Oasis Future Danube

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PIK Imperial College London PPIS PANNON PRO INNOVATIONS BUDAPEST BUDAPEST WATERWORKS Budapest Sewage Works Pte Ltd. GFZ Helmholtz-Zentrum POTSDAM DTU OASIS PALM TREE

Background: the Oasis family

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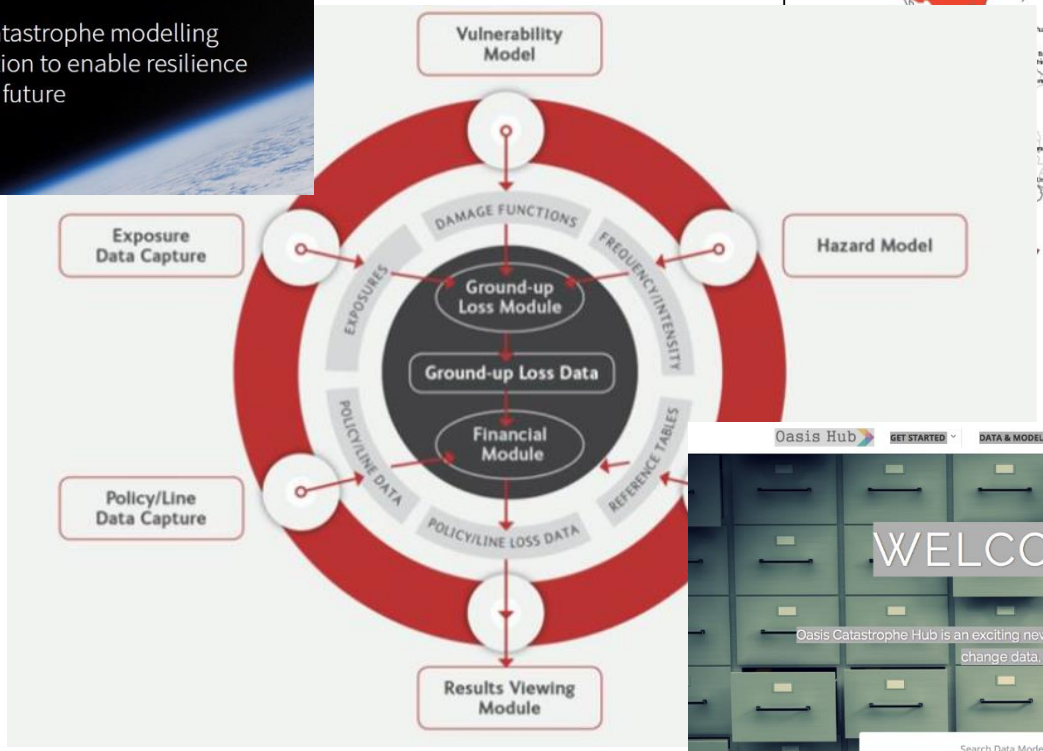
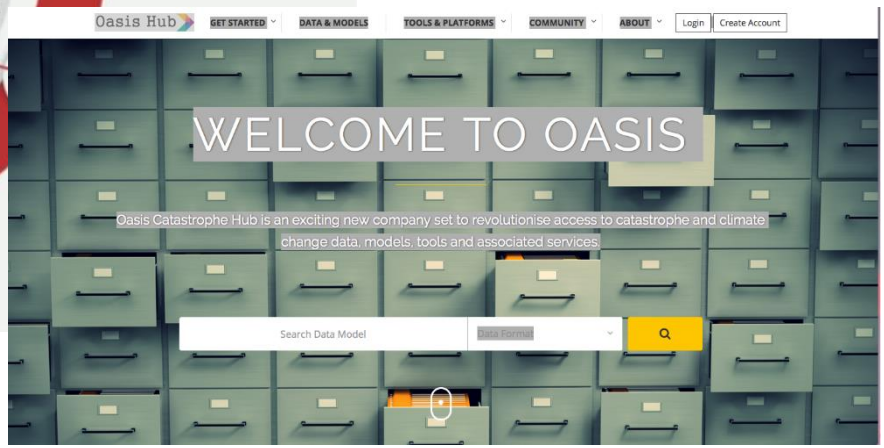
Open access catastrophe modelling driving adaptation to enable resilience in an uncertain future





Aim is to expand this framework to other sectors than insurance sector

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Motivation

- Existing global businesses provide customers with a **'black box' environment**, lacking transparency and, in addition, charge prohibitively high fees
- This is **hindering the extension of climate services** in the insurance sector and beyond and causes concern on how decisions on risk and the underwriting of risk are made
- More and more national and international regulations ask for a **"climate proof" investments** in large scale infrastructure
- The revision of the EU Floods directive (2nd cycle) will have a much **stronger focus on future risk, i.e. climate change and on transboundary issues** (implementation of the solidarity principle)
- **There hardly exist any common and transparent standards** for hazard and risk quantification

OASIS would like to provide a toolbox to tackle above issues.

Objectives

- Become a full scale model for the Danube Basin that uses stochastic modelling to predict today's and **future climate change impacts making the model unique**
- Acceptable in insurance markets and transfer this methodology into the government and industry sectors through **co-design with end-users**
- Draw awareness to this type of risk information to **sectors beyond the insurance sector**
- The model and its modules will be marketed through the **Oasis eMarket** and will be delivered with linked consultancy services.
- Deliver a **unique visualization package** to allow greater understanding of risks associated with the model for non-technical stakeholders.

Vision is to become one of Europe's leading providers of tools enabling catastrophe and climate risk assessment and adaptation planning by public, finance and other private sector organisations and create greater resilience against future events.

Novelty

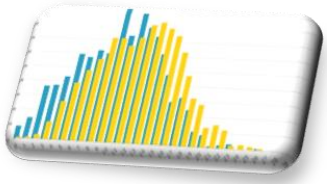
- **Future climate change impacts** on hazard and risk are considered and quantified;
- **Modular approach** that allows for applying the entire suite to get consistent multi-peril estimates or to plug-in external modules or data
- **Visualization** of results done by internet based open GIS technologies
- **Probabilistic approach** as a basis for informed decision making under uncertainty following OASIS Loss Modelling Framework
- **Full-basin, trans-boundary model for future climate impacts**

Tailor made processes and models focusing on certain users and locations by recognized standards

Future Danube: Model suite

Weather and climate module:
Stochastic generation of weather extremes under current and future conditions (precipitation, heat waves)

Hydrological module:
Modelling of hydrological extremes (floods, inundation, droughts) and water management (reservoirs, hydropower)



Risk module:
Modelling of flood damages in selected locations, to be extended to larger areas and other sectors

Adaptation module:
Toolbox for adaptation to hydrological and weather extremes

Visualization module:
Graphical interface for visualization of hazards and risk and analysis of outputs

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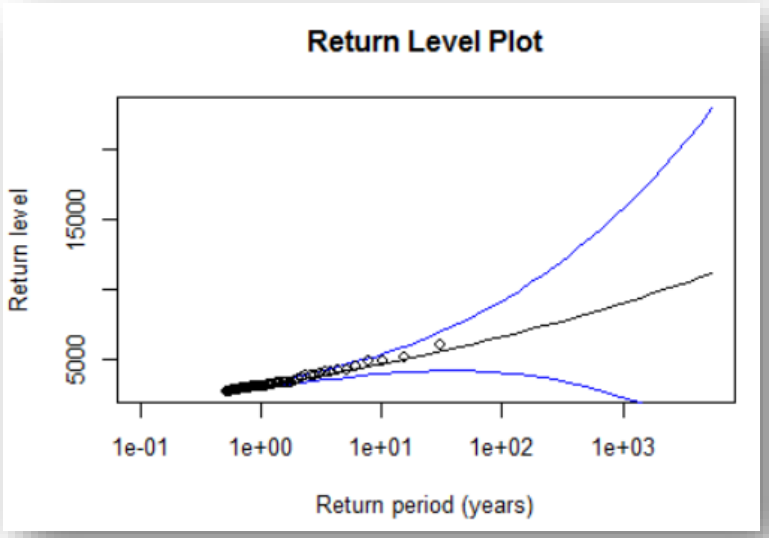
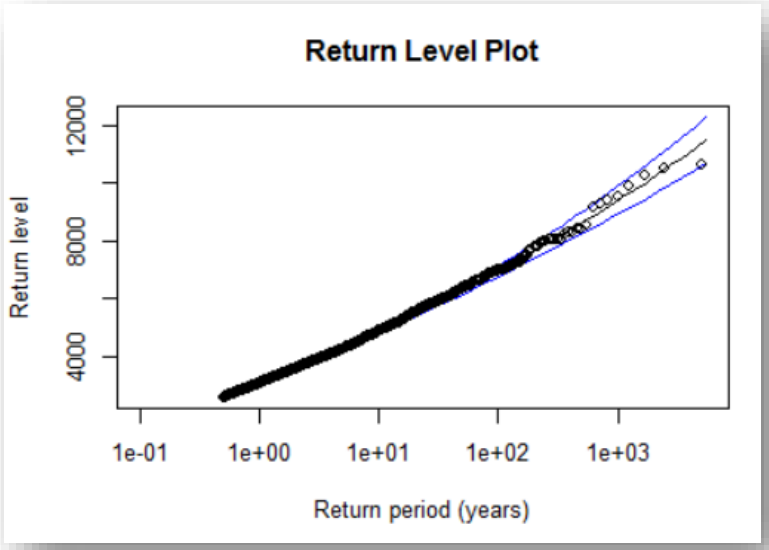
Climate and weather module: big data

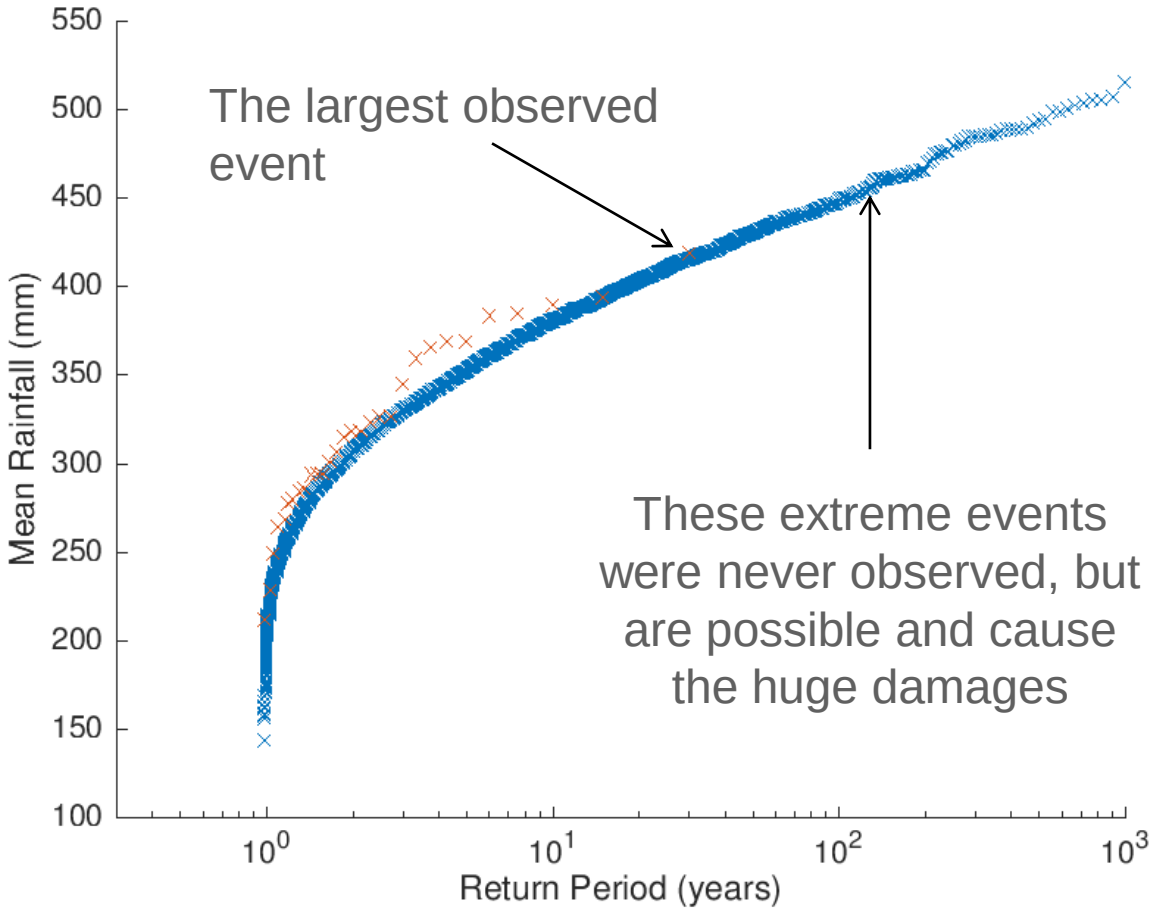
- **Robust risk information:** 200,000 years of daily climate and hydrological data, 13,0000 river sections and 200,000 spatial units
- **Methodology to reduce uncertainty**: uncertainty bounds (in blue) before and after it significantly decrease financial risk





Climate and weather module: input to further modules

- **JJA precipitation for Upper Danube basin**



X – 30 years of CORDEX data

X – 10,000 years of IMAGE data

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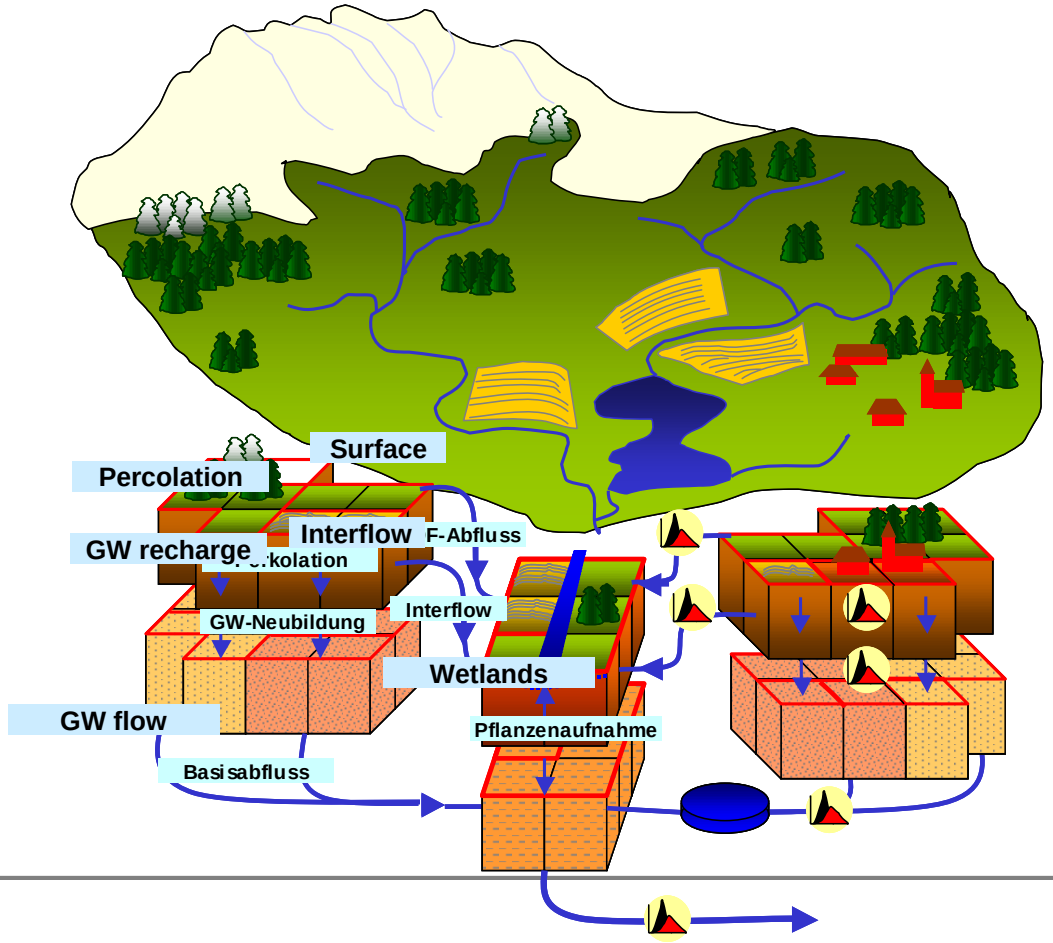
Hydrological module

- The weather information is fed into **the hydrological module (SWIM)**
- Floods/ droughts, water resources, water management, agriculture, hydropower, water quality



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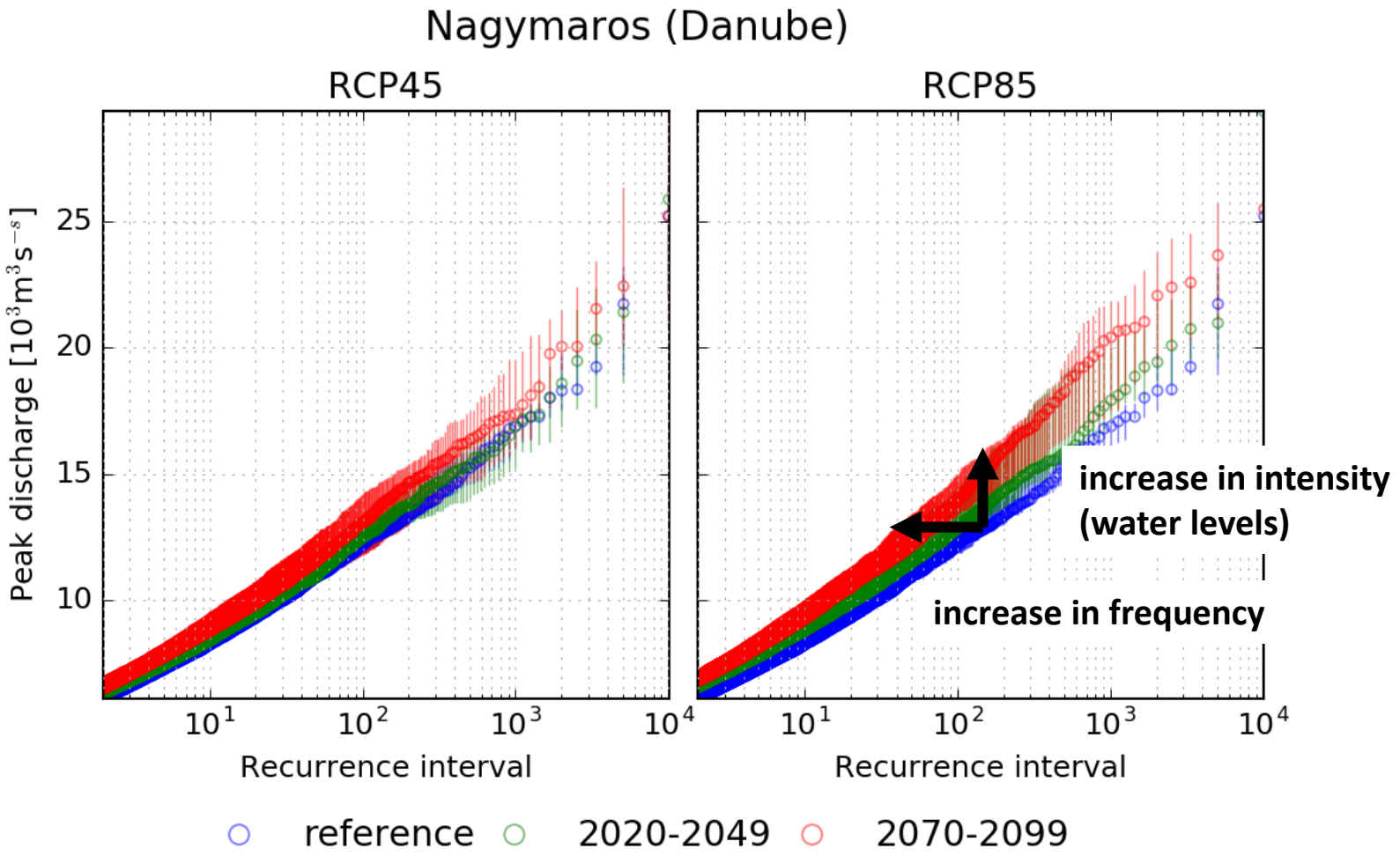
Change in flood frequency under future climate



These statistics are there for each of the 13,000 river sections

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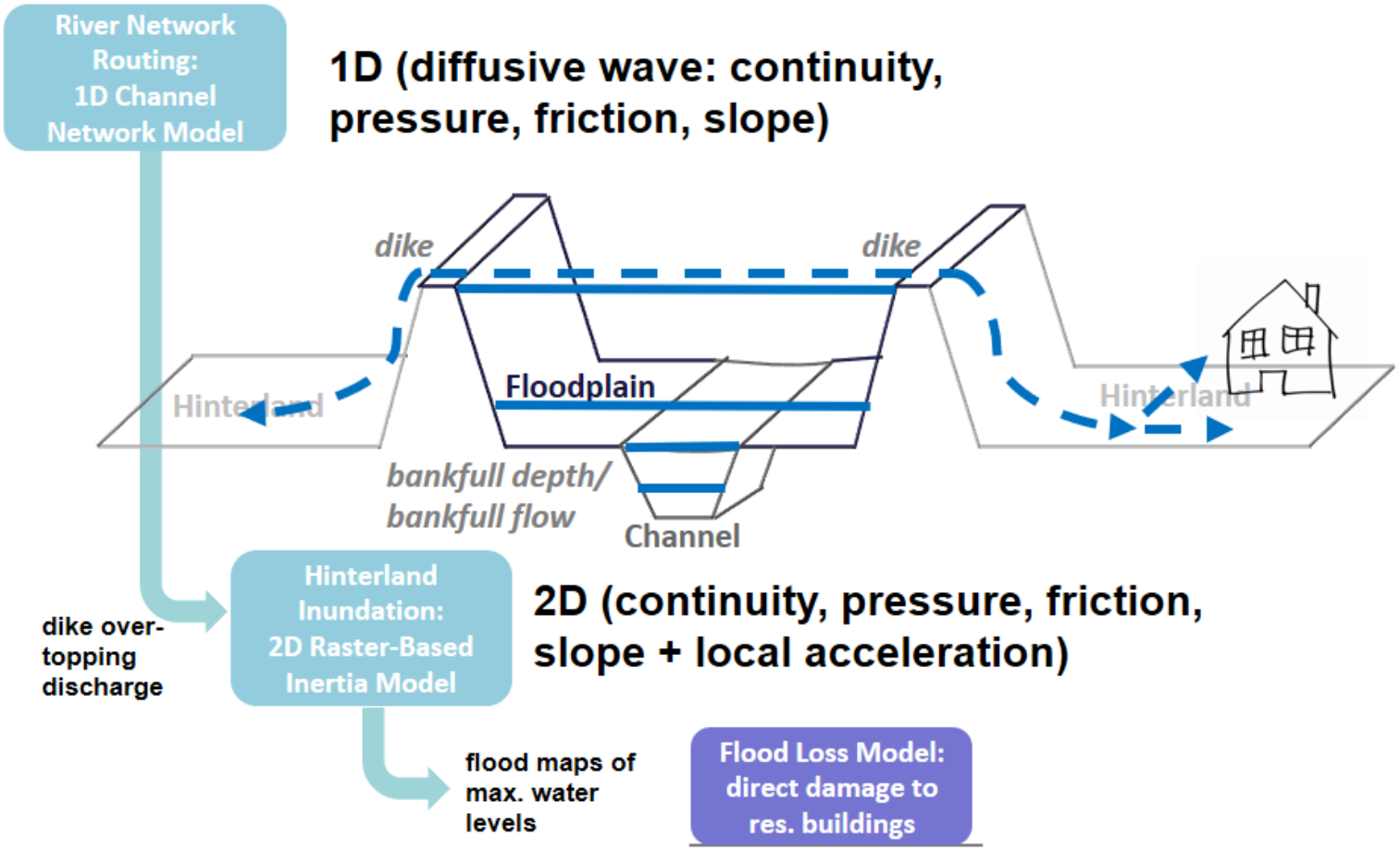
Risk module: from hazard to damage



For each inundated pixel: multi variable flood loss estimation

Loss = f (e.g. max inundation depth, building type, building quality, flood return period, duration, precautionary measures, emergency measures,…)

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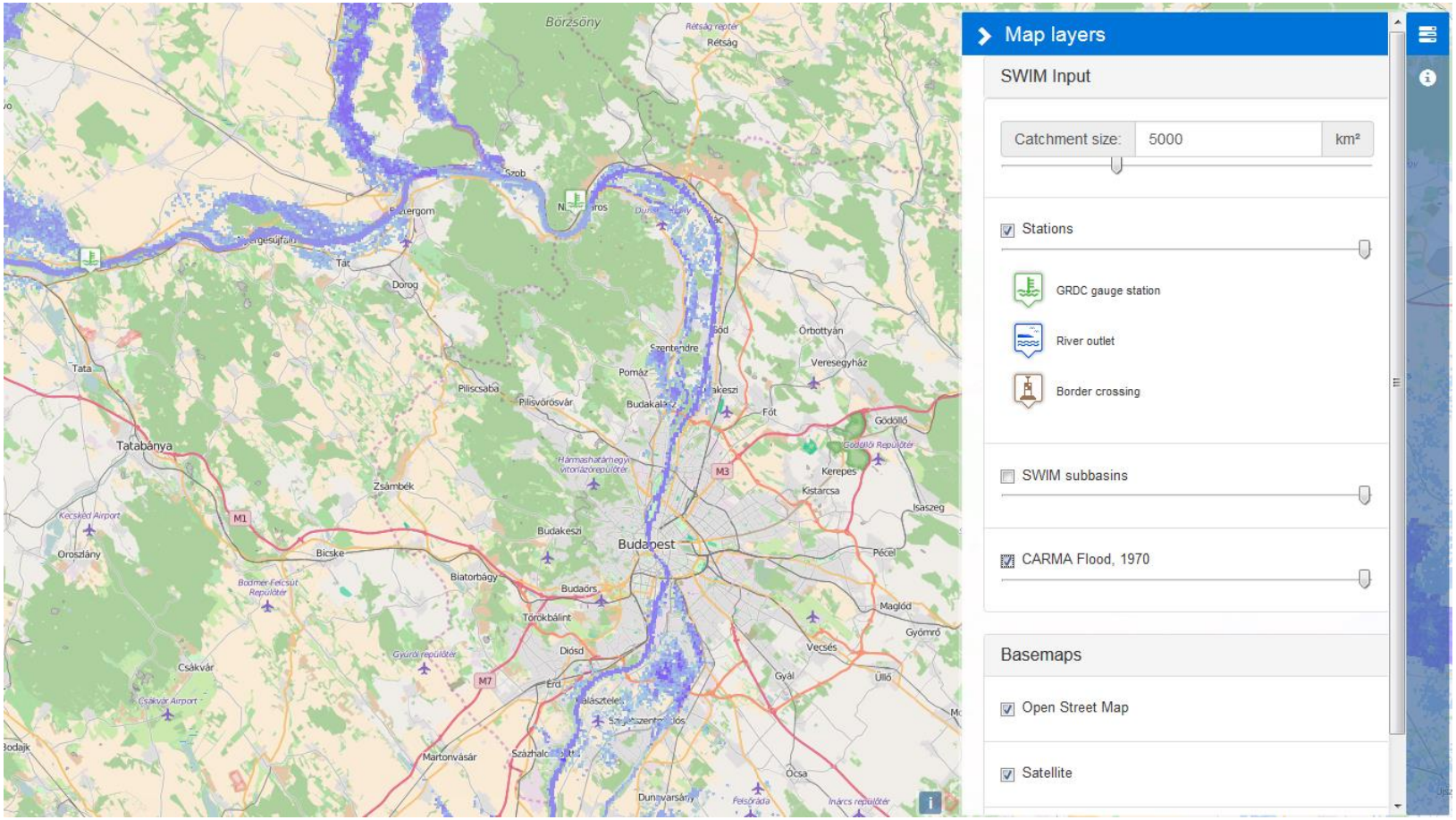
Future Danube: Inundation maps



Inundated areas, visualized in OpenStreetMap

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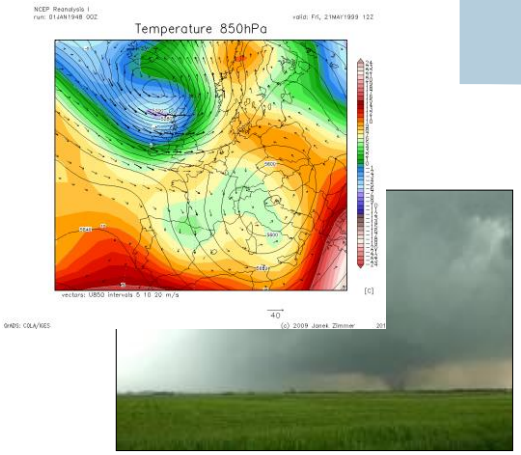
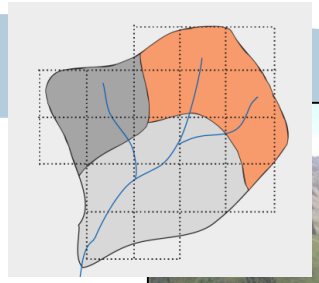
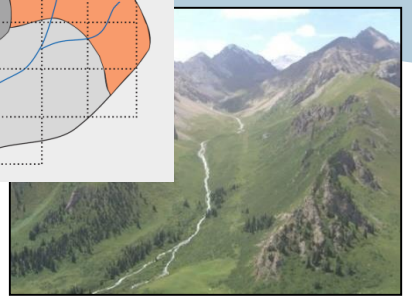
Future Danube: the process

Weather Event

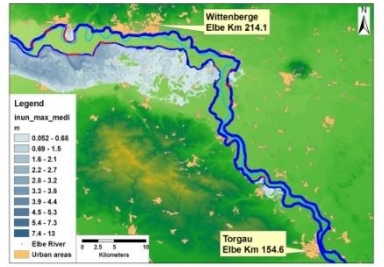


Hydrological processes



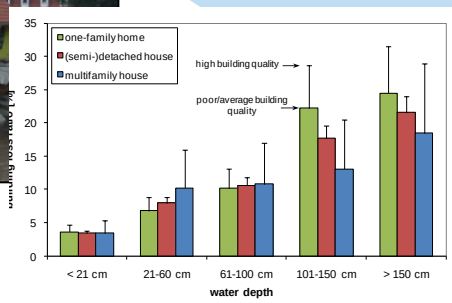


Hydraulic processes



Elements at risk

Damage



User-driven integrated modeling of hydro-climatic extremes and water resources

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Cooperation offer for further projects

- Modules or the entire model suite can be **transferred to other regions**
- Widening the **market beyond the insurance sector** (urban planning, energy)
- Covering the **full chain from hazard to risk to losses to adaptation**
- Easy to apply internet based **open GIS techniques** for data visualization

- **Verify the framework** in additional cases – water authorities, industries, energy sector, municipalities, insurance companies…
- **Test your model** within the Oasis LMF through the plug-n-play interface option
- **License** models
- Preparation of a LIFE proposal is under discussion

We are looking for future partners beyond Hungary, including regions and municipalities and industries likely to be affected by increasing extreme events

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References

- Oasis Future Danube with support from the EU's, **EIT Climate-KIC,** Europe's largest public-private innovation partnership focused on climate innovation to mitigate and adapt to climate change.
- O+D: Oasis+Danube Loss Modelling Programme selected under the **Technical Assistance Facility for Danube Region Projects (TAF-DRP).**
- **Climate change impacts on the insurance sector in Germany:** modelling of flood and storm damages under different scenario conditions
- Letters of intent: Allianz Group, Uniqa Group, Vienna International Group, Munich Re, German Insurance Association (GDV), Generali Group
- **H2020 Insurance Project, starting Spring 2017.**

eit Climate-KIC

TAF-DRP

Thank you for your attention!

http://oasisdanube.eu/

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