

Maxime Tarka

Engineer · Data, modelling and instrumentation

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Available from February 2027, depending on location · open to relocation in Canada and Europe · French citizen (EU) · Canadian post-graduation work permit valid until 2029

Summary

Engineer (ENSAM generalist programme, M.Sc. ÉTS Montréal) who works on environmental data from the sensors in the field to the website. Rebuilt a multi-site weather-station platform at Campus Sainte-Marthe (8 stations, about 7 million records), trained a deep-learning model that follows the snow cover of 22,155 glaciers from satellite images (786,014 observations), and adapted my open-source land-cover pipeline to a wildlife-habitat project at MacHydro. Generalist training in electrical engineering and automation, mechanics, fluid mechanics, materials, system design, robotics and computer science.

Experience

Geospatial analyst intern · MacHydro (remote) Sept – Nov 2026

- Developing a wildlife-habitat modelling workflow in Python for British Columbia: 10 m grid, terrain, land-cover, forest, disturbance, snow and hydrology layers, annual habitat-area trends per management unit, results viewer with GIS export. Confidential development for the company.
- Adapted my open-source land-cover pipeline (U-Net) to the workflow, trained on 705 hand-annotated Landsat and Sentinel-2 scenes (test mIoU 0.604 on unseen tiles), and ran it over 42 years of imagery to date fire and cutblock events. [Weights on Hugging Face](#).

Developer · Campus Sainte-Marthe (ÉTS and City of Sainte-Marthe) May – Aug 2026

- Rebuilt the BVECSM weather-station platform end to end. Datalogger acquisition (Campbell Scientific, CRBasic, LoggerNet) feeds an automated correction pipeline with an audit trail, and old and new data are merged into one history with versions, back to December 2015 (8 stations, about 7 million records).
- Built the FastAPI web platform (about 60 pages with dashboards, manual correction and CSV/Excel/Parquet download) and hydrological models (GR4J, GR4J-CemaNeige, MOHYSE, PyTorch LSTM), including a model pre-trained on ~1,200 basins and applied locally without retraining.
- Automated the system end to end for minimal maintenance (logger files read every 30 seconds). Used by researchers, university courses, the municipality and local farmers. Helped install equipment and took samples at the stations.

Graduate researcher · ÉTS, Montréal Sept 2024 – June 2026

- Developed a deep-learning pipeline classifying satellite imagery from 5 sensors, trained on a self-annotated set of 540 scenes (segmentation accuracy mIoU 0.705).
- Detected evaluation leakage that inflated accuracy (per-scene mIoU 0.696 on glaciers seen in training against 0.575 on unseen glaciers) and redesigned the test split.
- Processed 786,014 glacier-year observations (22,155 glaciers, 1984–2025); the pipeline now supports a doctoral thesis chapter and two supervisor-led projects.

Skills

Data and modelling: Python (pandas, NumPy, PyTorch, scikit-learn, random forest, LightGBM, CatBoost), MATLAB, Julia, SQL, time series, machine learning, statistical analysis, data visualisation (Streamlit, ECharts), hydrological modelling (HEC-HMS, MODFLOW)

Instrumentation and software: Campbell Scientific dataloggers (CRBasic, LoggerNet), FastAPI, JavaScript, Streamlit, Git/GitHub, LaTeX, VS Code, Hugging Face, Microsoft Office, Canva

Remote sensing and geospatial: Landsat, Sentinel-2, deep-learning segmentation and land-cover classification, change detection, Google Earth Engine, ArcGIS (including ArcGIS Hydro), QGIS, GeoTIFF/Zarr/Parquet, LiDAR and DEM processing

Engineering and simulation: SolidWorks, Abaqus (finite element simulation), 3DEXPERIENCE, electrical energy systems, physical modelling

Education

M.Sc. in Construction Engineering (thesis) · École de technologie supérieure (ÉTS), Montréal 2024–2026
Thesis rated “Excellent”, recommended for the Board of Directors Excellence Award.

Engineering degree (Diplôme d'ingénieur, M.Eng. equivalent) · Arts et Métiers (ENSAM), France 2022–2026
Diploma expected early 2027. Generalist programme: electrical engineering and automation, energy, mechanics and solid mechanics, fluid mechanics, materials and composites, system design, robotics, computer science, and manufacturing processes (casting, forging, woodworking).

Engineering projects (ENSAM)

- **Formula Student Electric** (2023–24): led the propulsion energy-chain work package of the ENSAM electric race car.
- **Wire-arc additive manufacturing** (Feb–June 2024, team of two): first step toward a physical model giving the machine settings for a target part geometry. Bead height and width against substrate curvature and layer count: repeat beads varied by at most 1.2% in height and 2% in width; laser-arm scans fitted in Julia (mean error up to 0.1 mm); linear growth over five layers (R^2 0.98 width, 0.97 height).
- **Piezoelectric energy harvesting** (Feb–June 2023, team of two): identified a model of a bimorph harvester on a shaker bench (resonance 305.1 Hz, quality factor 101.7) and optimised its mean power in Python.
- **Photovoltaic grid connection** (Sept 2022–Jan 2023, team of two): Simulink model of a solar panel on the grid (DC/DC converter, MPPT, inverter) delivering its maximum power of about 400 W.

Projects

- **Open source** (github.com/Research-Tarka): configurable, reproducible change-detection pipeline with pre-trained U-Net weights on Hugging Face, the MaskForge annotation tool and the GlacierScope viewer.
- **Publications:** SSRN preprint with open code and data ([doi:10.2139/ssrn.7418104](https://doi.org/10.2139/ssrn.7418104)), submitted to ISPRS Journal of Photogrammetry and Remote Sensing; manuscript under review at Nature Climate Change.

Languages and work eligibility

French (native) · English (daily professional use; TOEIC 845/990, 2023)

French citizen · Canadian post-graduation work permit valid until 2029 · Driving licence: B (France)