Living Earth Lab

Are we really delivering the promises of GeoAI or is it just a hype?

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Living Earth Lab

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CAREER DIRECTION

WHO IS AN ENVIRONMENTAL SCIENTIST

A professional who:

- Studies environmental problems
- Protects natural resources
- Researches pollution & climate impact
- Helps create sustainable solutions

👆They work for a healthier planet.

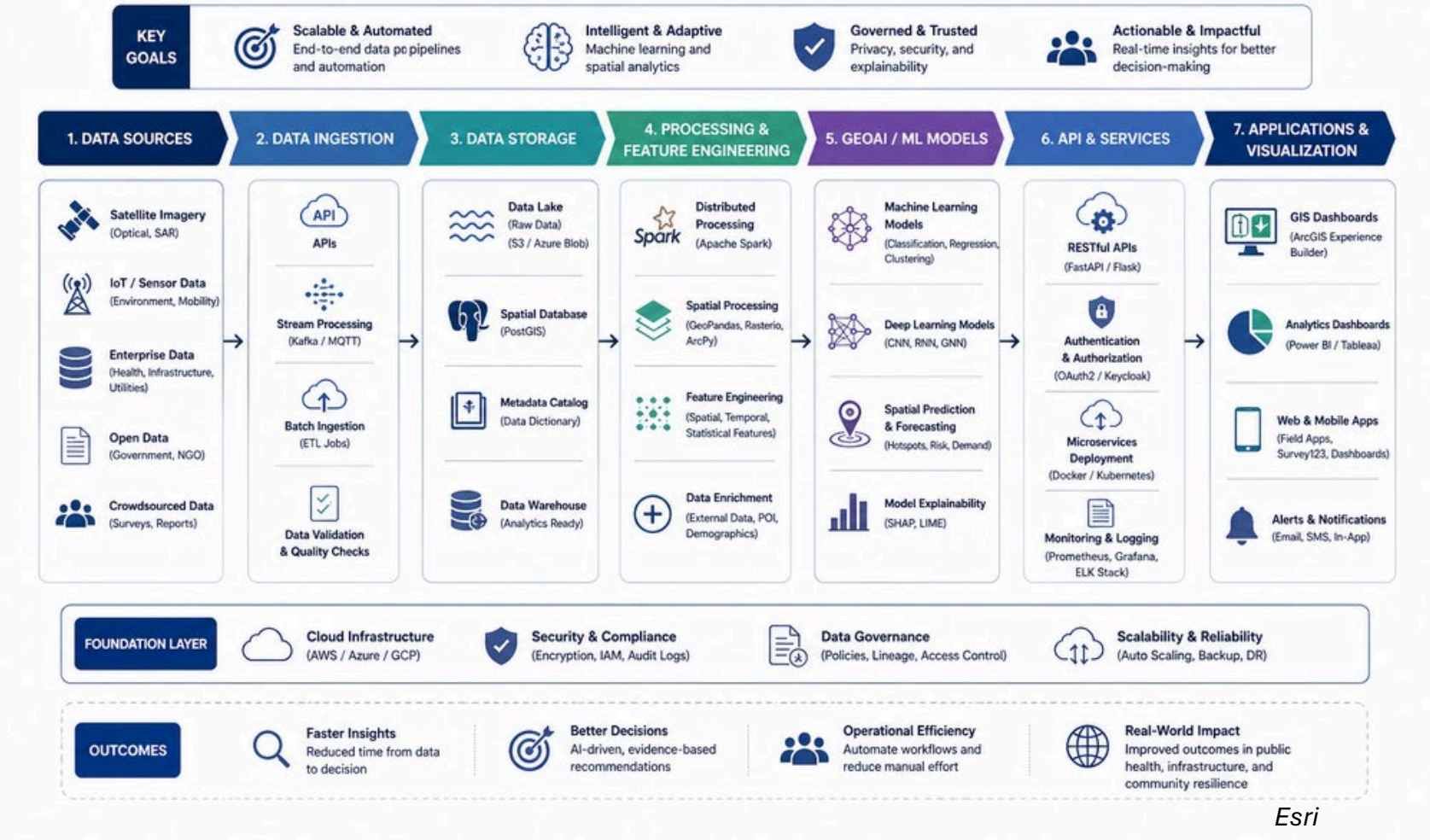
Shifting from over-promised potential to tangible impacts

A decade after the emergence of GeoAI, are we witnessing a revolution in geospatial sciences, or are we overpromising and underdelivering?

Why did GeoAI generate so much excitement?

Three promises:

- Automating geospatial analysis
- Extracting insights from massive Earth observation data
- Supporting better and faster decisions



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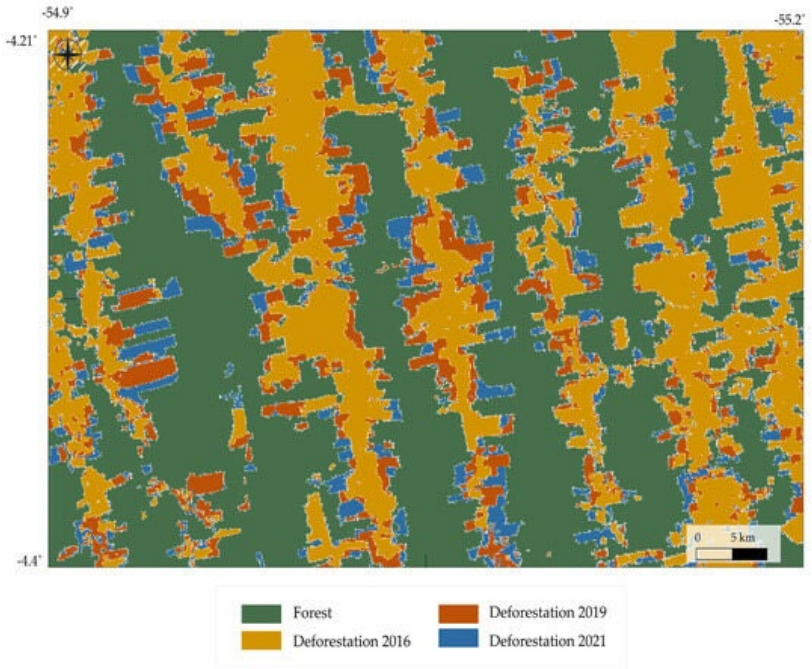
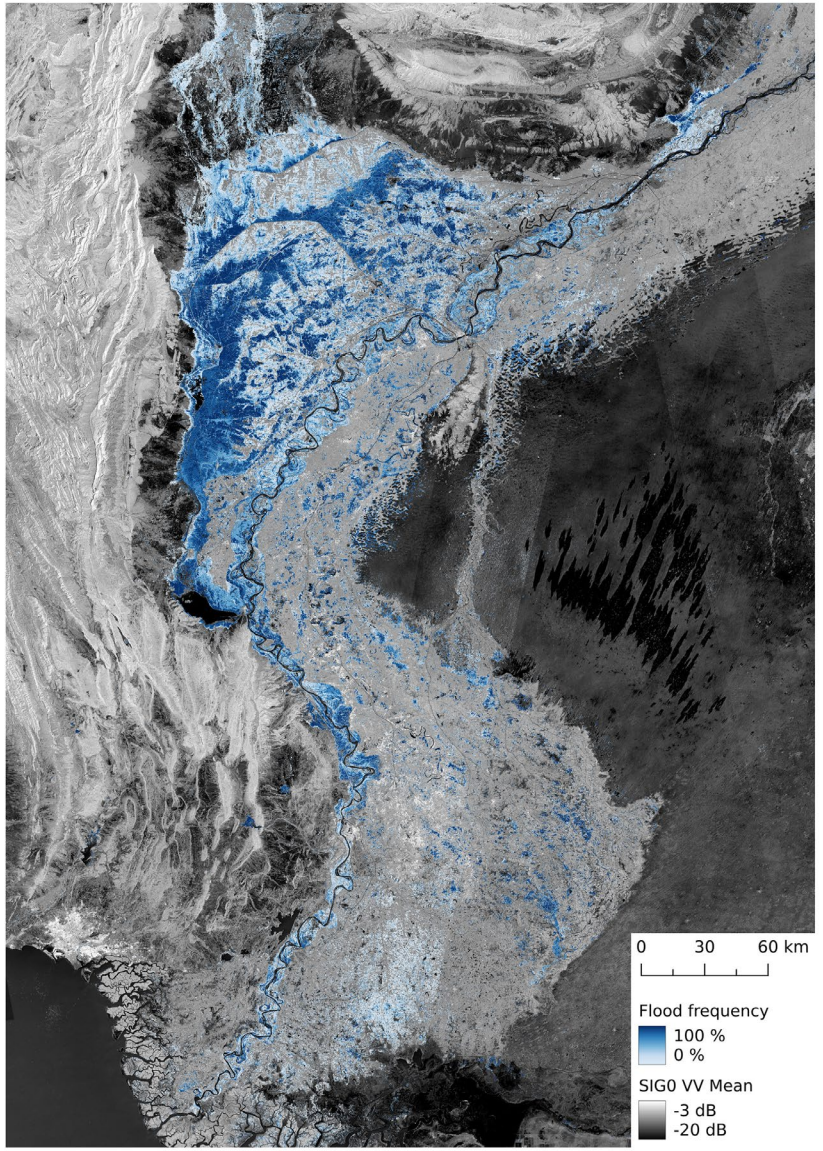
Where GeoAI is already delivering?

GeoAI has moved beyond the experimental phase in several domains.



Environmental Monitoring
Deforestation

Urban planning
Building extraction



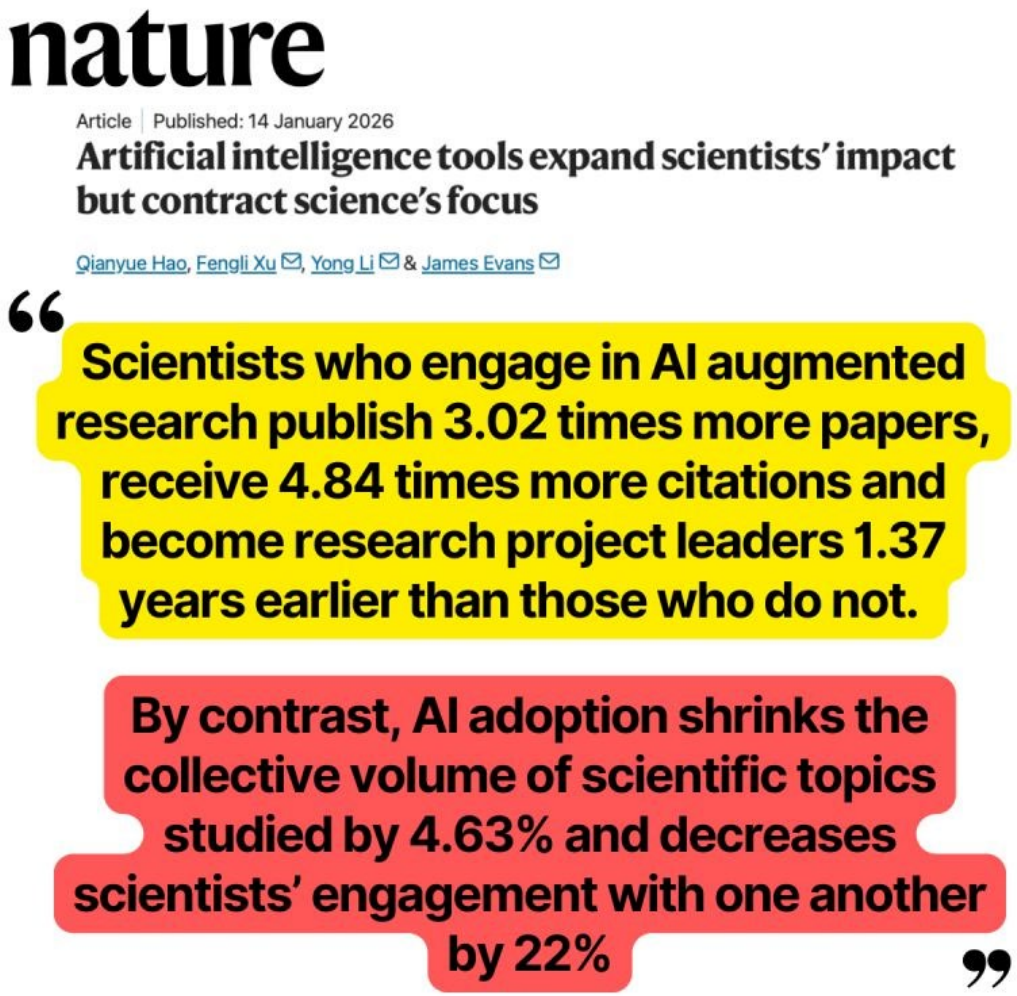
Disaster Management
Flood mapping

Why the hype may exceed the reality?

Many impressive models remain proof-of-concept and never become operational tools.

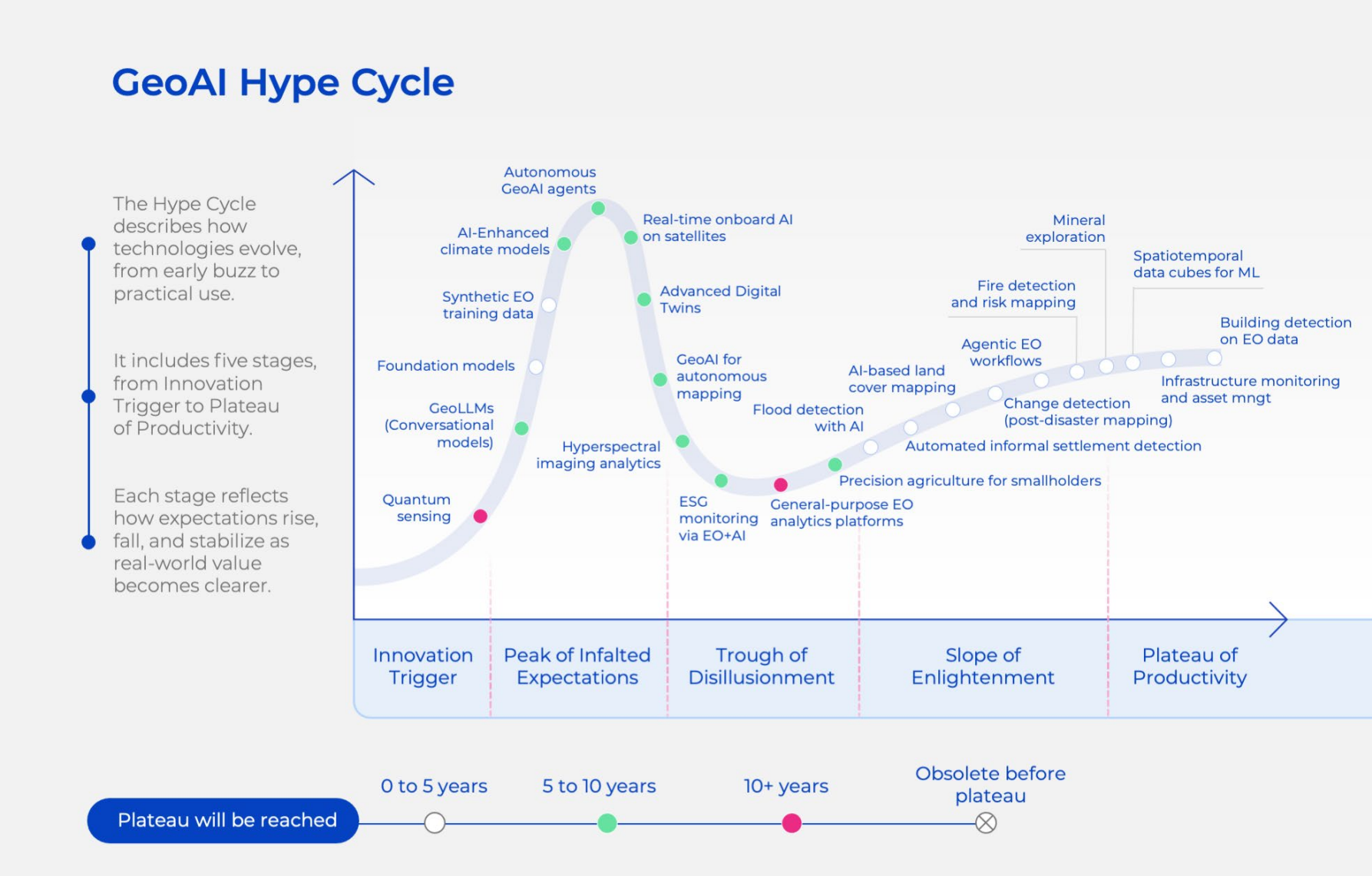
Four challenges:

- Data quality and bias
- Lack of explainability
- Poor transferability between regions
- Limited operational deployment



Where are we on the hype curve?

We have moved beyond the initial hype, but we are still far from realizing the full transformative potential.



More Accuracy ≠ More Scientific Progress?

- Are increasingly complex models producing genuinely new scientific understanding?
- Do tiny improvements in benchmark metrics translate into better decisions?
- Are we optimizing for scientific insight or for leaderboards and publications?

The field risks confusing incremental performance gains with meaningful scientific progress.

A model that is 0.3% more accurate but requires 10 times more computing resources may not represent progress if it doesn't change any real-world decision.

Can AI Save the Environment While Damaging It?

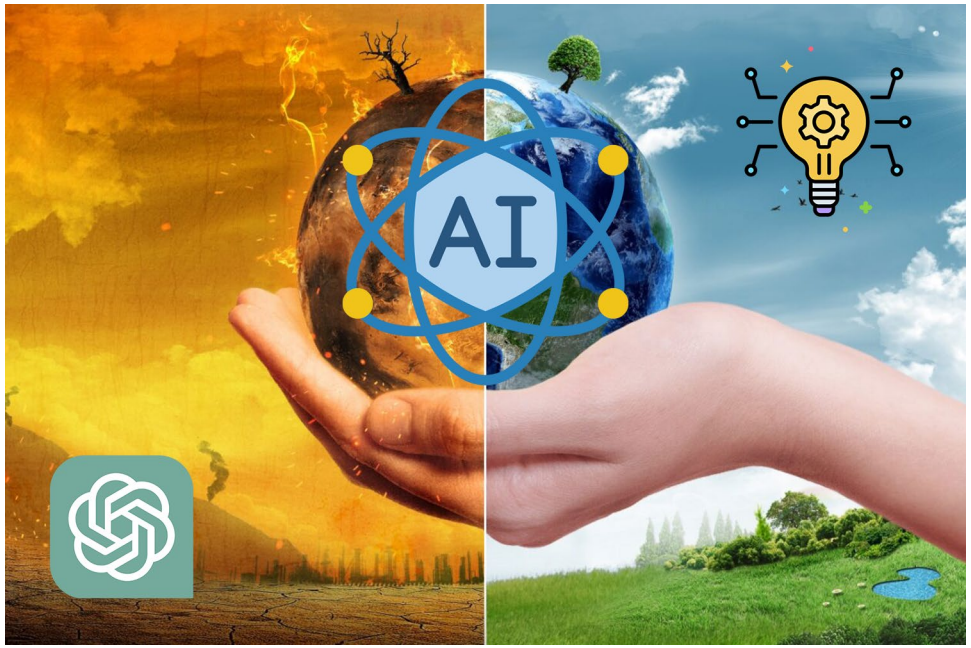
- Training large models consumes substantial energy.
- Growing computational demands increase carbon emissions.
- GeoAI can inadvertently contribute to the environmental problems it seeks to address.

The paradox

We use AI to protect the planet while simultaneously increasing the environmental footprint of our research.

Call to action

- Report computational costs.
- Consider carbon & water accountings.
- Develop efficient AI methods.
- Evaluate societal and environmental benefits alongside accuracy.

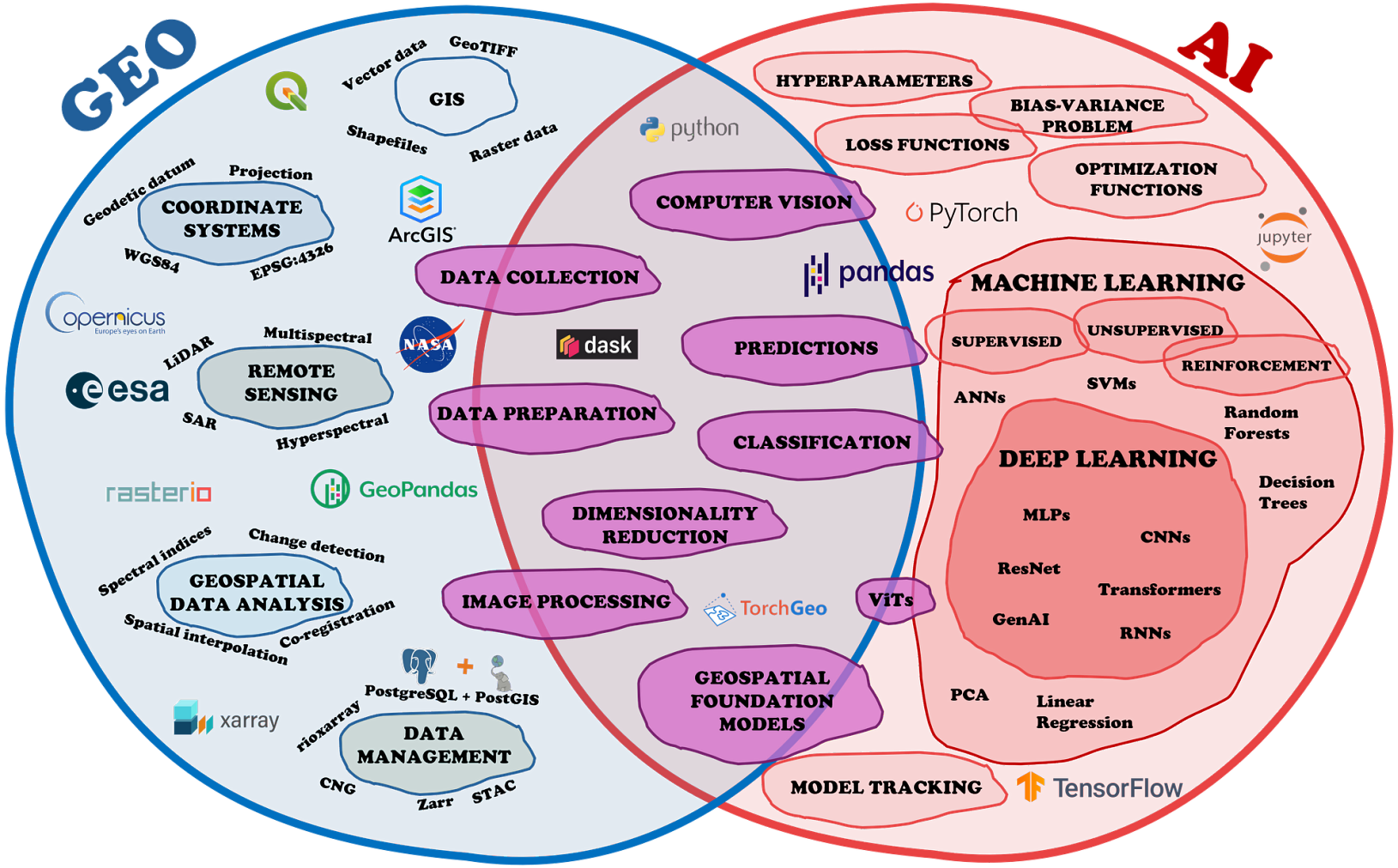


From hype to impact

GeoAI should augment geospatial experts, not replace them

Four priorities:

- Better data governance
- Explainable and trustworthy AI
- Reproducible and transferable models
- Integration with domain expertise



So… Promise or Hype?

Promise

Scientific advances

Operational successes

Better Earth observation

Hype

Overstated expectations

Limited scalability

Black-box concerns

GeoAI is a powerful set of tools that has already delivered important successes, but its transformative promises will only be fulfilled if we bridge the gap between research prototypes and operational, trustworthy systems.

The question is no longer whether GeoAI works, but whether **can we deploy it responsibly and at scale**.

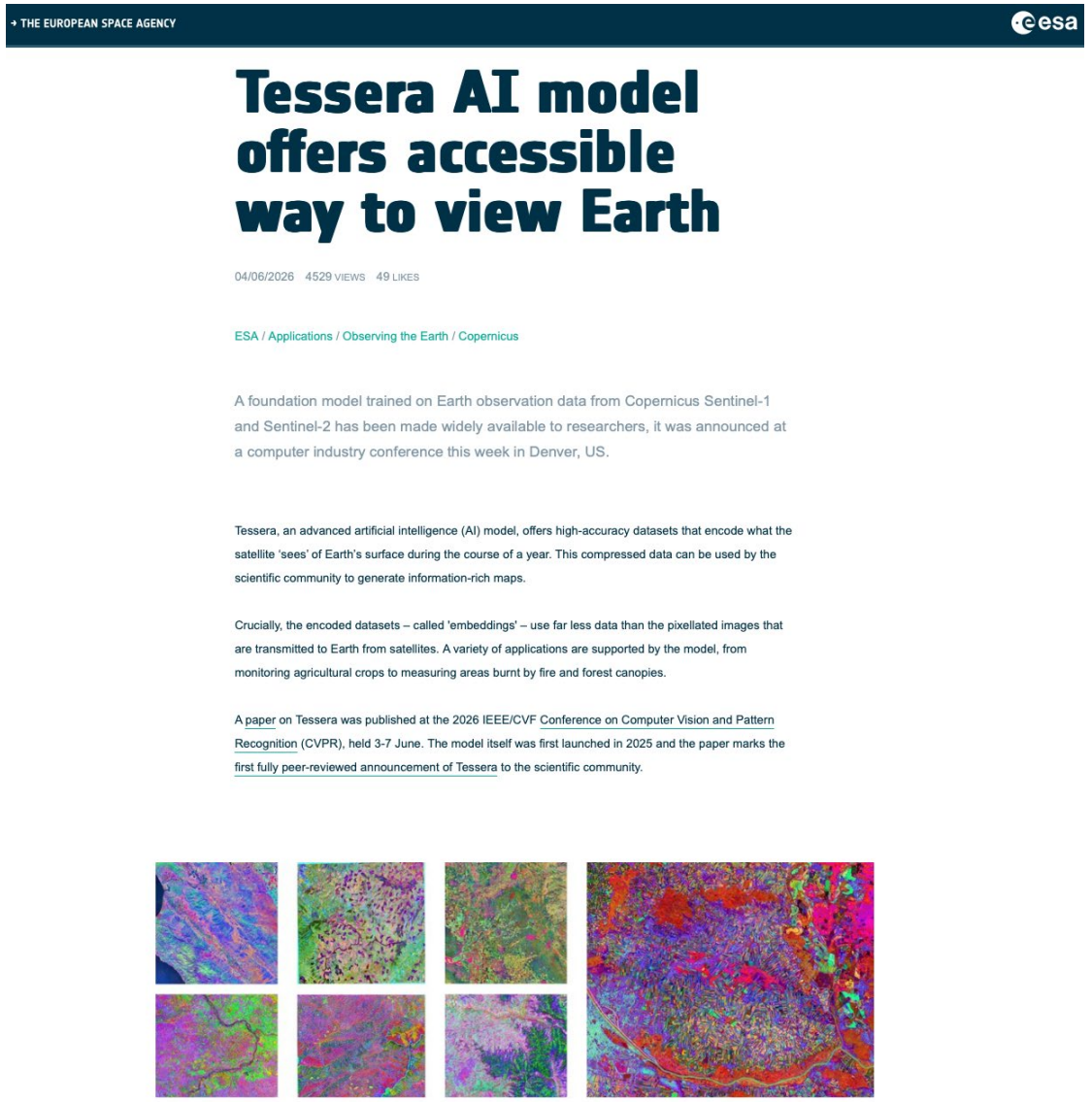
Towards Responsible GeoAI

GeoAI is delivering new capabilities in Earth observation and Environmental monitoring.

But the hype appears when:

- Benchmark performance is mistaken for scientific progress.
- Environmental costs are ignored.
- Real-world utility is not demonstrated.

The future of GeoAI should not be defined by who trains the largest model, but by **who delivers the greatest scientific and societal benefit per unit of computational and environmental cost**



→ THE EUROPEAN SPACE AGENCY esa

Tessera AI model offers accessible way to view Earth

04/06/2026 4529 VIEWS 49 LIKES

ESA / Applications / Observing the Earth / Copernicus

A foundation model trained on Earth observation data from Copernicus Sentinel-1 and Sentinel-2 has been made widely available to researchers, it was announced at a computer industry conference this week in Denver, US.

Tessera, an advanced artificial intelligence (AI) model, offers high-accuracy datasets that encode what the satellite 'sees' of Earth's surface during the course of a year. This compressed data can be used by the scientific community to generate information-rich maps.

Crucially, the encoded datasets – called 'embeddings' – use far less data than the pixellated images that are transmitted to Earth from satellites. A variety of applications are supported by the model, from monitoring agricultural crops to measuring areas burnt by fire and forest canopies.

A paper on Tessera was published at the 2026 IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR), held 3-7 June. The model itself was first launched in 2025 and the paper marks the first fully peer-reviewed announcement of Tessera to the scientific community.

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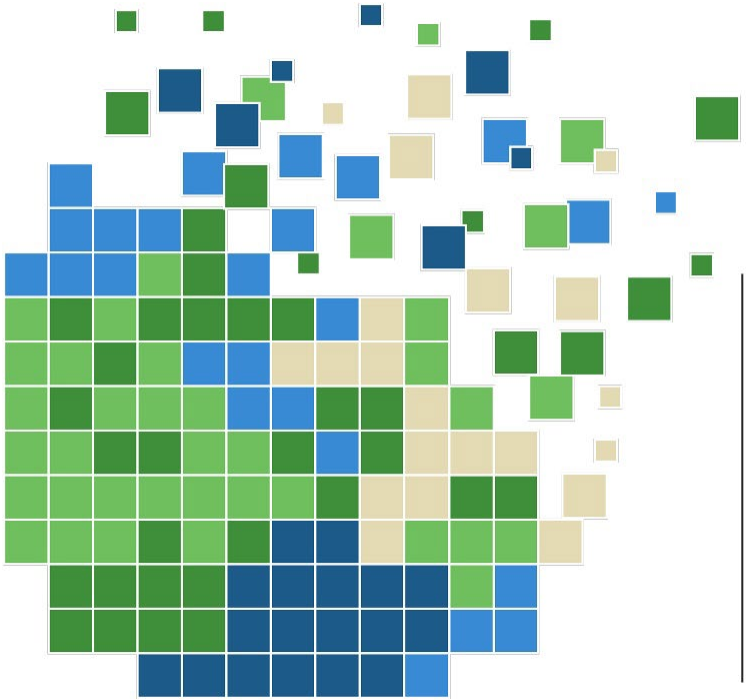

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