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Volunteering for the future – Geospatial excellence for a better living

Earth Observation and Aerial Surveys a new combined guidance note

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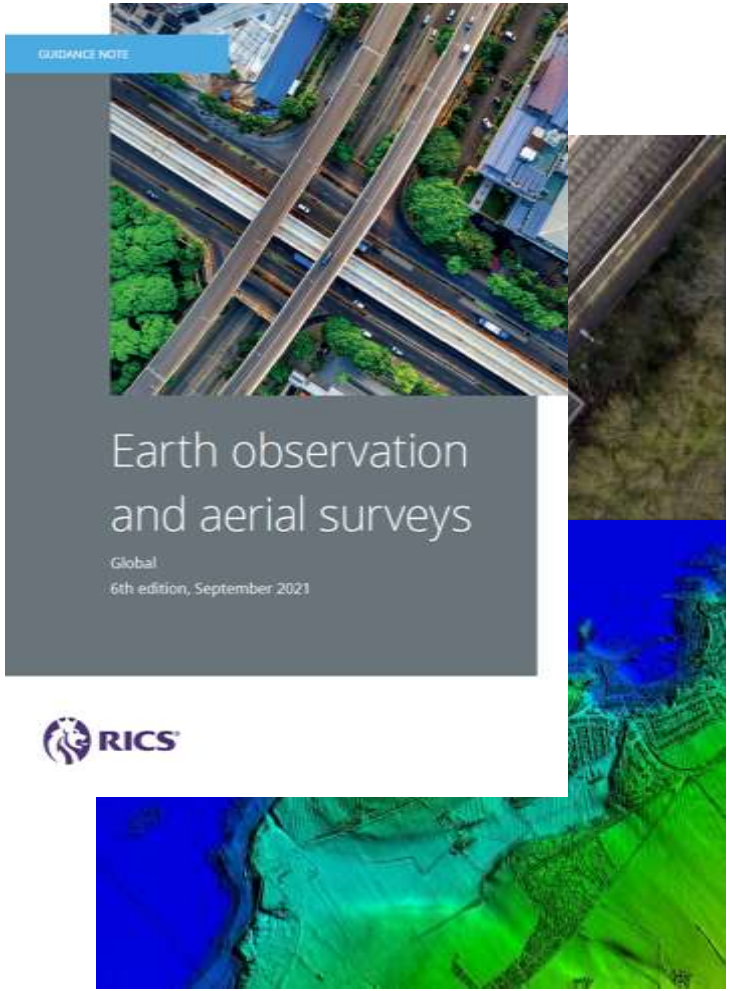
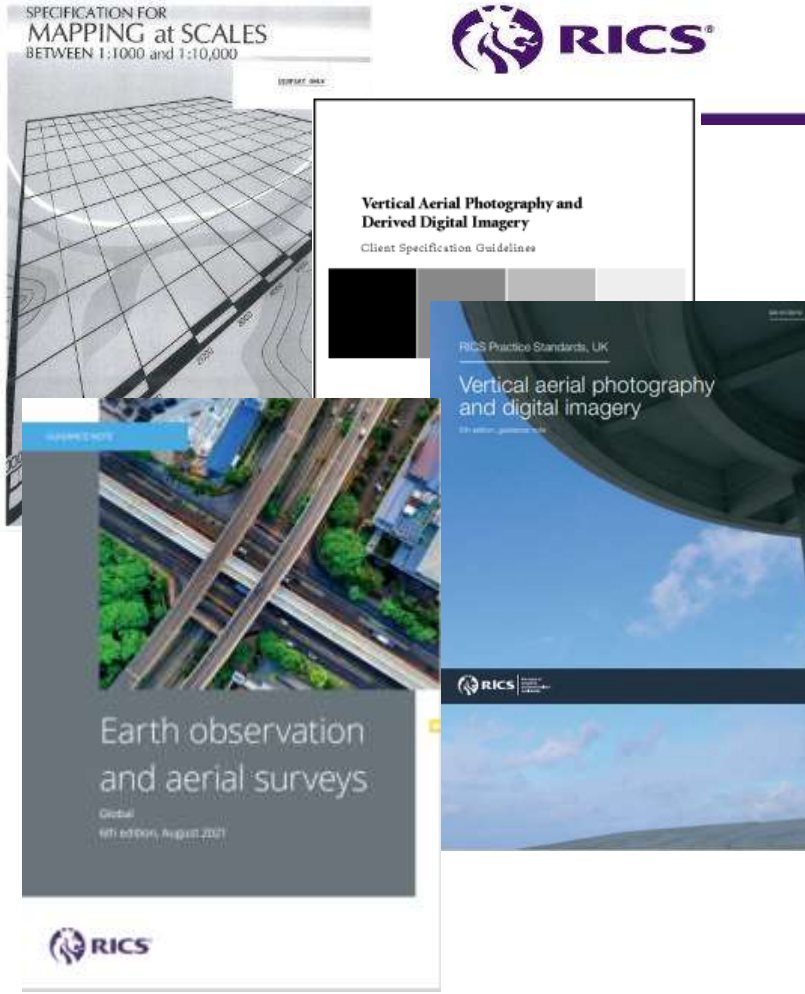
Introduction

- Earth observation and aerial surveys 6th edition
- Use Cases
- Choice of data capture platform
- Earth observation and aerial survey common factors
- Earth observation and aerial survey techniques
- Future developments
- What can this document do for you?
- Earth observation and aerial surveys 6th edition global Guidance Note (rics.org)



Imagery 6th ed 2021

- Full update from 2010 5th edition (aerial photography)
- Classical survey/geospatial principles
- Expert peer review, open consultation, assurance, regulatory implications, to be used in conjunction with national standards
- Endorsed by EAASI, CICES, Historic England and Remote Sensing and Photogrammetry Society (RSPSoc) The Survey Association (TSA)
- Calibration, Control, Accuracy tables
- Sample specifications, Combined accuracy table
- Sensor miniaturisation, Sensor fusion
- Beyond visual line of sight operation (UAV)
- LiDAR Developments - Geiger mode LiDAR (GML),
- single photon LiDAR (SPL) and flash LiDAR
- High-altitude pseudo satellites, Developments in sat tech



Use Cases

- Climate change
  - Deforestation
  - Methane monitoring
- Digital twins
  - Improving the efficiency of the construction industry and infrastructure sector
  - City modelling
- National mapping
- Land classification and land cover
- Land administration
- Intertidal, nearshore and riverbed mapping
- Precision agriculture

Choice of data capture platform

- Data Type
  - Photography
  - LiDAR
  - Multispectral, Hyperspectral and Thermal imagery
  - Synthetic Aperture Radar (SAR)
- Accuracy and Resolution
- Area of interest
  - Satellites
  - Manned fixed wing aircraft
  - Manned Helicopters
  - UAVs

Use case	AOI	Data type	Accuracy	Data capture platform
National mapping	Large	Aerial photography	High	Manned fixed-wing
City modelling	Large	Aerial photography (nadir and oblique)/LiDAR	High	Manned fixed-wing
Heritage recording	Small	Aerial photography	High	UAV, manned helicopter
Forestry	Large	LiDAR	Medium	Manned fixed-wing
Intertidal mapping, near-shore and river	Large	Bathymetric LiDAR	Medium	Manned fixed-wing
Infrastructure, civil engineering	Small/medium	Aerial photography/LiDAR	High	UAV/manned helicopter
Land classification	Large	Multispectral imagery	Low	Satellite
Precision agriculture	Small	Multispectral imagery	High	UAV

In practice there are many other successful combinations

Earth observation and aerial surveys common factors

- Area of interest and specification
- Project start and end date
  - Prevailing weather conditions
  - Time of year
  - Congested airspace
- Project constraints
  - Military or security clearances
  - Tidal constraints
  - Health and safety requirements
  - Special limitations
- Ground control

Earth observation and aerial survey techniques

- Aerial photography
- LiDAR / Bathymetric LiDAR
- Thermal, Multi and Hyperspectral imagery
- Earth Observation
- Accuracy and resolution tables
- Appendix A - Sample specifications
- Appendix B - Combined platform, altitude, data type and achievable accuracy

Platform	Height AGL (m)	Height AGL (ft)	Achievable accuracy RMSE for plan X, Y (m)	Achievable accuracy RMSE for height Z (m)	Achievable resolution (ppm²)
UAV	30	100	±0.02	±0.02	208
UAV	122	400	±0.06	±0.05	51
Helicopter	260	853	±0.03	±0.03	100
Helicopter	400	1,312	±0.04	±0.03	48
Fixed-wing	500	1,640	±0.04	±0.03	30
Fixed-wing	725	2,379	±0.06	±0.04	20
Fixed-wing	1,300	4,265	±0.10	±0.05	8
Fixed-wing	2,600	8,530	±0.20	±0.10	2
Fixed-wing	5,000	16,404	±0.39	±0.15	1

LiDAR Accuracy and resolution table

Future Developments

- Sensor miniaturisation
- Sensor fusion
- Beyond visual line of sight UAV operation
- LiDAR developments
  - Geiger-mode LiDAR
  - Single-photon LiDAR
  - Flash LiDAR
- High altitude pseudo satellites
- Developments in satellite technology

What can this document do for you?

- This document is intended for use by:
  - New customers interested in EO and Aerial Survey data
  - Existing customers, land, sea, engineering and environmental professionals
  - Earth observation and aerial survey specialists

- It is intended to start the conversation and to provide
  - clarification on issues such as project constraints, project schedules and ground control requirements
  - independent advice on the technical aspects of Earth Observation and Aerial Survey such as data types, accuracy and resolution

Thank you.

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