

# Reduce latency of critical insights

SKAISEN is an onboard AI solution for real-time object detection and change detection on optical EO missions. By processing data directly onboard, SKAISEN eliminates the traditional downlink bottleneck — delivering actionable intelligence in minutes rather than hours.

## Key benefits

### REDUCTION OF DOWNLINK-RELATED COSTS

Avoid transmitting irrelevant acquisitions. Object detection and change detection prioritize only the data that matters.

### FASTER ACCESS TO CRITICAL DATA

Prioritise which data should be downloaded with the highest priority based on AI-based on-board object detection.

### NO DATA IS CHANGED OR DISCARDED WITHOUT CONSENT

Your data from the sensor is safe, SKAISEN will generate only metadata for an operator.

### HIGHLY REUSABLE FOR ANY OPTICAL EO MISSION

Seamlessly supports a range of commonly used sensors and data processing units, currently tested with Simera Sense cameras and boards equipped with Xilinx® Zynq™ SoC and NVIDIA® Jetson™ SoC. More configurations and options will be added in the near future.

### ENHANCING MISSION AUTONOMY

Data-driven on-board decision-making is enabled.

### UPDATE ANYTIME IN-ORBIT

In case a new/updated solution exists, we upload it anytime directly on-board the spacecraft/satellite.

## SKAISEN Edge

Standalone FPGA IP Core with AXI DMA interface, GPU, or CPU-optimized binary for specific embedded processors. This powerful AI-based solution enables on-board cloud filtering and advanced object detection capabilities, significantly reducing downlink costs and providing faster access to valuable insights.

### PRODUCT AUDIENCE

Solution for customers developing their own software and on-board data processing pipeline, offering easy integration with their existing software stack.

### FLIGHT PROVEN

The SKAISEN Edge running on Xilinx® Zynq™ Ultrascale+™ is deployed on the TROLL 6U mission, with a hyperspectral camera as the main mission payload.

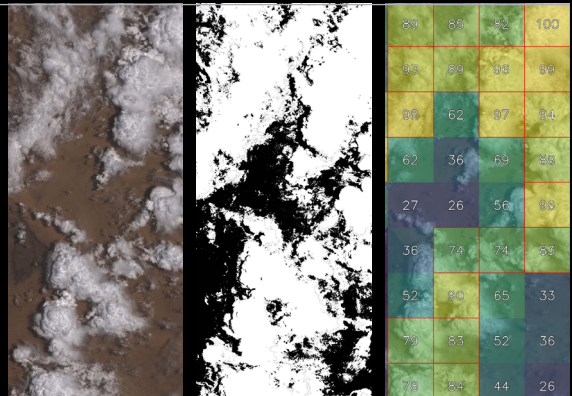
Additionally, there are additional scheduled missions that will utilize SKAISEN technology on-board.

FPGA IP Core	CPU OPTIMIZED Binary	GPU (NVIDIA® Jetson™)
Tested with Xilinx® Zynq™ 7020 and Xilinx® Zynq™ Ultrascale+™	Tested with 32/64-bit ARM CPUs	Tested with NVIDIA® Jetson Orin™
Delivered as Vivado IP Core with example SW project	Delivered as executable binary for your target processor	Delivered as executable binary

- Cloudiness prediction and object detection from optical EO imagery
- Optimized AI model with over 90% accuracy for cloud predictions. It can be further fine-tuned to your sensor
- Python SDK for integration with your pipeline or CLI application
- Continuous onboard change detection from compact world embeddings
- Ground support scripts to enable visualization and interpretability of the SKAISEN outputs
- Support with integrations, commissioning and operations
- Compression via SKAIPACK (sold separately)

## Cloud detection

Research shows that about 67% of Earth's surface is covered by clouds, which poses a major challenge for Earth observation satellites by degrading data quality and consuming valuable communication bandwidth on cloud-covered, low-value imagery. To address this, we developed SKAISEN, an AI-based onboard cloud screening system that uses machine learning algorithms to analyze and filter out cloud-contaminated regions in real time before transmission. By prioritizing cloud-free data, SKAISEN reduces communication overhead, optimizes bandwidth, and enhances mission efficiency, benefiting applications like environmental monitoring, disaster response, and agriculture. Cloud screening is also available as part of the SKAIPACK intelligent compression bundle.



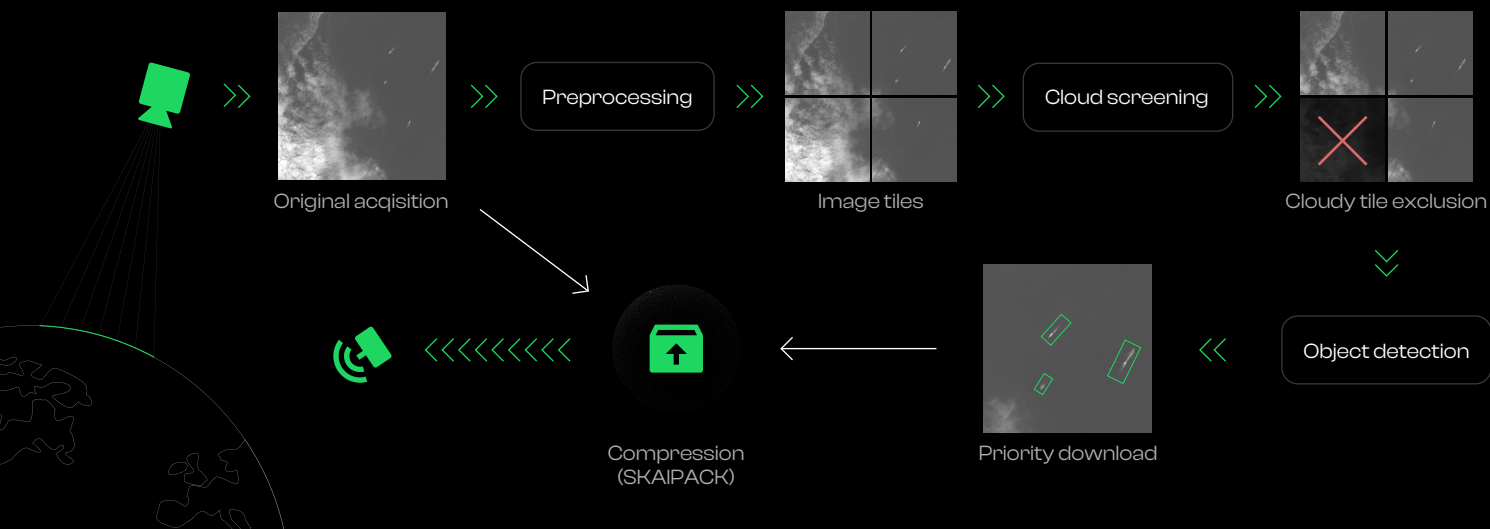
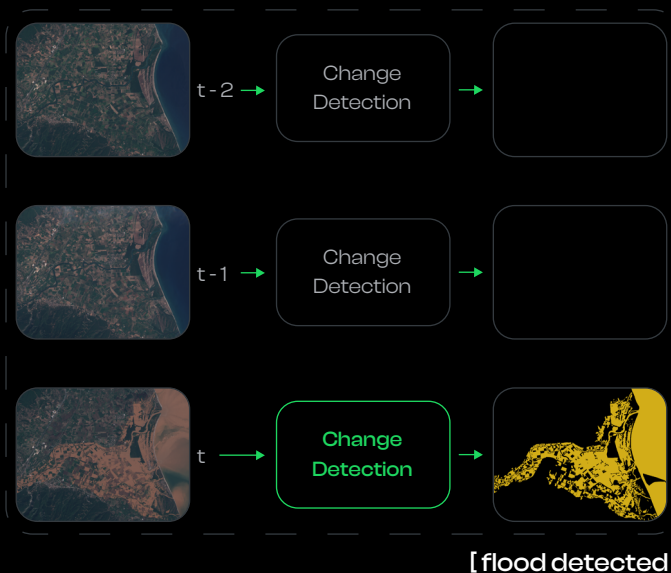
# Object detection

Identifying and tracking objects like ships, airplanes, and other targets in real time is challenging for Earth observation satellites, as traditional methods rely on sending large data volumes to the ground for processing, leading to latency and inefficient bandwidth use. With growing needs in civil monitoring, such as detecting methane leaks or infrastructure damage, real-time onboard detection is essential. Our SKAISEN system addresses this with AI-based object detection directly on the satellite, using machine learning to detect and classify multiple object types in real-time. By prioritizing relevant data for transmission, SKAISEN reduces communication overhead, improves response times, and supports rapid decision-making for applications in environmental protection, disaster response, and public safety.



# Change Detection

SKAISEN detects significant scene modifications — floods, infrastructure damage, land cover change — directly onboard, without storing historical imagery. The model uses compact world embeddings as reference, enabling continuous pass-by-pass monitoring with minimal onboard storage footprint and resilience to degraded inputs such as partial cloud cover or corrupted frames. Runs at 43 FPS on NVIDIA® Jetson™ Orin Nano.



SKAISEN is available as standalone models or as a full suite.

Cloud screening is licensed via SKAIPACK (sold separately).

## OBJECT DETECTION

AI-based onboard detection of ships, vehicles, and other targets

## CHANGE DETECTION

Continuous onboard monitoring for floods, infrastructure damage, land cover change

## FULL SUITE

Object Detection + Change Detection

- 1 Per device (lifetime)
- 2 Per project (unlimited devices)

To make an inquiry, request a quotation, or learn more about ZAITRA's products and services, please contact us at: [info@zaitra.io](mailto:info@zaitra.io)



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