EWCE 103

Surveying

Photogrammetric Surveying

Drone Photogrammetric Surveying

Drone Photogrammetry

Drone

- **Unmanned aerial vehicles (UAV),** better known as drone.
- Immense advantages of drone photogrammetry.



WW I Surveillance Drone-Pigeon Photography



Bundesarchiv, Bild 183-R01996
Foto: o.Ang. | 1914/1918 ca.

What is meant by drone survey?

- Use of a **drone,** or unmanned aerial vehicle **(UAV),** to capture **aerial data** with downward-facing multispectral cameras etc.

- During a drone survey, the **ground is photographed several times from different angles**, and **each image is tagged with coordinates.**

What are the benefits of drones in surveying?

- **Reduce field time and survey costs:**

Capturing topographic data with a drone is up to five time **faster** than with land-based methods and **requires less manpower.**

- **Provide accurate and exhaustive data:**

Total stations only measure individual points. **One drone flight produces thousands of measurements,** which can be represented in different formats.

- **Map the inaccessible areas:**

An aerial mapping drone can take off and fly almost anywhere. You are no longer limited by **unreachable areas**, **unsafe steep** slopes or **harsh terrain unsuitable for traditional measuring tools**.

Purposes/uses of Drone Surveying

- **Land survey/cartography.**
- **Land management and development**
- **Precise measurements:**
  - **Stockpile volumetric measurements.**
- **Slope monitoring.**
- **Urban planning.**

Question: Describe the purposes of drone surveying/mapping.

Purpose of drone Surveying:
Land surveying / cartography:

- **Generate high-resolution detailed 3D models of areas** where low-quality, outdated or even no data, are available.
- **Enable high-accuracy cadastral maps to be produced quickly and easily**, even in complex or difficult to access environments.
- **Surveyors can also extract different features from the images**, such as signs, curbs, road markers, fire hydrants and drains

Land management and development:

- **Greatly accelerate and simplify topographic surveys** for land management and planning.

- True for **site** scouting, allotment, planning and design, as well as final construction of roads, building and utilities.

UAV Photograph for Real Estate



Precise measurements: High resolution **orthophotos** enable surveyors to **perform highly-accurate distance and surface measurements**.

- **Stockpile volumetric measurements :** With 3D mapping software, it is also possible to obtain volumetric measurements from the very same images.

Volume measurement of a landfill in Bahamas

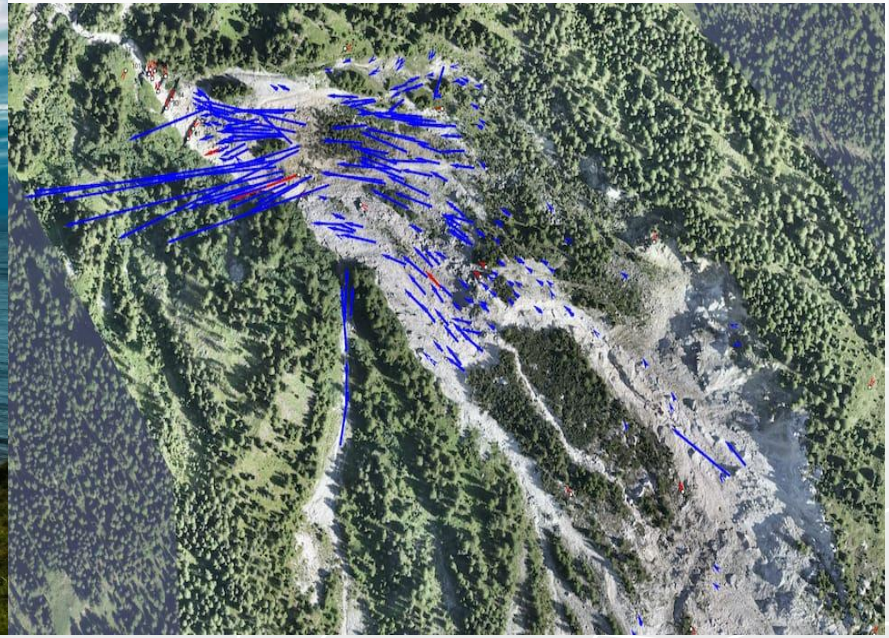




Slope monitoring:

Knowing the steepness of the ground's surface, the **areas can be classified and used for slope monitoring purposes**, including landslide mitigation and prevention.





Urban planning

- Development of increasingly **dense and complex urban areas** requires intensive planning and therefore time-consuming and expensive data collection.

- Urban planners can **collect large amounts of up-to-date data in a short period of time** and with far less staff.

- Images produced in this way **allow planners to examine the existing social and environmental conditions** of the sites and consider the impact of different scenarios.



Zoning map overlaid on an aerial map of mixed urban area and leisure area

What kinds of **deliverables** can you expect with drone surveying?

- **Ortho-mosaic map**.
- **3D Point Cloud**
- **Digital surface models (DSM).**
- **Digital terrain model (DTM)/Digital elevation Model (DEM).**
- **3D textured Mesh**
- **Contour Lines**

What kinds of deliverables can you expect with drone surveying?

Ortho-mosaic maps:

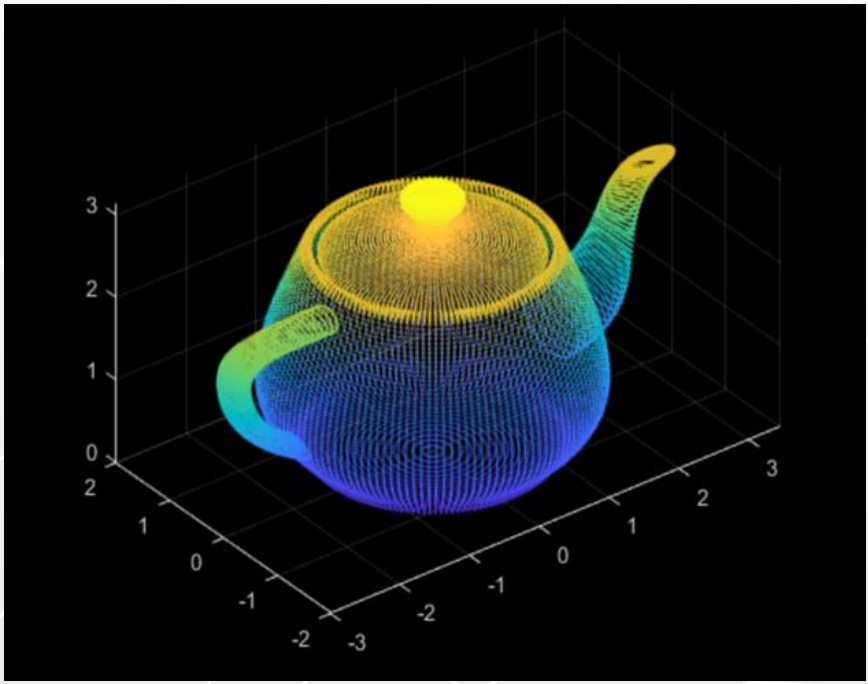
- Drone images are corrected for image distortion and stitched together during post-processing to create a highly-accurate ortho-mosaic map.



3D point cloud:

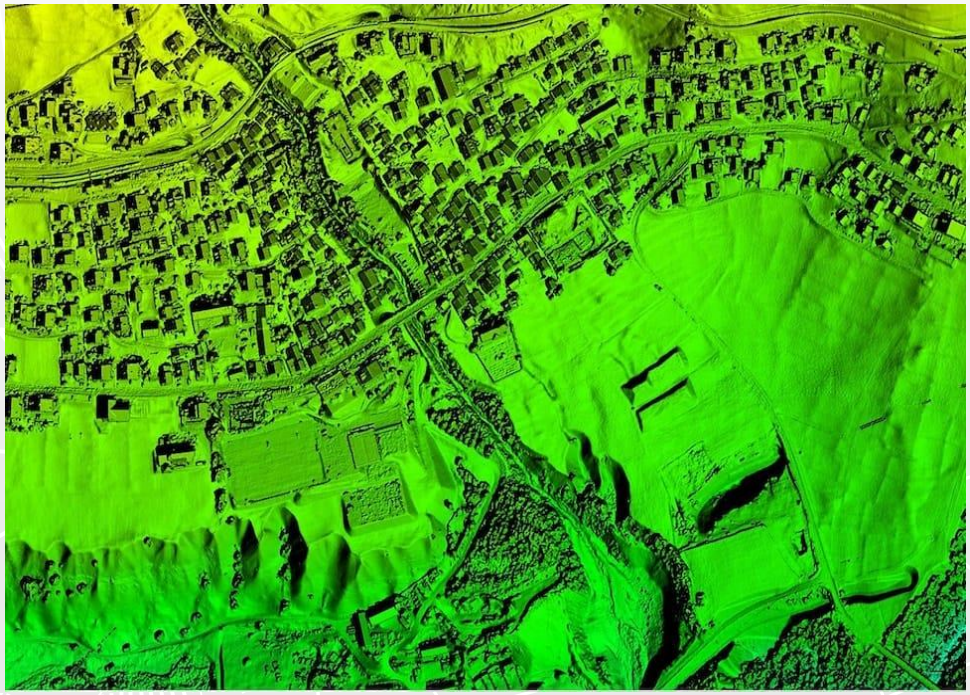
A densified point cloud can be generated from drone images. Each **point contains geospatial (X, Y, Z) and color information.**

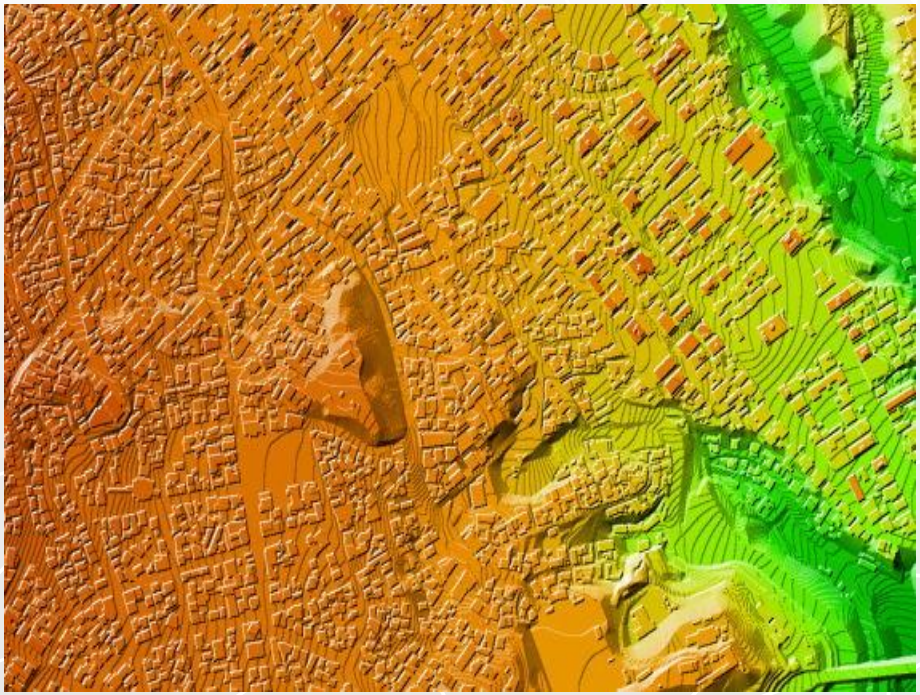




Digital surface models (DSM):

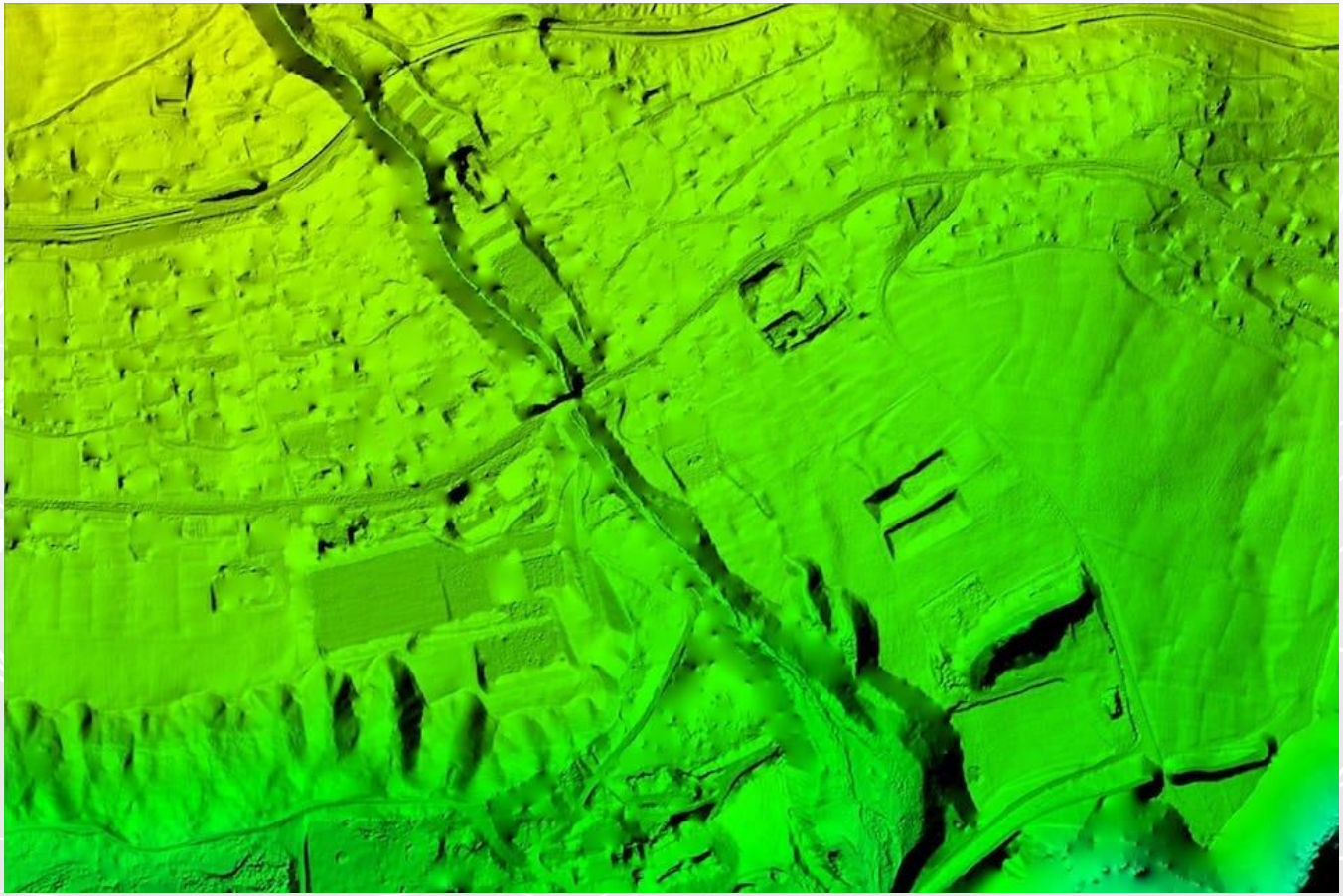
Drone images can also be used to create DSM models of the area. **Each pixel contains 2D information (X, Y) and the altitude (Z value) of the highest point for this position**.





Digital terrain model (DTM)/Digital elevation Model (DEM):

After filtering objects such as buildings, the drone images can be used to create DTMs with each pixel containing X, Y, and Z value of the highest altitude.



3D textured mesh:

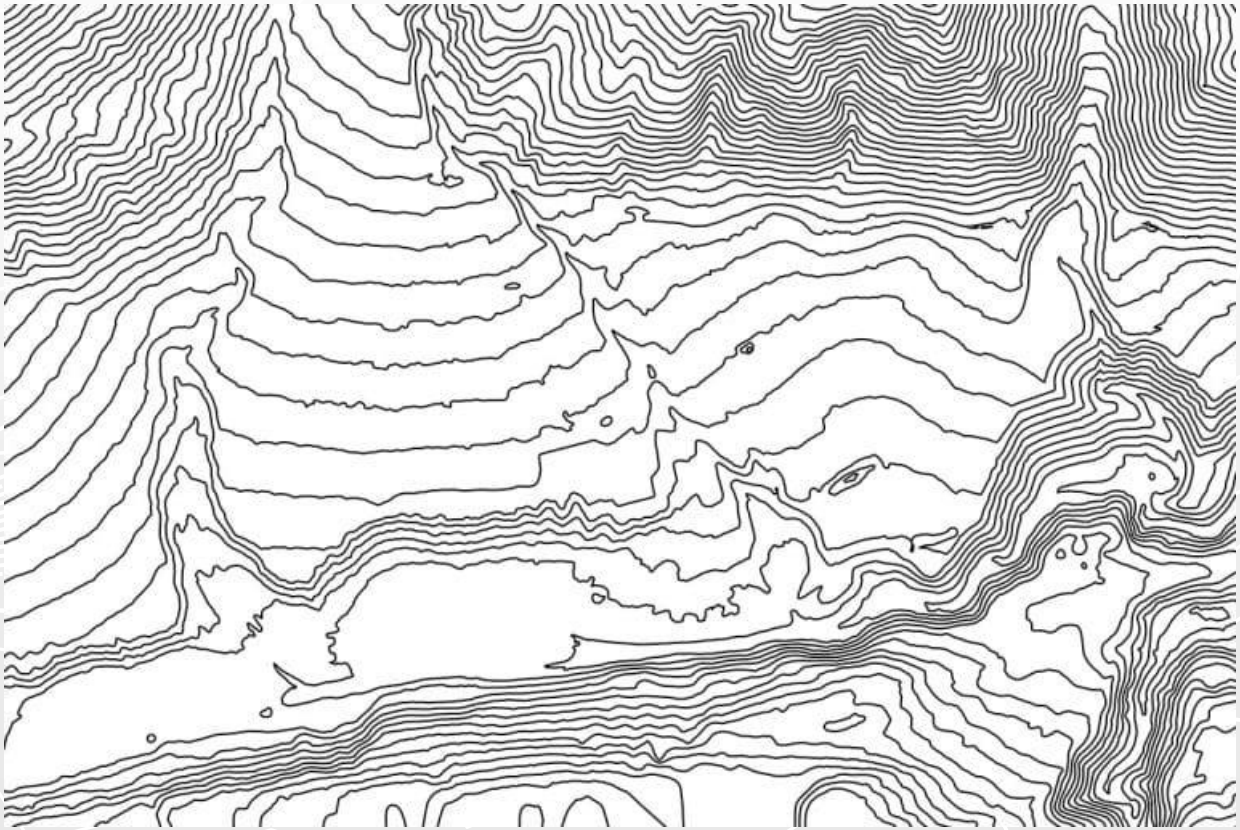
3D textured mesh is a **reproduction of the edges, faces, vertices and texture of the area** shot by the drone.





Contour lines:

DTM or DSM model, can be used to create a contour lines map, giving you a **better understanding of the surface of the area.**



Benefits of UAV/Drone Photogrammetry in Surveying and Mapping

Question: Briefly describe the benefits of drone photogrammetry in surveying and mapping.

Advantages of Drone Photogrammetry

- **Ease of Use**
- **Simple Equipment Prerequisites**
- **Effortless Transportation**
- **Superior for Ground Surveying Applications**
- **Highly Accurate**
- **Affordable**
- **Evolved Technology**
- **Complete Jobs and Tasks Expeditiously**

Benefits of Drone Photogrammetry

Ease of Use:

- Affordable,
- Made **particularly effortless via popular software applications**.

Simple Equipment Prerequisites:

- Requires only a **digital SLR** camera along with a **compatible software**.

Benefits of Drone Photogrammetry (ESESHAEC)

Effortless Transportation:

- Equipment is **easy to transport** and **fits well** on any surveying truck.

Superior for Ground Surveying Applications:

- For any application **requiring high-resolution imagery** of the utmost quality.

Benefits of Drone Photogrammetry

Highly Accurate:

- **Exceptionally accurate** and provides the kind of **precision** that is rarely seen at budget pricing.

Affordable:

- High-quality **professional drone** can be under **$1000** along with a **performance camera** costing **$500** and below.

Benefits of Drone Photogrammetry

Evolved Technology:

- During non-existence of UAV, **photogrammetry** was **very expensive,** but also was **inaccessible to the people.**

- Now **professionals**, **hobbyist**s, and **small businesses persons** are able to employ photogrammetry technology via unmanned aerial vehicles.

- End result is an **easy to operate and affordable.**

Complete Jobs and Tasks Expeditiously:

- Drone-powered photogrammetry can be **completed rapidly and with results** of highest quality.
- **UAV can be pre-programmed to move with exceptional precision through small areas** that a human pilot would never be able to navigate.
- Compact sizing of a drone **can bypasses any obstruction** easily and enables to achieve high-resolution imagery that would otherwise be impossible.

Question: UAV photogrammetry surveying can complete the jobs and tasks expeditiously. Explain.

what are other words for expeditiously?



quickly, speedily, swiftly, fast, rapidly, promptly, efficiently, immediately, apace, briskly



Thesaurus.plus

Thank You