



An experimental Earth Observation-based screening layer — not a structural safety assessment

Nicholas Rasetta — ORSS, Independent Project, Italy | orss.it

WHY THIS MATTERS

Italy's public school stock comprises tens of thousands of buildings with varying age and seismic exposure. Inspecting all of them on site is neither fast nor inexpensive. Copernicus EGMS now provides free, systematic satellite ground-motion data nationwide — a capability that did not exist at national scale a decade ago. ORSS tests whether these two already-public data sources can be combined into a scalable, transparent screening signal. **Screening is not diagnosis: every flagged site still needs expert, on-site follow-up.**

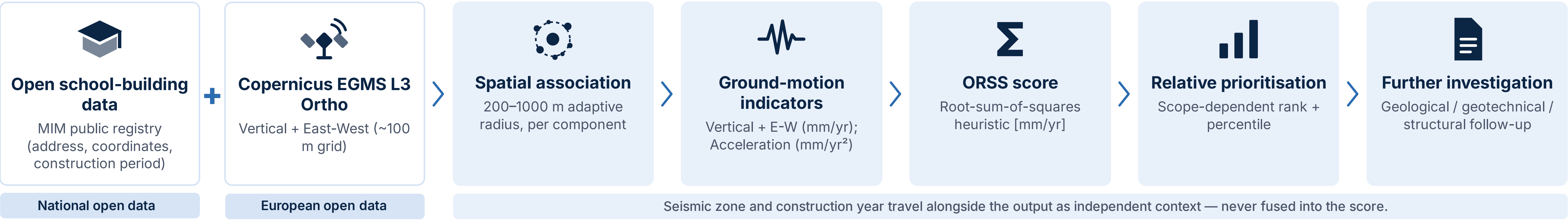
RESEARCH QUESTION

Can publicly available Earth Observation and school-building records provide a scalable, transparent screening layer to help prioritise sites for further geological, geotechnical or structural investigation?

Tested here on Italy's public school-building stock.

DATA SOURCES & WORKFLOW

Two public data streams, associated by location, feeding a screening pipeline — every stage traceable to the deployed code.



CURRENT COVERAGE (current implementation)

14,164	8	1,820	5,570,112
public school buildings covered	Italian regions covered	municipalities included	EGMS L3 measurement points cross-referenced

METHOD (ORSS SCORE)

score = $\sqrt{C_{\text{vert}}^2 + C_{\text{EW}}^2 + (C_{\text{accel}} \cdot \Delta t)^2}$

Δt = 1 yr (provisional)
The acceleration component is converted to velocity units using a provisional Δt = 1 yr. The choice of the characteristic time remains to be validated.

ILLUSTRATIVE REAL-WORLD CONSISTENCY CHECKS

Three high-priority ORSS sites cross-checked against independent public records of hydrogeological instability.

Bucchianico - Via Santa Chiara
School building

Very high priority

ORSS score **32.97**

Documented hydrogeological instability (public record)

Chieti - Via Arenazze
School building

Very high priority

ORSS score **7.95**

Documented hydrogeological instability (public record)

Casalanguida - Via S. Bartolomeo
School building

Very high priority

ORSS score **5.59**

Hydrogeological instability documented in the area
No site-specific correspondence established

Indicative consistency only — not validation.
These examples are not a statistically representative sample. Systematic validation against independent datasets, including a control sample, is ongoing.

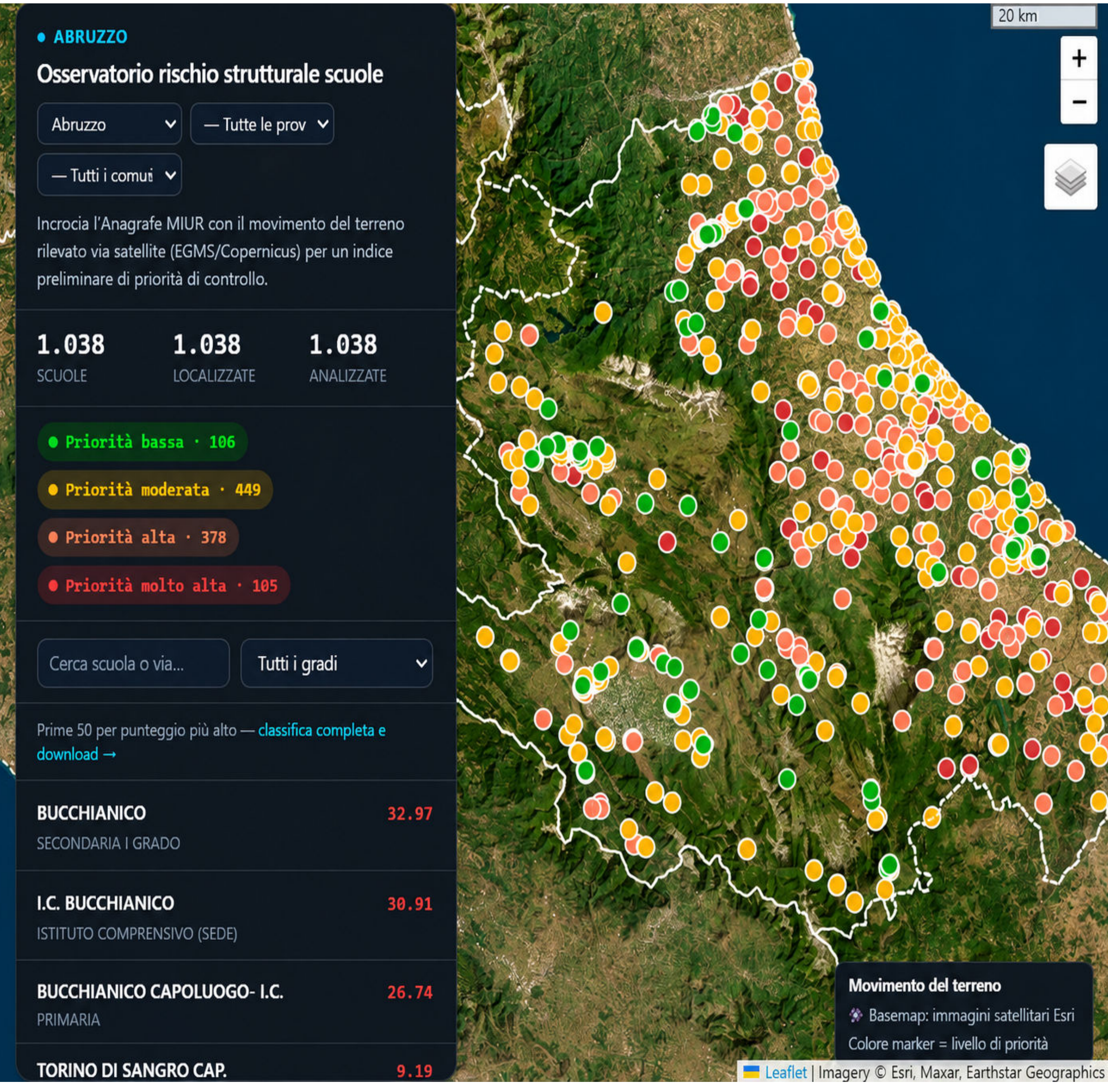


Fig. 1 — ORSS WebGIS view of the Abruzzo pilot region: 1,038 public school sites classified by relative screening priority, from low to very high.



Fig. 2 — EGMS vertical (left) and East-West (right) ground-motion trends for measurement points associated with the Bucchianico school site and used in the ORSS screening analysis.

KEY TAKEAWAYS

- Open MIM school records and Copernicus EGMS can be combined into a reproducible **screening** score.
- 2 of 3 independently checked high-priority sites coincide with documented hydrogeological instability — a signal consistent with the method, but not proof.
- The index is preliminary and relative, intended to prioritise field investigation, not to certify structural safety.

IMPORTANT LIMITATIONS

- Neighbourhood signal**
EGMS points are near the building, not on the structure.
- Heuristic score**
Not yet calibrated against structural or geotechnical outcomes.
- Relative priority**
Ranking, not an absolute risk or safety class.

NEXT STEPS

- Systematic validation against official landslide / hazard inventories.
- Sensitivity analyses and uncertainty estimates.
- Extension to additional regions.
- Integration of additional geospatial datasets.
- Open code and methodology.

ORSS does not assess structural safety — screening is not a substitute for investigation.



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