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## September 2024 Boris Flood in CEE

**PIU Seminar** 

Warszawa

9 June 2025



#### **Causes of the Floods**

Primary synoptic feature associated with the event was the low-pressure system Boris/Anett.

It developed in central Mediterranean and stalled over Central Europe. Extreme amount of rain fell over a large area in a 5-day period from September 12 to 16.



Source: EUMETSAT, DWD

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#### Impact Forecasting Modelling Response



#### **Affected Areas**

- 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 rainfall accumulations that exceeded 500 mm.
- In southwest Poland, flooding occurred in the Nysa Kłodzka basin and upper Odra.
- In Austria, widespread damage occurred particularly in Lower Austria.
- Additional impacts were reported from west Slovakia, as well as from parts of Romania.

#### Event footprint reconstructed based on observed river flows



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### **Insured Losses**



437m 16m



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### **Distribution of Claims**

- Spatial distribution of claims is in line with modelled flood extent.
- Claims in cities, that were not flooded (Prague, Brno, Warszawa) probably show place of policy holder but not flooded property.



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### **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. On Sep 14, 385.6 mm of rain was measured at Švýcárna gauging station – this is a new Czech precipitation record.
- In some basins, 2024 water levels exceeded those reached during historic flood event 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 two decades, as well as much more effective warning systems and forecasts made before the event significantly helped to mitigate material and human impacts in the Czech Republic.



### Austria

- The event affected mainly Lower Austria and partially Upper Austria and Styria.
- Lower Austria (Niederösterreich) was declared a disaster area (Katastrophengebiet) on September 15.
- Several reservoirs or levees broke. Those were situated mostly along the right-bank tributaries of Danube between the cities of Klosterneuburg, Tulln and Krems.



- Unlike in Poland or Czech Republic, many Austrian insurance companies are localized, and their portfolios are concentrated in one federal state (Bundesland).
- Depending on the location of their portfolios, for some companies Boris flood was a substantial loss with long return period (below based on IF AT flood model), for others practically no loss.
- Strict policy conditions (10,000 EUR) reduced the insured losses.



#### September 2024 Flood Loss as Return Period

Levee failure near Tullnberg

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### Austria

- IF Flood model footprint correctly captures spatial extent of the affected area.
- To the west of Wien, real losses increased due to collapse of flood protection in several places which was not modelled.
- Unlike Poland or Czech Republic, substantial share of losses was caused by wind.



#### Poland – 2024 in Comparison with 1997



#### 2024 flood:

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- Spatially smaller than 1997 (and 2010).
- Water levels in lower reaches did not exceed record levels.
- Improved weather forecast early alerts preparing for floods e.g. releasing tanks, moving things out of the flood area, readiness of all components of the emergency system

#### New reservoirs and dry polders



#### 2024 water levels reached new records at several places

- 1. Nysa Kłodzka river in Kłodzko 150 cm above record water level from 1997.
- 2. Wilczka river in Międzygórze 33 cm above record water level from 1997.
- 3. Morawka river with dry polder in Stronie Śląskie the polder collapsed on Sep 15.
- 4. Odra river in Krzyżanowice 43 cm above record water level from 1997.

### Effect of Polder Racibórz Dolny



**Racibórz-Miedonia** (downstream): peak water level 801 cm = 244 cm below peak in 1997

**Krzyzanowice** (upstream): peak water level 955 cm = 43 cm above peak in 1997

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### **September 2024 Flood Loss Estimates**

- Modelled flood loss for Polish market: 1.319bn PLN
- Return period of modelled loss varies per company between 13-36 years.





#### IF Footprint of Sep2024 Flood (Fluvial & Pluvial)

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### **Damage Assessment – Field Survey**

#### Main goals of the field survey:

- Validation of the modelled water depth based on water marks on buildings.
- Comparison of the real structural and non-structural damage against the model damage curves.
- Documentation of the role of artificial barriers bridges crossing the river, roads, railways.
- Assessment of the role of individual flood protection (sand-bags) in the loss mitigation.
- Investigated area: Czechia and Poland – Kłodzko, Stronie Śląskie, Jeseník, Krnov, Opava, Bohumín.



#### Damage Assessment Kłodzko, Poland

- The predominant damage mechanism observed is related to contact with water.
- Debris impacts are an additional source of structural damage to buildings located near the river.
- Water level near the river was very high, reaching up to 4.5 meters.
- Even in buildings situated further from the river (approximately 100 meters away), watermarks are visible at a height of around 2.5 meters.
- Most buildings located near the river experienced moderate to substantial structural damage.
- Buildings located further from the river experienced either no structural damage or minor damage.
- Structural damage to buildings correlates with the initial condition of the buildings.





# **Damage Assessment** Stronie Śląskie, Poland

#### Stronie Śląskie dry polder

- 16 meters high
- Built between 1906 and 1908 to contain the frequent flooding caused by the Morawka River
- Built to withhold 70-80 m<sup>3</sup>/s
- Flood wave 320 m<sup>3</sup>/s



- Watermarks noted at heights from 0.5 m to 3 m, depending on building locations.
- Several buildings fully destroyed.
- Multiple appurtenant structures destroyed.
- High water density indicated by mud levels inside buildings.
- Bridge sustained significant damage.



### **Next Step – Final Flood Extents**



Bohumín – the railway barrier works in the model as real barrier while, in reality, flood overcame it and the extent spread further east.

- As of now (spring 2025), local hydrological offices are working on projects to evaluate the flood. Peak flows and peak water levels are being verified because during a flood the gauging stations may measure incorrect values.
- Once the verified hydrological data is published, IF model developers will use the data together with other information that was not available during the flood event (dam breaks, levee failures, water reservoirs being emptied before the flood) and will create final flood footprints.



# Thank you.



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