CURRICULUM VITAE

Ahmad Ammar

PhD researcher in Earth observation, geocomputation and urban informatics

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Profile

Doctoral researcher at Ulster University developing open, transferable methods for estimating the energy efficiency of buildings from Earth observation and geospatial data. A decade of training and work in geo-informatics, remote sensing and spatial data science, across LiDAR forest structure, deep-learning image segmentation, air quality, hydrology, weather data engineering and administrative data research. Postgraduate teaching assistant in physical geography, environmental science and GIS, and author of open study guides and an interactive atlas for atmospheric science. Interests span geocomputation, Earth observation, urbanism, climate change, health geography and spatial epidemiology.

Education

Sep 2024 – present

PhD, Life and Health Sciences

School of Geography and Environmental Sciences, Ulster University, Coleraine

Project: Assessing energy efficiency of buildings: the role of remote sensing data and geospatial methods. Details.

Supervisors: Dr Saad Bhatti (https://www.ulster.ac.uk/staff/s-bhatti) (chair), Lecturer in GIS and Human Geography; Dr Paul McKenzie; Dr Muhammad Irfan (external).

Funding: Vice-Chancellor's Research Scholarship (VCRS), Ulster University.

Sep 2019 – Aug 2023

MS Remote Sensing and Geo-Information Science

Geospatial Research and Education Lab (GREL), Institute of Space Technology (IST), Islamabad · CGPA 3.80/4.00, merit scholarship

Dissertation: Assessing Global Ecosystem Dynamics Investigation (GEDI) LiDAR data for mangrove canopy height and above-ground biomass density mapping in the Indus Delta, Pakistan. Random forest models in Google Earth Engine predicted GEDI L2A RH98 canopy height and L4B biomass density from features of ALOS PALSAR-2, Sentinel-1 SAR and Sentinel-2 imagery; the continuous surfaces were validated against field plots. Abstract (http://www.bit.ly/3vtyVOc).

Supervisor: Dr Hammad Gilani, remote sensing and GIS researcher, International Water Management Institute (IWMI).

Coursework: advanced remote sensing and digital image processing; spatial thinking for monitoring and mapping natural resources; advanced GIS; advanced research methods; advanced programming and customising GIS; environmental sciences; big geospatial data analysis with Google Earth Engine; hydrometeorology.

Sep 2015 – Aug 2019

BS (Hons) Geo-Informatics

Institute of Geo-Information and Earth Observation (IGEO), PMAS Arid Agriculture University Rawalpindi · CGPA 3.92/4.00, gold medal and merit

scholarship

Final-year project: Automated extraction of urban features from a fusion of multisource satellite datasets using deep learning. An end-to-end pipeline in Keras and fastai compared U-Net, SSD and Mask R-CNN; U-Net was the most suitable for the fused data, with an F1 score of 0.89. Code and dataset (https://github.com/GeospatialGeeks/Satellite-Image-Building-Segmentation).

Supervisor: Dr Hasan Ali Baig, Assistant Professor, UAAR.

Coursework: GIS; remote sensing; physical and human geography; earth sciences; physics; statistics; calculus; linear algebra; discrete mathematics; object-oriented programming; geodatabase systems; digital image processing; GIS programming; web GIS development; computer graphics; CAD; cartography; surveying; navigation systems; photogrammetry; geodesy; soil mechanics; landscape modelling; environmental engineering; hydrology; agriculture; weather analysis and forecasting; spatial decision support systems; spatial data infrastructure; natural resource management.

Research

2024 – present

Building energy efficiency from Earth observation

Doctoral project, Ulster University · Greater London and Belfast

- Predicting ordinal EPC bands (A–G) from open satellite, map and climate data, with London as the development area and Belfast as the transfer test.
- Building reproducible building-level databases that link certificates, addresses and footprints through UPRNs.
- Multi-year Earth Engine composites (Sentinel-1 and 2, Landsat, MODIS, VIIRS, ERA5) and local Python and PyQGIS processing into point and zonal features; tests of year-to-year feature stability.
- Random forest and gradient-boosted baselines with feature selection and SHAP interpretation; spatial and temporal generalisation as a core test.
- Results published as an interactive map: the GBEM Atlas (https://ahmadammar.github.io/GBEM/) of Greater London and Greater Belfast.

2025 – present

Systematic and bibliometric review (in preparation)

Remote sensing and geospatial methods for estimating the energy efficiency of buildings

PRISMA 2020 and PRISMA-S systematic review with a bibliometric layer and a synthesis without meta-analysis (SWiM), focused on validation practice and transferability. Details.

Completed 2023

Mangrove canopy height and biomass from GEDI LiDAR

MS research, Institute of Space Technology

See Education.

Completed 2019

Deep learning for building extraction

BS research, PMAS Arid Agriculture University Rawalpindi

See Education.

Teaching

Postgraduate teaching assistant, School of Geography and Environmental Sciences, Ulster University, 2024 – present. Module-by-module details are on the teaching page.

YEAR	MODULE	ROLE
2026/27	EGM305 The Atmosphere (year 2)	Practical demonstrator; author of the open study guides and Atmosphere Atlas
2026/27	EGM104 Sustainable Worlds: People and Environment (year 1)	Practical-class teaching assistant
2025/26	EGM715 Web-based GIS (postgraduate, online)	Designed and recorded the lesson *HTML and CSS foundations for WebGIS*
2025/26	EGM505 Environmental Change (year 3)	Computer-lab demonstrator, coastal resilience and poster practicals
2025/26	EGM518 Advanced Remote Sensing and Geographic Information Systems (year 3)	Practical support, solar PV site suitability
2024/25	EGM114 The Biosphere (year 1)	Demonstrator, ecology practicals and rocky-shore fieldwork
2024/25	EGM115 The Hydrosphere (year 1)	Laboratory demonstrator, environmental chemistry
2024/25	EGM347 Skills for Sustainable Planning (year 2)	Marker, CV and cover-letter assignment

Professional experience

Mar 2024 – Aug 2024

Research Associate

Mahbub ul Haq Research Centre (MHRC), Lahore University of Management Sciences (LUMS), Lahore

- Research on organisational effectiveness and tax compliance in Punjab, in collaboration with the Punjab Revenue Authority.
- Data collection, cleaning and analysis, web scraping, geocoding, clustering and quality checks on large datasets.

Mar 2020 – Sep 2020

Earth Observation Project Analyst

Offshore Monitoring Ltd (http://www.offshoremonitoring.com), Limassol, Cyprus (remote)

- Fetching, processing and analysing meteorological data.
- Developing workflows that ingest it into ship-routing systems, which optimise sailing paths to save time and cost and cut fuel emissions.

Jul 2018 – Sep 2018

GIS and Remote Sensing Intern

Punjab Information Technology Board (PITB), Lahore

- Police jurisdiction mapping and crime analysis for Punjab.
- Constituency and result mapping for the 2018 general elections in Pakistan.
- 3D modelling of Lahore for traffic management.
- Web dashboards, geodatabase management and automation of GIS tasks.

Software and open materials

2024 – present

GBEM: Geospatial Building Energy Mapping (https://github.com/AhmadAmmar/GBEM)

Python · Apache-2.0 · copyright Ulster University

Data preparation, Earth Engine extraction, machine learning, figures and the systematic-review pipeline of the doctoral project.

2026

GBEM Atlas (https://ahmadammar.github.io/GBEM/)

Python build, JavaScript and deck.gl · copyright Ulster University

Interactive atlas of the energy performance of the housing stock in Greater London and Greater Belfast: grid cells, neighbourhoods and streets, hotspots, rankings, trends, retrofit needs and model results. Aggregates of certificates only, no data on individual homes.

2026

research-helpers (https://github.com/GeospatialGeeks/research-helpers)

Python package · MIT · copyright Ulster University

Everyday tools for reproducible research: Crossref-verified BibTeX and Zotero hand-off, open-access full texts, LaTeX to Word laid out like the PDF (including IEEE templates), spatial cross-validation and area of applicability, literature-review screening and bibliometrics, and a library of paper templates.

2026

Ulster University thesis template (https://github.com/GeospatialGeeks/ulster-thesis-template) (unofficial)

LaTeX, with Word and PDF builds and an Overleaf package · MIT

Thesis template set up to the Doctoral College's format guidance, building a PDF and a matching Word version from the same source.

2026

Atmosphere Atlas (version 1.5)

Python build, JavaScript and three.js

Self-contained interactive globe with 125 topics, 217 glossary terms, seven tours, real NOAA, NASA and IBTrACS data and laboratories for the EGM305 practicals.

2026

EGM305 Practical Companion

LaTeX, TikZ and pgfplots; python-pptx

Worked, step-by-step guide to all three practicals as one continuously numbered, cross-referenced book (200 pages, with a reference list), also published as three booklets; Practical 3 step-by-step deck (167 slides).

2019 – 2021 **GeospatialGeeks on GitHub (https://github.com/GeospatialGeeks)**
Python and Jupyter

Satellite-Image-Building-Segmentation (https://github.com/GeospatialGeeks/Satellite-Image-Building-Segmentation), Py4Geo (https://github.com/GeospatialGeeks/Py4Geo) and Data-Science (https://github.com/GeospatialGeeks/Data-Science).

Talks and reports

Dec 2025 **HTML and CSS foundations for WebGIS**
Recorded lesson for EGM715 Web-based GIS, Ulster University (Panopto)

Oct – Nov 2025 **Geospatial urban energy efficiency assessment**
PhD confirmation report and presentation, Ulster University

Jun 2025 **GeoML-driven urban energy efficiency assessment**
Research presentation (first-year PhD)

Writing

Pamphlet

- Ammar, A. (2026) *Marxian Economics 101: Understanding Political Economy for Socialist Struggle in the 21st Century*. July 2026 edition. Web edition and LaTeX source (https://github.com/AhmadAmmar/marxist-economics).

Selected essays

- Ammar, A. (2026) Eco-Socialist Critique of Climate Finance (https://ammarastan.substack.com/p/eco-socialist-critique-of-climate-finance). *Substack*, 15 July.
- Ammar, A. (2026) The right to the night (https://ammarastan.substack.com/p/the-right-to-the-night). *Substack*, 14 July.
- Ammar, A. (2025) Capital's Floodplain: South Asia's Annual Deadly Emergency (https://ammarastan.substack.com/p/south-asian-monsoon-deaths-2025). *Substack*, 20 December.
- Ammar, A. (2025) Abolish data centers? No, occupy and democratically plan what to store and run! (https://ammarastan.substack.com/p/data-centers-abolish-or-occupy) *Substack*, 31 October.
- Ammar, A. (2025) Let the Rivers Flow: Beyond Canal Colonies and Hydraulic Nationalism (https://ammarastan.substack.com/p/let-the-rivers-flow). *Substack*, 28 August.
- Ammar, A. (2025) Metabolic Rift and Punjab's Winter Smog Crisis (https://ammarastan.substack.com/p/metabolic-rift-and-punjabs-winter). *Substack*, 20 August.
- Ammar, A. (2019) The water quest: in search of a solution to alarming scarcity (https://www.globalvillagespace.com/the-water-quest-in-search-of-a-solution-to-alarming-scarcity/). *Global Village Space*.
- Ammar, A. (2017) Plight of the Capitalist City (http://www.marxistreview.asia/plight-of-the-capitalist-city/). *Asian Marxist Review*.
- Ammar, A. (2017) The Abolition of Distinction Between City and Village Life (http://www.marxistreview.asia/the-abolition-of-distinction-between-city-and-village-life/). *Asian Marxist Review*.

The full list is on the writing page.

Projects

Coursework and independent projects in Earth observation, GIS and data science (several described on the projects page):

- Spatiotemporal analysis of air quality in Pakistan (https://www.linkedin.com/posts/ahmadammar_pakistan-no2-islamabad-activity-6726394911882641408-s5oZ) using geospatial and machine-learning techniques in Google Earth Engine on Sentinel-5P data.
- Comparison mapping of NO_2 concentration (https://www.linkedin.com/posts/ahmadammar_no2-covid19-pandemic-activity-6723965949998985217-Cz1P/) over Pakistan before the COVID-19 pandemic and during the lockdown months (Sentinel-5P, Earth Engine).
- Time-lapse mapping of crop-residue burning (https://www.linkedin.com/posts/ahmadammar_punjab-india-pakistan-activity-6725501044341784576-jg5T) in Punjab (India and Pakistan), September–November (Earth Engine).
- Time-lapse mapping of urbanisation in Karachi (https://www.linkedin.com/posts/ahmadammar_googleearthengine-gee-urbandevelopment-activity-6722632558862970880-Z0TG), 1986–2020, harmonising Landsat 5, 7 and 8 (Earth Engine).
- Water-quality monitoring of lakes and dams around Islamabad with Sentinel-2 indices as a proxy for chlorophyll-a concentration (https://www.linkedin.com/posts/ahmadammar_islamabad-pakistan-googleearthengine-activity-6724456056405143552-ivgQ).
- Comparison of spatial interpolation methods for $PM_{2.5}$ and Air Quality Index estimation.
- Random forest land-cover mapping of Kashmir using optical, radar, indices and OpenStreetMap data in Earth Engine.
- ArcGIS toolbox for semi-automated OpenStreetMap data retrieval.
- Crop-type mapping and irrigation demand estimation from MODIS NDVI time series.
- Snowmelt runoff estimation for the Jhelum basin with the Snowmelt Runoff Model.
- Impact of El Niño and La Niña on the Indian monsoon region.
- Cab demand prediction with machine learning.
- MODIS-based automated snow-cover change assessment in the Upper Indus Basin, 2000–2019 (ArcPy).
- Mangrove change detection in the Indus Delta wetland, 1988–2018 (Landsat).
- Land-use suitability for urban development in the Potohar region with multi-criteria decision analysis.
- Mapping the 2017 Karachi floods with Sentinel-1 SAR.
- 3D model making from digitised stereo pairs in ERDAS Imagine.
- ArcGIS-based navigation system for Lahore.
- Groundwater modelling in Islamabad with OBIA and MCDA.
- Mobile geodata capture to study the transport habits of university students in Islamabad and Rawalpindi.
- Geodatabase development for a hypothetical smart city in ArcGIS.
- Ship detection in the Arabian Sea from Sentinel-1 SAR.
- Churn prediction in telecoms with exploratory data analysis.

Scholarships and awards

2024 — **Vice-Chancellor's Research Scholarship (VCRS)**
Ulster University

2019 – 2023 — **Merit scholarship, MS Remote Sensing and Geo-Information Science**
Institute of Space Technology, Islamabad

2019 — **Gold medal, BS (Hons) Geo-Informatics**
PMAS Arid Agriculture University Rawalpindi

2015 – 2019 — **Merit scholarship, BS (Hons) Geo-Informatics**
PMAS Arid Agriculture University Rawalpindi

Teaching development

2025 – 2026 — **First Steps to Supporting Learning and Teaching in Higher Education (FST)**
Ulster University, accredited by Advance HE · in progress, leading to Associate Fellowship of the HEA (AFHEA)

Observation of a subject advisor, lesson plan, observed teaching and evaluation of student feedback, mapped to the Professional Standards Framework. Details.

2024/25 — **PGTA: Introduction to Learning and Teaching**
Ulster University

Jan 2025 — **Programming skills for PhD researchers (Python)**
Ulster University workshop led by Dr Bob McNabb

Courses and certificates

YEAR	COURSE	PROVIDER
2022	SAR-401: Synthetic Aperture Radar: Hazards	edX
2022	Introduction to LaTeX	Geo University
2022	Ecology in R	Udemy
2022	Transportation Management, Logistics and Urban Planning	Udemy
2021	Clustering Geolocation Data Intelligently in Python	Coursera
2021	Predicting the Weather with Artificial Neural Networks	Coursera
2021	COVID19 Data Analysis Using Python	Coursera

YEAR	COURSE	PROVIDER
2021	Climate Change Forecasting Using Deep Learning	Coursera
2021	Analysing Covid-19 Geospatial Data with Python	Coursera
2021	Essential Epidemiologic Tools for Public Health Practice	Coursera
2021	Using Covid-19 Data to Make Supply Chain Logistics Decisions in Spreadsheets	Coursera
2021	Analyze City Data Using R and Tableau	Coursera
2021	COVID19 Data Visualization Using Python	Coursera
2021	Aerial Photography with UAV	Coursera
2021	Satellite Imagery Analysis in Python	Coursera
2021	Introduction to Spatial SQL with PostGIS	Coursera
2021	Climate Geospatial Analysis on Python with Xarray	Coursera
2019	Using Open Source Tools to Create an Enterprise GIS	Udemy
2019	Big Data Analytics with GIS	Udemy
2019	Internet Mapping with GeoServer, Postgres and OpenLayers 3	Udemy
2019	Urban Innovation 1: Sustainability and Technology Solutions	Udemy
2019	Urban Innovation 2: Urban Social Equity	Udemy
2019	Learn Geographic Information Systems with GeoDjango	Udemy
2019	Thermal Modeling of Solar Energy Systems	Udemy
2019	C++ Tutorial for Complete Beginners	Udemy
2019	Learning Path: PyQGIS: Conquer the Geospatial World	Udemy
2019	ArcGIS Web Maps with HTML, JS, CSS, and Off-the-Shelf Tools	Udemy
2019	Remote Sensing for Disaster Scenarios	NASA ARSET
2019	Investigating Time Series of Satellite Imagery	NASA ARSET
2019	Remote Sensing for Conservation and Biodiversity	NASA ARSET
2018	Change Detection in Land Cover Mapping	NASA ARSET

YEAR	COURSE	PROVIDER
2018	Processing Satellite Imagery for Monitoring Water Quality	NASA ARSET
2018	Spatial Database Development for Web GIS using Open-Source Software	SUPARCO, Islamabad
2018	Climate Change and Numerical Modelling (RegCM4)	SUPARCO, Karachi
2018	Analysing Global Climate Datasets using GrADS	Pakistan Meteorological Department, Islamabad
2018	Hands-on Workshop on Data Science in Practice	COMSATS, Islamabad
2017	Basic Hydrology	Udemy

Workshops and conferences

YEAR	EVENT	HOST
2025	Programming skills for PhD researchers (Python)	Ulster University
2024, 2018	PyCon Pakistan	Arbisoft, Lahore
2019	Regional Workshop on ICT Role for Disaster Management and Prediction	PMAS Arid Agriculture University
2019	Python for Signal and Image Processing	Riphah International University
2019	Workshop on Climate Data Analysis and Visualisation using NCAR Command Language	PMAS Arid Agriculture University
2017	International Science-Policy Conference on Climate Change in Pakistan	Islamabad
2016	Regional Training Workshop on GIS for Agricultural Monitoring	PMAS Arid Agriculture University
2015	Workshop on Mobile GIS Data Collection and Management System	PMAS Arid Agriculture University
2015 – 2017	GIS Day	PMAS Arid Agriculture University

Skills

Earth observation and GIS

Google Earth Engine, QGIS and PyQGIS, ArcGIS and ArcPy, ESA SNAP, ERDAS Imagine, ENVI, PCI Geomatica, eCognition, CityEngine, GrADS, SeaDAS, Panoply; data portals including EarthExplorer, GloVis, LP DAAC and Giovanni.

Datasets

Sentinel-1, 2 and 5P, Landsat, MODIS, VIIRS, ASTER, GEDI, ALOS PALSAR-2, SeaWiFS; ERA5 and ECMWF, NOAA, NCEP, CMEMS, DWD and NAVO products; Energy Performance Certificates and UPRN-linked address data; OpenStreetMap.

Programming

Python, JavaScript, SQL, Bash, LaTeX; CDO, NCO and NCL for climate data; R, C, C++ and MATLAB (working knowledge); Java and IDL (basic).

Python libraries

NumPy, pandas, GeoPandas, xarray, netCDF4, Shapely, Fiona, GDAL, scikit-learn, SHAP, TensorFlow and Keras, fastai, PyTorch, OpenCV, SciPy, Matplotlib, Folium, NetworkX, OSMnx, PySAL, python-pptx.

Machine learning and data science

Random forests and gradient boosting, feature selection and interpretation, validation on held-out areas and years, deep learning for segmentation and detection, exploratory and network analysis, clustering, web scraping and geocoding.

Scientific models

SWAT, GR4J, HEC-HMS, HEC-RAS, RegCM4, WRF; VIC, Snowmelt Runoff Model, DSSAT and AquaCrop (working knowledge).

Databases

PostgreSQL and PostGIS, MySQL, pgRouting, MongoDB.

Web and web mapping

HTML, CSS and JavaScript, three.js and WebGL, Leaflet, OpenLayers, GeoServer, GeoNetwork, MapGuide, Google Maps API, GeoDjango, Django, Flask, Node.js and Express, React and React Native.

Research and teaching tools

Git and GitHub, conda, Docker, Jupyter, Zotero, Panopto, Vevox, Blackboard; Linux (Ubuntu) and Windows; Microsoft Office, AutoCAD, Adobe Illustrator and Photoshop.

Languages

English and Urdu (both used in published writing).

Referees

Available on request.