

The Knowledge Network

The complete indexed root of the GlobeIR GIS & Remote Sensing Encyclopedia
— 61 topics in 10 categories, every one an in-depth article.

GIS & Remote Sensing

Encyclopedia root · 61 topics

GIS Fundamentals

The core concepts every geospatial professional builds on — data models, projections, topology, databases and standards.

1. What is GIS? Geographic Information Systems Explained

A clear definition of GIS, how a geographic information system works, its core components, and why organisations worldwide depend on it.

globeir.com/learn/what-is-gis/

2. Vector Data Model in GIS: Points, Lines and Polygons

How the vector data model represents the world as points, lines and polygons with attributes, and when vector beats raster.

globeir.com/learn/vector-data-model/

3. Raster Data Model: Grids, Cells and Imagery in GIS

The raster model explained — pixels, resolution, bands and when grid data is the right representation for spatial phenomena.

globeir.com/learn/raster-data-model/

4. Map Projections and Coordinate Systems Explained

Why the Earth cannot be flattened without distortion, how projections and datums work, and how to avoid the classic coordinate mistakes.

globeir.com/learn/map-projections-coordinate-systems/

5. Topology in GIS: Rules That Keep Spatial Data Clean

What GIS topology means, common topology rules and errors, and why topology-clean data is the mark of production quality.

globeir.com/learn/topology-in-gis/

6. Geodatabases and Spatial Databases: Storing GIS Data Properly

From file geodatabases to PostGIS: how spatial databases store geometry, index it, and serve multi-user enterprise GIS.

globeir.com/learn/geodatabases/

7. Spatial Metadata and Standards: ISO 19115, OGC and INSPIRE

Why metadata makes spatial data findable and trustworthy, and the standards — ISO 19115, OGC, INSPIRE — that govern it.

globeir.com/learn/metadata-standards/

Remote Sensing Fundamentals

How sensors observe the Earth from satellites and aircraft — the physics, the resolutions, the corrections and the core analysis methods.

8. What is Remote Sensing? Earth Observation Explained

A plain-language definition of remote sensing, how satellites and aircraft measure the Earth, and what the data is used for.

globeir.com/learn/what-is-remote-sensing/

9. The Electromagnetic Spectrum in Remote Sensing

How different wavelengths — visible, infrared, thermal, microwave — reveal different properties of the Earth's surface.

globeir.com/learn/electromagnetic-spectrum-remote-sensing/

10. Resolution in Remote Sensing: Spatial, Spectral, Temporal, Radiometric

The four resolutions that define any Earth-observation sensor, their trade-offs, and how to match resolution to application.

globeir.com/learn/spatial-spectral-temporal-resolution/

11. Passive vs Active Remote Sensing Sensors

The fundamental split in Earth observation: sensors that record natural energy versus sensors that transmit their own signal.

globeir.com/learn/passive-vs-active-sensors/

12. Satellite Orbits: Sun-Synchronous, Geostationary and Constellations

How orbit choice shapes what a satellite can observe — polar sun-synchronous mappers, geostationary sentinels and modern smallsat fleets.

globeir.com/learn/satellite-orbits/

13. Satellite Image Preprocessing: Corrections That Make Data Usable

Radiometric, atmospheric and geometric correction explained — the unglamorous steps that turn raw scenes into analysis-ready data.

globeir.com/learn/image-preprocessing/

14. Image Classification in Remote Sensing: Methods That Map Land Cover

Supervised, unsupervised, object-based and deep-learning classification — how pixels become land-cover maps, and how accuracy is proven.

globeir.com/learn/image-classification/

15. Change Detection in Remote Sensing: Methods and Best Practice

How multi-date imagery reveals what changed on the ground — techniques from image differencing to time-series algorithms, and their pitfalls.

globeir.com/learn/change-detection-methods/

Sensors & Satellite Programs

The missions and sensor technologies that supply the world's Earth-observation data — from Landsat and Sentinel to SAR, hyperspectral and thermal systems.

16. The Landsat Program: Fifty Years of Earth Observation

Why Landsat's continuous archive since 1972 remains the backbone of land-change science, and what its sensors deliver today.

globeir.com/learn/landsat-program/

17. Copernicus Sentinel Missions: Europe's Free Eyes on Earth

Sentinel-1 radar, Sentinel-2 optical and their siblings — what each mission measures and why Copernicus changed operational monitoring.

globeir.com/learn/sentinel-missions/

18. Commercial High-Resolution Satellites: The Sub-Metre Market

Maxar, Airbus, Planet and the new radar constellations — what commercial imagery offers, what it costs, and how tasking works.

globeir.com/learn/commercial-high-resolution-satellites/

19. Synthetic Aperture Radar (SAR): Imaging Through Cloud and Darkness

How SAR builds images from microwave echoes, what backscatter means, and why InSAR can measure millimetres of ground movement.

globeir.com/learn/sar-radar-imaging/

20. Hyperspectral Imaging: Reading the Chemistry of the Surface

What hundreds of narrow spectral bands reveal — mineral identification, species mapping, water quality — and what makes hyperspectral hard.

globeir.com/learn/hyperspectral-imaging/

21. Thermal Remote Sensing: Mapping Temperature from Above

How thermal infrared sensors measure surface temperature, and what heat maps reveal — urban heat islands, irrigation, leaks and fires.

globeir.com/learn/thermal-remote-sensing/

LiDAR & Photogrammetry

Measuring the world in three dimensions — laser scanning, image-based reconstruction, elevation models and true orthophotos.

22. What is LiDAR? Laser Scanning Explained

How LiDAR measures millions of precise 3D points with laser pulses, its platforms and returns, and what point clouds enable.

globeir.com/learn/what-is-lidar/

23. Point Clouds and LiDAR Classification

What lives inside a point cloud, how classification assigns every point a class, and why the ASPRS scheme and QC dashboards matter.

globeir.com/learn/point-cloud-processing/

24. Photogrammetry Explained: Measurement from Photographs

How overlapping images become precise 3D measurements — aerial triangulation, stereo mapping and modern dense matching.

globeir.com/learn/photogrammetry-explained/

25. DEM, DTM and DSM: Digital Elevation Models Explained

The difference between surface and terrain models, how elevation data is made, and what hydro-enforcement means.

globeir.com/learn/digital-elevation-models/

26. Orthophotos and True Ortho: Maps Made of Imagery

Why raw aerial images cannot be used as maps, how orthorectification fixes them, and what makes an ortho “true”.

globeir.com/learn/orthophotos/

27. Structure from Motion (SfM): 3D Reconstruction for Everyone

How SfM turns ordinary overlapping photos into 3D models and orthomosaics, and where it matches — or misses — survey-grade methods.

globeir.com/learn/structure-from-motion/

Drones & Surveying

Field data capture — UAV mapping, GNSS positioning, ground control and mobile mapping — where accuracy is made or lost.

28. Drone Mapping Basics: From Flight Plan to Deliverable

How UAV surveys work end to end — flight design, overlap, GSD, processing — and what separates a survey from a flight.

globeir.com/learn/drone-mapping-basics/

29. GNSS and GPS Surveying: RTK, PPK and Centimetre Positioning

How satellite positioning really works, why raw GPS is metre-grade, and how RTK/PPK corrections deliver centimetres.

globeir.com/learn/gnss-gps-surveying/

30. Ground Control Points and Survey Accuracy

What GCPs and checkpoints are, how many you need and where, and how accuracy is honestly reported.

globeir.com/learn/ground-control-points/

31. UAV Regulations and Flight Planning for Commercial Mapping

The regulatory landscape of commercial drone survey — categories, permissions, no-fly zones — and how professional operations plan around it.

globeir.com/learn/uav-regulations/

32. Mobile Mapping Systems: Surveying at Traffic Speed

Vehicle-mounted LiDAR and cameras that capture corridors in a drive-through — how MMS works and where it beats other methods.

globeir.com/learn/mobile-mapping-systems/

Spatial Analysis & Modelling

The analytical core of GIS — overlay, interpolation, networks, terrain, hydrology and spatial statistics that turn data into answers.

33. Spatial Analysis: An Overview of the GIS Analyst's Toolkit

The families of spatial analysis — queries, overlay, distance, networks, surfaces, statistics — and how real problems combine them.

globeir.com/learn/spatial-analysis-overview/

34. Buffer and Overlay Analysis: The Workhorses of GIS

How buffering and overlay answer “what is near” and “what coincides” — the two questions behind most practical GIS analysis.

globeir.com/learn/buffer-overlay-analysis/

35. Spatial Interpolation: IDW, Kriging and Estimating Between Samples

How continuous surfaces are estimated from point samples — the main methods, their assumptions, and how to validate them.

globeir.com/learn/interpolation-methods/

36. Network Analysis and Routing in GIS

Shortest paths, service areas, fleet routing and location-allocation — how GIS models movement along real networks.

globeir.com/learn/network-analysis-explained/

37. Terrain Analysis: Slope, Aspect, Viewshed and Beyond

What elevation models reveal when you differentiate them — slope, aspect, curvature, visibility and terrain-driven siting.

globeir.com/learn/terrain-analysis/

38. Hydrological Analysis in GIS: Watersheds, Flow and Flood

How terrain becomes hydrology — flow direction, accumulation, watershed delineation and the path to flood modelling.

globeir.com/learn/hydrological-analysis/

39. Spatial Statistics and Hotspot Analysis

Testing whether spatial patterns are real — autocorrelation, Getis-Ord hotspots, clustering and regression that respects geography.

globeir.com/learn/spatial-statistics/

GeoAI & Machine Learning

Where artificial intelligence meets geography — deep learning on imagery, training data, spectral indices and cloud-scale analysis platforms.

40. GeoAI: Where Machine Learning Meets GIS

What GeoAI covers — from feature extraction to prediction — and what it takes to make machine learning work on spatial problems.

globeir.com/learn/geoai-overview/

41. Deep Learning on Satellite Imagery

How convolutional networks and segmentation models extract buildings, roads and land cover from imagery at scale.

globeir.com/learn/deep-learning-satellite-imagery/

42. Training Data and Annotation for Geospatial AI

Why labelled data decides model quality, how geospatial annotation is done well, and what quality control looks like.

globeir.com/learn/training-data-annotation/

43. NDVI and Spectral Indices: The Arithmetic of Earth Observation

How simple band ratios like NDVI quantify vegetation, water, soil and burn severity — and how to use them without fooling yourself.

globeir.com/learn/ndvi-spectral-indices/

44. Cloud Geospatial Platforms: Google Earth Engine and Beyond

How planetary-scale cloud platforms changed Earth-observation analysis — data next to compute, and what that enables.

globeir.com/learn/google-earth-engine/

Web GIS & Technology

Maps as software — web GIS architecture, OGC services, vector tiles, open-source stacks, digital twins and developer tooling.

45. What is Web GIS? Maps as Living Software

How web GIS turns spatial data into browser applications — architecture, components and what separates portals that thrive from those that die.

globeir.com/learn/what-is-web-gis/

46. OGC Web Services: WMS, WFS, WMTS and the New OGC APIs

The interoperability standards that let any client consume any server's maps and features — and how the API generation modernises them.

globeir.com/learn/web-map-services-ogc/

47. Vector Tiles and Modern Basemaps

Why modern web maps ship geometry instead of pictures — how vector tiles work, and what they change about styling and performance.

globeir.com/learn/vector-tiles/

48. Open Source GIS: QGIS, PostGIS, GeoServer and the Modern Stack

The open-source geospatial ecosystem — what each major component does, and how full production stacks are assembled without licence fees.

globeir.com/learn/open-source-gis-software/

49. Digital Twins in the Built Environment

What separates a digital twin from a 3D model — live data, simulation and decision loops — and how city and asset twins are actually built.

globeir.com/learn/digital-twins-explained/

50. GIS APIs and Developer Tools: Building Location into Software

The developer's view of geospatial — mapping SDKs, geocoding and routing APIs, spatial SQL and the libraries that glue it together.

globeir.com/learn/gis-apis-sdks/

Cartography & Data

Making maps that communicate — design principles, thematic techniques, scale, and where trustworthy geospatial data comes from.

51. Cartographic Design Principles: Maps That Communicate

Visual hierarchy, colour, typography and honesty — the design discipline that separates readable maps from decorated data.

globeir.com/learn/cartographic-design-principles/

52. Thematic Map Types: Choropleth, Heat, Flow and Friends

The main thematic mapping techniques, what data each suits, and the classic ways each one misleads when misused.

globeir.com/learn/thematic-map-types/

53. Map Scale and Generalization: Detail That Fits the Zoom

What scale really means, why maps must generalise, and how multi-scale databases keep every zoom honest and legible.

globeir.com/learn/map-scale-generalization/

54. GIS vs GPS vs Remote Sensing: Untangling the Trio

The three most confused acronyms in geospatial — what each does, how they differ, and how they work together.

globeir.com/learn/gps-vs-gis-vs-remote-sensing/

55. Open Geospatial Data Sources: The Free Foundations

Where trustworthy free spatial data lives — imagery, elevation, OpenStreetMap, boundaries and climate — and how to use it responsibly.

globeir.com/learn/open-geodata-sources/

GIS Applications by Domain

How geospatial technology delivers in practice — agriculture, cities, disasters, environment, utilities and defence.

56. GIS and Remote Sensing in Agriculture

From satellite crop monitoring to variable-rate prescriptions — how geospatial technology runs modern and smallholder agriculture alike.

globeir.com/learn/gis-in-agriculture/

57. GIS in Urban Planning and Smart Cities

The spatial backbone of city-making — base maps, land use, 3D models, growth analytics and the operations layer of smart cities.

globeir.com/learn/gis-in-urban-planning/

58. GIS in Disaster Management: Before, During and After

How geospatial technology runs the disaster cycle — risk mapping, early warning, response coordination and damage assessment.

globeir.com/learn/gis-in-disaster-management/

59. GIS in Environmental Management and Climate

Monitoring ecosystems, assessing impacts and planning adaptation — the geospatial toolkit of environmental science and policy.

globeir.com/learn/gis-in-environmental-management/

60. GIS in Utilities and Telecom: Networks as Data

Why network industries run on GIS — connectivity models, outage response, vegetation compliance and fiber rollout.

globeir.com/learn/gis-in-utilities-telecom/

61. GIS in Defence and National Security

Terrain analysis, geospatial intelligence and mission planning — how location technology serves defence, lawfully and effectively.

globeir.com/learn/gis-in-defence-security/