



UNIVERSITÀ
DEGLI STUDI
DI BERGAMO

Dipartimento
di Lingue, Letterature
e Culture Straniere

Academy of Research Methodologies

Geourbanistica

Planning and Management of
Tourism Systems

Text Sciences and Culture
Enhancement in the Digital Age

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Modulo Mapping and Drone

Lesson 2: Use of drones for territorial
planning in synergy with mapping tools

Part I

There are many national and international acronyms indicating **REMOTELY PILOT AIRCRAFT**



RPAS, UAV

UAS, APR,



DRONE



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TECHNOLOGICAL ADVANCEMENT

Over last 50 years...

PRECISION and



Reduction of operating costs and time

Possibility of intervention in areas that could not be analyzed with conventional aircraft.

SENSING



Equipping drones with compact or professional digital cameras, thermal cameras, multispectral cameras, up to more advanced sensors such as 360° cameras or Lidar systems.



TECHNOLOGICAL ADVANCEMENT

Nowadays

ARTIFICIAL



Equip an RPAS with its own autonomy without ground controls.
Various systems are currently being tested that allow **self-learning** (neural networks)

MACHINE



"Experiences" from flights already carried out are loaded onto the aircraft, dividing them into "**successful**" and "**NOT successful**".
When a scenario occurs, the aircraft will be able to prefer the actions that lead to a **SUCCESSFUL** operation



THREE MAIN FIELDS OF APPLICATION

1. AMATEUR

2. PROFESSIONAL (cinema operators,
photographers, tourism...)

3. SCIENTIFIC TECHNICAL USE

+1: War use



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SCIENTIFIC TECHNICAL USE

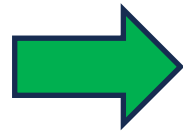
URBAN AND TERRITORIAL PLANNING GEOLOGY ENGINEERING ARCHITECTURE
GEOGRAPHY ARCHEOLOGY AGRICULTURE AND OTHER FIELDS

AEROPHOTOGRAMMETR



scheduled flights which, thanks to positioning systems (GPS), allows us to obtain "photographic stripes" with well-defined overlap percentages

- 3D Terrain models
- Point clouds
- Orthophotos
- Contour lines
- Altimetric profiles.

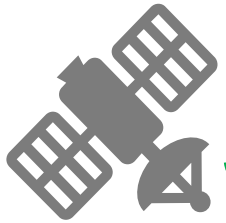


Thanks to the x, y, z coordinates contained in the collected data, it is possible to export the data to **GIS** systems



SCIENTIFIC TECHNICAL USE

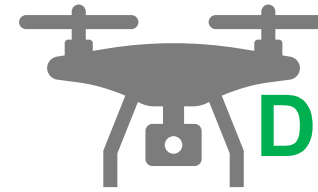
Revolution of detection techniques for
monitoring and control of the territory



**SATELLIT
E**

Slower update

NO targeted analysis



DRONE

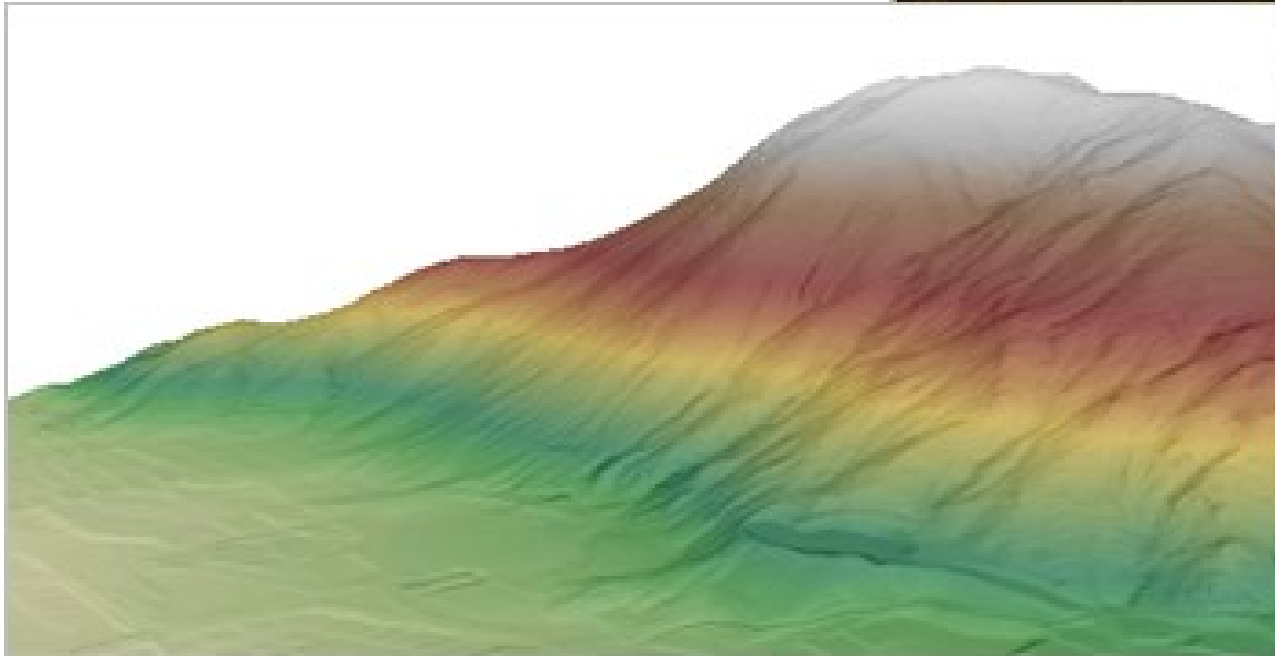
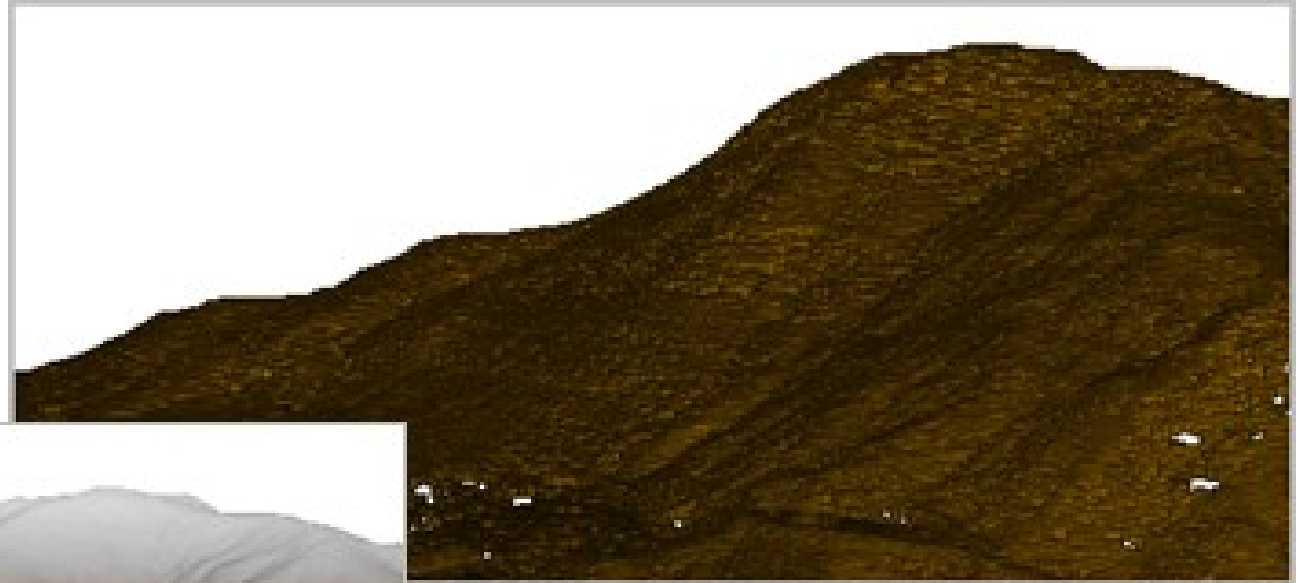
Real time situation

**More appropriate
metric scale**



SCIENTIFIC TECHNICAL USE

Thanks to
RPAS...



From **PHOTOGRAMMETRIC
CARTOGRAPHY**
(Point clouds)

to **DEM**
(Raster)



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Fonte: pro.arcgis.com

SCIENTIFIC TECHNICAL USE

DEM

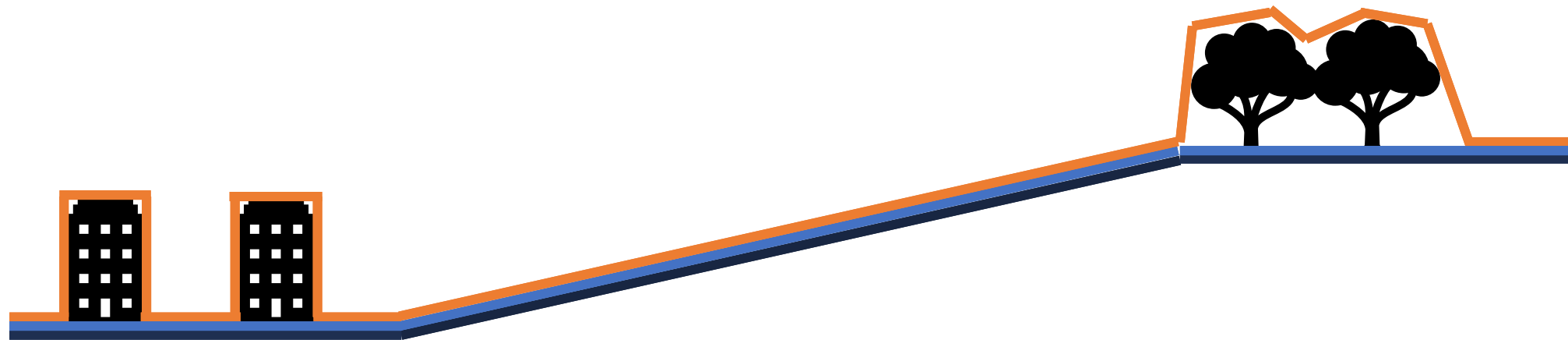
Digital Elevation Model

DSM

Digital Surface Model

DTM

Digital Terrain Model



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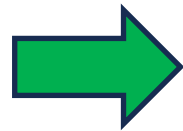
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SCIENTIFIC TECHNICAL USE

AEROPHOTOGRAMMETR



is achieved with the use of RPAS following the traditional method: it is necessary to operate with GCPs (Ground Control Points)



Current photogrammetric software is based on "Image Matching" algorithms: processing of stereoscopic models based on digital photo parameters and operating only on individual pixels.

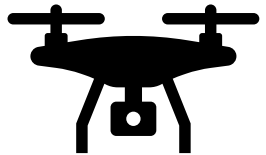


SCIENTIFIC TECHNICAL USE

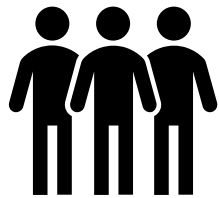
The Drone makes the job easier:

it does not replace the traditional method but strengthens it

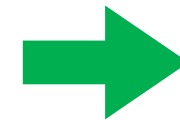
DRONE use



PROFESSIONISTS



SOFTWARE



SCIENTIFIC TECHNICAL USE

Pay attention to the reliability of the data

**NOT ALL DATA ARE
RELIABLE**



The RPAS production market is constantly growing. Easy access to these instruments creates the risk that many pseudo-professionals produce unreliable data



SCIENTIFIC TECHNICAL USE

DTM - altimetry

Attribute data:
each cell
contains data
on the
altitude of
each point

