Central Europe Floods of September 2024

Event Response

September 2024

Modelled Loss Summary

Aon releases a modelled estimate for the Central Europe Flooding of September 2024, caused by the Storm Boris. It is based on a full reconstruction of the footprint from rainfall observations and run using new Impact Forecasting flood models. Additionally, Aon teams have selected similar stochastic events to get initial modelled loss estimates shortly after the event.

- These losses are based on a fully reconstructed event using rainfall observation data, modelled in Impact Forecasting flood models
- The loss estimates are based on exposure data representing more than 90% market share and indexed to 100%
- Only the damage caused by fluvial and pluvial flooding is modelled. Losses caused by other perils (e.g. windstorm, landslide, hail) are not included
- Losses covered by facultative reinsurers and losses incurred by insurance policies not written locally (international programs) are not included
- Effect of demand surge is not modelled

Country	Market Loss Estimate (million EUR)
Czech Republic	775
Austria	555
Poland	285
Slovakia	33
TOTAL	**~1,650**

Event Overview

What were the causes?

The flooding resulted from an extreme amount of rain that fell over a large area of Central Europe in a 5-day period from September 12 to 16. Primary synoptic feature associated with the event was the low-pressure system **Boris** (alternatively Anett), which developed in central Mediterranean as a Genoa low and stalled over the region, bringing rounds of torrential rain for several days.

What areas were impacted the most?

Significant damage occurred in parts of the Czech Republic, Poland and Austria. In the Czech Republic, the most affected areas were in the Opava, Odra and upper Morava catchments, with instances of catastrophic damage in Jeseníky region, where rainfall accumulations exceeded 500 mm. In southwest Poland, dramatic situation occurred in the Nysa Kłodzka basin and in Austria, widespread flooding occurred particularly in Lower Austria. Additional impacts were reported from other countries - western and northwestern Slovakia, as well as in parts of Romania. In total, at least 28 people were killed, while several others remain missing at the time of this writing.

How does the event compare to historical events?

The event was widely compared to the historic flood event of 1997 in the Czech Republic and Poland. In some basins, 2024 water levels exceeded those reached in 1997 (including Opava River), but in other cases, particularly along middle Morava and Bečva Rivers, situation was less difficult. **Flood protection measures** built over the last 2 decades, as well as much more effective warning systems and forecasts made before the event significantly helped to mitigate material and human impacts in both countries.

Right: Kateřinky neighborhood of left-bank Opava, flooded by the Opava River.
Source: Fire Rescue Service of CR

Event Impacts

Czech Republic

The situation gradually deteriorated following the continuous rain on September 15. At the peak of the event, more than 270 locations reported flood stage, of which 120 exceeded the third, highest level. The worst situation was in Olomouc and Moravian-Silesian regions, particularly in Jeseníky, Opava and Ostrava areas, where the Opava River reached 1-in-100-year discharges and exceeded levels recorded during the catastrophic flood of 1997. Multiple towns and municipalities (Krnov, Opava) were partly or completely flooded. Many other locations across the country experienced flooding, notably in southern Bohemia and downstream of the Morava River.

The number of power outages peaked at 260,000 due to disruption on the grid. The widespread disruption occurred on the railway network, with essentially all travel cancelled in the Moravian-Silesian region. Emergency services responded to more than 20,000 incidents since the start of the event in total and more than 12,000 people were evacuated nationwide. Five persons were confirmed dead.

Austria

Extreme amounts of rain that fell in Austria resulted in widespread flooding, particularly in Lower Austria (Niederösterreich), which was declared a disaster area (Katastrophengebiet) on September 15. Particularly difficult situation occurred in the St. Pölten district, where multiple water courses overflowed their banks and several dams broke. Notable property losses were initially reported also from districts of Tulln, Krems and other. Five people were killed in the disaster area, including one firefighter. Notable damage and disruption were also reported from Vienna, as the local river Wien overflowed its banks.

Town of Krnov (upper) and River Wien in western Vienna (lower)
Source: Fire Rescue Service of CR, Stadt Wien

Event Impacts

Poland

Widespread flooding occurred in southwestern Poland. By September 18, the State Fire Service conducted more than 22,000 interventions related to the event, of which majority occurred in Silesian (śląskie), Lower Silesian (dolnośląskie) and Opole (opolskie) voivodeships. As of September 19, ten people were killed, several remain missing. More than 3,500 people were evacuated in total.

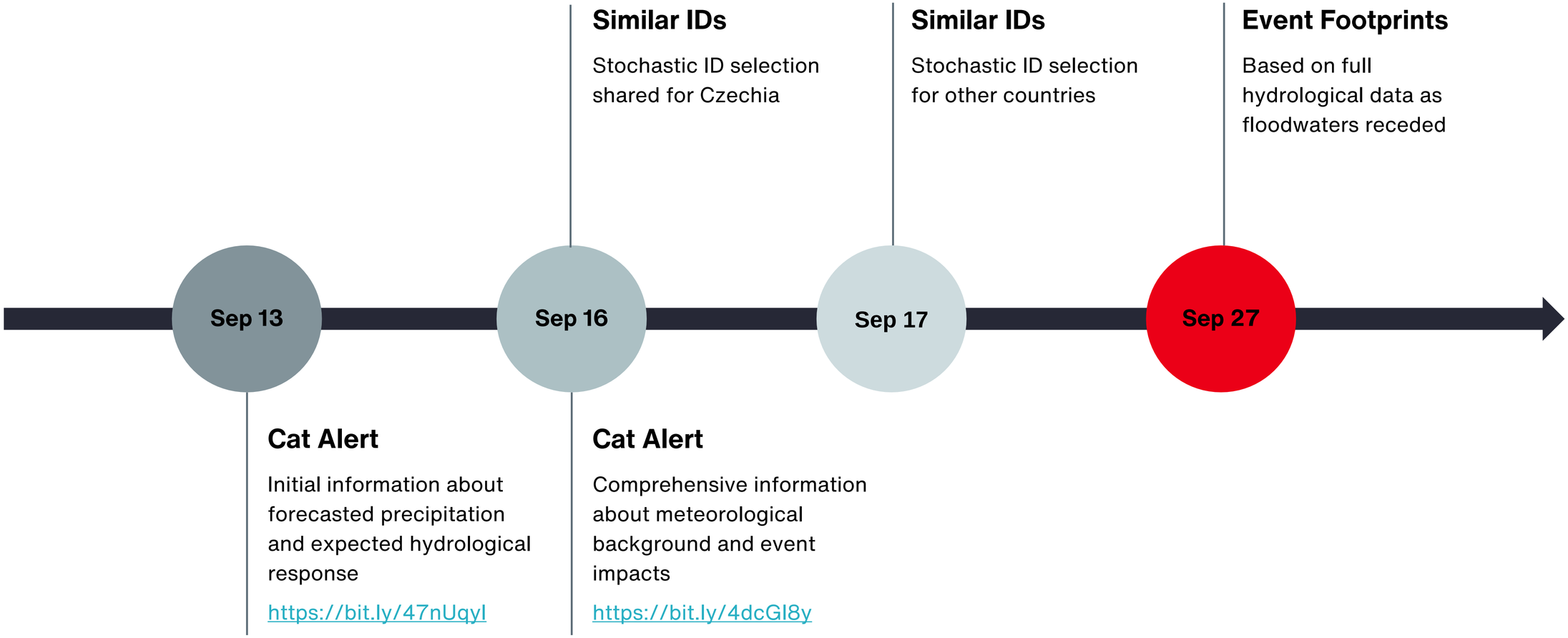
Critical situation occurred in Stronie Ślonskie, where a small reservoir collapsed on September 15, sending a large flood wave downstream and essentially flooding the entire town. Widespread damage occurred in the town of Głuchołazy, with a temporary bridge destroyed and large areas under water. The town was similarly affected during the Millenium flood of 1997. Further downstream, town of Nysa was notably affected. Critical situation also developed in the Kłodzko area, in Lądek-Zdrój, Prudnik and elsewhere. The flood wave later transformed and reached Wroclaw, with the culmination in the early morning hours of September 19. Flood defences upstream helped to keep the water levels under the 1997 records and despite reports of a number of dykes being breached along the river's course, the city escaped with relatively minor damage.

Slovakia

The most difficult situation ensued in Záhorie, Myjava and Kysuce regions. In Čadca, a 50-year flood on the Kysuca river affected the town and adjacent municipalities. In western Slovakia, many local streams burst their banks, notably in the town of Stupava. This was also the region with the highest rainfall accumulations, as it was notably affected by the windward effect of the Little Carpathian Mountains. It is worth noting that the highest rainfall, over 350 mm (13.8 in) in Pernek, was beyond the most pessimistic forecasts deemed as realistic prior to the episode. A notable amount of damage was caused by strong winds, particularly in the capital of Bratislava. One person died due to flooding.

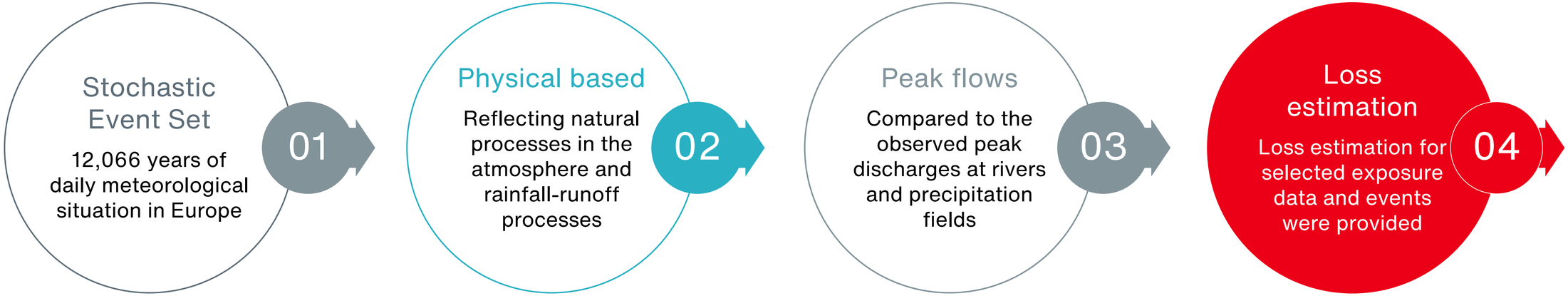
Catastrophic flood in Głuchołazy, southwest Poland (upper) and flooding in Čadca (lower)
Source: IMGW, Slovak Fire and rescue Corps

Impact Forecasting Modelling Response



Methodology

Similar Stochastic ID Selection



These events represent triggers for possible flood situations - from small localised floods to long-lasting regional rainfall events resulting in significant flooding across the region.

It is possible to find events that are not identical but similar enough compared to the recent meteorological situation.

Impact Forecasting has selected several events that are hydrologically similar.

Methodology

Event Reconstruction (Rainfall – Runoff modelling)

1 Precipitation

Flood driver

- Precipitation from SPARTAKUS dataset was used as an input for IF rainfall-runoff (RR) model for Austria
- Precipitation from ERA 5 and ICON dataset was used as an input for IF rainfall-runoff (RR) model for Slovakia
- Precipitation from IMGW dataset was used as an input for IF rainfall-runoff (RR) model for Poland
- Precipitation from CHMI dataset was used as an input for IF rainfall-runoff (RR) model for Czechia

2 Rainfall – Runoff modelling

Definition of the flooded area

- RR model was previously calibrated when developing the IF flood model for Austria, Czechia, Poland and Slovakia under the pan-European domain
- To have proper starting conditions, including water balance, the simulation was also done for the previous year

3 Frequency Analyses

Definition of the flooding intensity

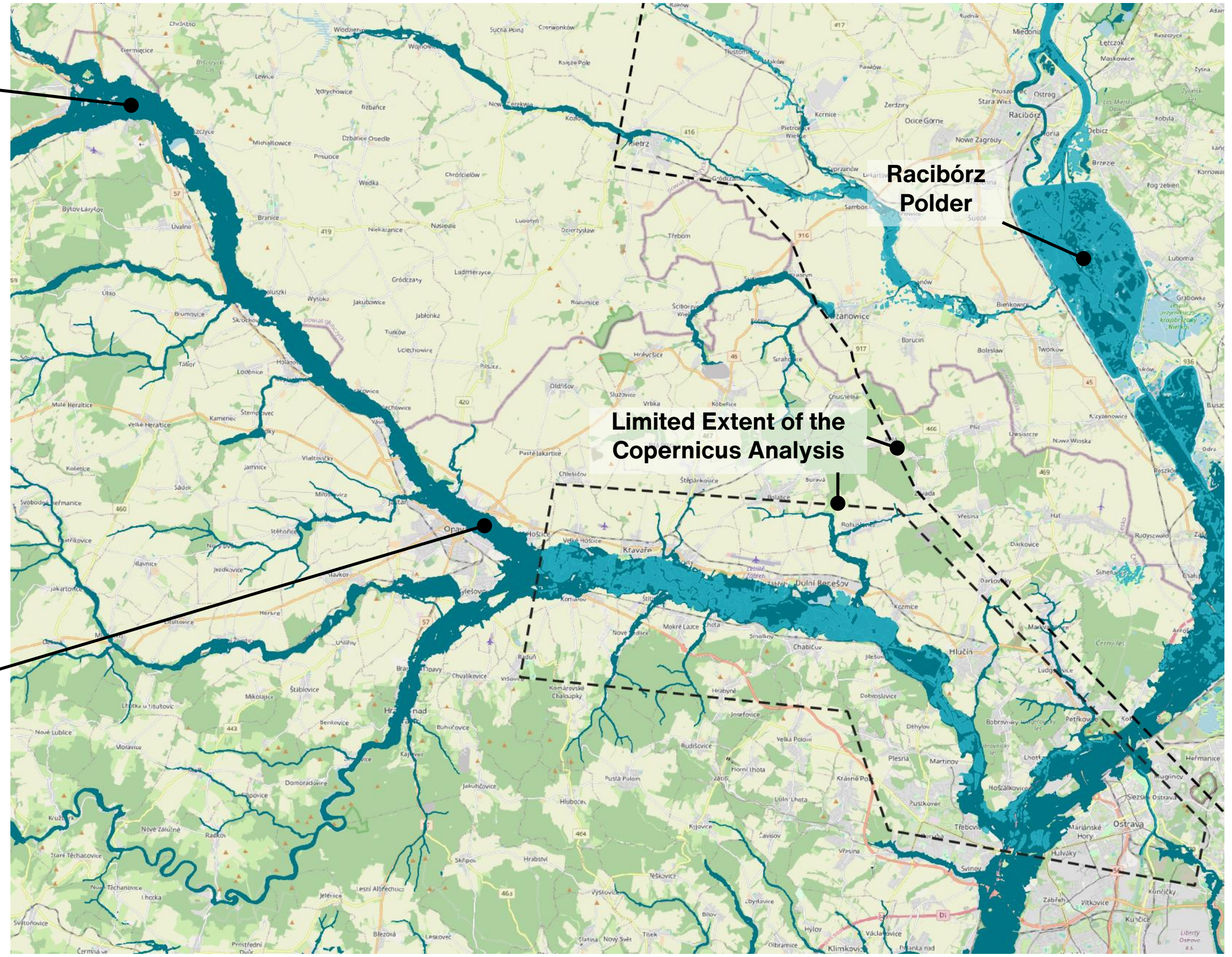
- Discharges for all rivers across the affected countries were extracted and return periods of river flows calculated, based on frequency analysis used in the Impact Forecasting flood models
- Pluvial return periods were calculated based on the observed values and frequency analysis, used in the Impact Forecasting flood models
- Frequencies were adjusted to match the observed values on gauge stations, where possible

Footprint Validation

Fluvial extent by Impact Forecasting (dark blue) and Copernicus (light blue)

The most affected towns of Krnov (upper) and Opava (lower) out of Copernicus' AOI

Photo: Fire Rescue Service of CR



What is Made Available

The following spatial data is made available in shapefile format for IF support users

It includes fluvial floodplain flooding footprint according all flood protection at the level of hydrodynamic simulation and level of standard of protection for urban areas affected by flooding

It does not include additional subperils

IF_CentralEuropeFlood_Sep2024_Poland_Fluvial.shp

IF_CentralEuropeFlood_Sep2024_Czechia_Fluvial.shp

IF_CentralEuropeFlood_Sep2024_Austria_Fluvial.shp

Download the data here

Contacts

Ladislav Palán
Lead in climate change quantification for flood
ladislav.palan@aon.com

Vít Kovačka
Flood model developer
vit.kovacka@aon.com

Michal Lörinc
Head of Catastrophe Insight
michal.lorinc@aon.com

Ondřej Hotový
Catastrophe Analyst
ondrej.hotovy@aon.com

Adam Podlaha
Head of Impact Forecasting
adam.podlaha@aon.com

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