EGU General Assembly 2025
27 April - 2 May 2025, Vienna, Austria

Cataloging and mapping of landslides rapidly by using an Earth observation-based innovative platform – the Landslide Hunter

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https://doi.org/10.5194/egusphere-egu25-16112

Landslide catalogs provide essential data on past events, supporting effective **hazard management** as well as the training and validation of **predictive landslide models**.

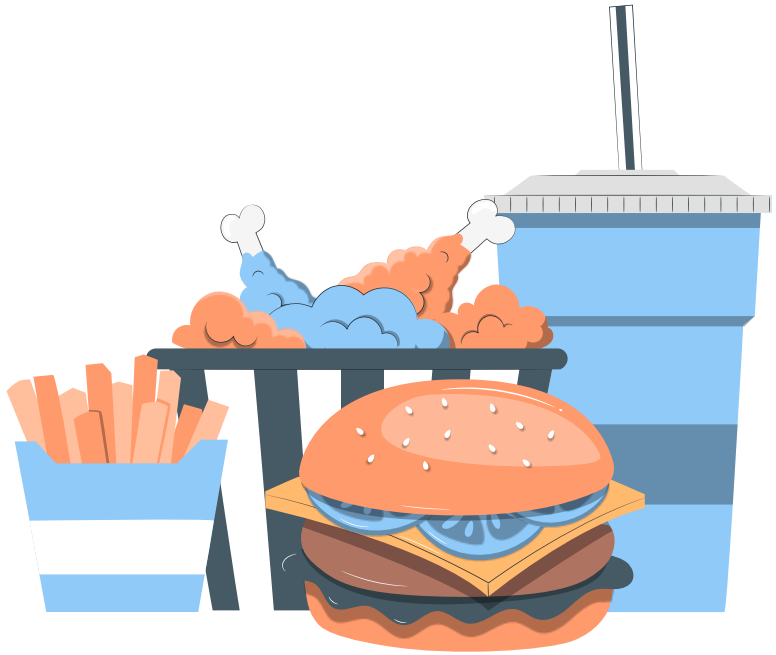
Illustration by Storyset.com

While landslide catalogs are mainly created by **manual mapping**, methods using **Earth observation** data are emerging that help **automate and improve** their production.

Illustration by Storyset.com

However, these methods are mostly **tested in specific case studies** and are **not yet routinely used** for regular landslide detection.

Illustration by Storyset.com



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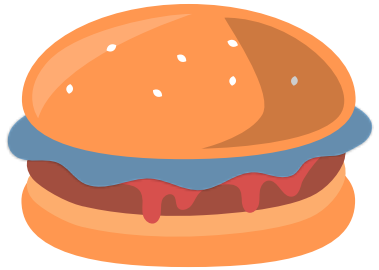


Expectation

Reality

Moreover, **optical** methods rely on **obstruction-free*** **imagery**, often leading to **delays in timely landslide detection**.

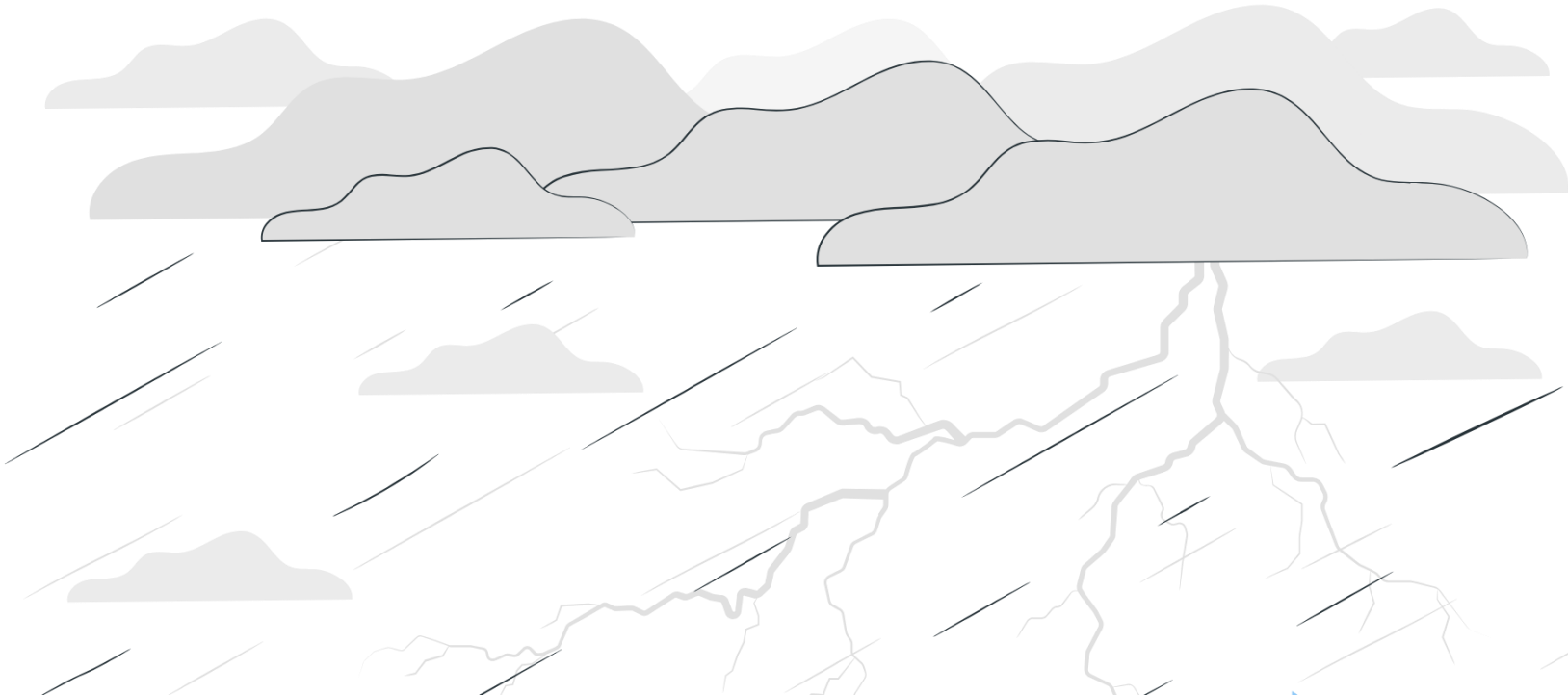


Illustration by Storyset.com

The **Landslide Hunter** platform aims to close the gap by speeding up detection **minimizing obstruction-related delays** and offering an environment for **testing and benchmarking** EO-based methods.

The project "Landslide Hunter: the first fully automated AI-based platform to map and monitor landslides remotely" with file number OCENW.XS23.3.145 of the research programme NWO Open Competition Domain Science XS is financed by the **Dutch Research Council (NWO)**

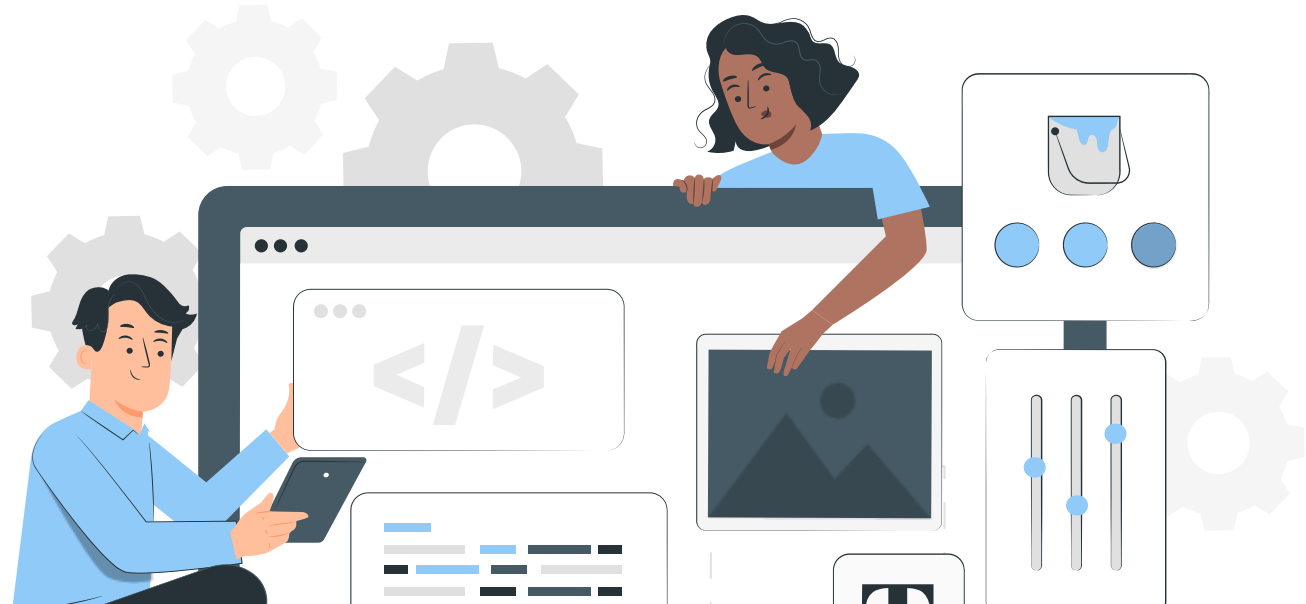
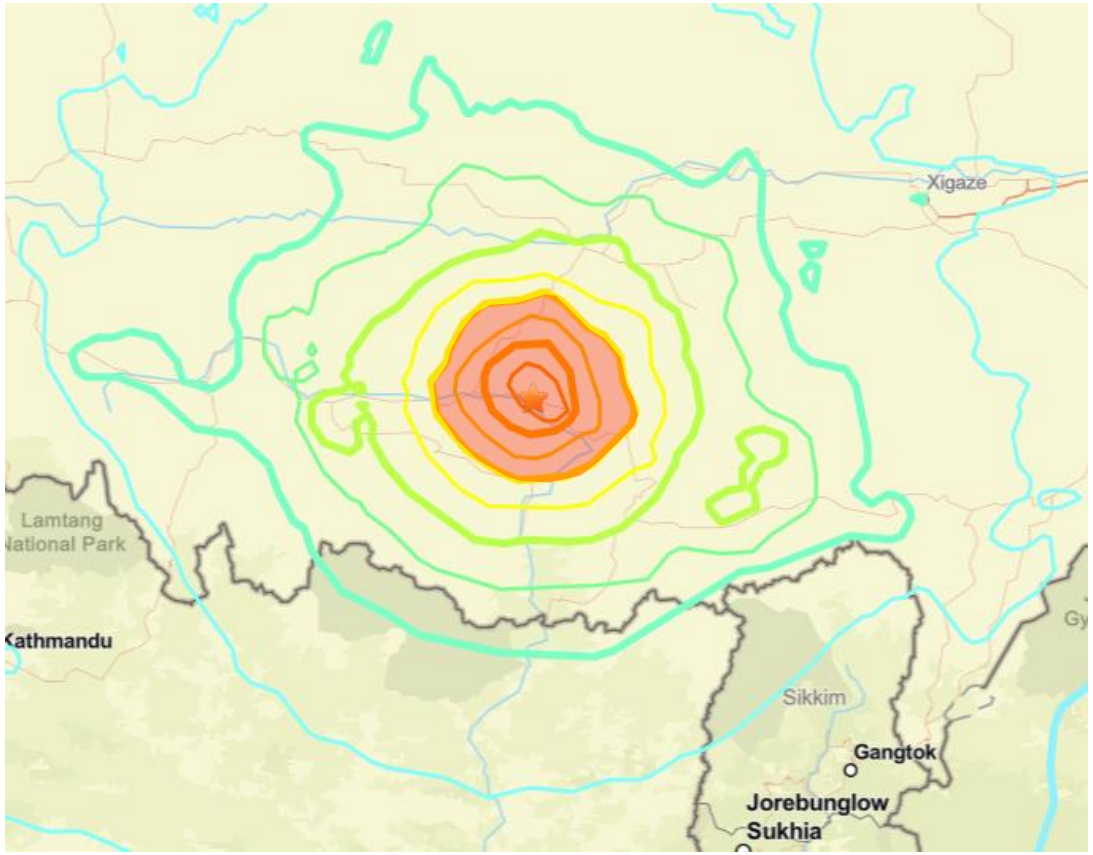


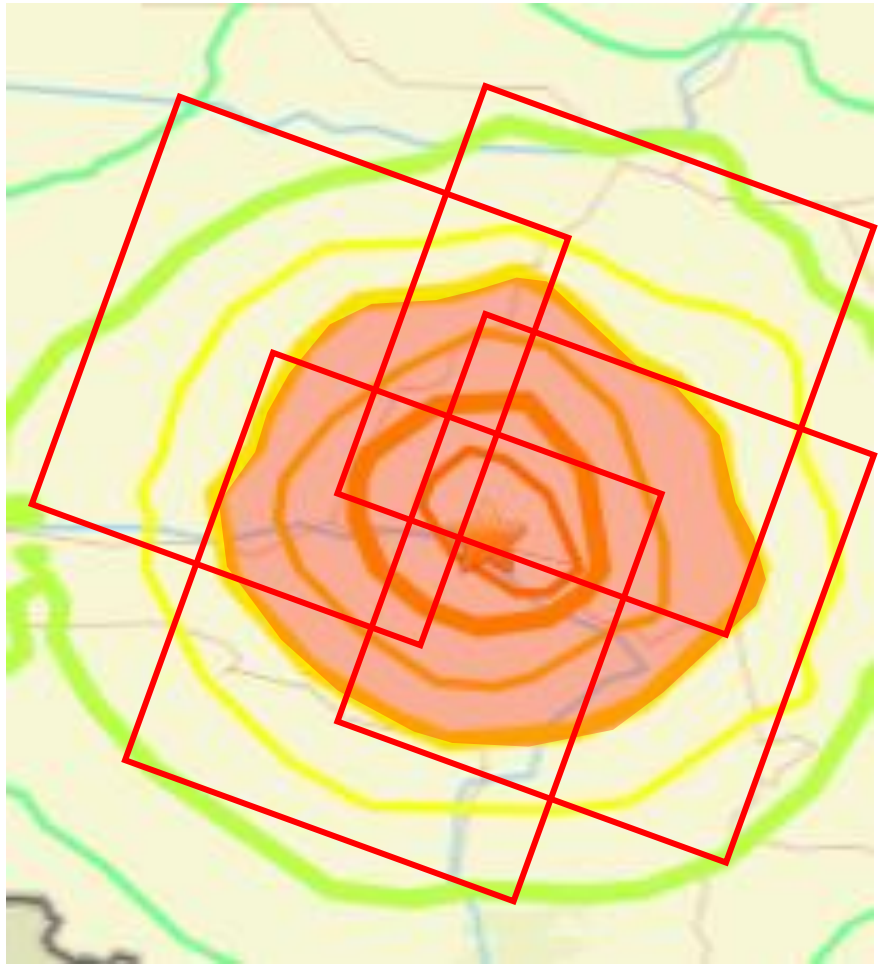
Illustration by Storyset.com

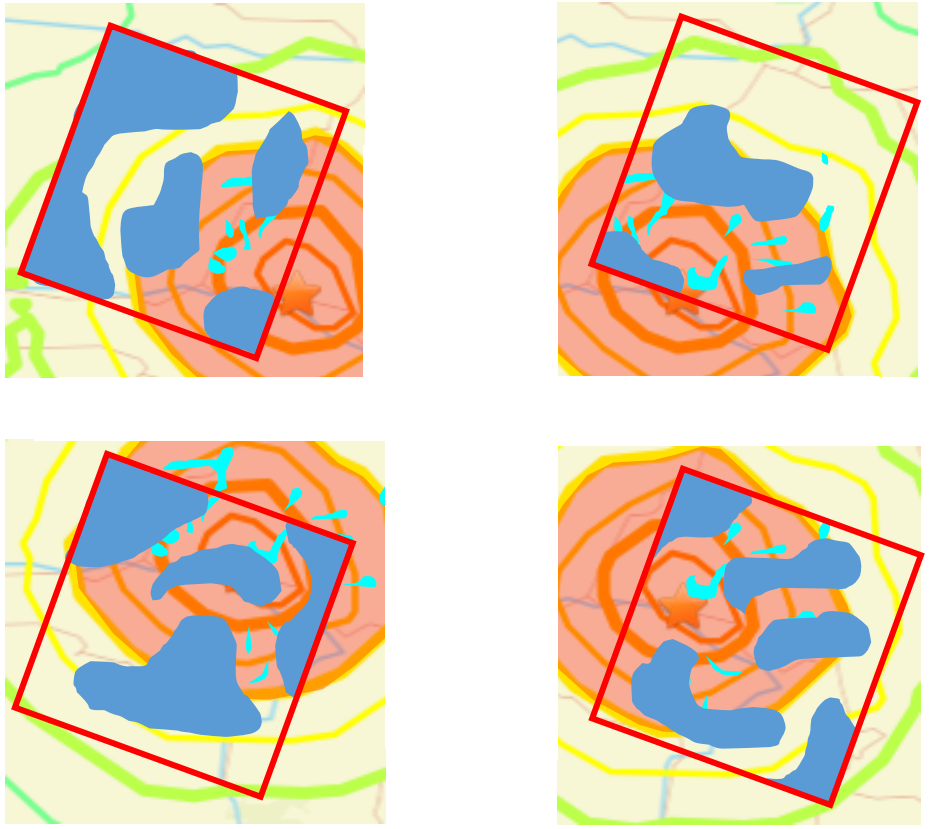
The platform **tracks online sources** for events that **may trigger** landslides



Areas where landslides are likely to have occurred are identified.

Pre- and post-event EO images are **collected and analyzed** to detect **visible landslide extents** using various landslide detection methods





Landslides extents, background regions, and occlusions are identified for each image.

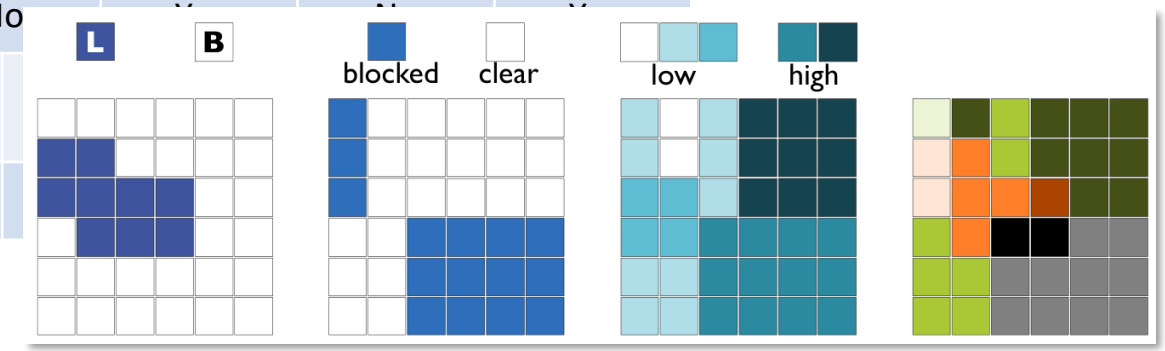
Determining the **actual landslide extents** by combining partial (and unreliable) information is **challenging**.

Illustration by Storyset.com

Analysis results are categorized into cell-based **semantic classes** and associated **certainty indicators**

Classes	Unknown	Anomaly	Not Landslide			Landslide		
	U	A	B!	B	B?	L?	L	L!

Model Inference	Landslide								Not Landslide	
Model Probability	High				Low				Low	High
Occlusion	No		Yes		No		Yes		No	
Occlusion Probability	High	Low	Low	High	High	Low	Low	High	High	
Classification	L!	L	L	A	L	L?	L?	A	B	

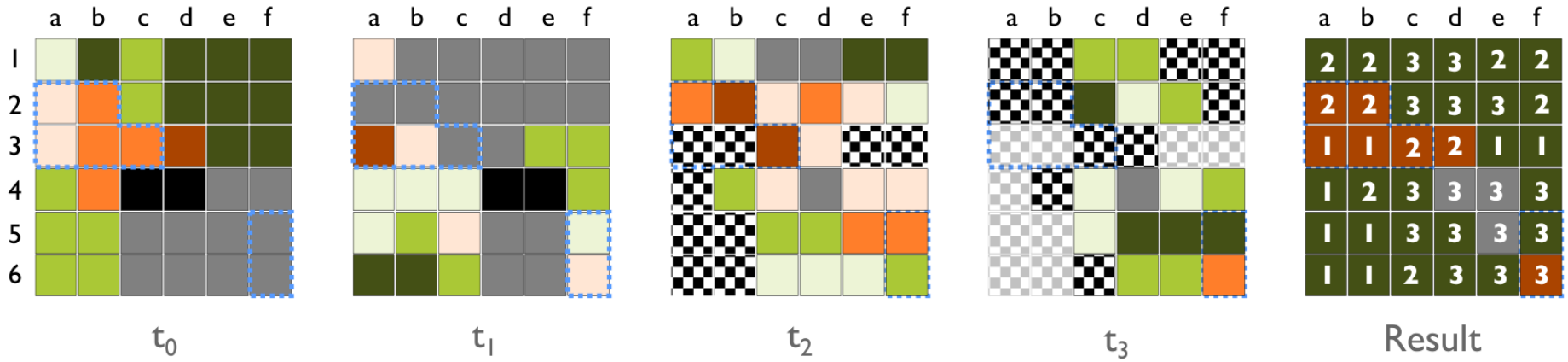


For more information

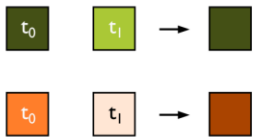
Mapping of landslides by using partially cloudy optical EO imagery: a case study of 2023 Türkiye Earthquakes
A. D. Ozbakir, S. Girgin, H. Tanyas

https://doi.org/10.5194/egusphere-egu25-17549

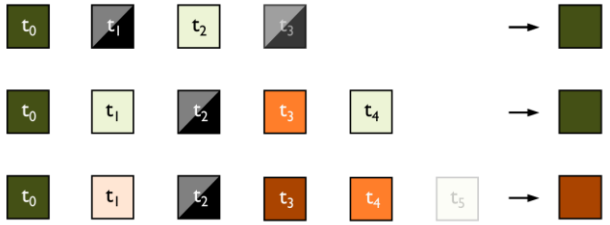
A **rule-based** process assigns a **single representative class** to the **time series** of each data cell



R1. Immediate Repeat



R2. Majority Vote



R3. U Dominance

For more information

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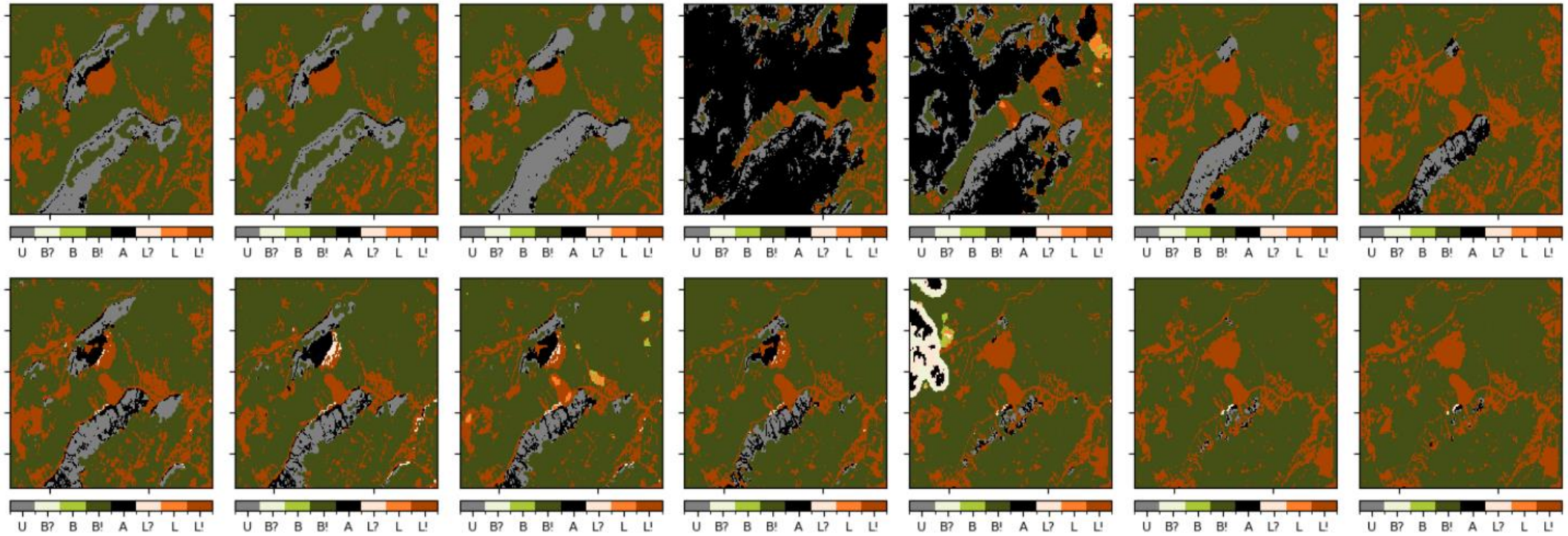
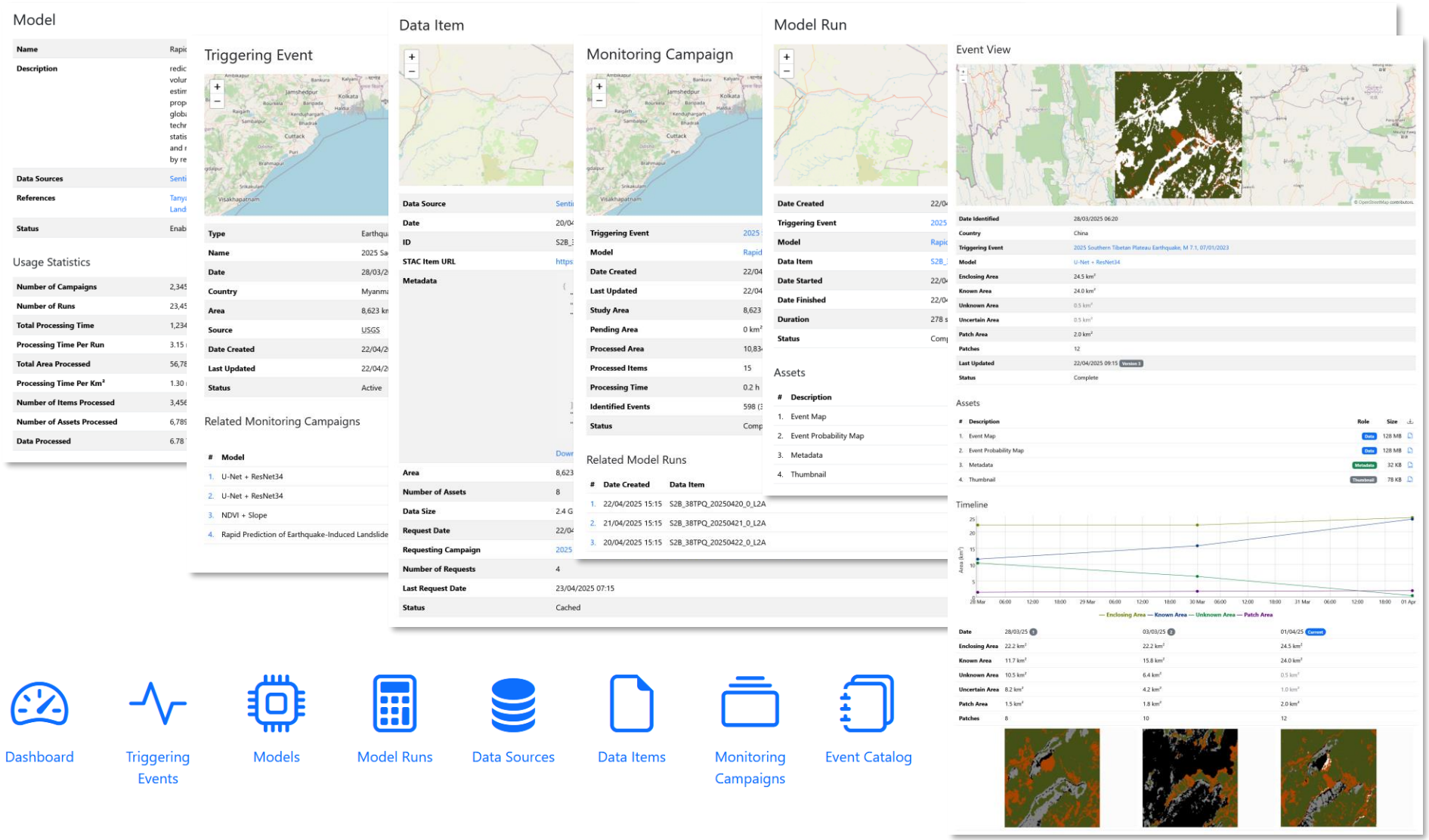
Partial extents are marked for **further tracking** until complete landslide coverage is obtained through **successive analyses**



This enables the timely first detection and effective monitoring of landslides, even under obstructed conditions (e.g., cloudy).

The results are made available in an **open-access landslide catalog** through a **user-friendly web portal**



The core features and capabilities of the platform focus on **robust operation**, **sustainability**, **interoperability**, and **open access**

- **Open-source** software adhering to research software development best practices. Python
- **Plug-and-play** functionality for **integrating models** through abstract classes and utility methods for spatiotemporal processing and machine learning. Powered by Model Sherpa
- **Automated monitoring** of data sources for new EO data and management of model runs.
- **Smart caching** for storage of EO data items and assets.
- Automated aggregation of model outputs to generate **versioned landslide clusters**.
- Identification of individual **landslide patches** related to the same landslide cluster.
- Open-access data sharing via **STAC** and OpenAPI-compliant **REST API**.
- **Mobile friendly** user interface with notification features facilitating **relational browsing**.
- Scalable backend architecture with **parallel processing** capabilities.

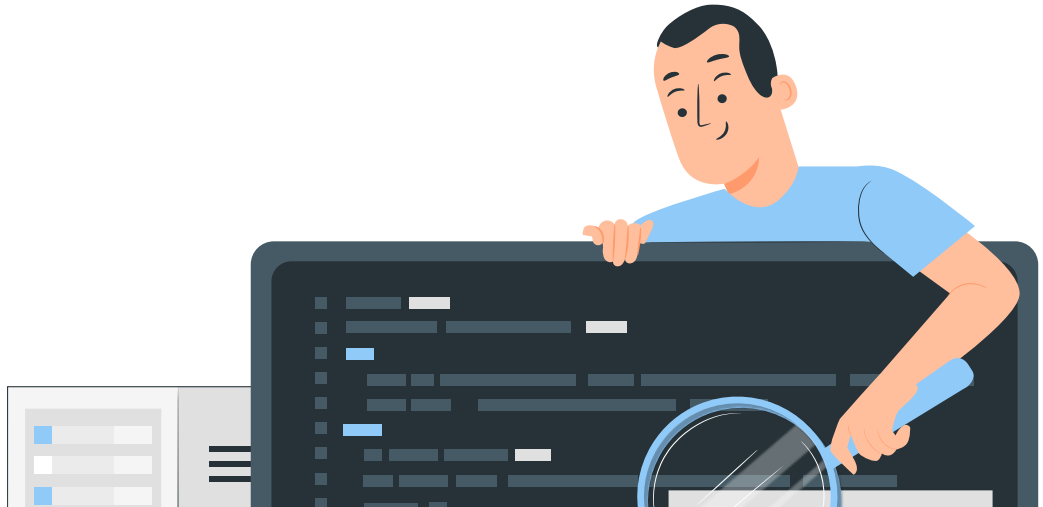
Besides enabling rapid first identification of landslides triggered by hazard events, the platform can also **serve as a testbed** for landslide mapping

- Evaluation of the **reusability** of existing landslide detection methods.
  Plug-and-play functionality for integrating models through abstract classes and utility methods.
- Further **testing and validation** of existing methods.
  Global analysis capability backed by robust data access, processing, and storage infrastructure.
- Development, validation, and testing of **new methods**.
  Focus on the methodology without spending time for data access and processing.
- **Benchmarking** of methods for accuracy, robustness, and performance.
  Easily run multiple monitoring campaigns using different methods and parameters.
- Identification and mapping of **other phenomena**.
  The platform or spinoffs using the same architecture can support mapping of other events, such as earthquake damage, flooding, etc.

Illustration by Storyset.com

The platform is scheduled for beta testing in **June 2025**.

Want early access? Reach out to join our early adopter group!



Contact us if you want to learn more or collaborate!

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