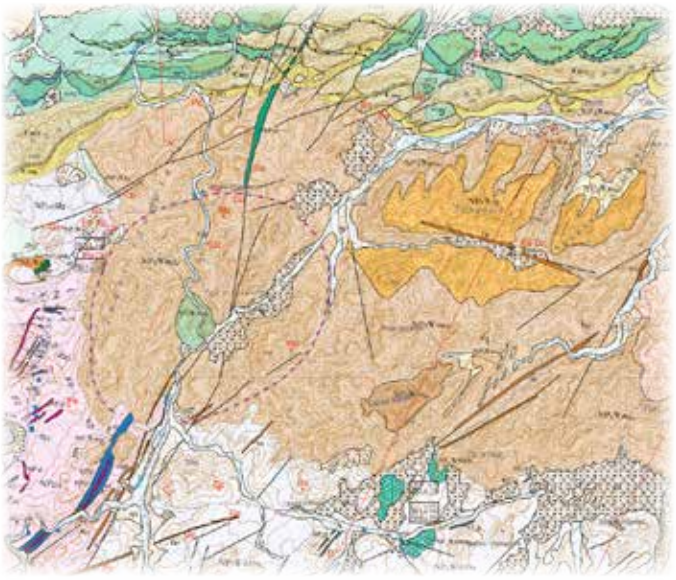
The company **mission** of Geomap is consistent with the path so far traced and with the company vision: the product of our work, resulting from the combination between an experience over many decades and the use of new technologies, is always focused on an applicative purpose and on the assigned objectives, in full compliance of the professional ethics and the requirements of Customers.

The experience of Geomap is based on more than 600 projects, carried out since 1958 and covering more than 35 million km², throughout the world. Geomap operates also in multidisciplinary project for which it can rely on the collaboration with other companies and experts of specific fields.

FIELDS OF ACTIVITY AND CATEGORIES OF CLIENTS

The major **fields of activity** are:

- land knowledge, planning and management
- protection of the environment and of the natural and cultural heritage
- basic geological mapping, structural geology
- geology and geomorphology applied to engineering works and land protection
- water resources assessment and management
- search and evaluation of natural resources
- planning, realization and management of Geographic Information Systems
- processing of remotely sensed images through digital photogrammetry
- geognostic and geophysical surveys
- UAV surveys
- professional training



The **categories of clients** to which Geomap activity is addressed are:

- national and international public bodies and agencies: International cooperation
- territorial services and infrastructure management companies and entities
- engineering firms, land planning organizations, construction firms
- oil and mining companies
- GIS planning and managing firms; land data survey organizations
- consulting firms, research institutes and universities

PROFESSIONAL STAFF

The **professional staff** includes the eight partners of the company and several customary collaborators, all highly qualified, geologists and photointerpreters, with a specific skill in applied geology and geomorphology, environmental analysis, remote sensing data processing and interpretation, creation and management of geographical databases and GIS. All the technical staff stands out for its high competence, for the respect for professional ethics and for the ability to operate quickly on the national territory and abroad, also in close collaboration with local and international institutional bodies. For multi-disciplinary activities Geomap has stable collaboration relationships with other companies and with experts in specific sectors.

Pietro DAINELLI, geologist
Founding Partner and Sole Administrator
Key qualifications: regional geology, remote sensing and photointerpretation, GIS, thematic mapping. Responsible of the Quality System

Simonetta LANDI, surveyor and GIS expert
Partner
Key qualifications: data processing, geographical databases and GIS. digital mapping, editing

Paolo NAFISSI, geologist
Partner
Key qualifications: regional and structural geology, remote sensing and photointerpretation, thematic mapping, geological and structural surveying

Paolo FACIBENI, geologist
Founding Partner
Key qualifications: applied geology, hydrogeology, remote sensing and photointerpretation, thematic mapping

Niccolò DAINELLI, geologist
Partner and Technical Director
Key qualifications: applied geology, geological and geomechanical surveying, remote sensing, photogrammetry and photointerpretation, GIS, professional training

Stefano GIANNARDI, geologist
Partner
Key qualifications: applied geology and engineering geology, data processing, GIS, thematic mapping.

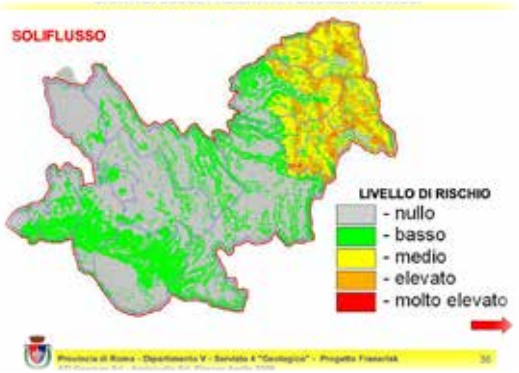
Alessandro ERCOLI, geologist
Founding Partner
Key qualifications: applied geology and engineering geology, geomorphology, remote sensing and photointerpretation, thematic mapping

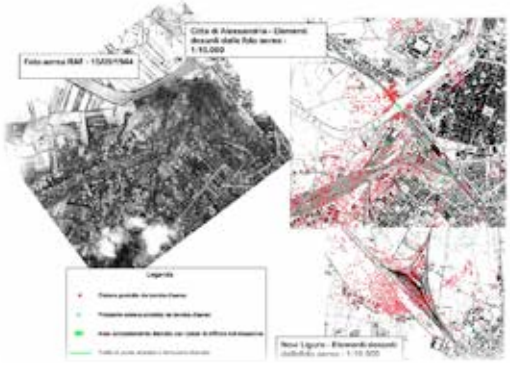
Carlo CONEDERA, geologist
Founding Partner
Key qualifications: applied geology, geomorphology, remote sensing and photointerpretation

ACTIVITY
Land

LAND

- production and updating of thematic maps, realization of Geographic Information Systems for the management and elaboration of territorial data, calibration and validation of land cover classifications, through field surveys and computer assisted processing and interpretation of remotely-sensed data
- multi-temporal analysis, through remote sensing techniques, of the evolution of land use, of urban areas, industrial and dump sites, vulnerable areas
- base thematic studies for the development of Catchment Plans, Territorial Plans and Park Plans
- field survey and mapping of landslides, erosion, slope stability and coastal dynamics; multi-temporal analysis, by means of remote sensing, of the evolution of such processes
- Land System and Land Classification studies, through remote sensing interpretation and field work, for land use planning; photo-interpretation and field work for soil survey
- design and realization of geographical databases (GIS)
- photogrammetric processing of remote sensing satellite aerial and UAV imagery for the production of orthophotos and digital terrain models
- updating and elaboration of topographic bases





ACTIVITY
Environment and cultural heritage

ENVIRONMENT

- Environmental Impact Assessment studies (EIS)
- environmental characterization studies for projects of contaminated land reclamation
- research and evaluation of areas designed for urban and industrial waste dumps
- studies in support of the planning of quarrying activity
- multi-temporal studies, by means of aerial photos and other historic images, for the analysis of the evolution of industrial sites and for planning of recovery, reclamation and securing

CULTURAL HERITAGE

- location of archaeological sites, buried or submerged, through the photo-interpretation of remotely-sensed data; geomorphological analysis for the reconstruction of palaeoenvironment related to ancient settlements
- geological, hydrogeological and structural surveys for the restoration, protection and conservation of archaeological sites. Analysis of construction materials and ancient mortars with the location of provenance sites, for planning restoration activities
- geophysical prospecting for the location of buried structures and hypogeum cavities, and for a non-destructive checking of anomalies detected by remote sensing

ACTIVITY
Applied geology and hydrogeology

APPLIED GEOLOGY

- geological base mapping: field survey, remote sensing, laboratory analysis, geological geo-databases design and creation, editing and print of geological maps and explanatory notes
- analysis of geological, geomorphological and environmental conditions related to the selection and study of optimal routes for roads, railroads, hydraulic pipes, power lines and other linear infrastructures. Geological, structural and slope stability surveys for tunnels, dams, bridges and other installations. Research of building material, inventories for quarrying activity
- geotechnical studies for building, infrastructures and industrial installations
- research and analysis of appropriate sites for dumps of urban and industrial waste
- geology and geomorphology for Catchment Plans, studies of fluvial morphology for the protection from floods and erosion
- studies of landslides and multi-temporal analysis of their evolution; slope stability mapping in support of projects for specific infrastructures
- terrestrial photogrammetric surveys of sub-vertical rock walls and geo-structural analysis for the individuation of potential instability

HYDROGEOLOGY

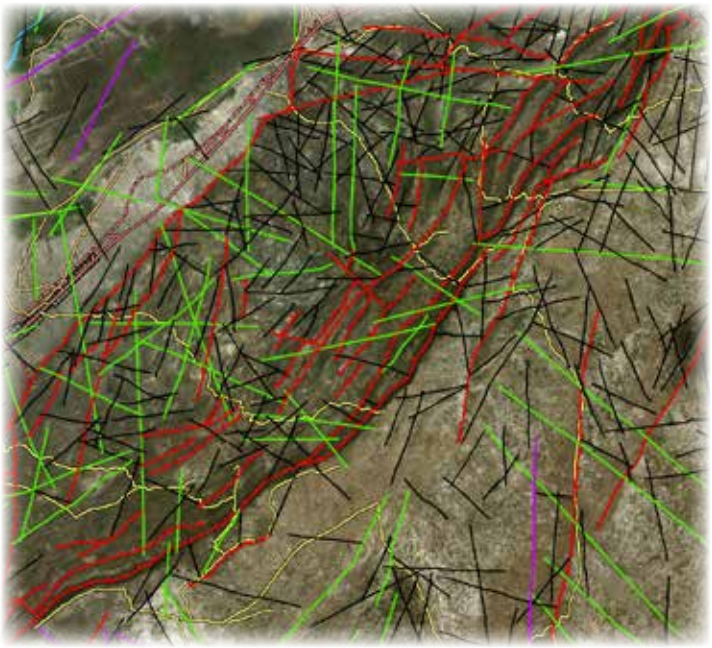
- regional studies, geological and geomorphological surveys, aimed at the research and evaluation of surface and groundwater resources; fracture analysis for the evaluation of secondary permeability and as a guide for further geophysical investigation for the research of groundwater in igneous and carbonate rocks
- water points inventory; geological assistance to drilling and testing
- geological and geomorphological surveys for the location and evaluation of potential reservoirs; selection and study of dam construction sites, analysis of the catchment area
- selection of the layout for aqueducts and hydraulic pipelines; analysis of geological and slope stability conditions of the route
- land use and land cover mapping in support of the evaluation of the water balance and needs

ACTIVITY
Energy and mineral resources

ENERGY AND MINERAL RESOURCES

Support to exploration

- regional and detailed geological and structural studies, by means of interpretation and spectral processing of remotely sensed imagery (optical and radar); fracture analysis by structural interpretation, in support to mineral, hydrocarbon and geothermal resources exploration;
- field surveys for geological mapping, stratigraphic and structural studies and ore deposits evaluations; detailed studies of seismic line layouts;
- selection and study of optimal routes for oil and gas pipelines and power lines and of sites for deposits and installations



Support to environment protection

- environmental screening and preliminary impact evaluations, relative to the activity of exploration and production of hydrocarbons, for on-shore and off-shore applications of exploration permit and concession for exploitation in course of approval;
- environmental impact studies, including the assistance during the procedure of evaluation.
  - On-shore: for applications of permits waiting for assignment, containing protected natural areas (SIC, ZCS and others), for drilling sites, seismic lines, oil and gas pipelines, transformation plants, windpower and photovoltaic installations, including baseline survey;
  - off-shore: for drilling and production platforms, laying of sealines, technological installations (LNG terminals);
- environmental characterization studies for projects of land reclamation of contaminated sites.

ACTIVITY
Professional training and services

PROFESSIONAL TRAINING AND SERVICES

- teaching on geological photo-interpretation, within university degree or post-degree courses;
- on site and e-learning professional courses on remote sensing and photo-interpretation applied to earth sciences, agriculture and natural resources evaluation, applied geology and geomorphology, GIS and geo-databases
- participation as teachers to workshops and courses held by scientific associations, public and private organizations
- courses on applied remote sensing followed by on-the-job training for foreign technicians within cooperation projects and for technicians of public and private organizations within specific personnel training projects, carried out at Geomap or at the respective locations
- On-line courses on Geomatics (GIS, Remote Sensing, Photointerpretation)

ACTIVITY
Investigations and surveys

DRONE SURVEYS

- Photogrammetric surveys for the production of:
  - ortophotomosaics;
  - digital elevation models (DSM, DTM, ecc.);
  - 3D terrain models;
- Surveys for the evaluation and monitoring of:
  - agricultural activities;
  - forest resources;
  - hydrogeological instability and other geological criticalities;
- Surveys for mapping production;
- Surveys of buildings and artifacts aimed at the production of 3D models and front views;
- Buildings and infrastructures inspection;

GEOPHYSICAL PROSPECTING

In collaboration with
Geologist **Daniele Lisi**
(www.geolisi.it)

- Surface wave dispersion analysis according to the following methodologies: MASW (Multi-channel Analysis of Surface Waves) in Rayleigh and Love waves, ESAC (Extended Spatial Autocorrelation), HVSR (Horizontal-to-Vertical Spectral Ratio), Holi-Surface® (method patented by the Eliosoft company), MAAM (Miniature Array Analysis of Microtremors);
- Seismic refraction in P and Sh waves (seismic tomography or GRM method);
- Seismic Down Hole.

GEOGNOSTIC INVESTIGATION

In collaboration with
Songeo Srl Company
(www.songeo.it)

IN SITU GEOTECHNICAL INVESTIGATION

- geognostic drillings;
- execution of borehole tests such as: S.P.T. and pressure measurements (Menard pressuremeter);
- Lefranc permeability tests with variable and constant load, Lugeon tests;
- installation of inclinometers, settlement gauges, inclinoassestimeters, Norton and Casagrande piezometers;
- static cone penetrometer tests such as: C.P.T. - C.P.T.E. - C.P.T.U.- S.C.P.T.U.- dissipation tests;
- dynamic penetrometer tests such as D.P.S.H.;
- consulting on territorial planning.

ENVIRONMENTAL INVESTIGATION AND ANALYSIS

- investigations for the environmental characterization of contaminated sites;
- installation of piezometers, instrumentation and acquisition of groundwater chemical, physical and biological parameters;
- piezometer rehabilitation and development with air lift method;
- sampling of different environmental matrices (soil, water) according to the UNI 10802: 2013 standard;
- chemical analysis of terrain, water, gas with portable instrumentation;
- field measurement, analyses and tests for in situ land treatment and remediation;
- tracer tests;
- application and development of plans for control and monitoring of waste treatment plants and landfills;
- planning and consultancy on various environmental issues;
- supplying and construction of in situ water and land remediation systems;
- land reclamation with chemical-physical and biological methods;
- tank decontamination and removal;
- waste transport on own account.

PORTFOLIO
Clients

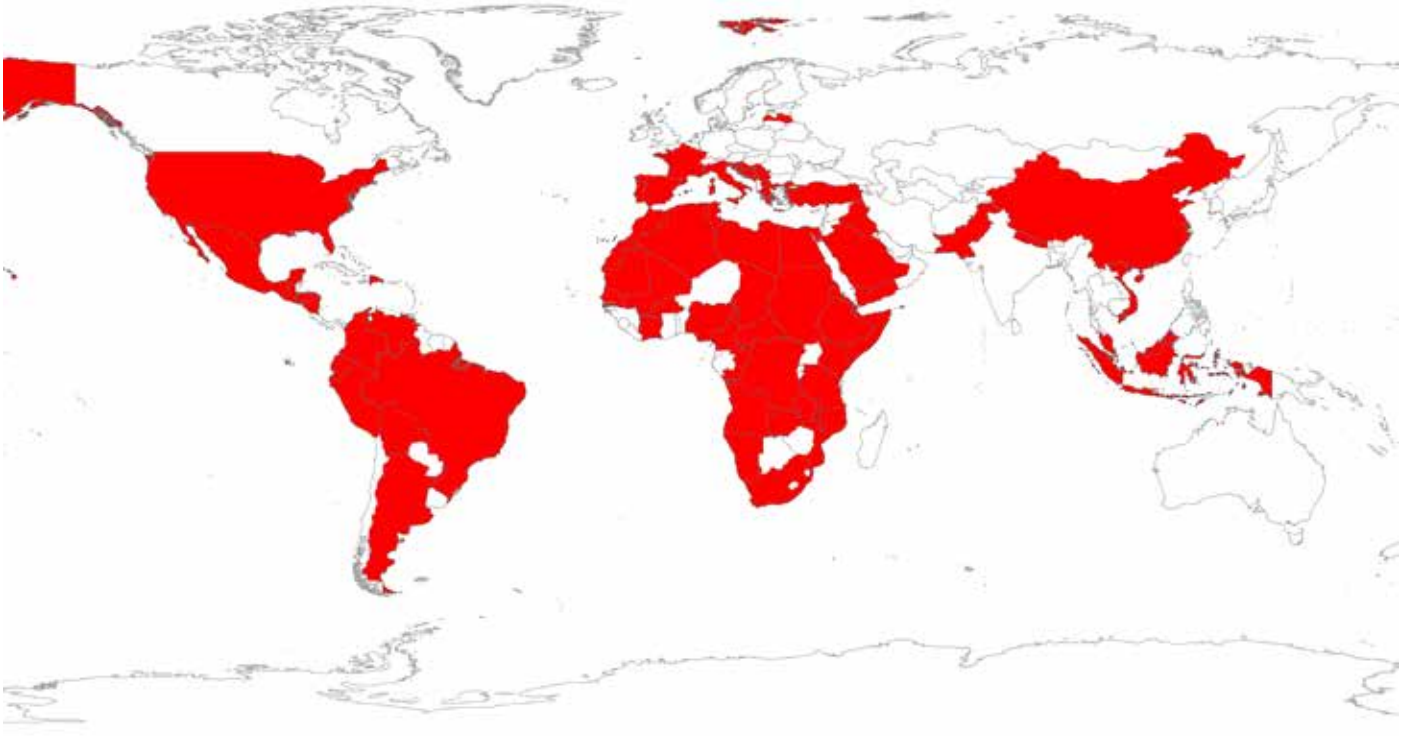
GEOMAP PROVIDED ITS SERVICES TO THE FOLLOWING CATEGORIES OF CLIENTS:

Engineering and construction firms, consulting firms	Acna C.O. (Savona), Aermap (Florence), Agrotec (Rome), AIC Progetti (Rome), Alpina (Milan), ANAS SpA (Rome), Aquater SpA (S. Lorenzo in Campo (PS)), Arlab (France), Bonifica (Rome), Capotaormina (Taormina), Casa SPA (Florence), CMP (Rome), Comavi (Rome), Consultprogetti (Rome), Copresop (Florence), Costruzioni Nucleari (Rome), CoTei (Florence), CRG (Florence), Covig (Rome), ELC Electroconsult (Milan), Enichem (Milan), ENI Rewind (Milan), Farmoplant (Massa), Fergus Foundation (Rotterdam, NL), FIATEngineering (Turin), Fosweco (Milan), Geotest (Rome), Golder Associates Srl (Turin), Hydrogeo (Pisa), Idromin (Milan), Idrotecneco (S. Lorenzo in Campo (PS)), Ifagraria (Rome), Il Nuovo Castoro (Rome), IGA Consulting (Rome), IGG-Soilmec (Rome), Intecsa (Spain), Interconsulting (Rome), Ismes (Brescia), Istituto VIA (Rome-Bamako), Italconsult (Rome), Italpros (Rome), Lamco (Rome), Lotti & Ass. (Rome), Lyonnaise des Eaux (France), Montedison (Milan), NIER (Bologna), Pontello Costruzioni (Florence), Progei (Rome), Reconsult (Rome), RIGA (Rome), Rodio (Milan), SARA (Rome), Scame (Florence), SELM (Milan), SGI (Milan), SGG (Siena), Sicai (Rome), Siteco (Rome), SIMAM Spa (Senigallia), SNAM Progetti/SAIPEM (Fano), So.Ge.Stra (Rome), Solvay (Livorno), SPEA-Autostrade (Rome), SGI- Studio Galli Ingegneria (Padova), Studio 80 (Palermo), Syndial (Fano), Techniplan (Rome), Technital (Verona), Technosynesis (Rome), Telespazio/e-Geos (Rome), Terna/Enel, Teseco SpA (Pisa), Todini (Rome), Tormini Scarl (Rome), Unigeo (Rome), Vams Ing. (Rome), Vianini (Rome)
Oil and mining companies	Adobe, Ageco, Agip Carbone, Agip Petroli, Agip Uranio, Amoco, Anglo-Ecuadorian, British Gas, Burma, Canada Northwest, Candia, CEP, Conoco, Consorgas, CORI-Agip, CPA, Edison, ELF, ENEL, ENI, Erico, Etosha, Etruscan Gold Exploration, Exxon, Fiat Rimi, Fina, Forest-CMI, Great Basins, Gulf, Gupco, Hammar, Humble, Intergas Più, Italmin, Kewanee, Larderello, Libyan Desert, Medoilgas, Mobil, MTA, Northsun Italia, Oasis, ONU-UNDP, Pan American, Pergine, Petrex, Phillips, Planet Oil, Pluspetrol, Po Valley Operations, Ri.Min, Scebeli, Shell, Sinclair, Siri, Snia, Soekor, Total
Agencies and public bodies	AEM (Turin), BNEDER (Algeria), CER (Bologna), Centro Interregionale (Rome), Commissione Europea, Consorzio Bonifica Montana Val di Sieve, Consorzio Acque Provincie di Forlì e Ravenna, Consorzio LaMMa/Regione Toscana, ENEL (Florence), ETSAF/Regione Toscana, ERSAF/Regione Lombardia, Ferrovie dello Stato (Roma), FAO (Rome) INETER (Nicaragua), ISTAT (Rome), National Museum of Archaeology (Malta), NWSA-PNUD (Yemen), SIA-Casmez (Rome), Ufficio Speciale Ricostruzione Lazio (Rieti), UNESCO (Paris)
Ministries	Agricoltura e foreste, Ambiente, Esteri (Direzione Generale Cooperazione allo Sviluppo), Ministère de l'Energie, des Mines et du Développement Durable, Direction de la Géologie (Morocco)
Regional administrations	Abruzzo, Basilicata, Campania, Emilia-Romagna, Liguria, Lombardia, Marche, Molise, Puglia, Sardegna, Sicilia, Toscana, Umbria, Veneto
Provinces	Alessandria, Livorno, Padua, Rome
Municipalities	Alessandria, Arezzo, Bonassola (SP), Buonconvento (SI), Capolona (AR), Castel Focognano (AR), Certaldo (AR), Florence, Firenzuola (FI), Griante (CO), Laterina (AR), Londa (FI), Montalcino (SI), Montemarciano (AN), Monteroni d'Arbia (SI), Rapolano (SI), Signa (FI), Subbiano (AR), Tremezzo (CO).
Watershed authorities	Arno-Serchio, Liri-Garigliano-Volturno, Po, Tevere
Mountain communities	Alto Garda, Alto Lario, Valle Trompia, Valtellina
Universities and research bodies	Camerino, Florence, Pisa, Urbino, CNR-IGG (Pisa), CNR-IREA (Milan), Consorzio LAMMA (Tuiscany Region), Istituto Agronomico per l'Oltremare (Florence)

PORTFOLIO
Countries

GEOMAP EXPERIENCE DEVELOPED IN:

Europe	France, Italy, Greece, Latvia, Malta, Portugal, Spain, ex Yugoslavia, Svalbard (Norway)
Africa	Algeria, Angola, Burkina Faso, Cameroon, Chad, Congo, Ivory Coast, Djibuti, Egypt, Eritrea, Ethiopia, Kenya, Libya, Malawi, Mali, Morocco, Mauritania, Mozambique, Namibia, Nigeria, Central African Rep., Senegal, Somalia, South Africa, Sudan, Tanzania, Tunisia, Congo Democratic Rep., Zambia
Asia	Saudi Arabia, China, Philippines, Hong Kong, Indonesia, Iraq, Malaysia, Nepal, Pakistan, Turkey, Vietnam, Yemen
America	Argentina, Bolivia, Brazil, Colombia, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Peru, Dominican Rep., U.S.A., Venezuela.



PROJECTS

High Resolution Geospatial Mapping

Project name:
MGCP - Multinational Geospatial Co-Production Program

Country:
Horn of Africa

Location(s):
Ethiopia, Eritrea and Somalia – various areas within these countries

Client(s):
e-Geos SpA, Rome. Italy

Aims of the project:
Creation of a thematic vector database, land cover, infrastructures and hydrography, at the scale of 1:100,000 and 1:50,000, by the interpretation of very high resolution satellite images.

Contract holder(s):
GEOMAP

Staff:
2 senior photointerpreters and GIS experts, 10 junior photointerpreters

Project activities:
Analysis of satellite images and ancillary data for the definition of interpretative keys. Preparation of GIS projects for interpretation, subdivision of the study area into cells and of the cells into work "jobs". Image interpretation and extraction of geographical features with relative storage in a geodatabase. Edge matching of jobs. Quality control of the data produced from the point of view of interpretation and topological / alphanumeric consistency. Assembly of the final data, verification of photo-interpretation homogeneity and completeness. Delivery of shape-files of the extracted features.

Covered area:
334,000 sq km (as of 31/12/2020)

Start: December 2008
End: in progress

PROJECTS

Geological mapping in Morocco

Project name::
Plan National de Cartographie Géologique (PNCG)

Country: Morocco

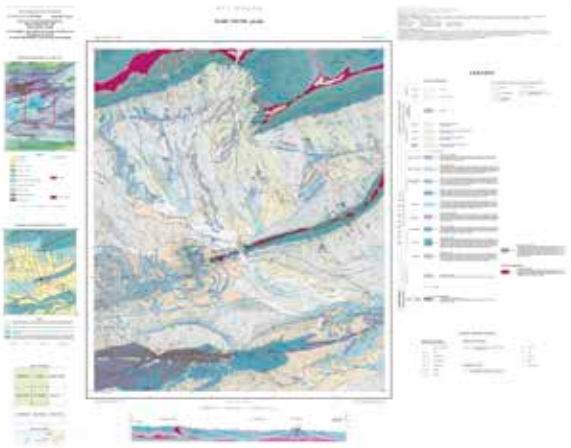
Location(s) (4lots):
1. Eastern Anti-Atlas (5 sheets), 2. Central High Atlas (4 sheets), 3. Eastern High Atlas (6 sheets), 4. Western Sahara Laayoun-Dakhla basin (12 sheets)

Client(s):
Ministère de l'Energie, des Mines et du Développement Durable – Direction de la Géologie, Rabat – Morocco

Aims of the project:
Realization of 15 sheets at the scale of 1/50,000 and of 12 sheets at the scale of 1/100,000 of the Geological Map of Morocco.

Contract holder(s):
Geomap (leader in the first two projects), S.EL.CA. Srl, Florence, Geomine Sarl, Casablanca, Infodigit, Casablanca. With the collaboration of the Institute for Geosciences and Georesources (IGG) of the Italian Council of Research (CNR), Pisa, Florence and Turin, the Department of Earth Sciences of the University of Pisa, the Department of Earth Sciences of the University of Padua, the LTS (Land Technology & Services) Srl of Treviso and Padua, the Faculty of Sciences Semlalia of the Cadi Ayyad University of Marrakech, the Faculty of Sciences of the Hassan II Aïn Chock University of Casablanca.

Staff: 31 geologists, 5 photogeologists geomorphologists, 2 hydrogeologists, 2 mining geologists, 4 GIS experts



Project activities:
Compilation and analysis of existing data, interpretation of aerial photographs, processing and interpretation of satellite imagery, preparation of topographic base maps, field geological and geomorphological survey, laboratory analyses, evaluation of mineral and water resources, creation of a GIS, colour printing of maps and explanatory notes.

Geomap has performed the following activities: general coordination of the project, including the relations with the client (for the first and the second as project leader), management of the relationships with the Italian and Moroccan partners, coordination and direction of the field surveys, organisation of the laboratory studies, design and managing of the data bank and of the project GIS, including the implementation of the geodatabase of the geological maps, to be prepared for printing, editing of the explanatory notes.

	first lot	*second lot*	*third lot*	*fourth lot*
Start:	April 2003	March 2011	March 2012	October 2017
End:	May 2007	October 2018	May 2020	in progress

PROJECTS

Final Design for the improvement to 4 lanes of the State Road 372 "Telesina"

Project name:
Entrusting of support services to the ANAS Project team for the Final Design of the Caianello (A1) - Benevento route for the improvement to 4 lanes of the State Road 372 "Telesina", from km 0+000 to km 60+900. Lot 1: from km 37+000 (S. Salvatore Telesino junction) to km 60+000 (Benevento junction). Geological Planning Services.

Country: Italy
Location(s): Benevento Province

Client(s):
ANAS S.p.a., Roma

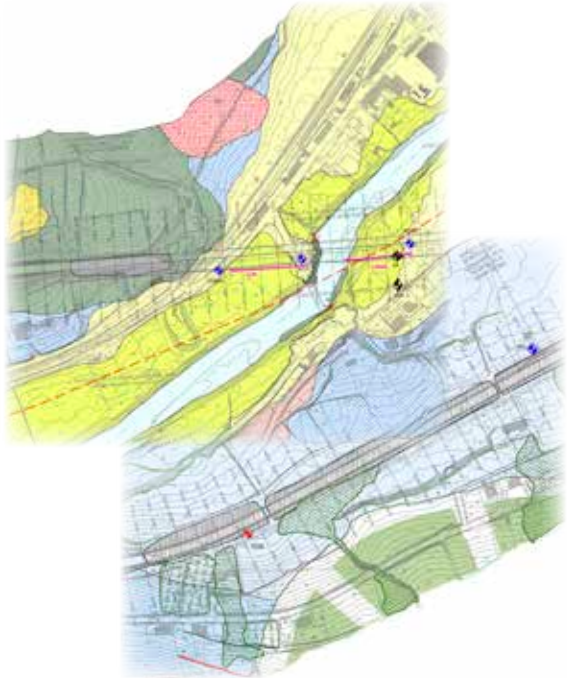
Aims of the project:
Realization of a geological, geomorphological and hydrogeological study to support the final design for the improvement to 4 lanes of the State Road 372 "Telesina", between the junction of S. Salvatore Telesino and that of Benevento..

Contract holder(s):
GEOMAP

Staff:
3 geologists, 1 GIS/CAD expert

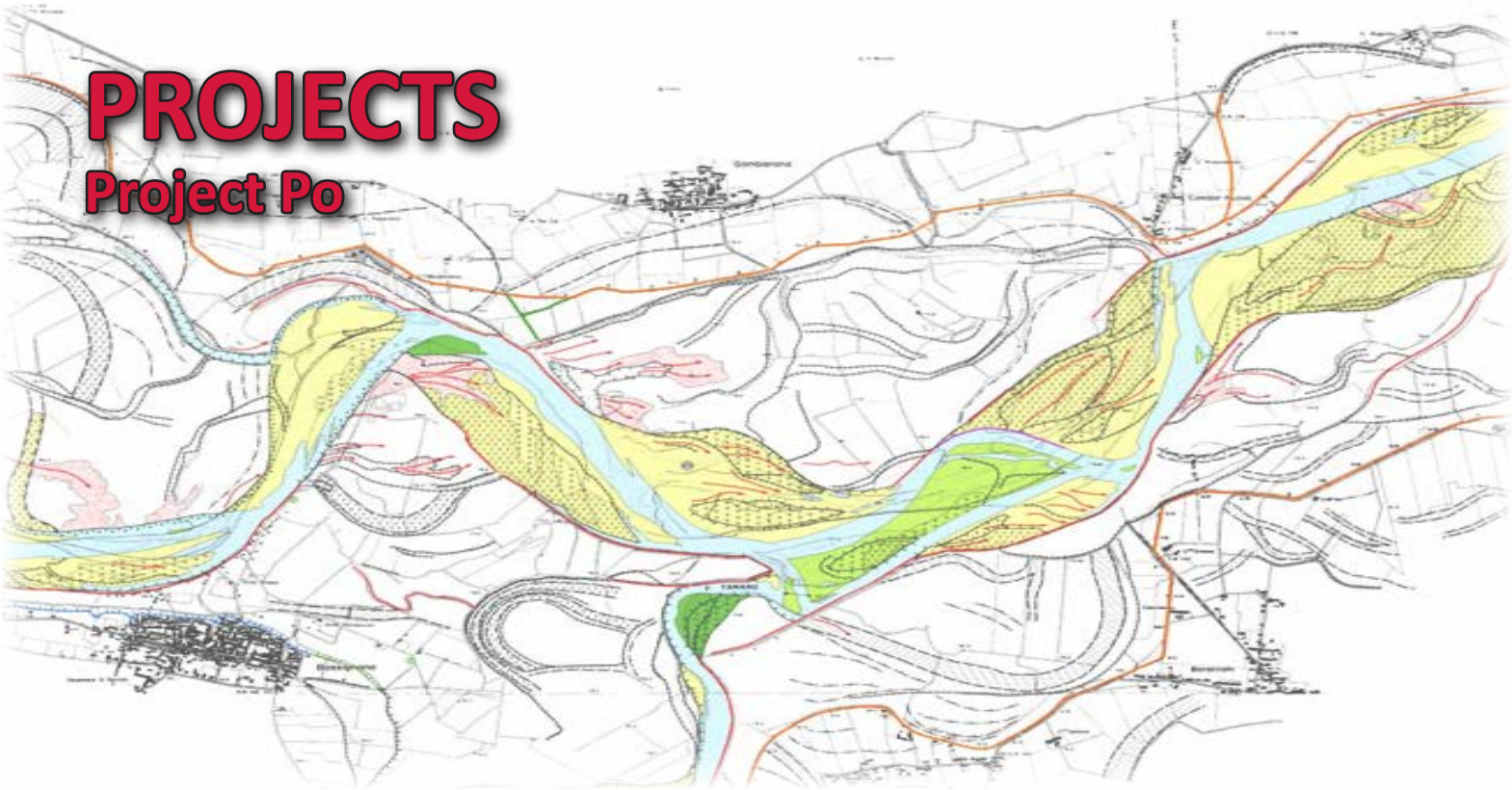
Project activities:
The study was carried out in accordance with the Technical Standards of the Special Tender Specifications for the Services for the execution of geological and territorial surveys of ANAS SpA and consisted of the following stages: 1) critical analysis of the existing bibliography and cartography; 2) interpretation of stereoscopic aerial photographs and satellite images; 3) geological, geostructural, geomechanical and geomorphological survey carried out during two campaigns in the field; 4) analysis and interpretation of geognostic and geophysical investigations carried out for the Final Project and of previous ones; 5) inventory of the landslides obtained from the IFFI and PAI databases and from other cartography; 6) inventory of water wells.
The results consisted of a number of cartographic documents: location map of investigations; geological map and geomorphological map at the scale both 1:2.000 and 1:5.000, hydrogeological map at 1:5.000 scale; longitudinal geological profiles and transverse geological sections; geological and geomechanical survey cards, well inventory cards; scenario map of the landslide risk; finally the geological report and the report on the material management plan were prepared

Start: May 2016
End: January 2017



PROJECTS

Project Po



Project name:

Geomorphological characterization of the Po river bed and floodplains, from the confluence of the Dora Riparia (Turin) to Pontelagoscuro (Ferrara)

Country:
Italy

Location(s):
Po Valley, across the regions of Piedmont, Lombardy, Emilia-Romagna and Veneto.

Client(s):
Po River Basin Authority, Parma / SGI- Studio Galli Ingegneria, Padua

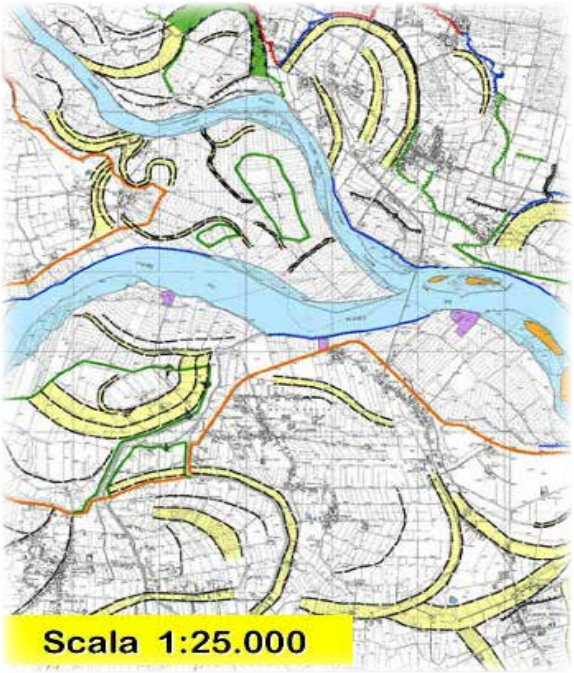
Aims of the project:
Analysis of the modifications of the Po river bed, over approximately 480 km of course, with particular reference to the variations of natural thresholds and banks, to the effects of the floods of 1994 and 2000 and to the interactions between dead hydrography and main levees.

Contract holder(s):
GEOMAP

Staff:
2 geologists photointerpreters, 1 GIS expert

Project activities:
The morphological analysis of the segment between the confluence of the Tanaro and Pontelagoscuro was carried out between 1979 and 2002, since the previous morphological changes had already been studied by a former project, carried out by Geomap for another Client in 1982.
For the upstream segment of the Tanaro, the study was based on all the historical documentation available, either cartographic or air-photographic.
Morphological elements were identified by means of aerial photos taken in 1995, 2000 and 2002, which, respectively, allowed the recognition of the effects of the flood of November 1994, the extension of the waters during the October 2000 flood and, in the latter case, the consequences of the above event and the situation of the bed during the exceptional low water level of 2002.
The evolution of the river bed was reconstructed by comparing the situations recognized by photointerpretation with thematic and topographic maps of 1979 and 1988, respectively.
The morphological elements necessary for the characterization of the flood zones were obtained partly from aerial photos, but mostly from AIMA orthophotos and topo maps of various origins and scales (IGMI and Regional Technical Map- CTR), which were also used as the basis for the presentation of the results.
A GIS environment was employed to manage all the acquired data as well as for the production of layouts and hardcopy maps.

Start: September 2003
End: September 2006



PROJECTS

DUSAF Project - updating the land use/land cover of the Lombardy Region

Project name:
Updating the geographic information base of the land use destination of the Lombardy Region - DUSAF 2001, DUSAF 5 and DUSAF 6

Country:	*Location(s):*
Italy	the entire Lombardy Region

Client(s):
ERSAF- Regional Body for Agriculture and Forestry Services, Milan

Aims of the project::
Realization of the update of the land use cover of the Lombardy Region, by photointerpretation of orthophotos acquired in different years:

Project	*Orthophoto*
DUSAF 2001	IT2000
DUSAF 5	AGEA 2015
DUSAF 6	AGEA 2018

Contract holder(s):
GEOMAP

Staff:
3 photointerpreters, 1 GIS operator

Project activities:

The three projects DUSAF2001, DUSAF 5 and DUSAF 6 consisted of updating the land use/land cover geodatabase of the entire regional territory using the orthophoto respectively of the years 2000, 2015 and 2018.

It was carried out in a GIS environment through the interpretation of digital orthophotos in true and false colors (le latter with a near infrared band), satellite imagery and the help of ancillary data, with the detail comparable to the 1:10,000 scale.

The interpretation, performed by modifying and/or integrating the existing information layers (areal and linear) both as geometry (maximum tolerance 0.5 mm at 1:10,000 scale) and as semantics, was based on the established DUSAF legend at the 5th classification level.

The final product is formed by a polygonal information layer, concerning the various classes of land use/land cover, and a linear layer representing hedges and rows of vegetation.

	DUSAF 2001	*DUSAF 5*	*DUSAF 6*
Start:	September 2001	February 2016	April 2019
End:	December 2001	August 2016	November 2019

PROJECTS

Geostructural studies by photointerpretation in support of geothermal exploration

Project name:
Geostructural studies by photointerpretation in support of geothermal exploration

Countries:
Indonesia, Ethiopia, Kenya, Malawi, Tanzania, Bolivia

Location(s):
Blawan Ijen and Mataloko (Indonesia); Alalobeda, Aluto and Meteka (Ethiopia); Menengai (Kenya); various areas in Malawi; Kiejo-Mbaka and Rufiji (Tanzania); Empexa (Bolivia)

Client(s):
ELC Electroconsult SpA, Milan

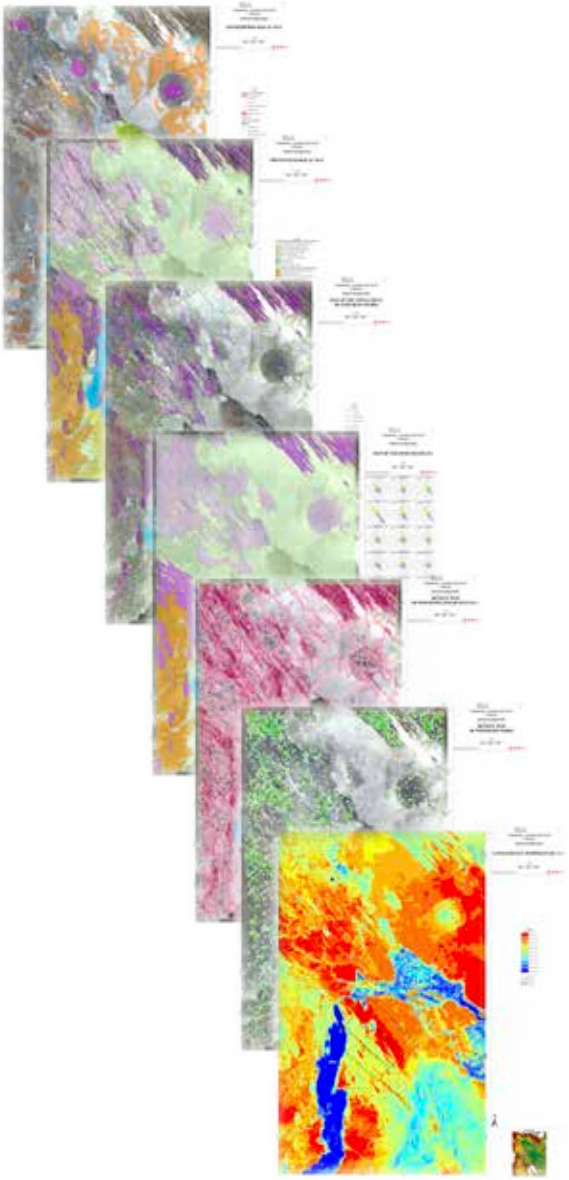
Aims of the project:
Realization of geostructural and geomorphological studies through remote sensing optical and radar satellite images to support the exploration of geothermal resources in various sites.

Contract holder(s):
GEOMAP

Staff:
3 photogeologists, 1 GIS expert

Project activities:
The studies include a preliminary phase of acquisition and pre-processing of remote sensing images of various sensors with medium and high spatial and spectral resolution (eg Landsat, Aster, Sentinel 2, Spot, etc.), in order to make them suitable for photointerpretation. Subsequently the photo-interpretation on video in a GIS environment of these images is performed, in order to extract a certain number of themes, including: total field of lineations, drainage and landforms, photogeological units. A digital terrain model (eg SRTM or GDEM) is always used to support remote sensing data.
The total field of lineations is then processed and analyzed to: 1) generate data statistically aggregated in the form of rose diagrams, to represent various trends of azimuthal distribution of the linear elements, both as a whole or divided by type or geological unit; 2) produce derived maps of fracture density and location of the nodal points (where two or more lineations cross each other). These studies typically produce, in addition to a written report, a series of cartographic documents such as: photogeological map, geomorphological map, structural map, map of the total field of lineations, fracture density map and nodal point density map.

Start: September 2011
End: in progress



PROJECTS

Analysis of the susceptibility to landslides (Franarisk Project)

Project name:
Franarisk

Country: Italy
Location(s): Province of Rome

Client(s):
Province of Rome- Department of Agricultural and Environmental Policies- Department V, Service 4 "Geological"

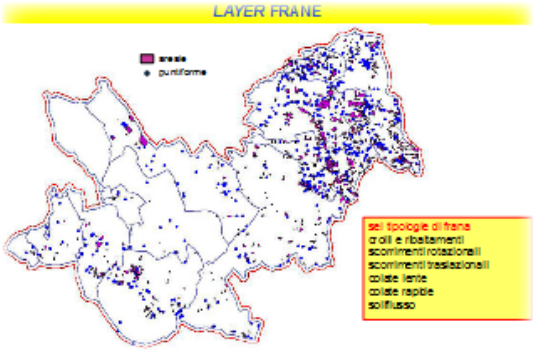
Aims of the project:
Identification of the parameters influencing the slope stability and of the factors triggering the instability; creation of a landslide susceptibility map; creation of a database and a GIS project for management.

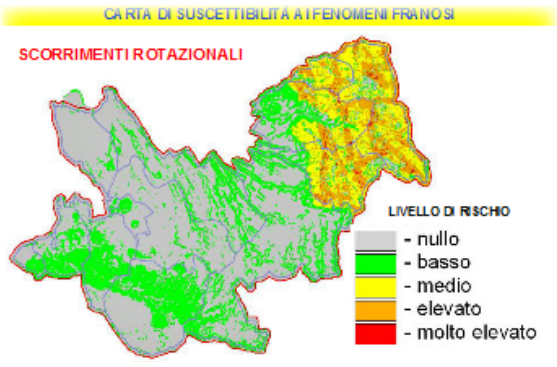
Contract holder(s):
GEOMAP

Staff:
4 geologists photointerpreters, 2 GIS experts

Project activities:
Realization of a Geological Map at 1:10,000 scale compliant with CARG standards, by field survey and integration from bibliography and photointerpretation; derivation from the geological map of a Lithotechnical Map containing the classification of geological units based on their characteristics of mechanical behavior and of a Map of Covers; realization of a Census/Map of Landslide Phenomena, at 1:10,000 scale, by photointerpretation and field survey, guided by a preliminary analysis of all the archive data (IFFI, Basin Authority, SIRDIS Lazio Region, Provincial Geological Service); classification into five types according to Varnes, plus solifluction; derivation from the map of landslide phenomena of a layer of unstable points, represented by the highest point of the crown of each landslide, plus the point phenomena, which are associated with geolithology, type of landslide, slope, curvature, exposure.
Analysis of the susceptibility to landslide phenomena, for each of the six types of landslide, in a GIS environment, through the evaluation of the discriminating parameters (slope and geolitology), that is, the necessary but not sufficient conditions for the occurrence of a certain type of instability and the predisposing parameters, i.e. the geomorphological, morphometric, lithotechnical, tectonic and land cover conditions which contribute, directly or indirectly, to aggravate the stability conditions, but are not sufficient to determine it.
Creation of the Map of Susceptibility to Landslides for each type of landslide. Historical archival investigation of landslides to analyze the relationships between instability events and triggering phenomena, such as rainfall and seismicity.

Start: April 2008
End: May 2009





PROJECTS

Photo-interpretation in support of groundwater search for water supply of rural populations (*Hydraulique Villageoise - Village hydrogeology*)

Project name:
Photo-interpretation in support of groundwater search for water supply of rural populations (Hydraulique villageoise - Village hydrogeology)

Country:
Africa

Location(s):
Regions of the Sahel – Mali, Cameroon, Centrafrican Rep., Mauritania, Burkina Faso

Client(s):
Various: Lotti & Ass., Unigeo (Roma); Geolab, Arlab (Francia)

Aims of the project:
Preliminary geological investigations in support of water research for supply of single villages in areas of impervious hard rocks (crystalline, carbonates).

Contract holder(s):
GEOMAP

Staff:
4 geologists photointerpreters, 2 GIS experts

Project activities:
The investigation starts with a preliminary study of satellite imagery at smaller scales (1:100,000, 1:50,000) aimed at interpreting the structural setting of the area and at assessing the kinematic characteristics of the different fracture trends. A second phase is carried out at local scale and is based on the interpretation of high resolution images or aerial stereo pairs at the scale of 1:10,000, involving an area of approximately 4 km2 centred on each village.
The fracture traces, representing preferential zones of groundwater flowing in hard rocks, are mapped. They are classified according to their length and conspicuousness and are interpreted in relation to the geological units outcropping and known in the subsurface. Furthermore, the intersections of two or more fractures are identified and classified as nodal points, being interpreted as preferential locations of groundwater occurrence.
This type of investigation is employed as guide to the planning of geophysical surveys and to select the location for drilling wells.
This methodology has been applied to more than thousand villages, with an average success percentage of 90%.

Start: 1983
End: in progress

PROJECTS

Photointerpretation aimed at the identification of risk areas for the possible presence of WWII unexploded aerial bombs

Project name:
Photointerpretation aimed at the identification of risk areas for the possible presence of WWII unexploded aerial bombs

Country: Italy

Location(s): Province of Alessandria (Piedmont)

Client(s):
Provincial Authority of Alessandria, Civil Protection Service

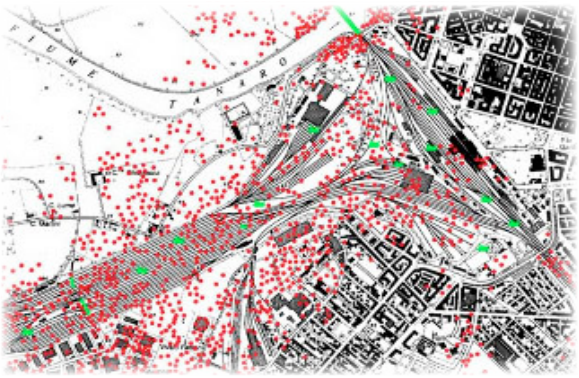
Aims of the project:
Identify the risk areas for the possible presence of WWII unexploded bombs in the territory of the Province of Alessandria.

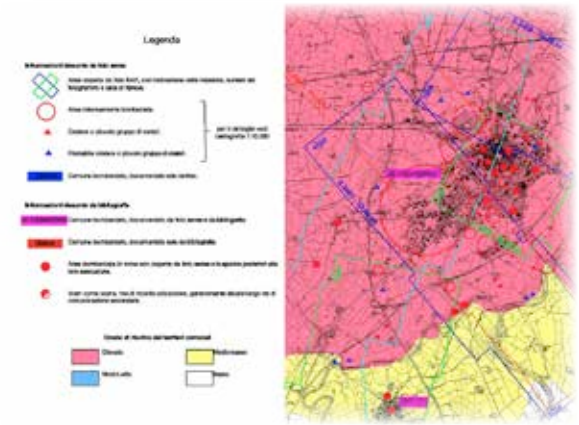
Contract holder(s):
GEOMAP

Staff:
1 photointerpreter, 1 GIS operator

Project activities:
The project has been carried out in two parallel phases.
The first consisted in the identification of craters and of the effects of aerial bombardments inferable from 1944 RAF aerial photographs. The results of this analysis were represented on topographic maps at 1:10,000 scale.
The other phase involved the collection of bibliographic documents by the Provincial Authority at several civic archives and libraries, and their evaluation and storage in a database.
The information extracted from both the aerial photographs and the bibliography were transferred on topographic maps at 1:50,000 scale, producing a "Map of the potential risk areas", where the risk level is represented in 4 classes with different colours, for each municipality included in the provincial territory.
All the data collected and produced within this project were stored in a geodatabase, in order to allow updating whenever new information is acquired.

Start: May 2000
End: September 2001





PROJECTS
Evolution of industrial sites

Project name:
Photointerpretation and bibliographic analysis concerning industrial areas, active or decommissioned, aimed at reconstructing their evolution

Country:
Italy

Location(s):
Abruzzo, Lazio, Liguria, Lombardy, Piedmont, Puglia, Sardinia, Sicily, Tuscany

Client(s):
AGIP Petroli, ACNA C.O., Edison Spa, Enichem, Farmoplant, SELM, SNAM Progetti Spa, SAIPEM Spa, SIMAM Spa, SYNDIAL Spa

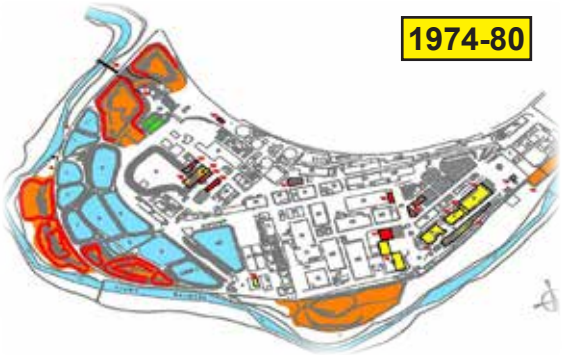
Aims of the project:
Reconstruct the evolutionary steps of industrial plants and appurtenant areas for the identification of possible environmental issues.

Contract holder(s):
GEOMAP

Staff:
1 geologist photointerpreter, 1 photogrammetric operator, 1 GIS expert

Project activities:
Research and acquisition of historical aerial photos and satellite images from public and private entities and on-line; interpretation of the collected remote sensing data in order to perform a multi-temporal analysis aimed at the recognition of variations over time in the studied locations. This methodology is specifically effective when there is little and uncertain direct information and where the activities and the ownership of the site have changed over the years. In some cases, where remote sensing imagery is lacking, historical maps and plans of the plants are also used, if reliable and dated. In other cases, when a precise volumetric evaluation of any ground movement is required, aerial photogrammetric restitution can be performed.
Usually this kind of analysis allows retracing the evolution of processing plants, waste deposits, the individuation of settling tanks and related outlets, the presence of earthworks for digging or backfill (potential pollution sources), which are presently hidden or whose memory has been lost.

Start: 1988
End: in progress



PROJECTS
Hal Saflieni Hypogeum, Malta

Project name:
Hal Saflieni Hypogeum

Country: Malta
Location(s): Hal Saflieni

Client(s):
UNESCO – National Museum of Archaeology, Malta

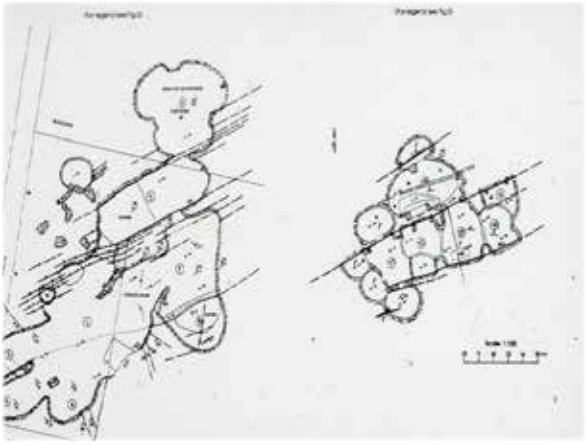
Aims of the project:
Define the geo-structural and hydrogeological situation of the site in order to determine the reasons for water infiltration and stagnation, high humidity, development of organisms and degradation of wall paintings..

Contract holder(s):
GEOMAP

Staff:
2 geologists, 1 CAD operator

Project activities:
Detailed geological and structural surveys were carried out, aimed at mapping the fault and fracture planes, bedding attitude, discontinuities and their relationships with the different water occurrences, in order to reconstruct the possible water migration paths, both of natural and anthropic origin. The surveys in situ were integrated with structural analysis from aerial photographs.
The study also took into consideration the chemical characteristics of the water and the anthropic pressure existing outside the archaeological complex, including the water supply and sewerage networks.
In conclusion, a map was drawn up where the risk areas were outlined, i.e. those within which possible water infiltration could have reached the Hypogeum levels, also indicating their direction of migration and suggesting all possible interventions to hinder them.

Start: January 1992
End: September 1992



PROJECTS

Zarema May Day Dam, Ethiopia

Project name:
Wolkayite Sugar development project – detailed design of Zarema May Day dam and its appurtenant structures – Ethiopia

Country: Ethiopia

Location(s): Zarema River basin, North-western Tigray

Client(s):
SGI Studio Galli Ingegneria, Padua - Sembenelli Consulting, Milan

Aims of the project:
To carry out a geological, geomorphological, structural and geo-mechanical study of the area identified as suitable for the realisation of an irrigation system related to a dam along the course of the Zarema River in the province of Tigray.

Contract holder(s):
GEOMAP

Staff:
2 field geologists, 2 geologists photointerpreters, 1 GIS operator

Project activities:
A first phase of the work involved the pre-processing of very high resolution satellite images (Worldview 2): orthorectification, pan-sharpening, mosaiking and contrast stretching, to produce a support for the photointerpretation and field operations.
Subsequently, the interpretation of the images of the area of the planned Zarema reservoir concerned geology, drainage, landforms and geomorphological processes, i.e. gravity movements and erosion, total field of lineations (faults, fractures, dikes and regional lineaments). At the same time, a first reconnaissance mission was carried out to verify the conditions and the accessibility of the area and to plan the successive survey mission. During this, that was lasting 15 days, a detailed geostructural and geomechanical survey was carried out and the checking the photointerpretation in the area of the foreseen irrigation works. The collected data were then processed, aiming at the geomechanical characterization of the outcropping lithotypes, also through laboratory analyses (indices of rock mass quality), and at the creation of a large-scale geostructural map of the irrigation work area.
The documents produced were: Report; Drainage map, Geomorphological map, Photogeological map and Map of the total field of lineations for the area of the entire Zarema reservoir, at a scale of 1:10,000 and 1:25,000; detailed geological maps for the area of the irrigation works at the scale of 1:1,000 and 1:5,000; geological cross sections along the proposed lay-outs of irrigation canals and tunnels.

Start: July 2013
End: April 2014

PROJECTS

Rio Guavio dam, Colombia

Project name:
Surveys on the area concerned by the construction of the rock-fill dam along the course of the Rio Guavio River

Country:
Colombia

Location(s):
Rio Guavio, Cordillera oriental

Client(s):
Consorcio VIANINI-ENTRECANALES

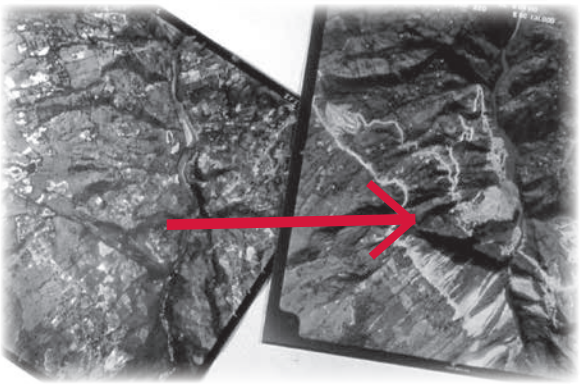
Aims of the project:
To provide geological, structural and geomorphological data in support of the final design, for the procurement of materials and the location of the building yards. Evaluate the possible risks arising from the slope instability induced by the construction of the project road works, carried out during the construction of the dam.

Contract holder(s):
GEOMAP

Staff:
2 geologists photointerpreters, 2 CAD operators

Project activities:
In an initial phase of the investigations, the pre-existing aerial photographs were analyzed and the information obtained was transferred on a 1:5,000 topographic base to be checked and integrated in the field.
The field work consisted of the geostructural and geomorphological characterization of the site, with the creation of thematic maps.
Subsequently, a geomorphological analysis of the area was performed, based on aerial photographs taken immediately after the construction of the road network, as this caused a series of landslides of various sizes, that, in some cases, completely blocked the yard activity. A comparison between aerial photos taken before and after the landslides was made, in order to analyse the original morphologic setting of the area.
The legend adopted in the specific case describes, for each landslide (active or potential), the level of the risk deriving from its presence, evaluating the probability that the event may occur (low, medium, high), the resulting effect (small, big, catastrophic), the type of landslide (rockfall or topple, sliding, flowing, complex) and the volume of earth involved, expressed in cubic meters and expressed in magnitude classes, according to the case history of the region..

Start: September 1981
End: September 1984



PROJECTS

Support to building design in the areas affected by the 2016-17 Central Italy earthquakes: Amatrice Cemetery and Rieti "Majorana" school

Project name:
Support to building design in the areas affected by the 2016-17 Central Italy earthquakes:
Recovery and reconstruction of the monumental cemetery of Amatrice (Rieti, Italy).
Demolition and reconstruction of the Primary School "Q. Majorana" located in Villa Reatina (Rieti, Italy).

Country: Italy
Location(s): Amatrice, Rieti

Client(s):
Ufficio Speciale Ricostruzione Lazio (Rieti)- Special Office for the Reconstruction of Lazio

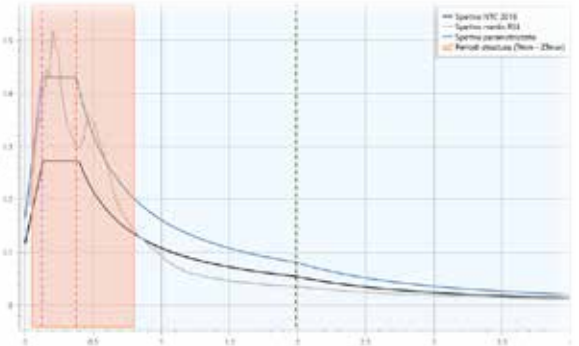
Aims of the project:
To carry out the appropriate geological studies and draft the geological report as per national regulations (NTC2018) to support the Detailed and Final Design of building works in the areas affected by the Central Italy earthquakes (Amatrice Cemetery and "Q. Majorana" School in Rieti).

Contract holder(s):
GEOMAP (Principal) in a Temporary Group with Studio Tecnico Gruppo Marche Macerata (Agent)

Staff:
3 geologists, 1 GIS operator

Project activities:
The first activity carried out for the two projects was the preparation of the geognostic and geophysical survey plan for the characterization of the subsoil, on the basis of an initial on-site inspection and the current national and regional legislation.
The planned investigations were subsequently supervised during their execution and, in the case of the Amatrice Cemetery, a detailed geological and geomorphological field work of the area was carried out (for the Majorana school, the geological survey was performed as the area is located in an alluvial plain).
On the basis of the investigations conducted, the field work and bibliographic data, a geological, hydrological and hydraulic report was drawn up according to the NTC2018 and the regional legislation of Lazio in support of the Detailed and Final Design.
A 1D Local Seismic Response Analysis was also carried out for the seismic characterization of the intervention site.

	Amatrice Cemetery	*"Q. Majorana" School - Rieti*
Start:	August 2019	February 2020
End:	October 2020	in progress



PROJECTS

Geostructural study of the ENI "Val d'Agri" Concession

Project name:
"Val d'Agri" Concession, geological photo-interpretation: geo-structural study

Country: Italy
Location(s): Val d'Agri, Basilicata

Client(s):
Saipem Spa, Fano, Italy

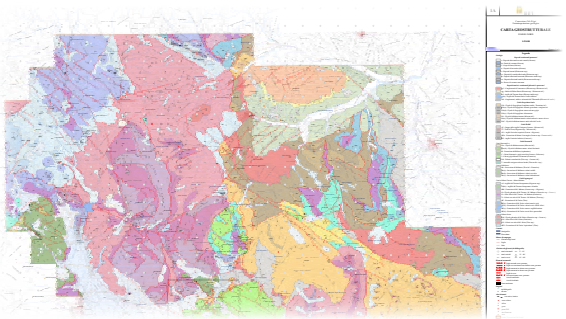
Aims of the project:
To perform a geo-structural study, by photo-interpretation and field work, of the area of the ENI "Val d'Agri" Concession for hydrocarbon exploration and production, in support to the evaluation of vulnerability of the substratum to pollution related to the drilling of oil wells.

Contract holder(s):
GEOMAP Studio Geologico

Staff:
1 geologist photointerpreter, 2 structural geologists, 1 GIS operator

Project activities:
A bibliographic and cartographic data collection has been preliminarly carried out, followed by the preparation and pre-elaboration of GIS and remote sensing data for the interpretation activities.
The photo-interpretation of orthophotos has been performed for the realization of the total field of fractures.
A digital geological map has been compiled from bibliographic and remote sensing data; other maps have been derived from the elaboration of structural data for fracture analysis.
A field work campaign has been performed in order to verify geological data and collect structural measures in a database and subsequently process them to obtain statistical information to be compared with photo-interpreted fractures;
In the end, final maps and reports have been produced.

Start: May 2011
End: August 2011



ADMINISTRATIVE REFERENCES AND CERTIFICATIONS

Registered and operational headquarters:	Lungarno Colombo 48, 50136 Florence, Italy. Ph. +39 055 674104 Fax +39 055 7349341 e-mail: geomap@geomapsrl.it Certified e-mail: geomasrl@pec.it
Start of activity as consulting office, Studio Geologico Geomap:	1958
Year establishes as Limited Liability Company:	1989
Year establishes as Engineering Company:	2014
Capital:	€ 20.800,00
Fiscal code and registration number:	04108890486
Social security registration:	EPAP (Multi-Category Social Security and Assistance Body) INARCASSA
Sole Administrator:	Dr. Pietro Dainelli
Technical Director:	Dr. Niccolò Dainelli
Bank references:	Banca Nazionale del Lavoro, Ag.2, Via Gioberti, 50121 Florence; Banco Fiorentino- Mugello, Impruneta, Signa – Credito Cooperativo, Agenzia di Firenze, V.le A. Volta 82, 50133 Florence
Turnover for the past five years:	2020: € 524,638.00 2019: € 311,272.00 2018: € 425,992.00 2017: € 323,970.00 2016: € 278,898.00
Certifications:	UNI EN ISO 9001:2015 for "Design and provision of services for applied geology, territorial and environmental analysis, including remote sensing and the Geographic Information Systems"; Sector EA 34, certification SQ082837, CSICERT/ACCREDIA released 2008/10/08, renewed 2017/09/24.

GEOMAP srl
SOCIETÀ DI INGEGNERIA

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1958 - 2018

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