EGU – 2022 – Vienna, Austria
GI1.1 – Open session on geoscience instrumentation and methods

Topographic and photogrammetric techniques applied to the study of the morphology of ravines in Campana city, Buenos Aires, Argentina

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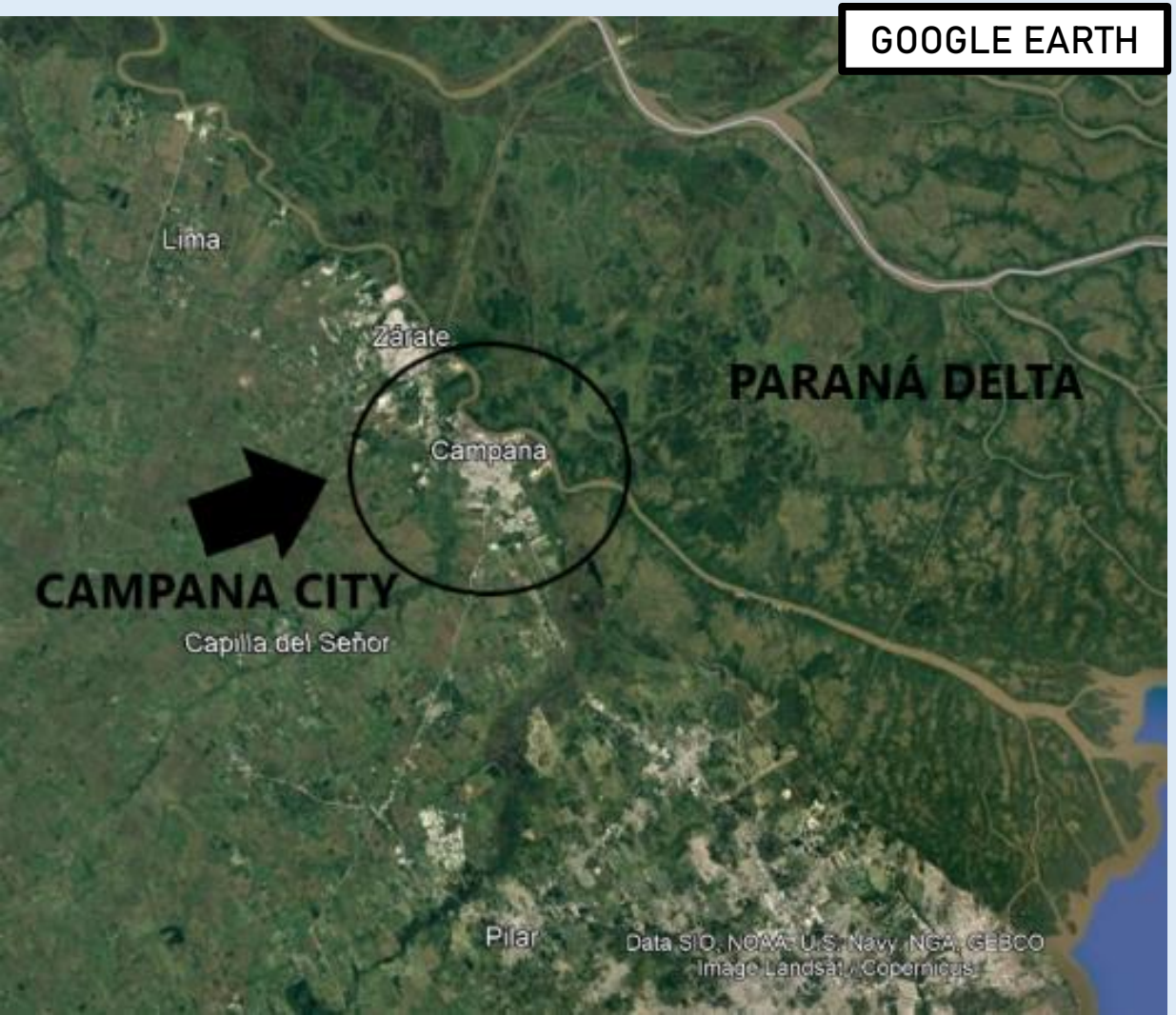
LOCATION

ARGENTINA

PARANÁ RIVER

LOCATION

CAMPANA CITY



THIS PROJECT IS PART OF A CONTINNUM STUDY OF THE CONDITION OF RAVINES IN THE CITIES OF THE PARANÁ RIVER AREA

HIGH IMPACT FOR LOW-MEDIUM INCOME COMMUNITIES IN SLIDE-RISK ZONES OF THE PARANÁ RIVER

FOCUS OF THE STUDY

- DEVELOP A QUICK AND CHEAP METHOD FOR RAVINES EVALUATION IN LOW-MEDIUM INCOME CITIES

- HELP MUNICIPALITIES AND COMMUNITY TO REPORT RISK RELATED TO SLOPE STABILITY AND PREVENT MAJOR ISSUES

- USE TOPOGRAPHIC AND PHOTOGRAMETRIC METHODS TO STUDY THE MORPHOLOGY OF SLOPES IN ADDITION TO IN SITE INSPECTION

REQUIREMENTS

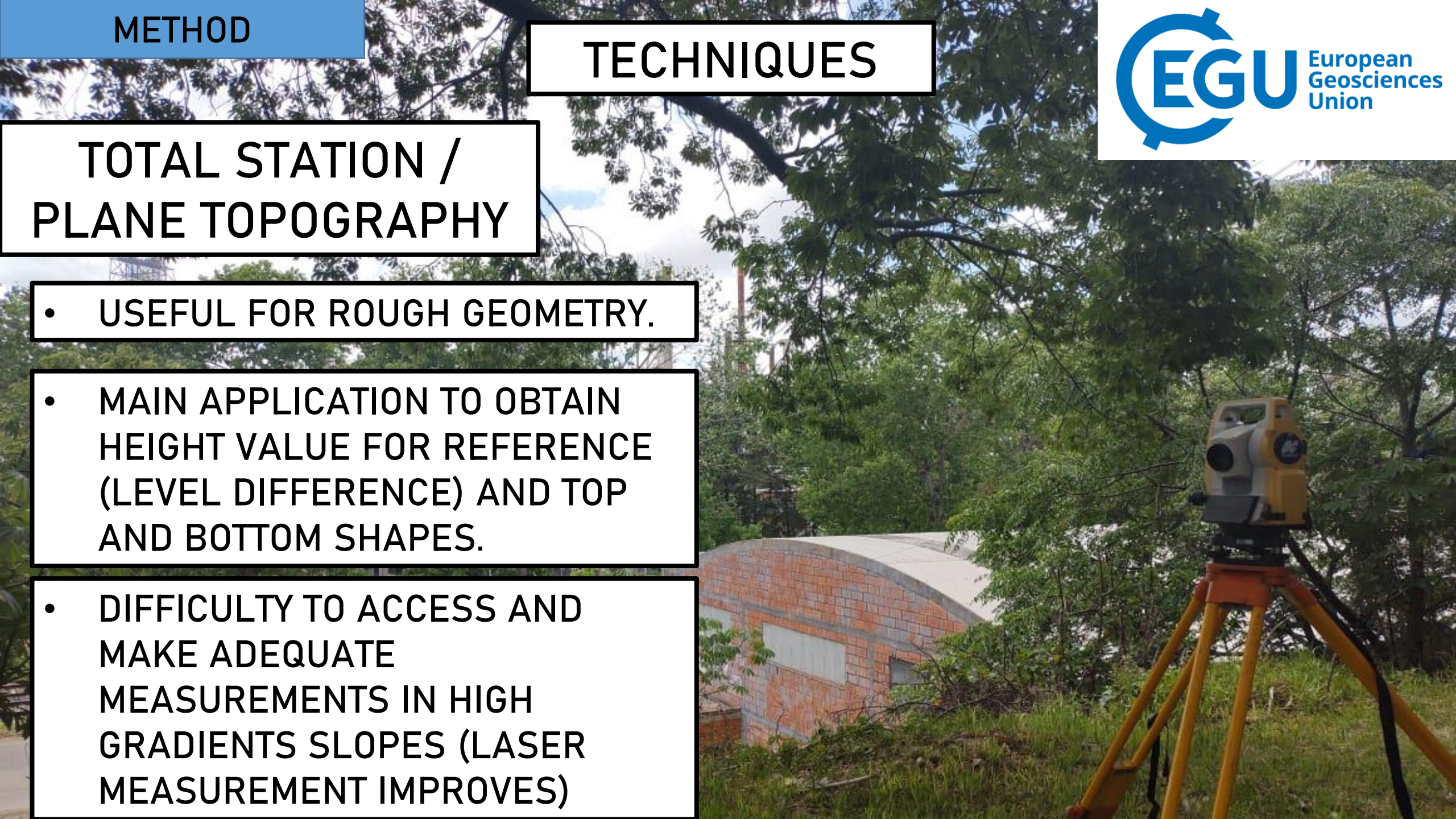
- OBTAIN THE GEOMETRIC PARAMETERS TO DEVELOP SLOPE STABILITY CALCULATIONS
- EVALUATE THE VEGETATION AND SURFACE CONDITION
- OBTAIN GEOTECHNICAL PARAMETERS
- INSPECT SLOPE CONDITION AND POSSIBLE CRACKS/SLIDING CONDITIONS

METHOD

TECHNIQUES

TOTAL STATION / PLANE TOPOGRAPHY

- USEFUL FOR ROUGH GEOMETRY.
- MAIN APPLICATION TO OBTAIN HEIGHT VALUE FOR REFERENCE (LEVEL DIFFERENCE) AND TOP AND BOTTOM SHAPES.
- DIFFICULTY TO ACCESS AND MAKE ADEQUATE MEASUREMENTS IN HIGH GRADIENTS SLOPES (LASER MEASUREMENT IMPROVES)

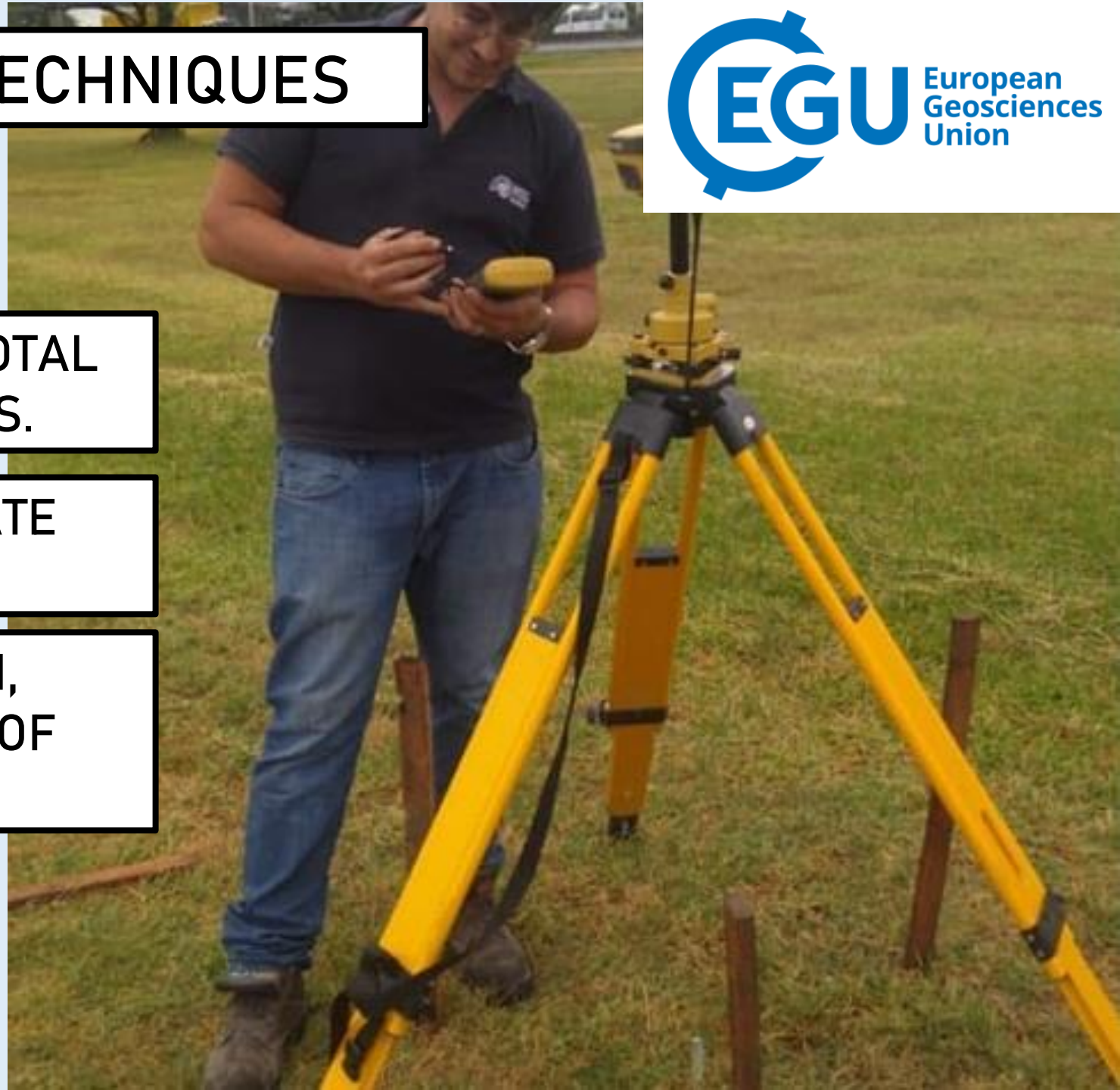


METHOD

TECHNIQUES

GPS (DGPS)

- SAME APPLICATION THAT TOTAL STATION IN GENERAL TERMS.
- USEFUL FOR GEOCOORDINATE THE POSITION OF SLOPES.
- DURING IN SITE INSPECTION, USED FOR RECORD POINTS OF INTEREST.



METHOD

TECHNIQUES

DRONE / LASER SCAN

- DIFFERENT TECHNIQUES SAME OBJETIVE : MAKING A SURFACE / PICTURE IN 2D OR 3D.
- POSSIBLE TO VISUALIZE THE REAL CONDITION OF THE MORPHOLOGY WITH A GOOD PICTURE (PHOTOGRAMMETRIC).
- GIVES A GOOD MEASUREMENT TOOL, USEFUL FOR LOCATING POINTS OF INTEREST (POINT CLOUDS).
- WEAK POINT OF METHOD: HIGLY AFFECTED BY VEGETATION.

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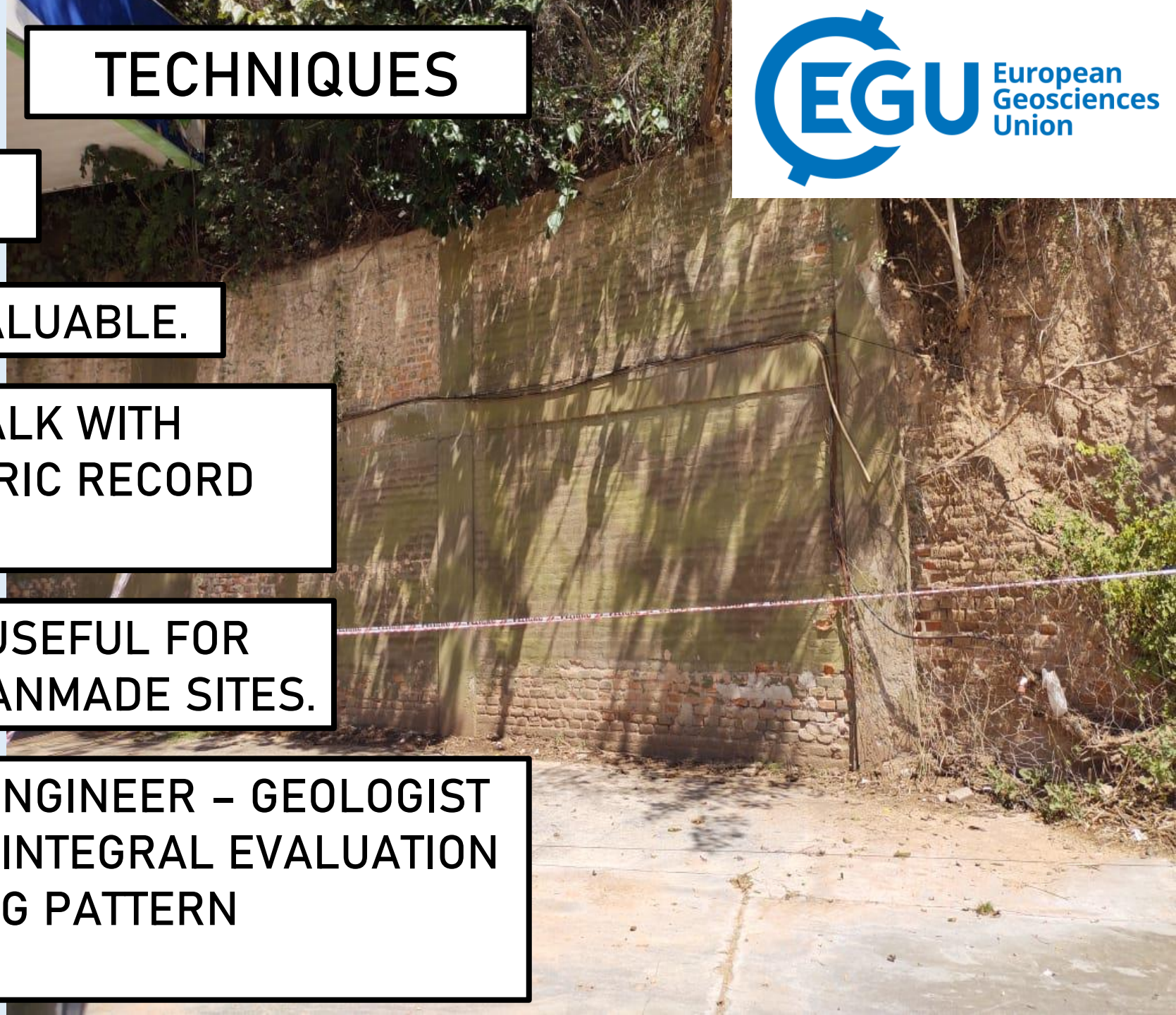
METHOD

TECHNIQUES

SITE INSPECTION

- ALWAYS A NEED. UNVALUABLE.
- VERY IMPORTANT TO TALK WITH PEOPLE IN SITE, HISTORIC RECORD OF THE SLOPE.
- PHOTOS AND VIDEOS, USEFUL FOR ANALYSIS. IDENTIFY MANMADE SITES.
- WELL-TRAINED EYE / ENGINEER – GEOLOGIST IS THE BEST TOOL FOR INTEGRAL EVALUATION AND CRACKING/SLIDING PATTERN IDENTIFICATION.



KEY POINTS

KEY POINTS

GEOMETRY

- HEIGHT
- SHAPE
- SLOPE ANGLE
- MASS DISTRIBUTION

GEOTECHNICAL

- SOIL TYPE
- CONDITION
- GROUNDWATER
- CRACKS/SLIDES

GEOLOGICAL

- PAST EVENTS
- URBAN ENVIRO
- FORMATION
- GEO-RELATED

RISK MANAGEMENT

- COMMUNITY
- HOUSES
- INFRASTRUCTURE
- ANTHROPIZATION

RESULTS

6.4 KM OF RAVINE INSPECTED

LESS THAN 1 WEEK OF WORK ON SITE

2 WEEKS OF PROCESSING AND CALCS

14 SITES OF INTEREST LOCATED

SMALL TEAM
1 GEOLOGIST
1 ENGINEER
1 TECHNICIAN

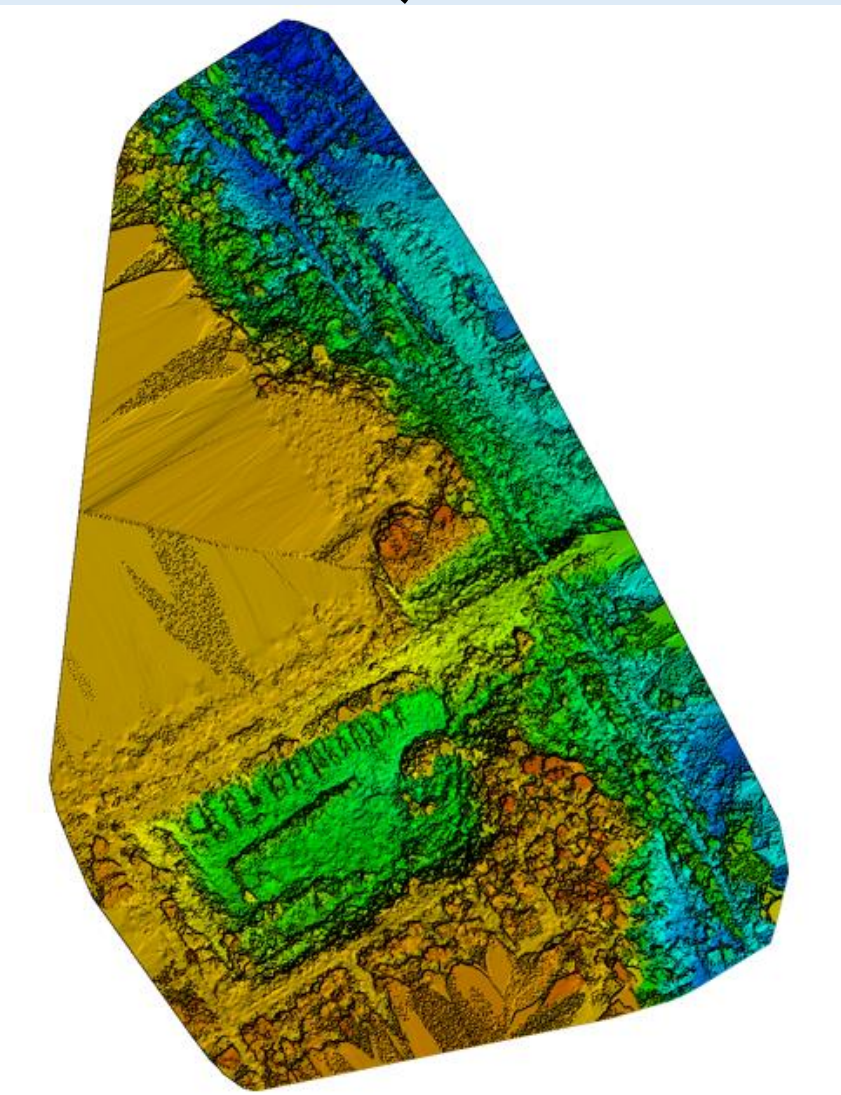
HIGH AMOUNT OF VALUABLE INFORMATION

RISK EVALUATION & MITIGATION MEASURES

RESULTS

PHOTOGRAMMETRIC TOOLS

DSM (DIGITAL SURFACE MODEL)

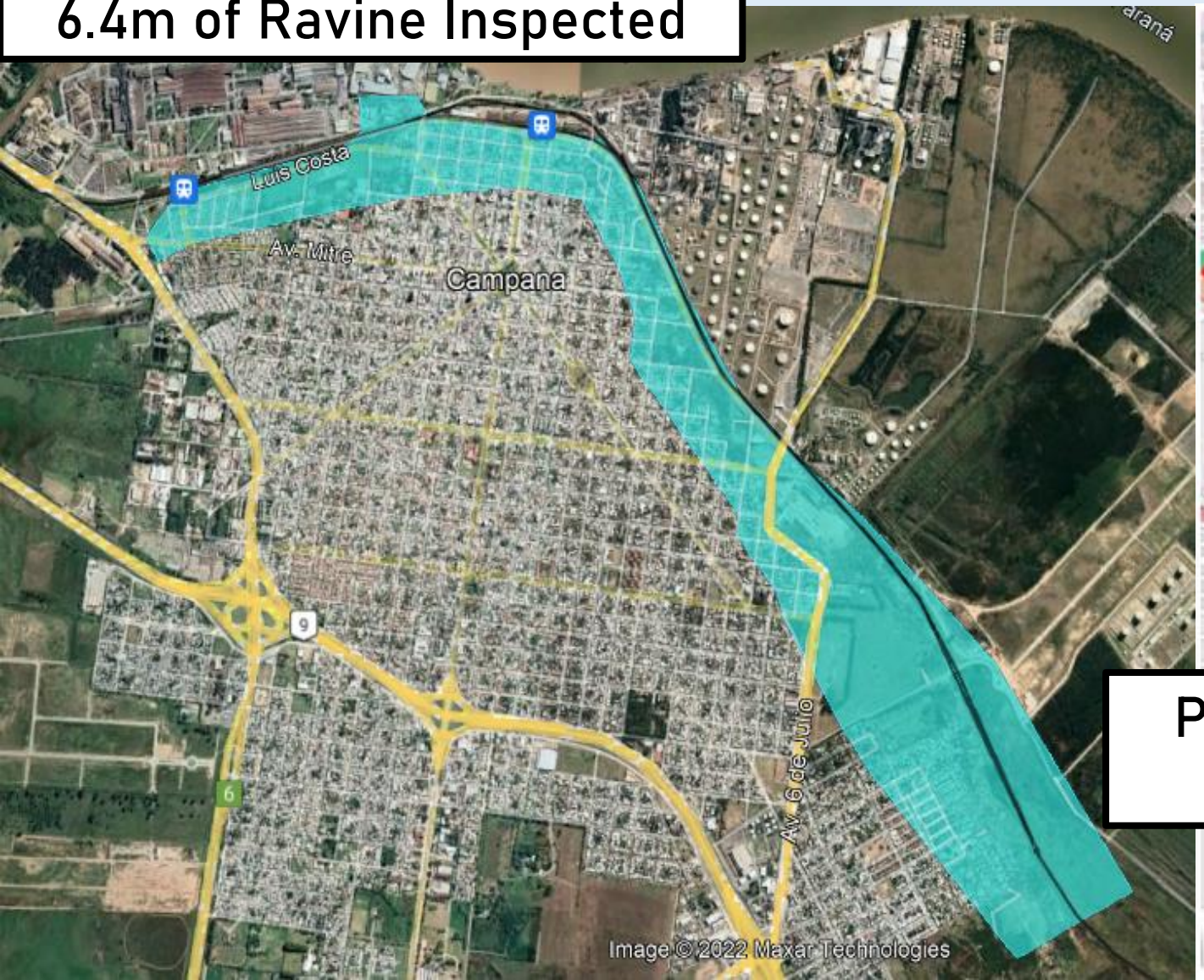


ORTHOPHOTO

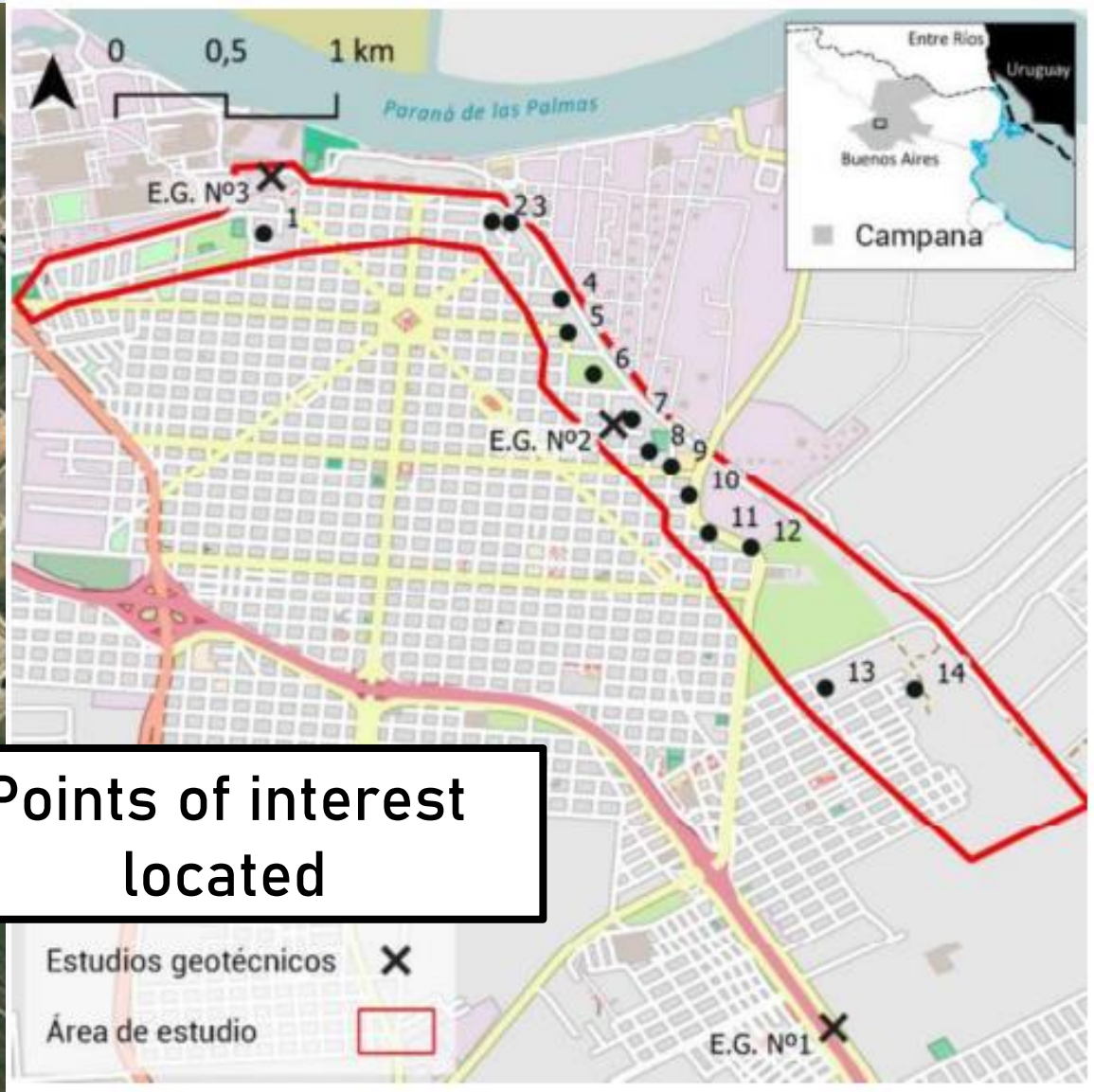
RESULTS

CONCLUSIONS

6.4m of Ravine Inspected



Points of interest located



RESULTS

ANTHROPIZATION

6 m high masonry Wall close to collapse

No engineering design

RESULTS

CRACKS AND SLIDES

Roads with cracks in top of ravine

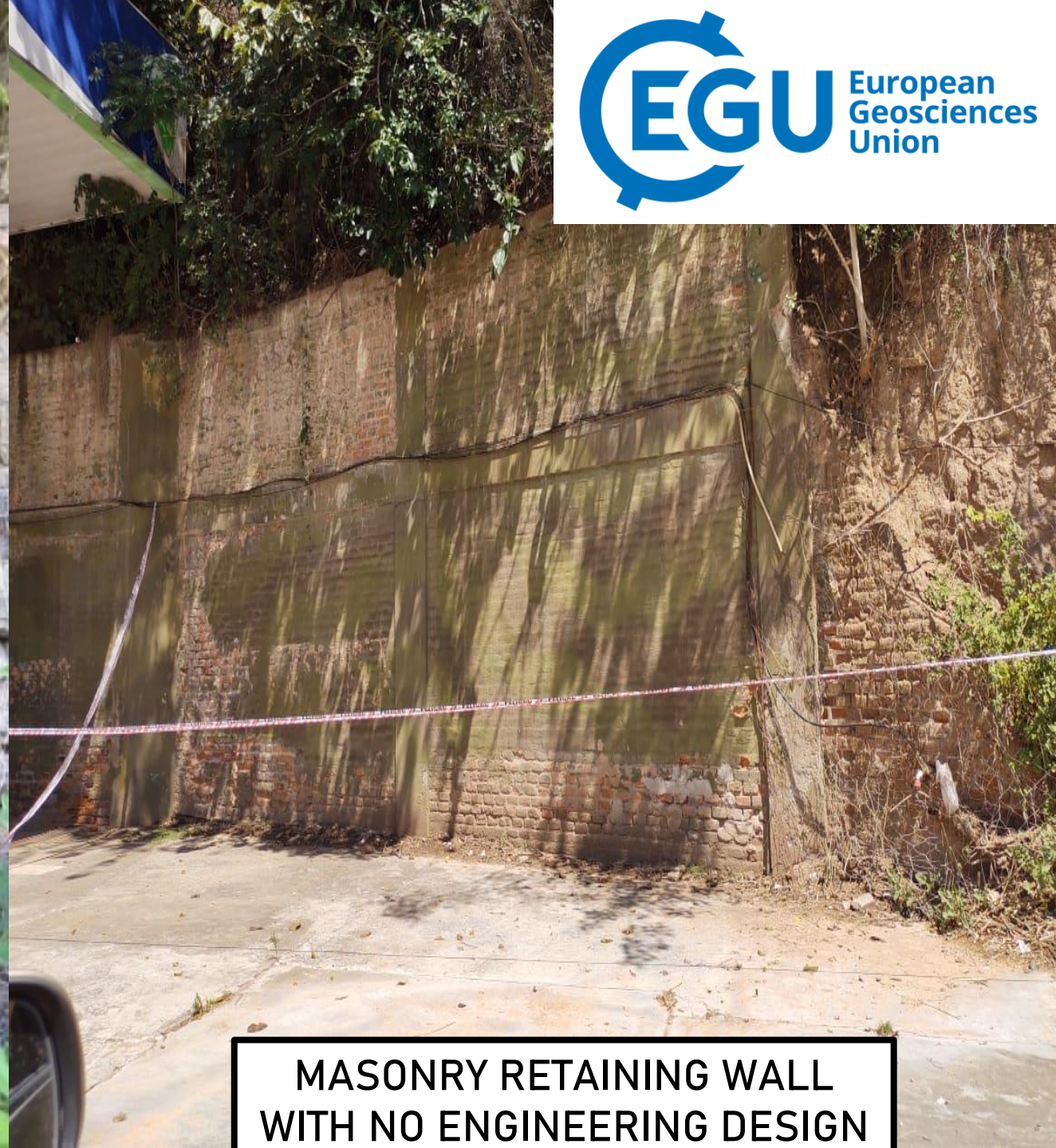
Structural Pathologies in buildings

CONCLUSIONS

- QUICK AND CHEAP METHOD FOR RAVINE EVALUATION. HIGH REDUCTION IN TIME AND COSTS.
- TOPOGRAPHIC/PHOTOGRAMMETRIC METHODS ARE A USEFUL TOOL FOR GEOMETRY EVALUATION.
- SITE INSPECTION IS UNVALUABLE.
- HISTORY AND SITE EVENTS MATTER. UNPLANNED ANTHROPIZATION IS VERY RISKY.
- COST-EFFECTIVE METHOD FOR PREVENT AND MEASURE RISK.
- SMALL WORK WITH HIGH IMPACT IN COMMUNITY

THANK YOU!!

GABION WALL
ENGINEERING-BACKED



MASONRY RETAINING WALL
WITH NO ENGINEERING DESIGN

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