



Survey Lab

Ground and Remote Sensing



Spin off of

SAPIENZA
UNIVERSITÀ DI ROMA

WHO WE ARE

Survey Lab Ltd. is a spinoff of **Sapienza University of Rome** funded in **2008** by researchers of the Geodesy and Geomatics Section of the Civil, Environmental and Construction Engineering Department (DICEA).

The company was founded thanks to the expertise of a team made by **Researchers** and **PhDs** belonging to DICEA's **Geodesy and Geomatics** area.

PROFESSORS

PHD

UNIVERSITY

SME



OUR MISSION

The main expertise of the company is in the development, distribution and promotion of **innovative monitoring systems** based on satellite Earth Observation data and geomatics techniques to monitor the stability of land, structure and infrastructure in order to increase the capability of setting up preventive mitigation actions to protect land and built-up environment.

Disseminate knowledge of DInSAR technology as a tool both prevention survey, through training courses, seminars and workshops.



GEOMATICS SERVICES

TOPOGRAPHIC MONITORING | Sedicated services to geomatics, hydraulic and structural studies



MONITORING STATION → Planimetric displacements, horizontal component, out of plumb

HIGH PRECISION LEVELLING → Subsidence phenomena, underground works, buildings collapse

GPS → Ongoing monitoring, dynamic load testing, mapping



Buildings



Infrastructures



Dams

SATELLITE MONITORING | Analysis devoted to **continuous monitoring of the stability** of structures and infrastructures



DInSAR → this technique **measures displacements** of buildings and infrastructures with the accuracy of **mm/year**

FREQUENCY → many satellite missions in operation collect data with high frequency, even **every 15 day**

BACK ANALYSIS → feasible using archive data that from **1992 to now** cover all Earth

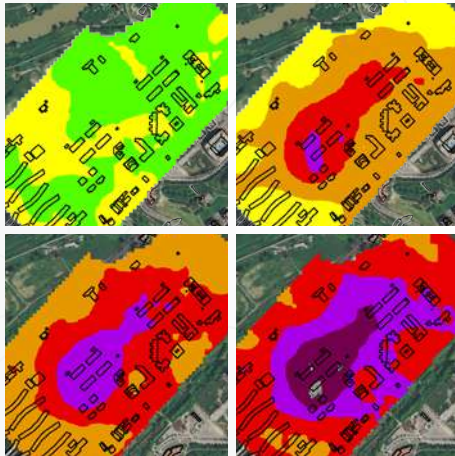


WIDE AREA ANALYSIS → production of **maps of synthesis** relative to medium-large dimension **urban areas** utilizing SAR Interferometry technologies, representing the **velocity of the average deformation**

BUILDINGS CLASSIFICATION → classification in respect of the average velocity of displacement observed, indication of the **level of displacement** of each building

SINGLE STRUCTURE ANALYSIS → quantitative analysis of the damage state with **evaluation and prediction of the deform state** of individual structures with the use of finite element predictive models

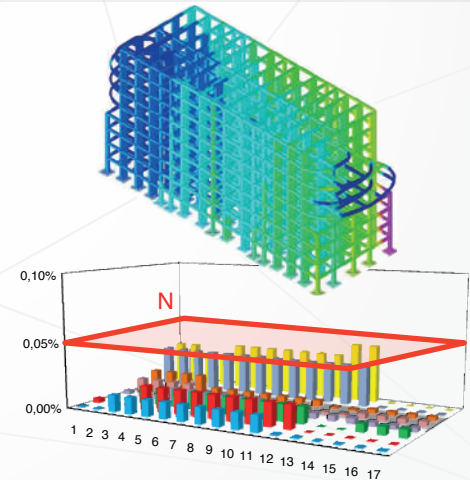
Wide Area Analysis
temporal evolution



Buildings Classification
average velocity of displacement



Single Structure Analysis
FEM modeling



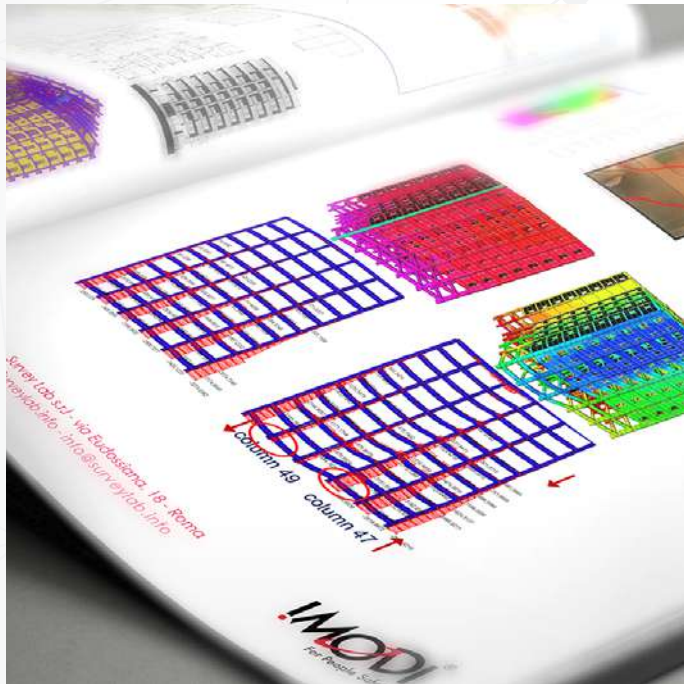
INTEGRATED MONITORING | Integration of satellite data, levelling, monitoring station and geotechnical analysis

MTS

REPORT → a detailed **technical report** will be provided for each MTS monitoring

OUTPUT → production of **charts and numerical elaborations** obtained after MTS monitoring

ONLINE PLATFORM → **interim reports** on MTS monitoring will be available for consultation on our online portal



SURVEYS AND MODELING | Topographic surveys and point cloud processing from laser scanning



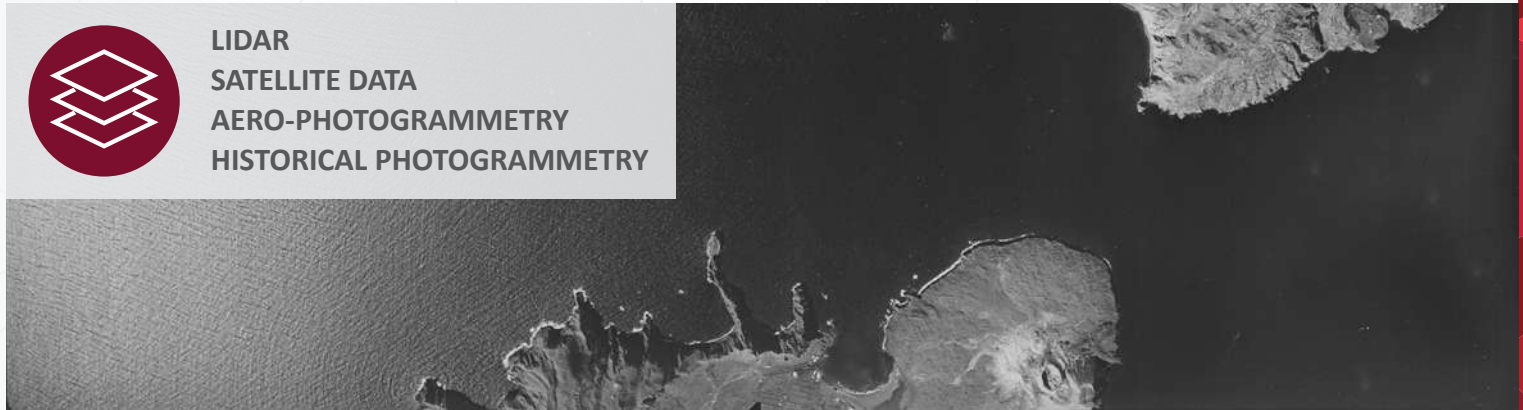
**MONITORING STATION
LASER SCANNING
GPS**



CARTOGRAPHIC PRODUCTION | Data provided in **GIS-compatible** format and integrated with auxiliary **thematic data**



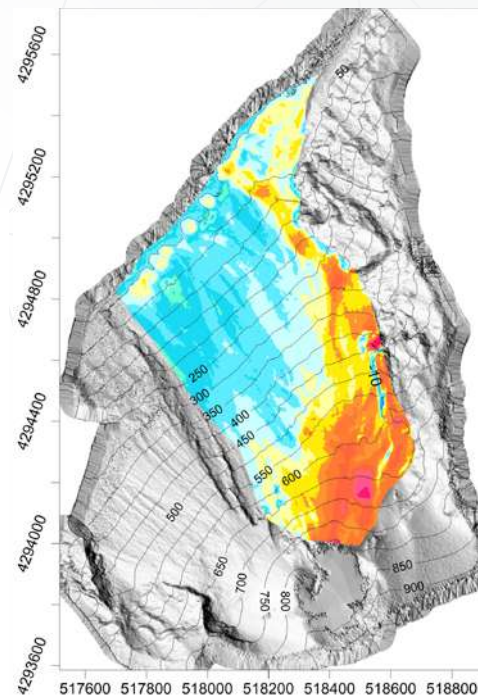
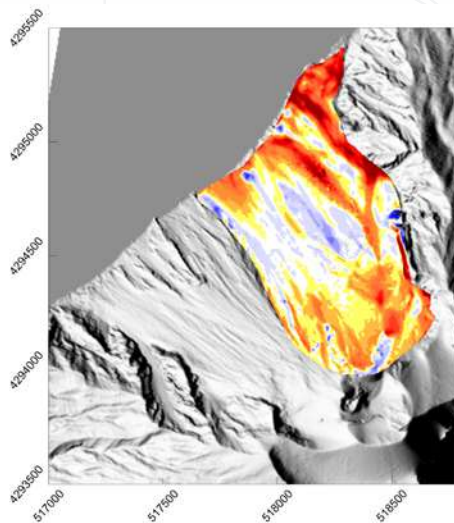
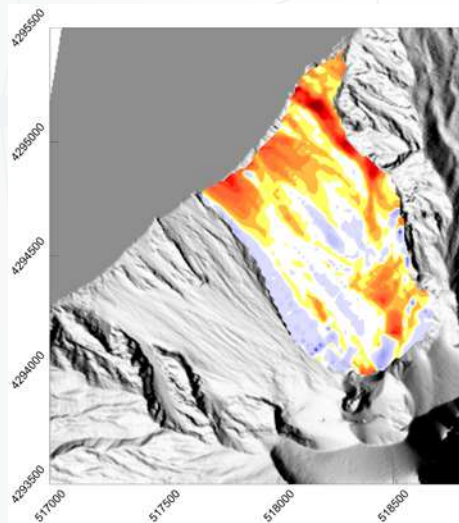
**LIDAR
SATELLITE DATA
AERO-PHOTOGRAMMETRY
HISTORICAL PHOTOGRAMMETRY**



MULTITEMPORAL ANALYSIS | Quantitative analysis of the **evolution** of natural and man-made **processes**



STEREO SATELLITE IMAGES
HISTORICAL PHOTOGRAMMETRY
LIDAR



TRAINING COURSES
PROJECTS DESIGN AND MANAGEMENT
R&D PROJECTS

GEOREFERENCED DATABASE
WEBGIS PLATFORMS
APP DEVELOPMENT

Leica LS15 Digital Level

HEIGHT MEASUREMENT

Accuracy using standard Invar staff	0,2 mm, 0,3 mm
Accuracy using standard staff	1,0 mm

DISTANCE MEASUREMENT

Precision	15 mm a 30 m
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MEASUREMENT RANGE

Minimum range	1,8 m
Maximum range	110 m
Measurement time	2,5 sec

Leica ScanStation P30/P40

Scan rate	1.000.000 punti/s
Accuracy	1,2mm
Angular accuracy	8" horizontal 8" vertical
Field-of-View V/H	290°/360°
Laser	Class 1
Beam divergence	< 0.23 mrad
Camera resolution	4 megapixel 17°×17° 700 megapixel panoramic

GPS Topcon GR 3

TRACKING

Number of Channels 72

Signals Tracked

GPS	L1,L1 CA,L1 P,L2,L2 C,L2 P,L5
GLONASS	L1,L1 CA,L1 P,L2,L2 CA,L2 P
GALILEO	All

WAAS/EGNOS Yes

Antenna Type Integrated Micro-Center on Flat Ground Plane

ACCURACY

Real time RTK accuracy
H: ± 10 mm + 1 ppm
V: ± 15 mm + 1 ppm

Post processed Static DGPS
H: ± 3 mm + 0.5 ppm
V: ± 5 mm + 0.5 ppm

Monitoring Station Leica Nova TM50

ANGLE MEASUREMENT

Accuracy Hz and V	Absolute, continuous, quadruple	0.5" (0.15 mgon) or 1" (0.3 mgon)
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DISTANCE MEASUREMENT

Range	Prism	1.5 m to 3500 m
	Non-Prism / Any surface	1.5 m to >1000 m
Accuracy / Measurement time	Single(Prism)	0.6 mm+1ppm/tip. 2.4 s
	Singol (Any surface)	2 mm+2ppm/tip. 3 s
Laser dot size	at 50 m	8 mm x 20 mm
Measurement technology	System Analyser	Coaxial, visible red laser

MOTORISATION

Direct drives based on Piezo technology	Rotation speed Time to Change Face	max 200 gon/s tip. 2.9 s
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LONG RANGE AUTOMATIC AIMING (ATR)

Range ATR mode	Circular prism (GPR1, GPH1P)	3000 m
	360° prism (GRZ4, GRZ122)	1500 m
Accuracy / Measurement time	ATR angle accuracy Hz, V	0.15 – 0.3 mgon/tip. 3-4 s

Leica
Geosystems

 **TOPCON**

RESEARCH AND DEVELOPMENT PROJECTS

2012

2014



World heritage monitoring by remote sensing

Short-term monitoring of UNESCO sites and archaeological sites in urban areas.

Funded by ASI Italian Space Agency

2013

2016



Mediterranean supersite volcanoes

Development and testing of a tool for automatic processing of frames extracted from surveillance cameras to obtain useful parameters to monitor the evolution of the lava field.

European Funding Program FP7

2013

2015



Monitoring urban areas by means of long term DInSAR time series

Analysis of SAR data captured by satellite sensors for the study of subsidence phenomena in urban areas, aimed at assessing damage of structures and infrastructures.

Funded by ESA - BIC Lazio

2016



Edifice monitoring displacement

Creation of an app aimed at monitoring the movement of buildings in large urban areas through thematic maps obtained by the elaboration of satellite data using DInSAR technique.

Funded by Regione Lazio - Italy

2016

2018



Implemented monitoring system for structural displacement

Monitoring of the stability of buildings and infrastructures integrating Earth Observation data processed with DInSAR technique, data acquired in situ and numerical models.

Funded by Horizon 2020 - SME INSTRUMENT PHASE 2 | Grant agreement No 720121

2017

2018




Monitoring built-up area from satellite

Monitoring by satellite techniques of densely populated areas, to prevent and reduce the risk associated with soil deformations.


Funded by H2020-INNOSUP-2016-2017

Client	Activity	Type of survey	Equipment
Italian National Office of Commissioner for the Securing of Big Dams	Detailed survey of the dam of Muro Lucano - PZ (Italy)	3D reconstruction	Laser Scanner, Photogrammetry, GPS
Municipality of S.Vito Romano (Rome)	Detailed survey of Fosso della Polveriera (Italy)	3D, topographic framework	Laser scanner, monitoring station
Municipality of Lugnano In Teverina	Detailed survey of landslide slope (Italy)	3D reconstruction	Laser Scanner, Photogrammetry, GPS
Joint Venture Mdina 2009	Surveying activity - St Paul Bastions, Mdina (Malta)	3D reconstruction	Laser Scanner, Photogrammetry, GPS
Municipality of Colonna (Rome)	Detailed survey of the cliff in Parco Tofanelli (Italy)	3D reconstruction	Laser Scanner, Photogrammetry, GPS
Municipality of Fagnano Alto (L'Aquila)	Digital photogrammetric rendering to produce numerical cartography, accurate plano- altimetric survey (Italy)	Plano-altimetric survey	Stereo-Photogrammetry
SYSDECO SRL	Project Storm drain Rome - Accurate plano-altimetric survey (Italy)	Plano-altimetric survey	GPS
Metro C - Rome	Geomatic monitoring of the buildings/monuments affected by the excavation of the T3 part of the Line C – Metropolitana di Roma	High precision plano-altimetric survey	Monitoring station, GPS, Satellite Interferometry
Lazio Region Hydrographic Office	Surveying and precision evaluation of hydrometric zero of the hydrometric rods installed at the measurement sections, plano-altimetric survey of embankments and shores areas of River Tiber and monitoring of superficial water resources of Lazio Region (Italy)	High precision plano-altimetric survey	GPS, leveling, monitoring station
Académie de France	Construction of the three-dimensional high-resolution models of bas-reliefs - Castello Sforzesco of Milano (Italy)	3D reconstruction	Laser Scanner, Photogrammetry
EGO (European Gravitational Laboratory)	Creation of the reference system for the Advanced Virgo interferometer	High precision plano-altimetric survey	Monitoring station, GPS
IDS srl Pisa	Reverse engineering delle strutture della città rupestre di Vardzia (Georgia), through high-precision laser scanners	3D reconstruction	Laser Scanner, Photogrammetry
GEOPLANNING S.R.L.	Detailed survey of the landslide slope of Civita di Bagnoregio (Italy)	3D survey - High precision plano-altimetric survey	Laser Scanner, Photogrammetry, GPS
Italian National Institute of Geophysics and Vulcanology	Processing of high resolution laser scanner data, for the creation of the 3D model and survey rendering of the Pizzi Deneri Observatory (Italy)	3D survey	Laser Scanner, Photogrammetry, GPS
West Systems srl	Topographic survey of transverse sections of the sector of River Mugnone from Via del Romito to Ponte delle Riffe – Florence (Italy)	High precision plano-altimetric survey	Monitoring station, levelling, GPS
Condominium Via dei Sabelli	Analysis of historical time series of interferometric data through the use of satellite radar techniques - Rome (Italy)	Altimetric monitoring	Satellite Interferometry

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