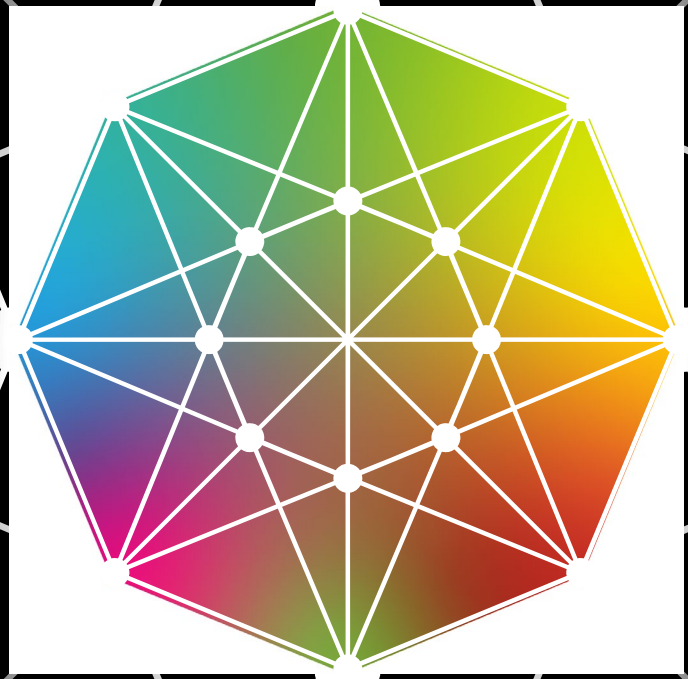
16TH ITU ACADEMIC CONFERENCE

ITU KALEIDOSCOPE
GENEVA2026

AI and frontier technologies for good

7-9 July 2026
Geneva, Switzerland

Hosted by AI for Good Global Summit



Guidelines

Presentation Day 2, 8th of July @ 09:00 - 10:30
Session: AI 4 Sustainable Development: Education, Inclusion, and Society
Session Chair: Philippa Biggs, Head of Emerging Trends Foresight Unit, ITU
Presentation: S4.1 *Mapping schools for sustainable connectivity - a geospatial AI approach leveraging foundation models*
Timeslot:

- 15m maximum (including Q&A)
- 10m presentation
- 5-10 Slides

Mapping Schools for Sustainable Connectivity - A Geospatial AI Approach Leveraging Foundation Models

Casper Fibaek and Rochelle Schneider, European Space Agency, Italy & United Kingdom
Abi I. Riley, Imperial College London, United Kingdom
Kelsey Doerksen, Oxford University, United Kingdom
Dohyung Kim, UNICEF, Switzerland

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Connectivity planning starts with a reliable school map

School registries are often incomplete, outdated, or difficult to audit

- *Invisible schools*
- *Misallocated connectivity investment*
- *Weak monitoring of equitable access*

Preparing the data (1) - School Dataset

School

Deduplication

1. Deduplication

Merge <25m to nearest school with similar name

Geographic filtering

3. Geographical Location

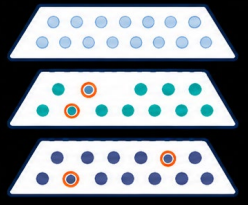
If geographical criteria for removal are met:

Distance to a building/population/water

Missing coordinates

2. Missing coordinates

Attempt Geocoding



Stratification

4. ***Stratification***

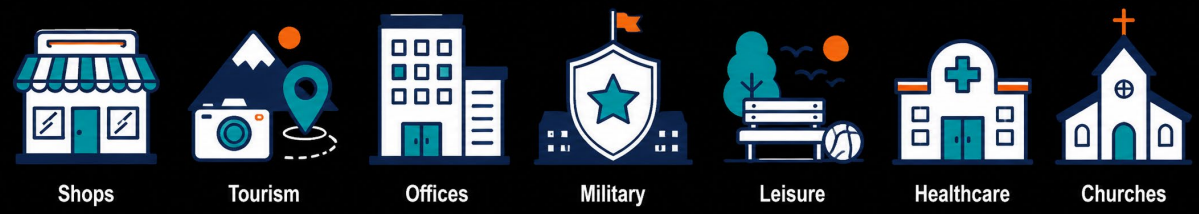
Using DEGURBA and political boundaries to stratify the samples

Preparing the data (2)

Negative samples

Finding good negative samples is not easy

- *OSM PoIs: shops, tourism, offices, military, leisure, healthcare, and religious buildings - OVERPASS API*
- *Named PoIs are higher quality*
- *Geographical filtering*
- *Stratified like the schools*
- *1/5 additional samples for non-urban areas stratified by landcover class*



A Cost-Aware Funnel Narrows the Search

Tier 1: Where should schools exist?

Input:

- *Population*
- *Settlement type*
- *Nighttime lights*
- *Land Cover*
- *Terrain*
- *Existing Schools*

Sources:

- Sentinel 1, 2
- CopDEM
- ESA WorldCover
- VIIRS Nightlights
- GHSL - Population
- GHSL - DEGURBA
- GIGA and Government

Tier 2: Which buildings look like schools?

Input:

- *Vector Points of Interest*
- *VHR Satellite Images*

Sources:

- Open Street Map
- Google Buildings
- Microsoft Buildings
- GHSL - Population
- GHSL - Degurba
- ESA WorldCover
- Climate Zones (KBG)

Tier 3: Which Candidates are Real

Input:

- *VHR Satellite Images*
- *Tier 1 & 2*
- *Operator Knowledge*

Sources:

- Sentinel 1, 2
- CopDEM
- ESA WorldCover
- VIIRS Nightlights
- GHSL - Population
- GHSL - DEGURBA

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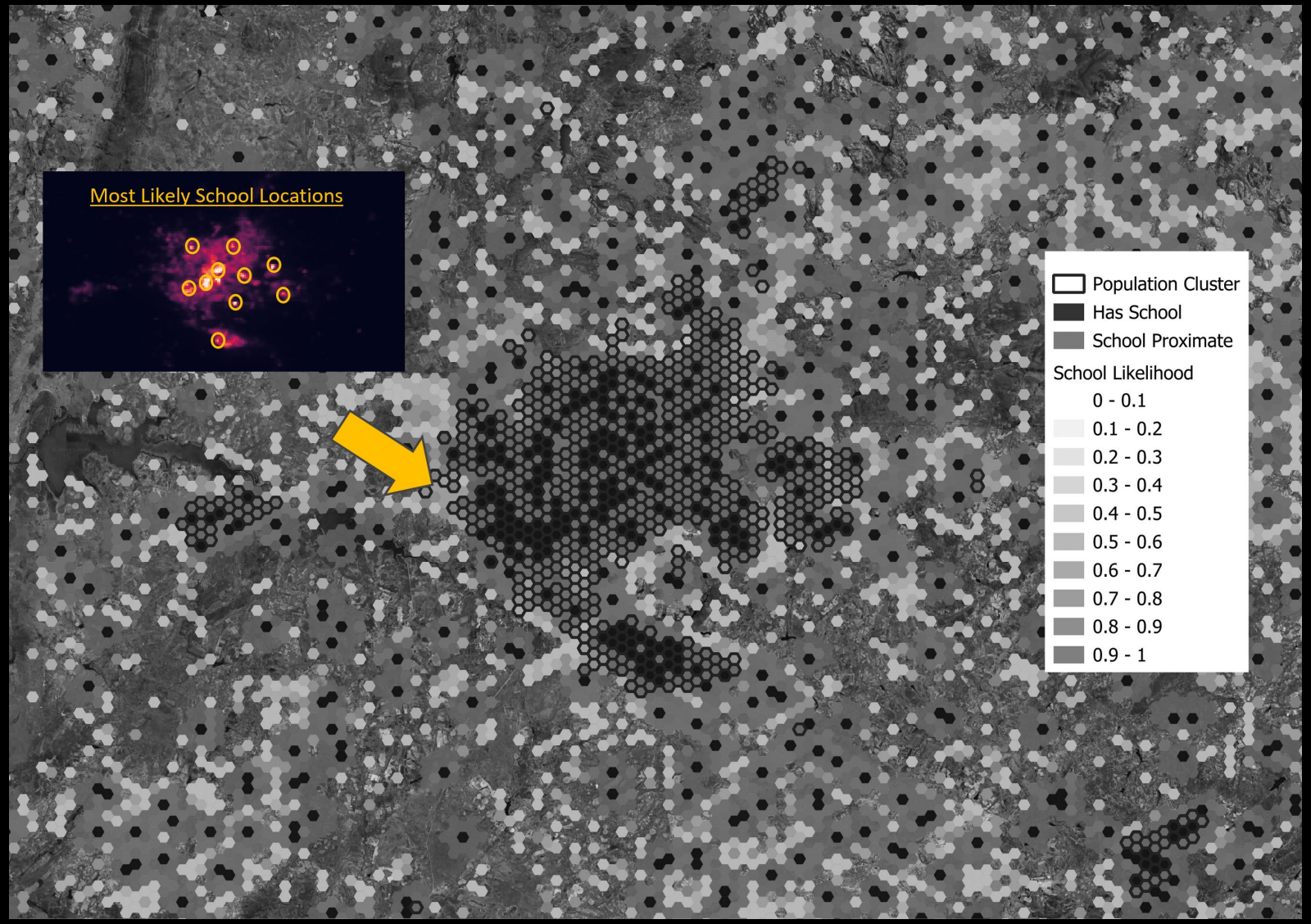

Where we would have expected schools.

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Schools

Not-Schools

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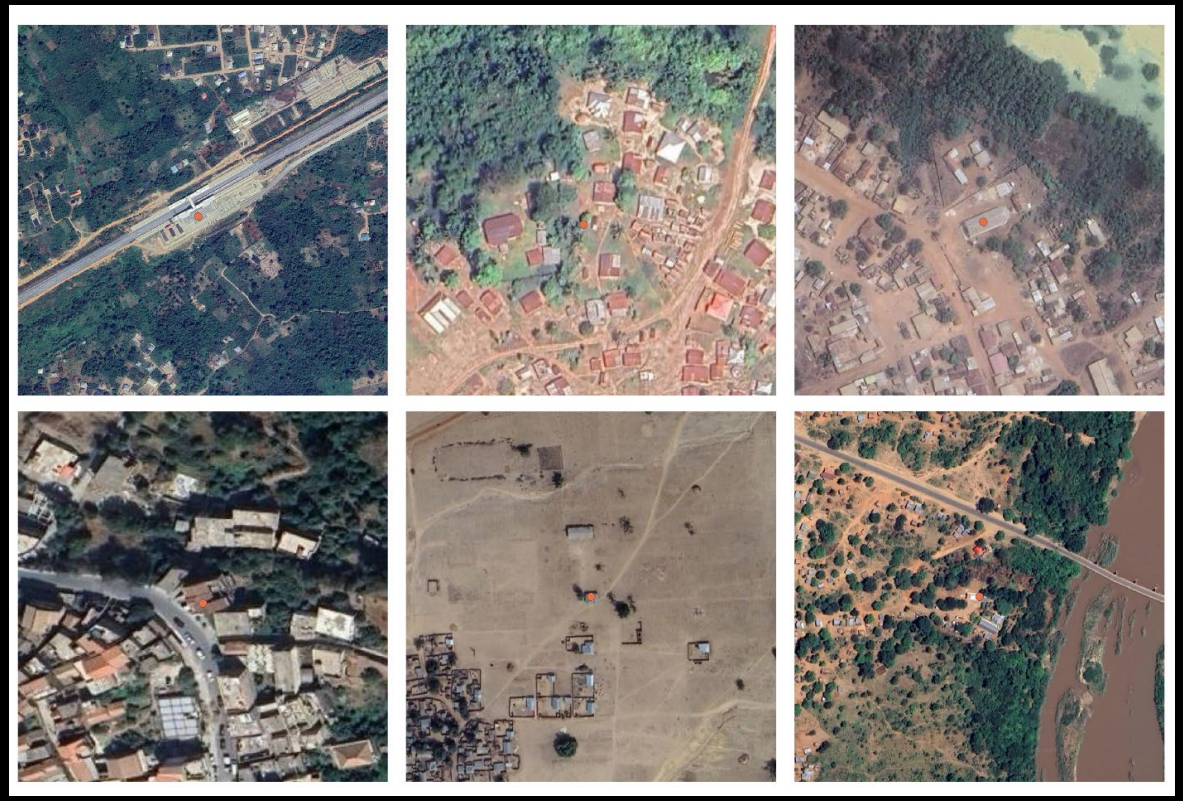
Evidence at Different Scales

0.90 F1

Tier 1 continent-scale
school-presence prioritisation

83.2% Accuracy

Tier 2 VHR school classification
Under challenging conditions



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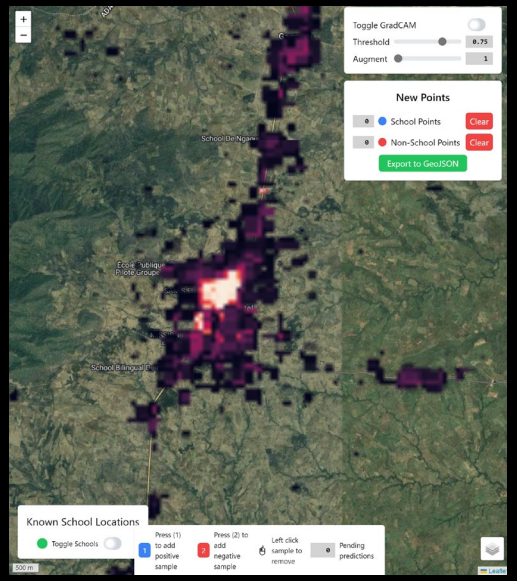
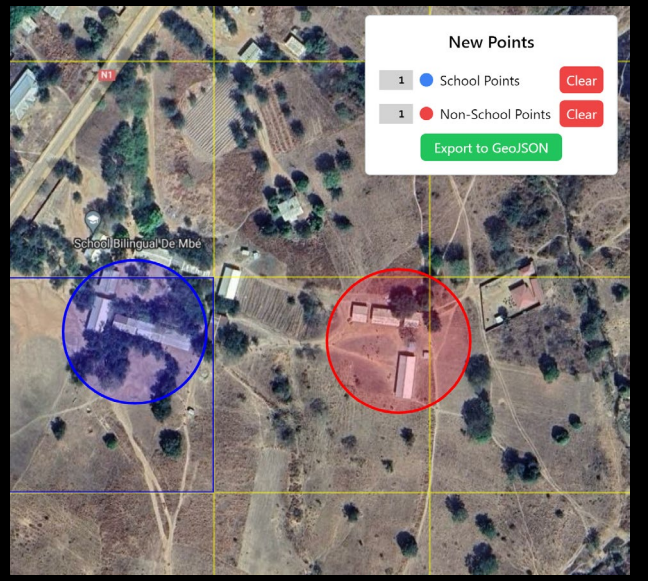
Keeping humans in the Loop & Building Trust





location | imagery evidence | model score | reviewer decision | provenance

- **Confirm, Reject, or Add**
- **Inspect Grad-CAM evidence**
- **Record decisions and update the model**

- **Trained model runs a laptop, runs inference on WMS feed.**
- **Fine-tuneable based on iterative feedback**

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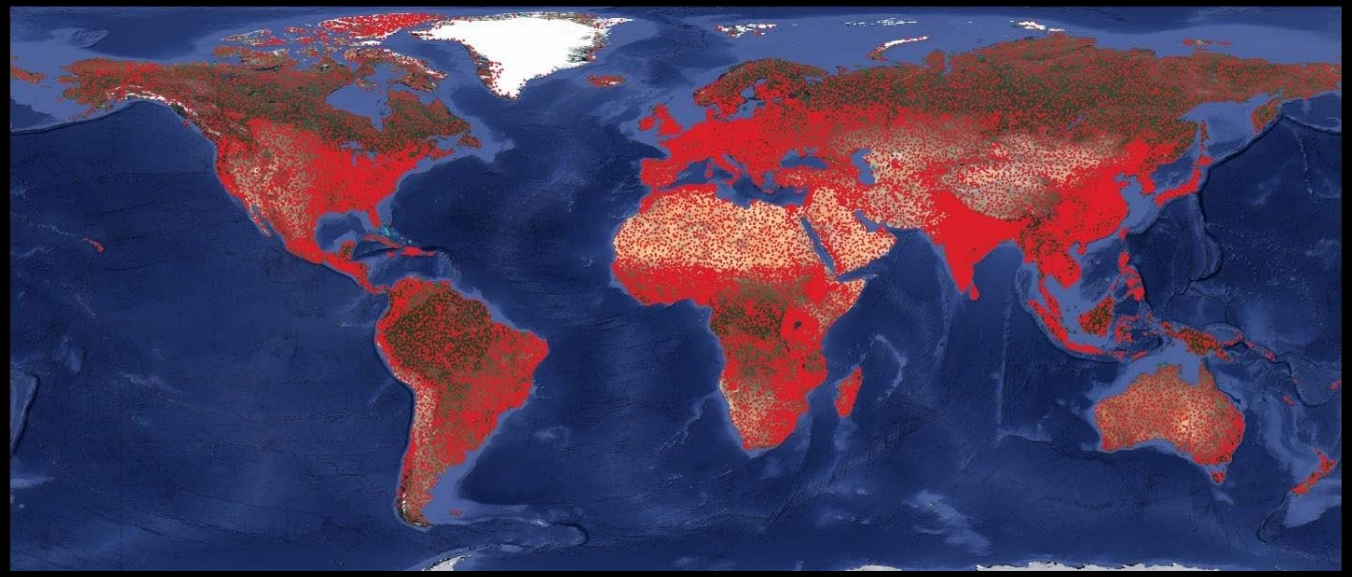
Pre-train Broadly, Fine-tune Deliberately

1. Global pre-training
- Globally sampled VHR imagery
- Static geospatial context
- Self-supervised masking objective
- Diverse climates and settlement forms

2. Reusable representation

3. Targeted fine-tuning
- School examples
- Churches and religious facilities
- Administrative and police buildings
- Markets and sports facilities



Broad pre-training supplies transferable features; curated hard negatives teach the distinction needed in practice.

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From school detection to sustainable connectivity

- Prioritise expensive imagery analysis where registry gaps are most likely.
- Combine transferable geospatial representations with targeted local refinement.
- Maintain transparent, updateable school records through structured human review.

Questions?

Casper Fibaek
European Space Agency

Session 4 - AI for sustainable development: Education, inclusion, and society

Thank you!