



A CASE STUDY IN COLLECTING ACTIONABLE HAZARD DATA IN THE ERA OF EXTREME FLOODS

2021



In July and August 2021, heavy rain hit Northern Europe, followed by Hurricane Ida in the US and the Caribbean, resulting in billions of dollars of loss for the insurance industry. With the capability to see through darkness and clouds, ICEYE was able to generate data on the flood depths and define the number of impacted buildings within hours of the occurrence, enabling insurers to take immediate action to respond to their client's needs.

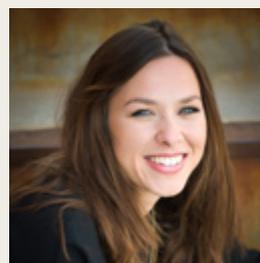
For this panel discussion, Matthew Grant was joined by Nathan Uhlenbrock, Solutions Architect at ICEYE and Rosina Smith, Head of Product at McKenzie Intelligence Services. The discussion aimed to bring to life the various stages of what happens from when a storm is first forecast all the way through to how the data gets onto an insurer's desktop. They talked through the process of how ICEYE deploys its synthetic aperture radar (SAR) satellites during flood events, how it gathers the data and provides insurers and other clients with key information including flood depth. Our speakers discussed how this data can be used for decision-making in claims and exposure management.

[View original LiveChat here](#)

Speakers



Nathan Uhlenbrock
ICEYE
Solutions Architect



Rosina Smith
McKenzie Intelligence Services
Head of Product

Nathan Uhlenbrock, Solutions Architect, ICEYE

What does your role at ICEYE involve?

NU: As a Solutions Architect I help ICEYE achieve its product goals. ICEYE was the first company to miniaturise synthetic aperture radar satellites, and it was the first constant flood monitoring programme. ICEYE is also developing products for wind damage and wildfire damage amongst others.

How does ICEYE ensure that its satellites are in the right place at the right time?

NU: Our meteorology team helps us know where a flood is likely to occur. To capture imagery ahead of the flood, we send our satellites to those locations. It's possible to do this quickly as we own the satellites. Currently we have 14 deployed, and nine of them are used for flood analysis.

What are the benefits of ICEYE's imagery?

NU: Given the number of satellites we have, ICEYE can cover a large area in a short period of time. Our satellites are also able to capture imagery at any time; they can see at night, through clouds and through smoke. Floods tend to occur when there are clouds, so this capability is essential. The final key benefit is the combination of high resolution with large footprint size.

How do ICEYE's satellites capture data?

NU: Our satellites send energy beams to the earth. This energy is then reflected back, and the satellites record the intensity of this reflection. We then combine this satellite information with third-party data, algorithms and machine learning,

ICEYE's data is provided in near real-time. What does this mean?

NU: We observe the flood as soon as it occurs and aim to process the data within 24 hours of our first image acquisition. When the flood peaks, we release the full extent and depth at a very high resolution, following up with daily updates if required. This is much faster than is common in the insurance industry, with wait times of several weeks for models to be run and often subjective measurements from humans in the field.

Why does it take 24 hours for ICEYE to release data?

NU: We are able to give a situational awareness response faster than 24 hours. We can send out a high-level report of what we're seeing, such as the towns affected and average depth of flood water, in almost real-time. Governments are often keen to get this information quickly. It takes ICEYE 24 hours to create a high-fidelity version, and this timeframe matches up with when our customers are able to take action.



15,781 buildings impacted by flash flooding in Louisiana on 17th May 2021. Source: ICEYE

What is the spatial resolution and what is the vertical accuracy of flood height?

NU: The horizontal resolution of ICEYE's imagery is generally around three metres per pixel. The data that is finally presented to our clients uses a variety of sources, including river gauges and terrain data. Third-party digital terrain data is necessary to create our flood depth analysis, so the quality of this data can impact the horizontal resolution and vertical precision. In major insurance markets, terrain data tends to be of higher quality so ICEYE's horizontal resolution is never worse than five metres, and the vertical resolution is never worse than 30 centimetres.

Does ICEYE estimate the damage from the flood?

NU: ICEYE does not directly estimate the damage to a building or the financial loss, but our information is used by insurers to assess individual building loss by using their own or other third-party models.

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— NATHAN UHLENBROCK

Rosina Smith, Head of Product, McKenzie Intelligence Services

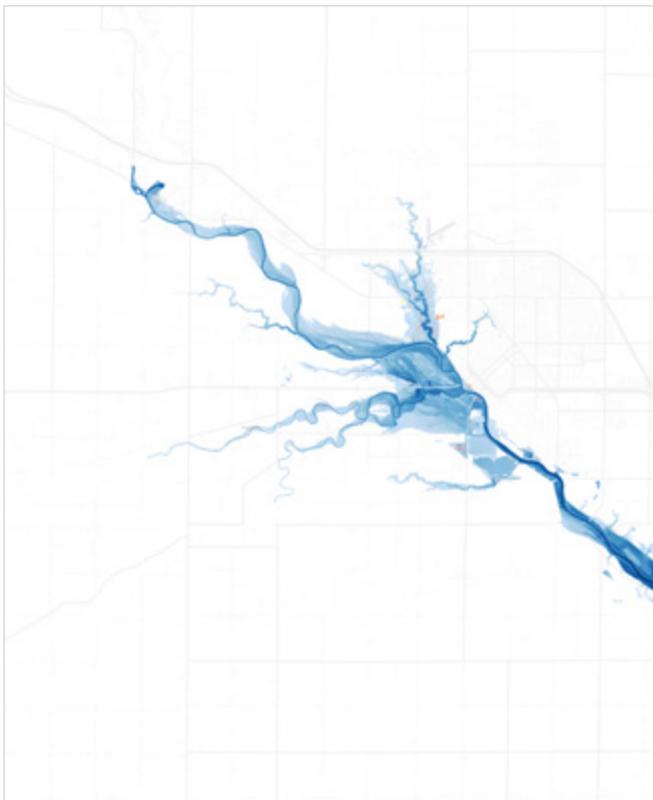
Can you explain what you offer with GEO?

RS: GEO is our Global Events Observer. It is a front-end system that brings in third party APIs combined with machine learning and analyst insight. It was built in conjunction with the European Space Agency. It now includes one of ICEYE's flood products.

What data does MIS provide to organisations in Lloyd's?

RS: In August 2021, MIS announced that all Lloyd's managing agents will have unlimited access to GEO, and the data that we provide through GEO. The partnership also gives access to the DCA (Delegated Claims Administrator) community, which are outsourcing partners that support the Lloyd's market.

What data is MIS getting from ICEYE and how is it being presented to clients?



1,380 buildings impacted by a dam breach
in Midland, Michigan in May 2020. Source: ICEYE

RS: ICEYE's data comes to MIS in two components. The first is flood extent, which helps us understand where is flooded and where we need to deploy further intelligence resources. The second component is the severity metric: flood depth. MIS looks at this data with our other sources to corroborate the potential damage to properties that we're managing on behalf of our clients. One of the reasons why we are keen to work with ICEYE is due to the rapid revisit potential - that is the speed with which a satellite can return to an event - which is important for us as we aim to build a picture of an event as it happens.

How does MIS ingest ICEYE's data and how do clients access it?

RS: MIS offers its customers ICEYE's data in different formats. GEO is available as a front-end and can ingest data from ICEYE via an API. Alternatively, MIS can set up APIs for customers to access data

directly. Once we have ICEYE's data, we supplement it with other sources. We review any areas of uncertainty with ICEYE. Finally, we apply our damage assessment to individual properties following further assessment by our Intelligence Analysts. The output to our clients can then be one or more of the following: 1) a simple yes or no determination of whether damage was suffered to an individual building, 2) a direct FNOL (First Notification of Loss) call made on behalf of an insured client, or 3) an insured's loss estimate at portfolio level that is incorporated into a company's event response process.

Who typically uses the MIS system?

RS: Many claims handlers use our system and we are increasingly seeing interest from exposure management teams. At MIS we are familiar with the key exposure management data sets used across the industry. We understand how modellers are representing insurance contracts and policy terms such as attachment points and layer deductibles. We can apply this directly to bespoke reports for exposure management teams.

What data sources does MIS use to complement ICEYE's data?

RS: In addition to ICEYE's data, we use other sensor data from weather stations and river gauges. We also commission data from the companies that deploy aircraft and drones to fly underneath clouds. MIS can provide additional information to support business interruption loss estimates by for example looking at road closures and power outages.

[View original LiveChat here](#)

ICEYE

ICEYE operates the world's largest synthetic-aperture radar (SAR) satellite constellation that can provide data and imagery for any location on earth, multiple times a day. By combining satellite imaging with multiple auxiliary information sources, ICEYE's Flood Monitoring Solution provides the insurance industry with near real-time global flood extent and depth data at the building level. This data enables claims automation and efficiency, and the calculation of overall flood losses to be estimated faster and more accurately than using models. In the future, ICEYE aims to develop a portfolio of natural catastrophe solutions that produce wind, earthquake, and wildlife damage data.

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McKenzie Intelligence Services

McKenzie Intelligence Services (MIS) empowers P&C insurers with trusted intelligence to respond to catastrophes. Using an AI powered solution, MIS blends machine learning and expert analysis to deliver a detailed digital representation of global perils at speed. MIS enables claims and exposure management teams to make fact-based decisions in the immediate aftermath of a catastrophic natural or man-made event anywhere on Earth.

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