EIOPA roundtable
on catastrophe models
and physical risk

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Outline

- **What makes physical risk modelling difficult?**

- Overview of the ISIMIP database

- Overview of the Climate Impact Explorer

- Learnings on the use of open source data

Sources of uncertainty in climate impact modelling

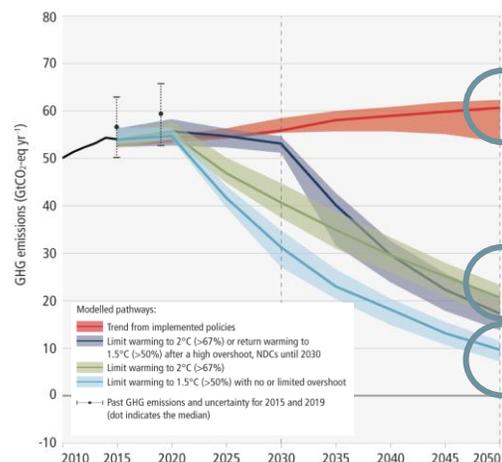CLIMATE ANALYTICS

IPCC WG III emissions scenarios (April 2022)

Extreme event similar to Low "Bernd"

Frequency

x23

x10

x2
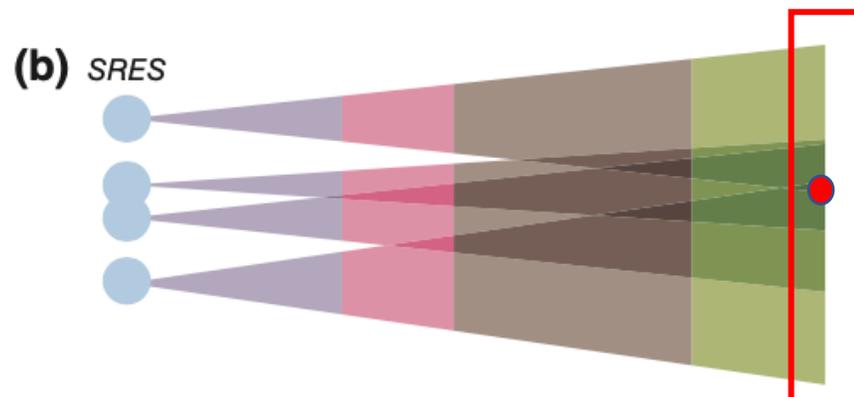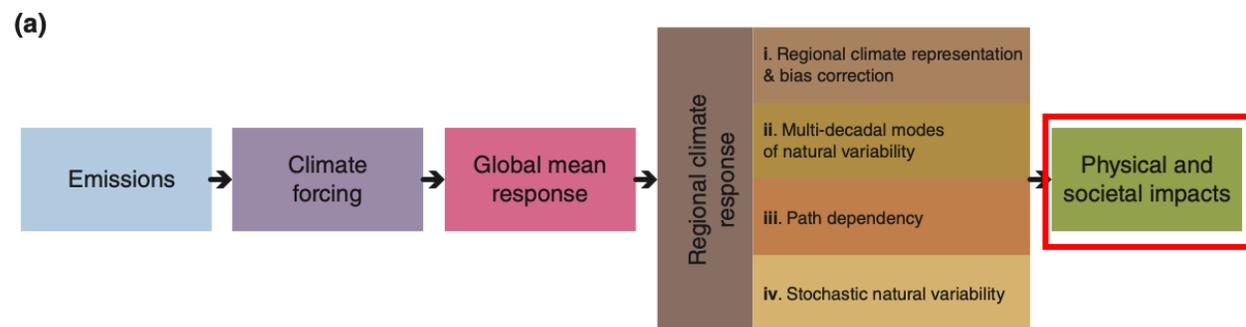
x1.8

?

Fig. 3: WG III Emissionsszenarien

Fig. 4: Precipitation at Ahr / Erft

"Low Bernd" in 2021 is estimated to have caused aprox. 5 Bn Eur insurance claims[1]

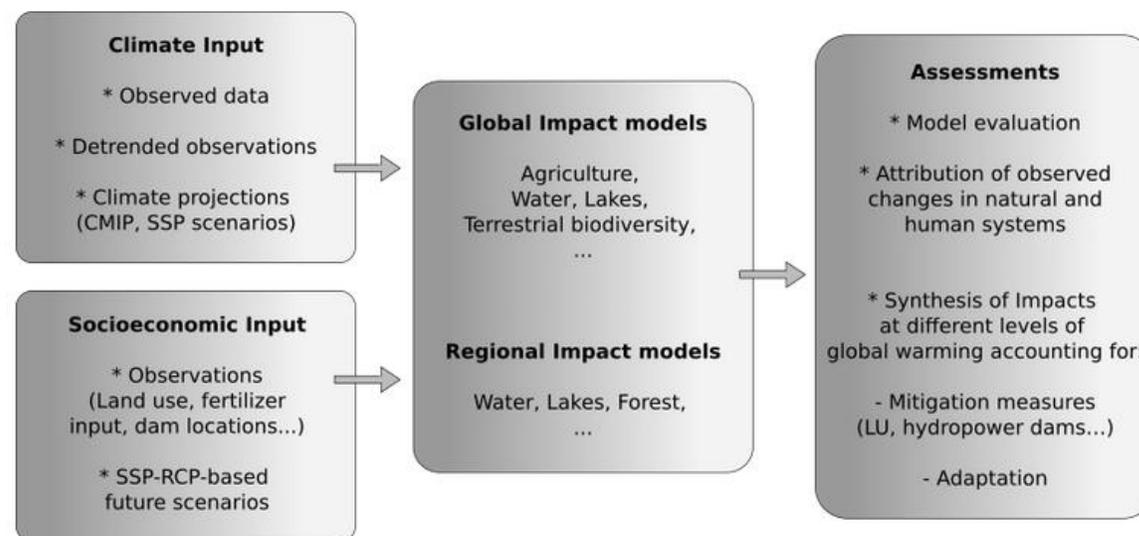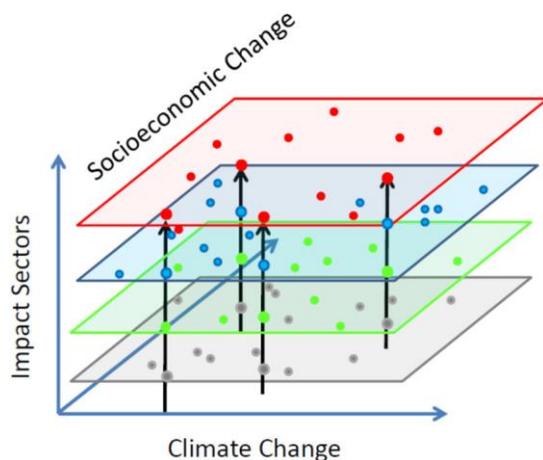# From emissions to impacts – Sources of uncertainty

(a)

Emissions → Climate forcing → Global mean response → Regional climate response
- i. Regional climate representation & bias correction
- ii. Multi-decadal modes of natural variability
- iii. Path dependency
- iv. Stochastic natural variability

→ Physical and societal impacts
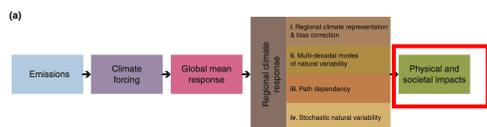
(b) SRES

[2]James et al., (2017)

- From emissions to local impacts, a range of factors need to be incorporated that are all subject to considerable uncertainty

- Uncertainty increases further down the 'impact modelling chain', and can become very large at the end of the chain (societal impacts such as damages)

- Moreover, the difficulty of capturing local-scale processes and the random noise component characteristic of the climate system and impact-related processed lead to increased uncertainty at the local level
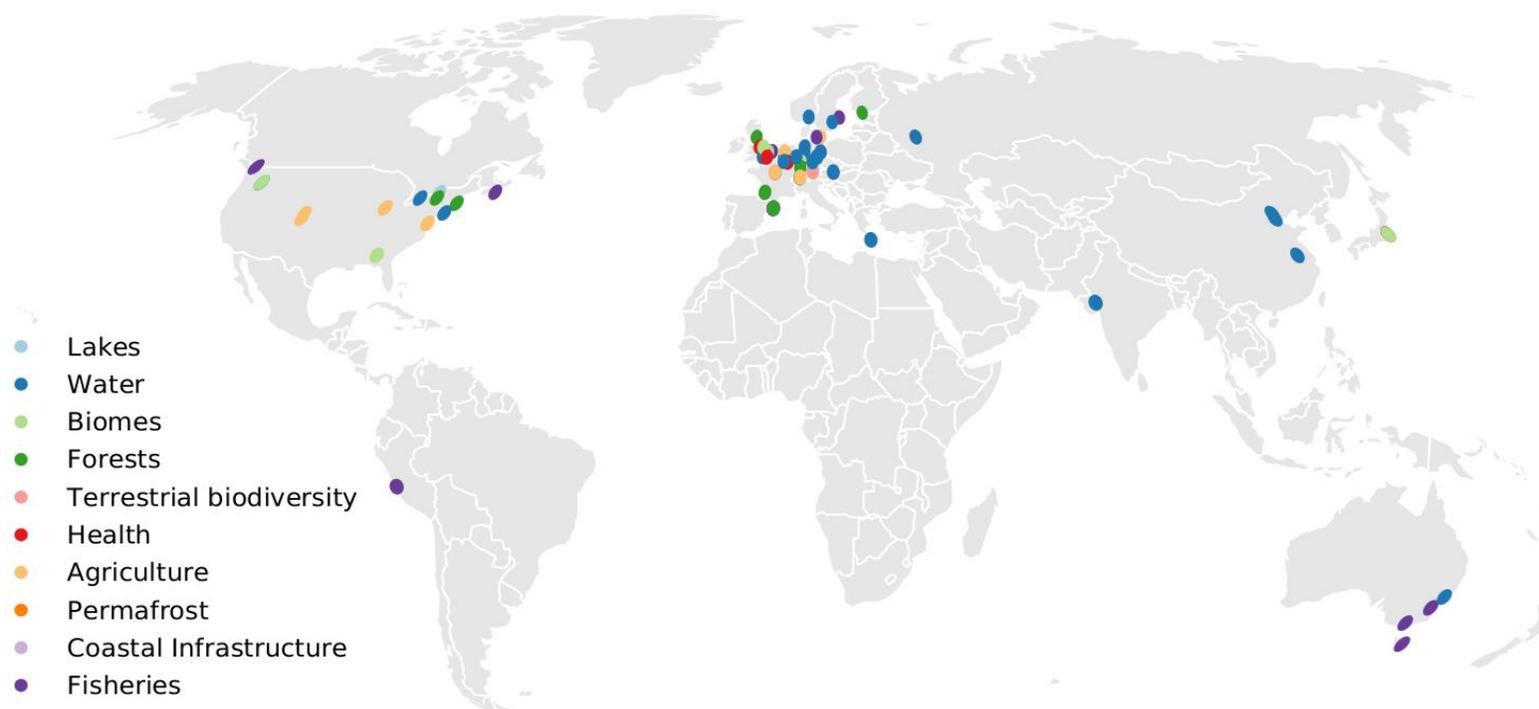
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ISIMIP – Overview

- The **Inter-Sectoral Impact Model Intercomparison Project** was created to conduct research on climate impacts on multiple sectors and across the globe

- It has been a pioneering project because it has relied on **common experimental protocols and common input datasets**, thus allowing to compare results across impact modelling groups

- It explores sectoral impacts from both the climate and human forcings (land use, water management, etc.)

ISIMIP – Modelling groups

Lakes
Water
Biomes
Forests
Terrestrial biodiversity
Health
Agriculture
Permafrost
Coastal Infrastructure
Fisheries

Community-driven effort based on voluntary participation of so far 100+ impact modelling groups worldwide, coordinated by the Potsdam Institute for Climate Impact Research

ISIMIP – Simulation rounds

ISIMIP Fast track (First release 2013-2016**):**
- future impacts (2010-2100)
- limited amount of sectors

ISIMIP 2a (2017-2020):
- historical impacts (1971-2010)

ISIMIP 2b (2017-2020):
- future impacts (2010-2100)
- addition of more sectors

ISIMIP 3a (2020-):
- historical impacts (1971-2010)
- focus on detection & attribution

ISIMIP 3b (2020-):
- future impacts with a focus on adaptation
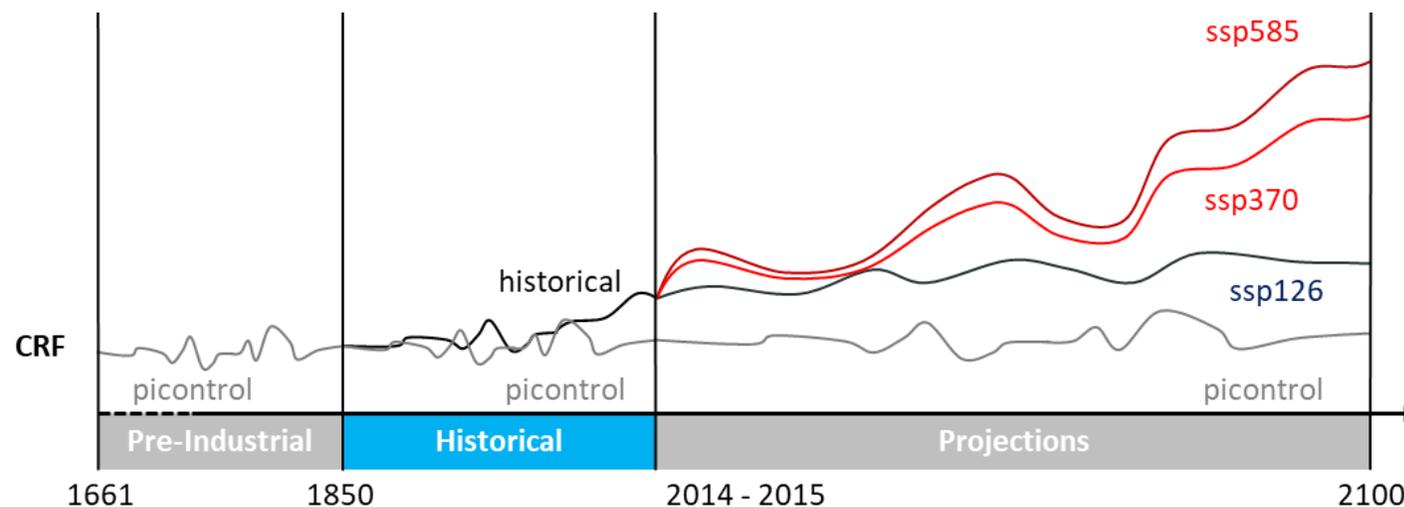
Standardized variables and data format, naming and structure

ISIMIP – Sectoral coverage

Water (global)   **Water (regional)**   **Fisheries**   **Energy**   **Regional forests**   **Global biomes**   **Agriculture**

Agroeconomics   **Terrestrial biodiversity**   **Permafrost**   **Coastal systems**   **Health**   **Lakes**   **Fire**

Labor productivity   **In development:**   **Water quality**   **Groundwater**   **Peatlands**

- ISIMIP results have been used in **200+ scientific peer-reviewed publications** and key contributors to the WG2 of the IPCC (on Impacts and Adaptation)

ISIMIP – Resources

Main portal: https://www.isimip.org/

Protocol: https://www.isimip.org/protocol/3/

Repository: https://data.isimip.org/

Data folder: https://files.isimip.org/

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CIE – user interface

Scenarios

RCP2.6

RCP4.5

RCP6.0

RCP8.5

NGFS current policies

NGFS net-zero 2050

NGFS delayed transition

CAT current policies
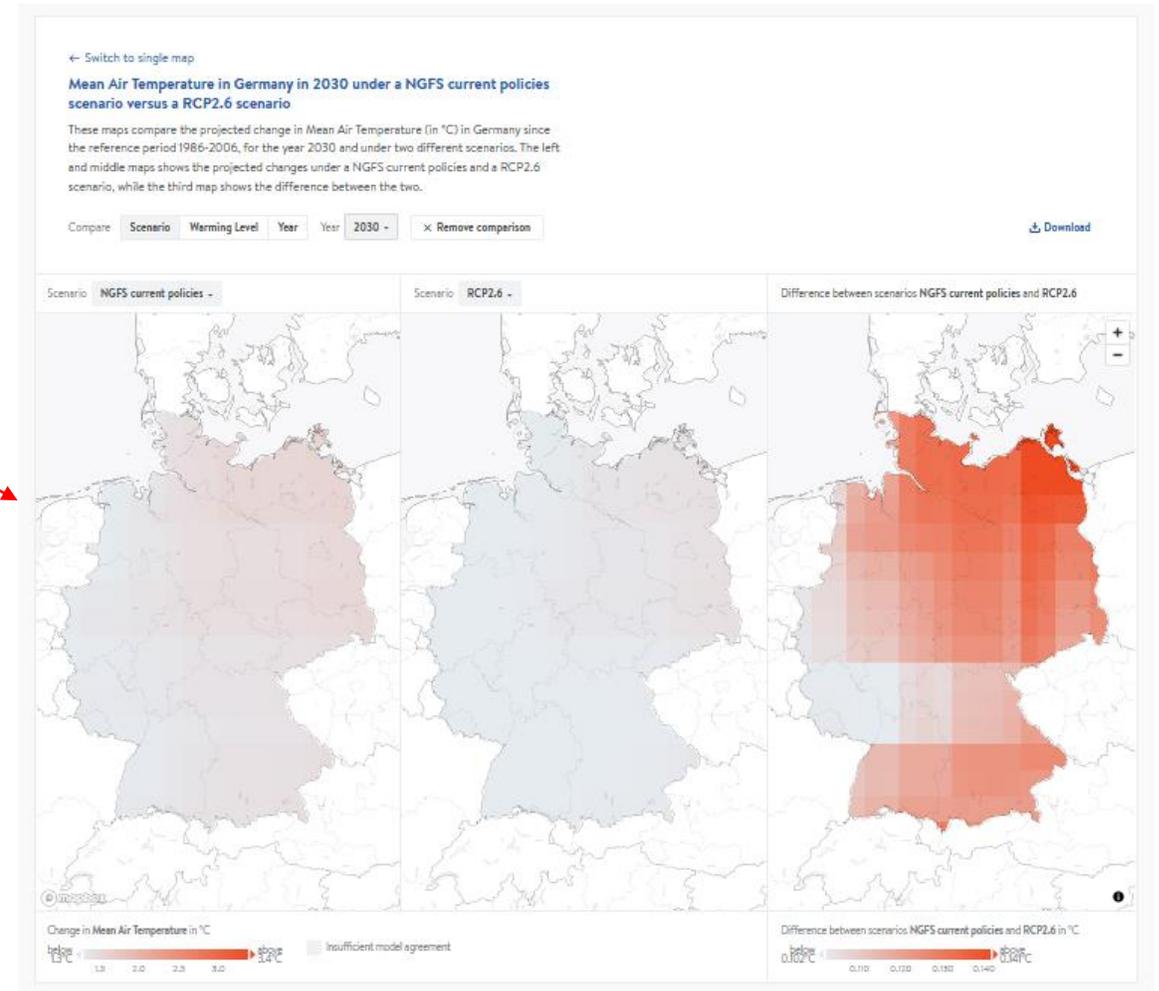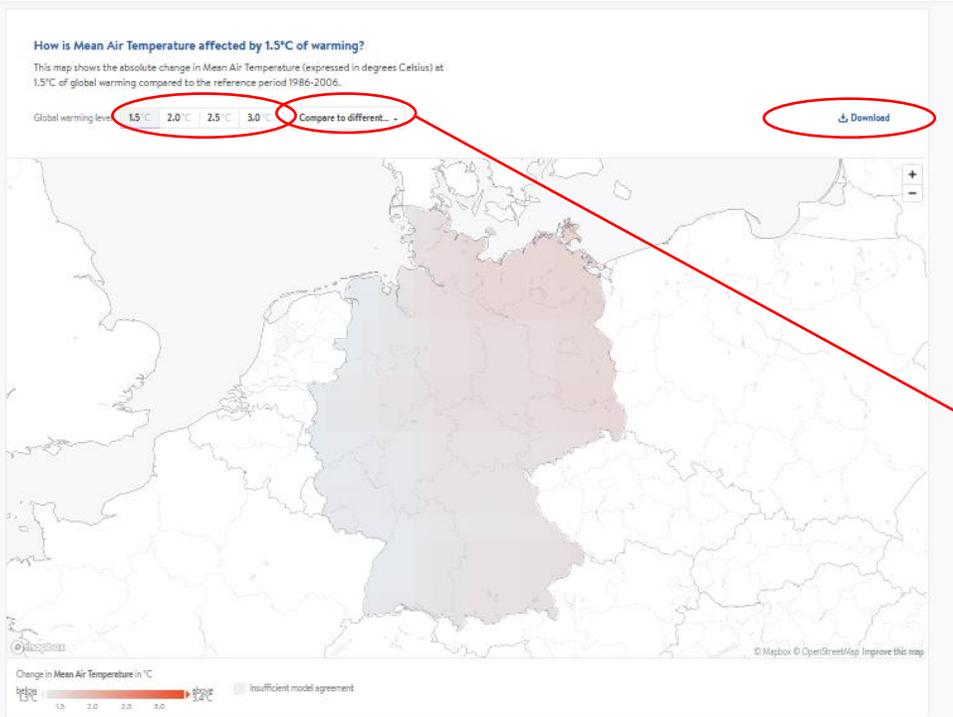
https://climate-impact-explorer.climateanalytics.org/

CIE – user interface

User survey

Climate Impact Explorer – data overview

- Provides impact projections for:

  - **8 scenarios**: 3 developed for the NGFS, 1 from the Climate Action Tracker, and 4 Representative Concentration Pathways

  - **32 indicators from 5 sectors, including Economic Damages** (4). But also Climate (11), Extreme Events (8), Agriculture (5), Freshwater (4)

  - with a comprehensive estimate of the uncertainty range (especially its upper bound – worst case scenario)

- Possibility to **compare projections** for different scenarios, years or warming levels

- Projections are based on publicly available impact data (ISIMIP and Climada) generated primarily for research purposes, and visualized in a way tailored to the NGFS

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Use of open source physical risk data
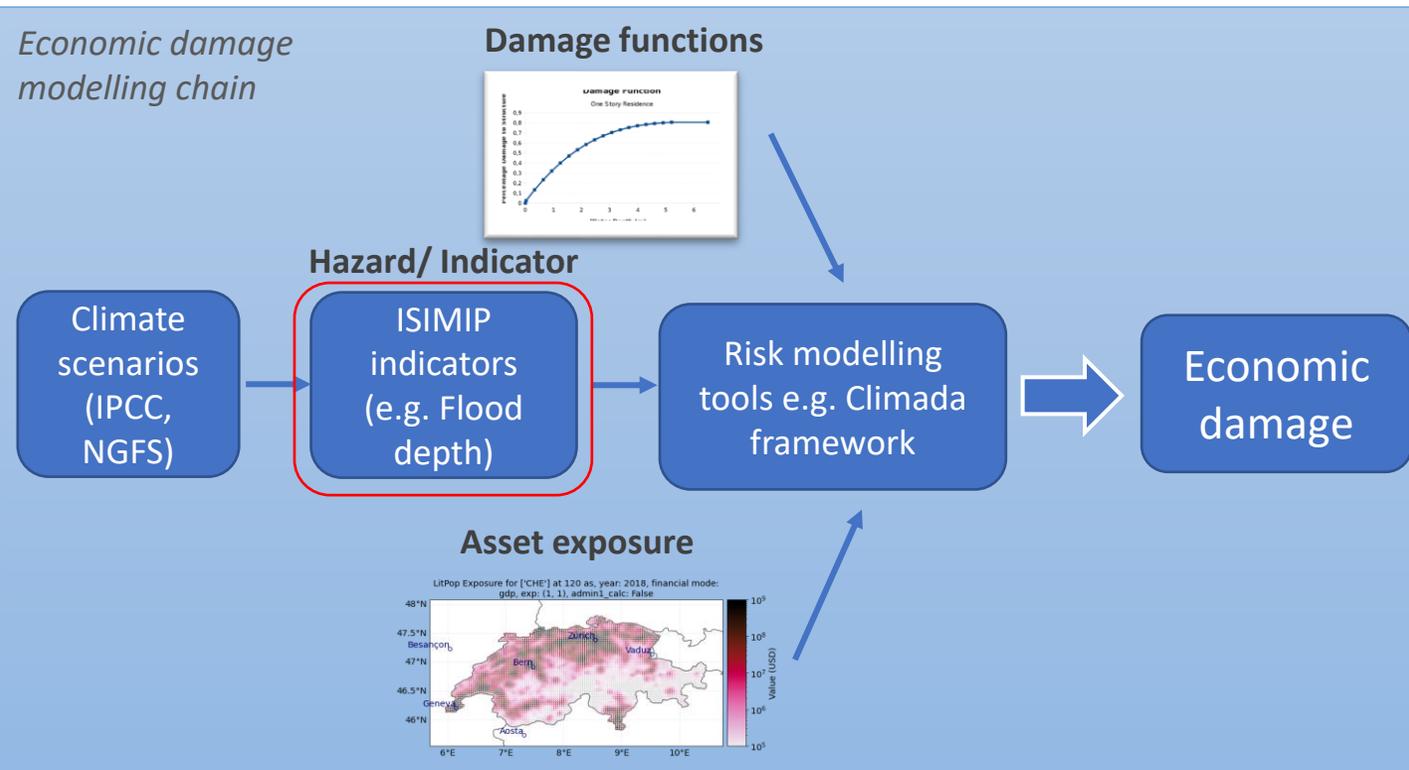
Challenges:

- Which model to choose?

- ISIMIP data was not produced specifically for economic damage calculation

- Global data vs. local resolution

- Validation of the open source data (other models, observations)

- To understand the date, reaching out to the modelling team is beneficial

Thank you for your
attention