UNIVERSITÄT SALZBURG Z_GIS

UAV-based remote sensing

Dr. Sebastian d'Oleire-Oltmanns

Department of Geoinformatics – Z_GIS

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Definition

- ***U*nmanned *A*erial *V*ehicle – UAV**

  Aerial vehicle that is controlled from a certain distance or flies even autonomously

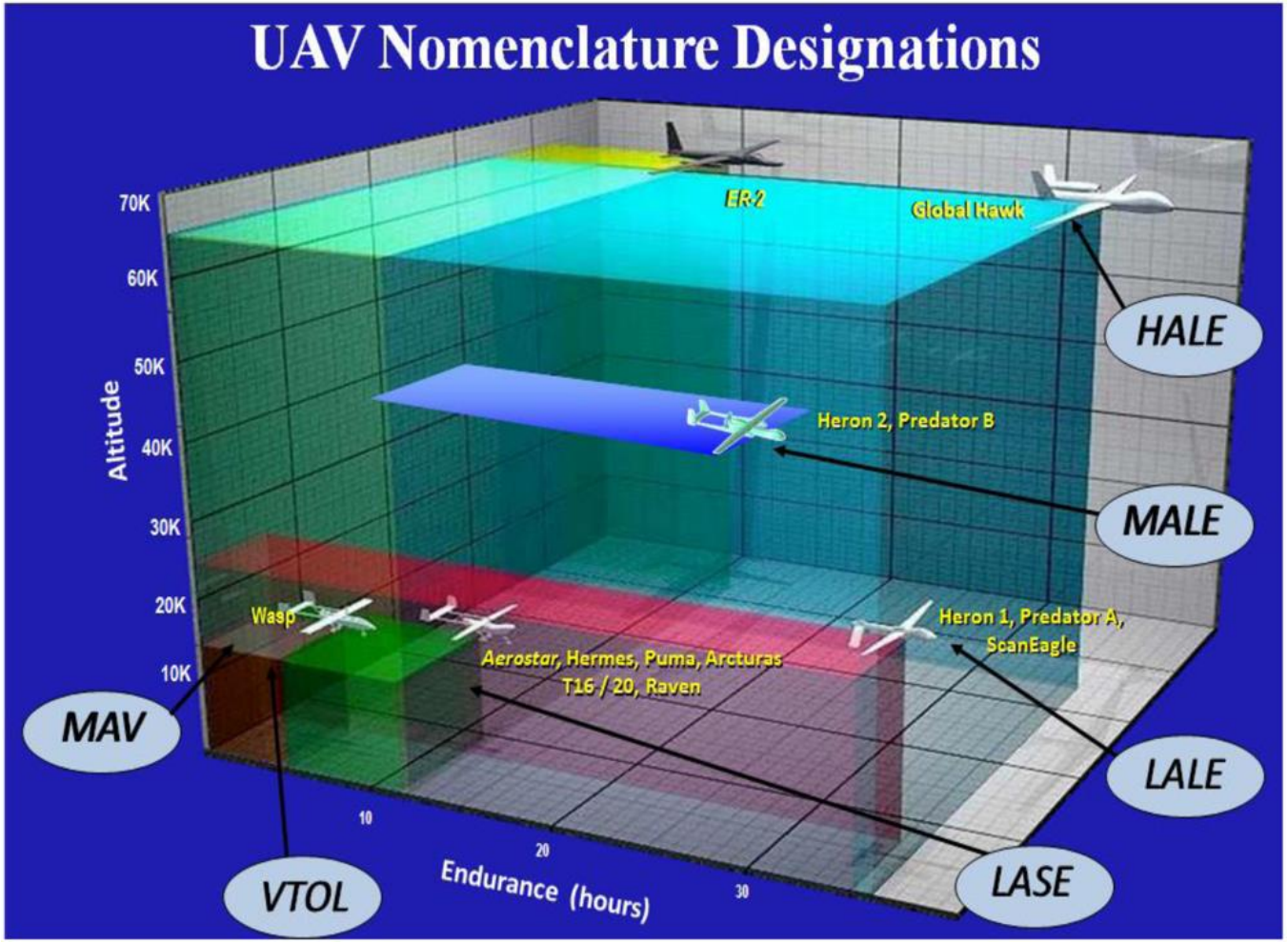
- ***U*nmanned *A*erial *System*– UAS**

  Aerial vehicle as described above that includes some kind of sensor (i.e. camera, radar, Lidar or else)

- ***R*emotely *P*iloted *A*ircraft *S*ystem – RPAS**

  = UAS; defined by ICAO

Overview about UAV/MAV



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Added value of UAS-based remote sensing

UAS

- Very high spatial resolution (up to single cm!)
- high temporal resolution possible
- Mainly optical data
- Data acquisition is affordable
- Flying heights range between some 10 to several 100s of meter above ground

Comparison to other remote sensing sources

Satellite sensors

- Cover a much larger area per image
- lower resolution, even from HR sensors
- Data is still rather expensive
- (archive) satellite data and aerial images as powerful pool of information

Different platforms

- Helikopter
- Quadkopter
- Oktokopter
- Fixed-wing aircraft

Application fields

- Mapping/Monitoring: erosion, habitats, archeological sites
- Security issues: mass events, concerts, soccer
- Maintenance: power lines, rails
- Aerial photography
- Video documentation
- many more…

Application example

UAV-based mapping of gully erosion

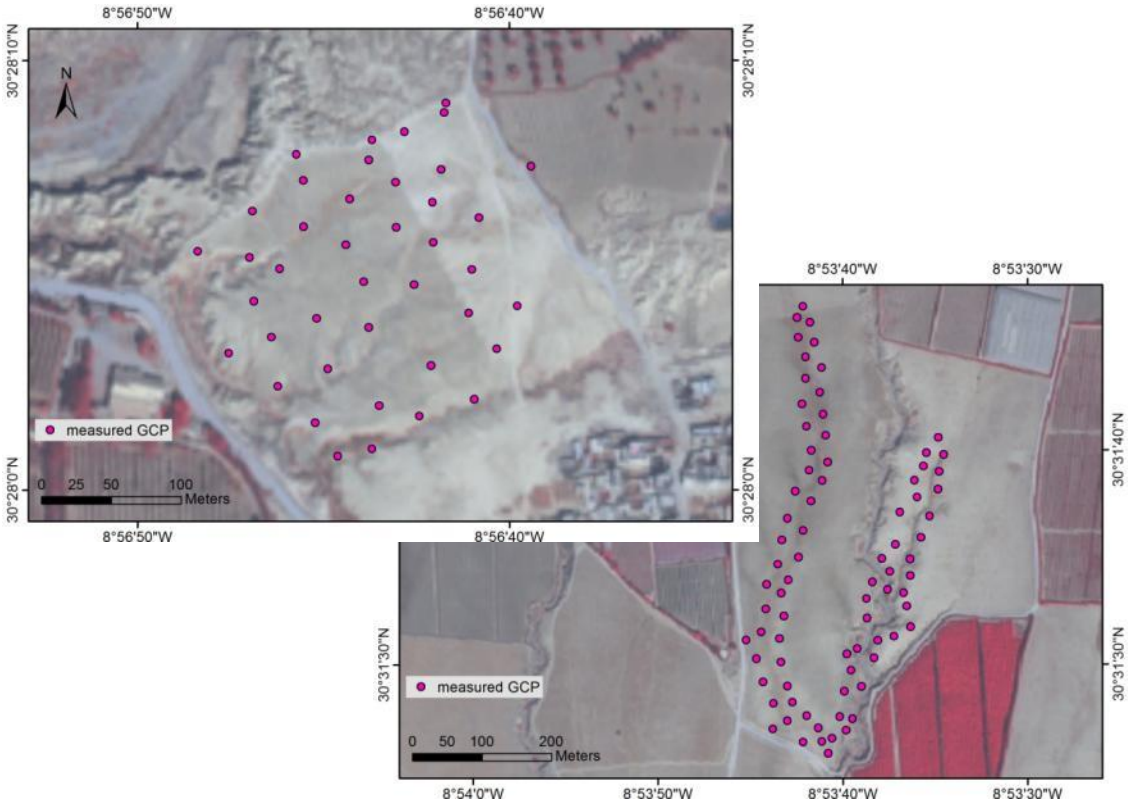
Different gullies

Data Acquisition

- Distribution of *G*round *C*ontrol *P*oints (GCPs)

Data Acquisition

- Creating local coordinate system
- Measuring GCP coordinates with total station (or dGPS)



Requirements for flight campaign

- In-track overlap of images to each other of 70%
- Parallel overlap of about 70%

  → Principle of stereo image acquisition

- Image resolution depending on flying height

Data Acquisition

- Using autopilot software for aircraft control
- Manual, assisted and autonomous mode
- Creating flight plan within the software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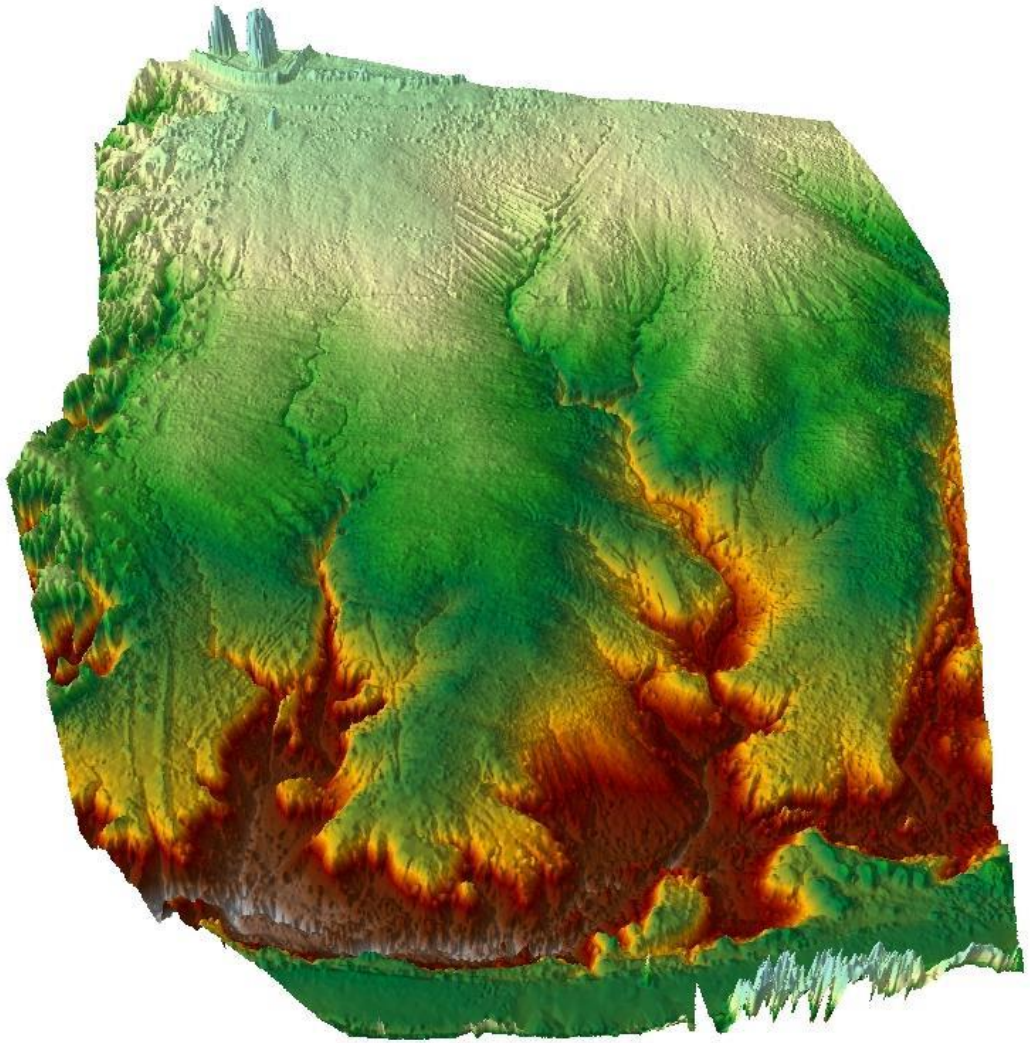
Data prod

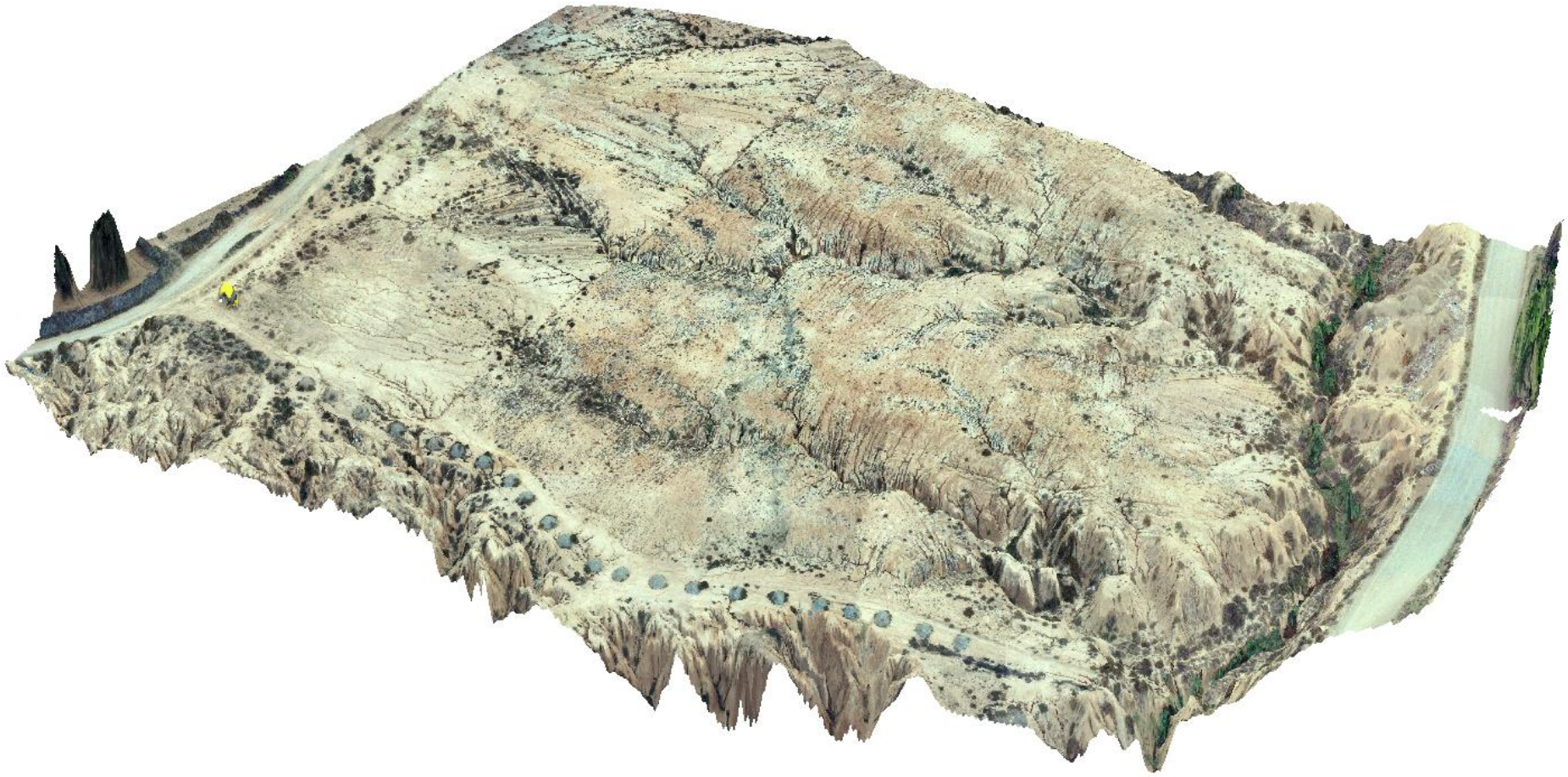
- Orthoimage
- Area extent
  200 m x 250 m

Data products

- Digital Surface Models (DSMs)
- Resolution: 0.04 m x 0.04 m



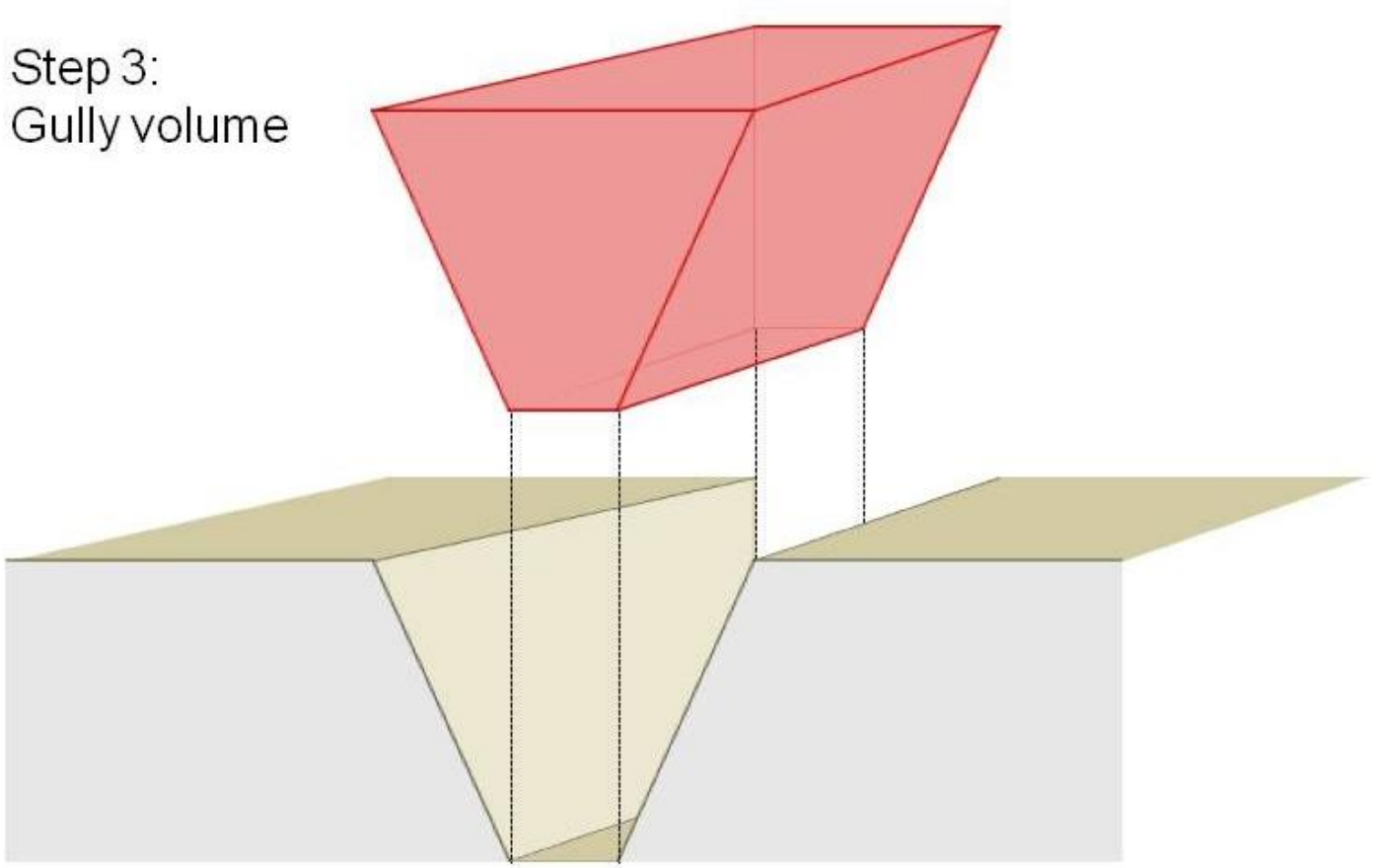
3D Orthoimage



Possible analysis

- **Hydrological modeling**
  - e.g. using Hydrology toolbox in ArcGIS
- **Quantification of erosion volumes**
  - Very high resolution allows calculation of even little changes within a short period of time

Quantification of erosion rates



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Thank you for your attention!