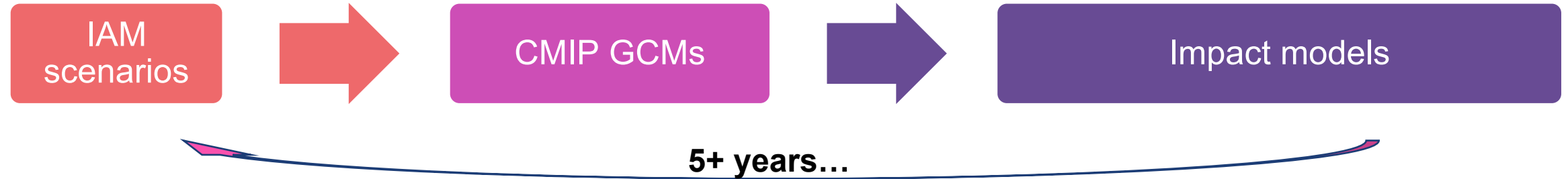




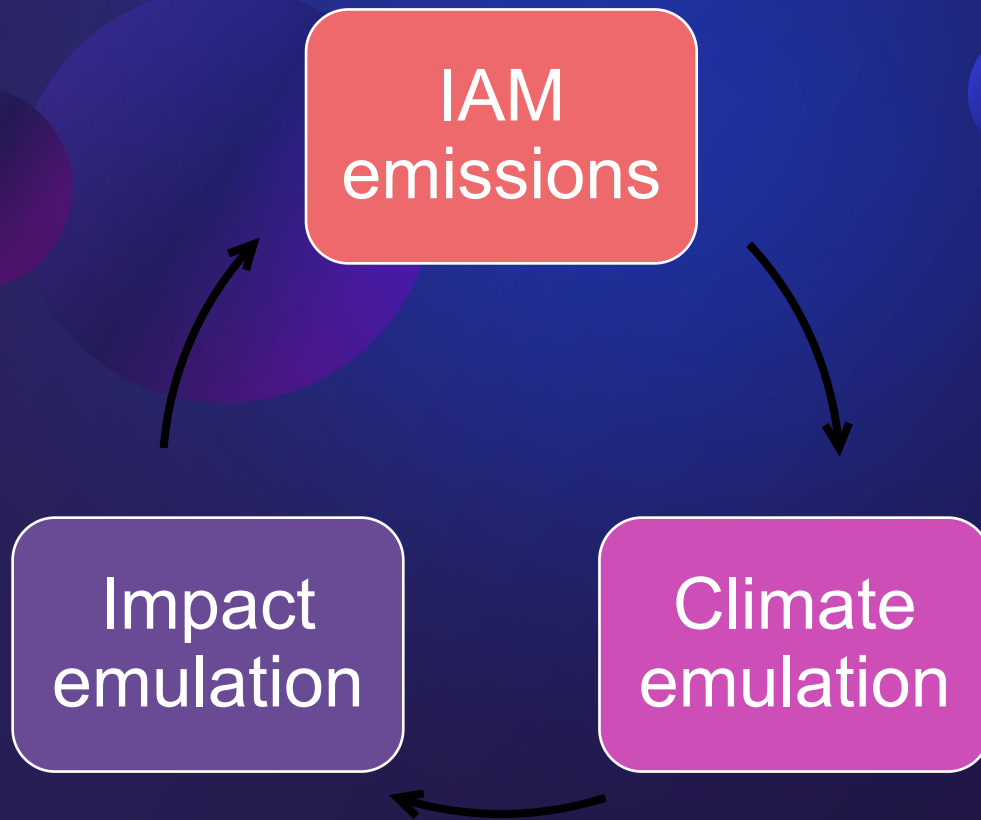
Cross-sectoral ISIMIP and PROCLIAS
Workshop

Rapid IPCC x-WG assessment



1. Rapidly understand climate impacts from any new emissions pathway

Rapid IPCC x-WG assessment



1. Quickly understand climate impacts from any new emissions pathway

2. Represent climate impacts in new IAM pathways as an input or endogenous processes

Why emulate?

You don't have access to the original models

You don't have the computing power, expertise or budget to run them

You need only a reduced form representation of the results

You need to do it orders of magnitude faster

You need flexibility to explore huge sample spaces and behaviours

...

You like to reduce lifetimes of careers and knowledge into a few equations

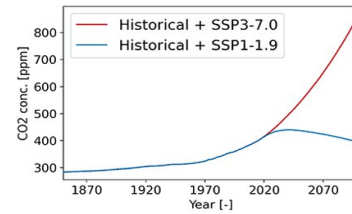
You don't mind irritating whole communities

Because you don't let perfect be the enemy of progress

Emulators!

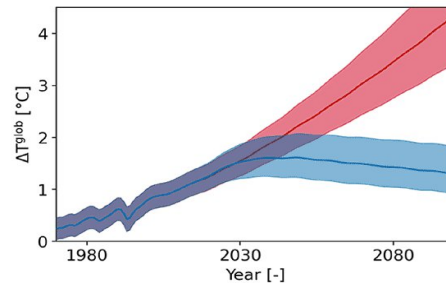
- **Simple Climate Models** (MAGICC, FAiR, OSCAR, HECTOR,...)
- Primarily aimed at emulating atmosphere, CO₂ ppm, radiative forcing and global temperature
- Limited spatial resolution, probabilistic, annual timeseries

(a) Emission or concentration-driven scenarios



Modelling forced response (MAGICC)
+ unforced variability (MESMER)

(b) Global climate response incl. natural variability

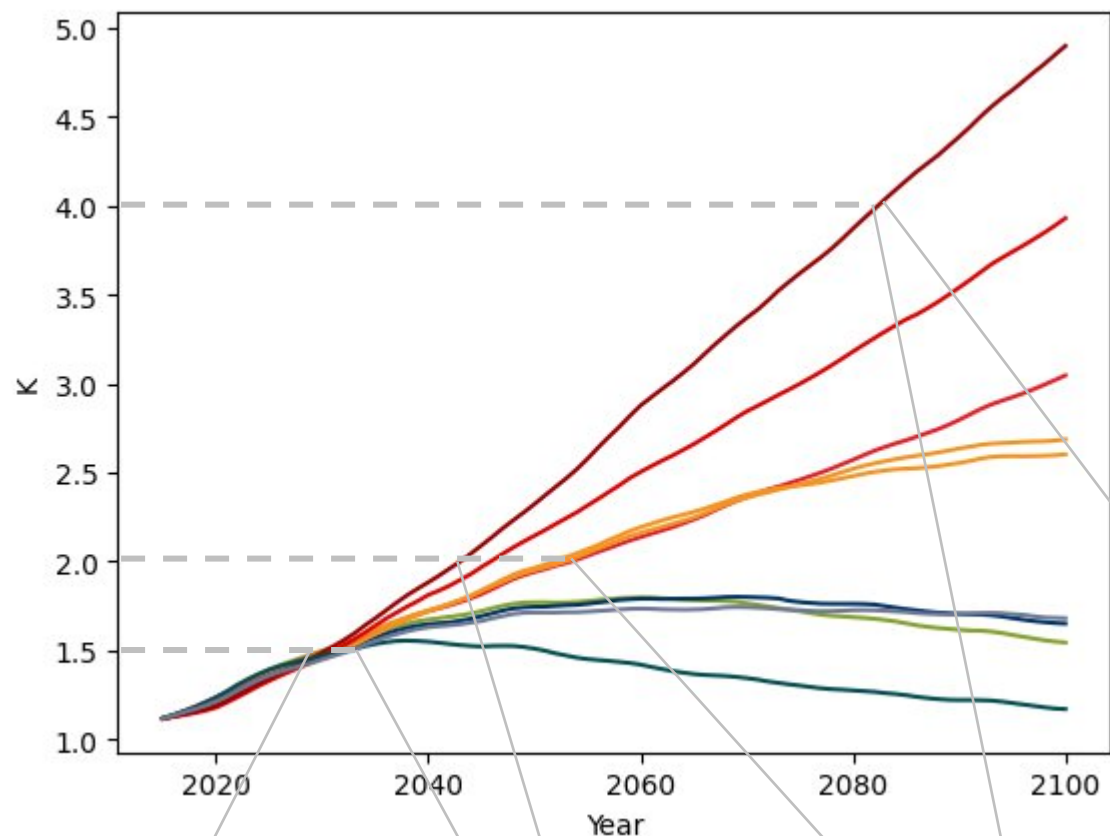


Regional
response
incl. variability
(MESMER)

Earth System emulators (MESMER, STITCHES, fldgen..., PRIME)

- Gridded climate variables, at annual or monthly resolution as timeseries with natural variability
- Temperature, precipitation, soil moisture, fire weather,...

Beusch et al. 2022. GMD



CurPol
ModAct

SSP2-45

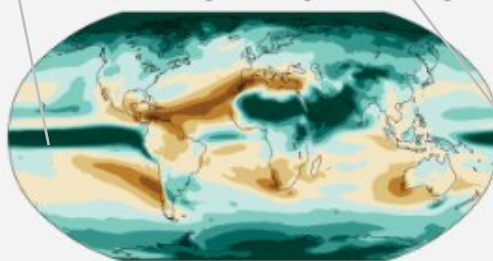
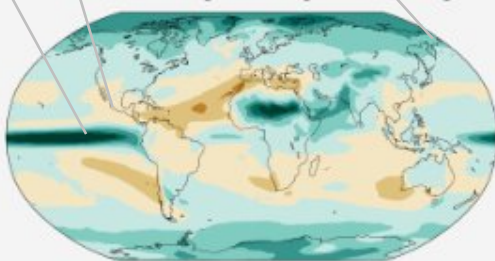
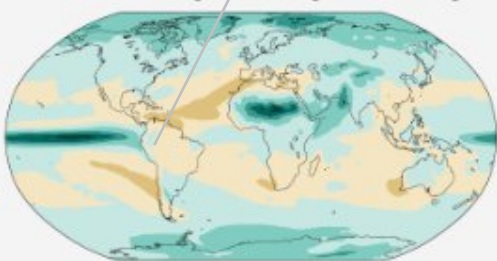
GS
Neg
SSP1-26

SP

Simulated change at 1.5°C global warming

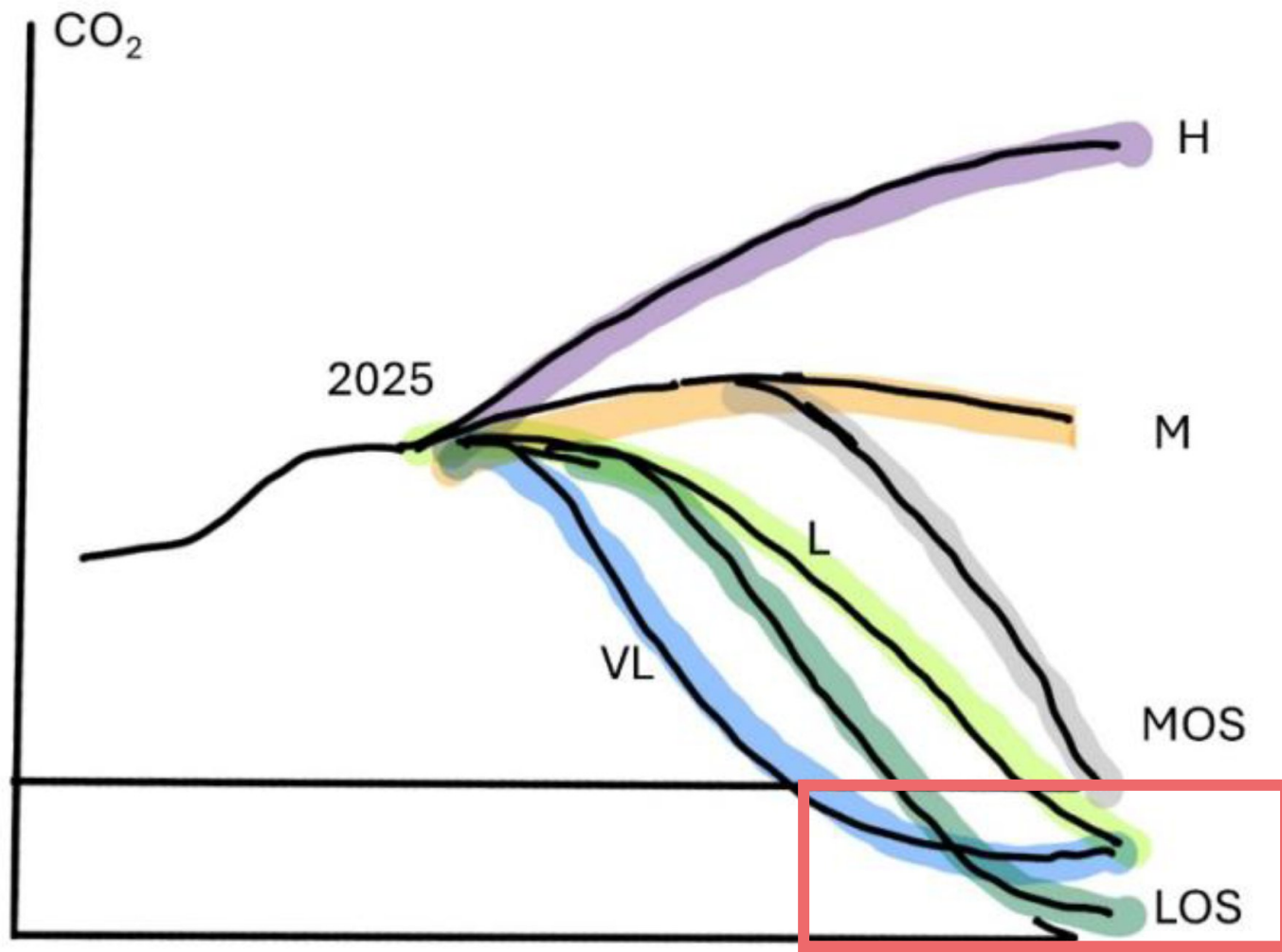
Simulated change at 2°C global warming

Simulated change at 4°C global warming



Global Warming Levels

**Break free from
the RCP-SSPs?**



ScenarioMIP for CMIP7 preliminary design

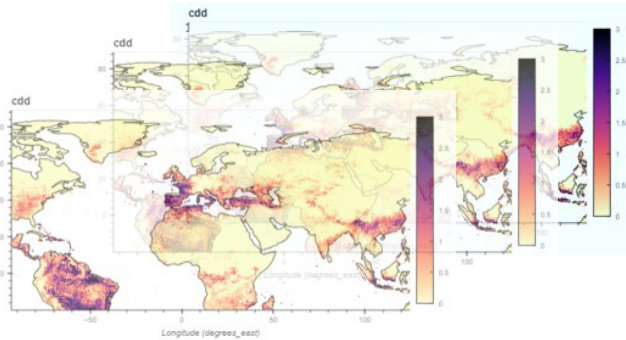
Break free from
the RCP-SSPs?

How can we
estimate climate
impacts before
the new
ScenarioMIP
runs are
completed by
the CMIP7
CCMs?

Aim: Rapid emulation of long-term climate impacts & risk indicators

More impacts

Temp & Precip. extremes, drought, CDD, hydrology, crop yield potentials, fire weather, ...



SSP and model uncertainties

- Climate-Impact model quantiles
- SSPs for population exposure & vulnerability



Community friendly

Designed for ISIMIP & IAM inter-operability and inter-comparison

Uses Global Warming Level approaches for rapid assessment of climate hazard exposure

What impacts?

Pre-release v0.4 <https://zenodo.org/records/10868066> (in review - ESSD)

Precipitation

- Heavy precipitation days
- Wet & very wet days
- Precipitation intensity index
- Consecutive dry days

Hydrology (runoff & discharge)

- Drought intensity
- Seasonality
- Interannual variability
- Water stress



Temperature

- Heat wave events
- Tropical nights



Land*

- Crop yield potential



Energy demands

- Cooling degree days
- Energy intensity*



Fire weather indices

- *FWI x4*
- *Vapour pressure Deficit*



Outputs

- Hazard (absolute values), e.g. heatwave days/yr
- Relative change to 1974-2004 e.g. % change
- Hazard (bivariate) score (0-6), measures absolute conditions and relative change

Data

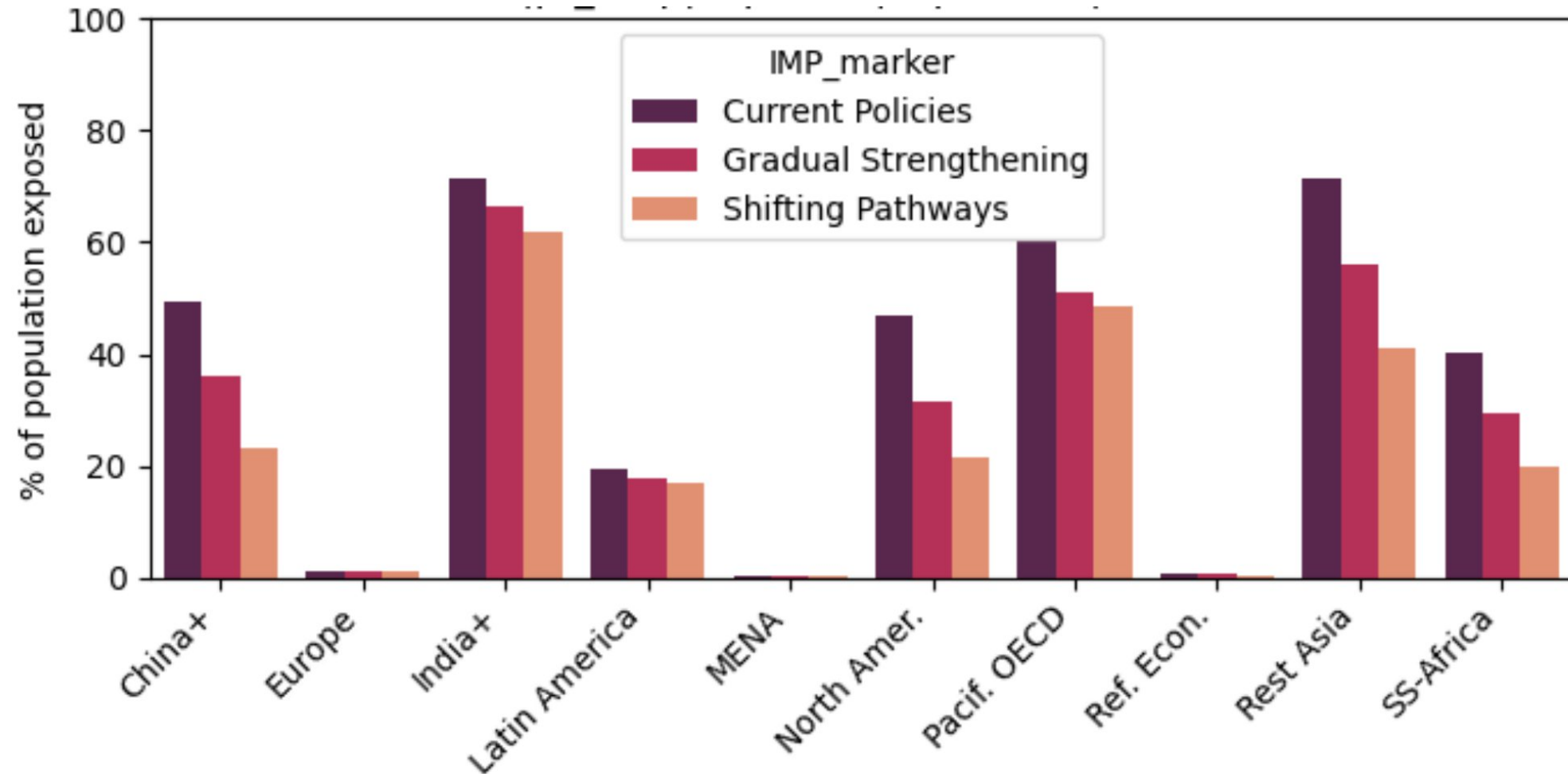
- Mostly ISIMIP3b (CMIP6), GCMs + GHMs
- GWLs – 1.2, 1.5, 2, 2.5, 3, 3.5 °C

Aggregation

- country, region, World
- Mean, population, land-area, GDP-weighted*

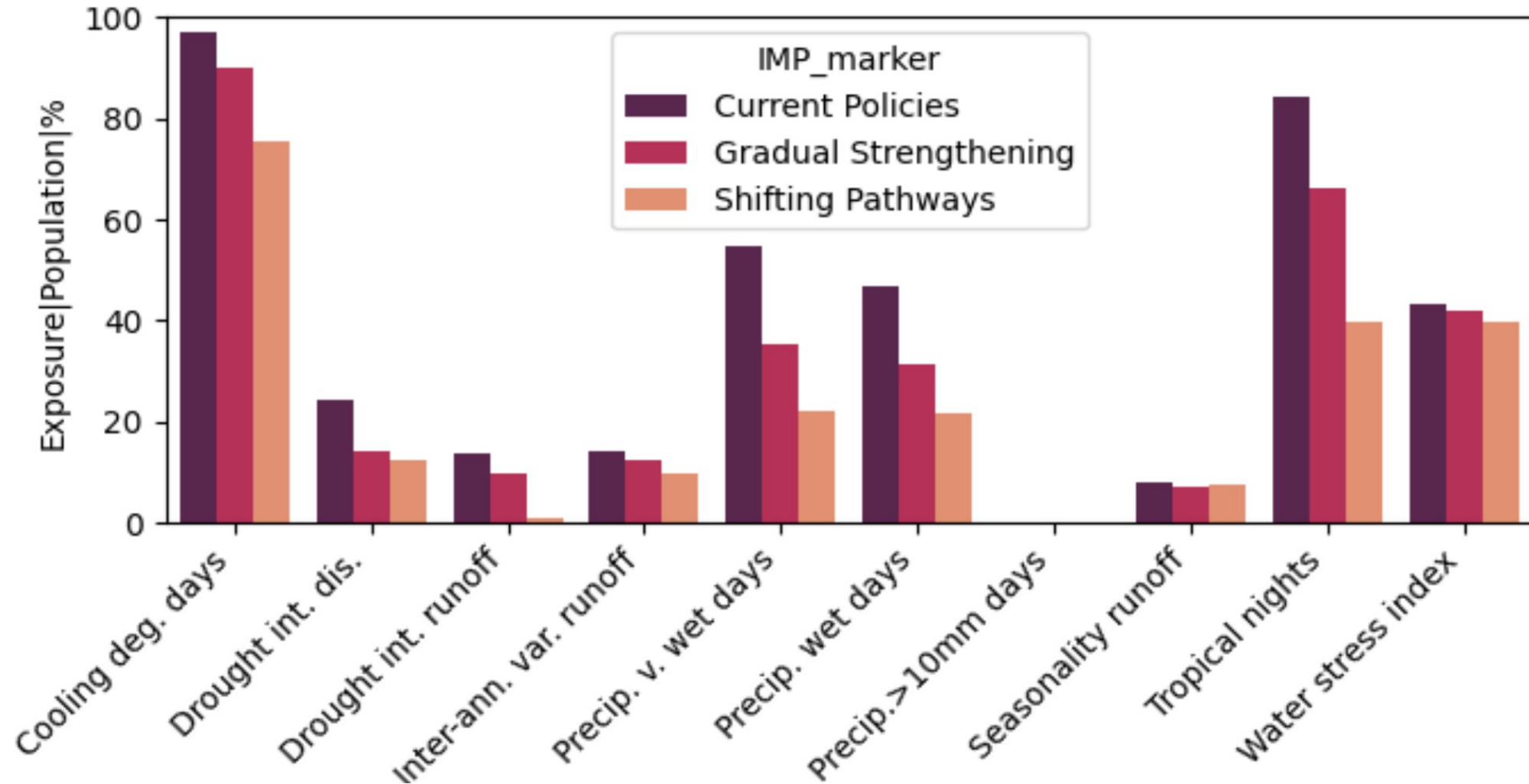
Example results for 3 IPCC illustrative pathways

2070 Exposure to significant change in “wet days”

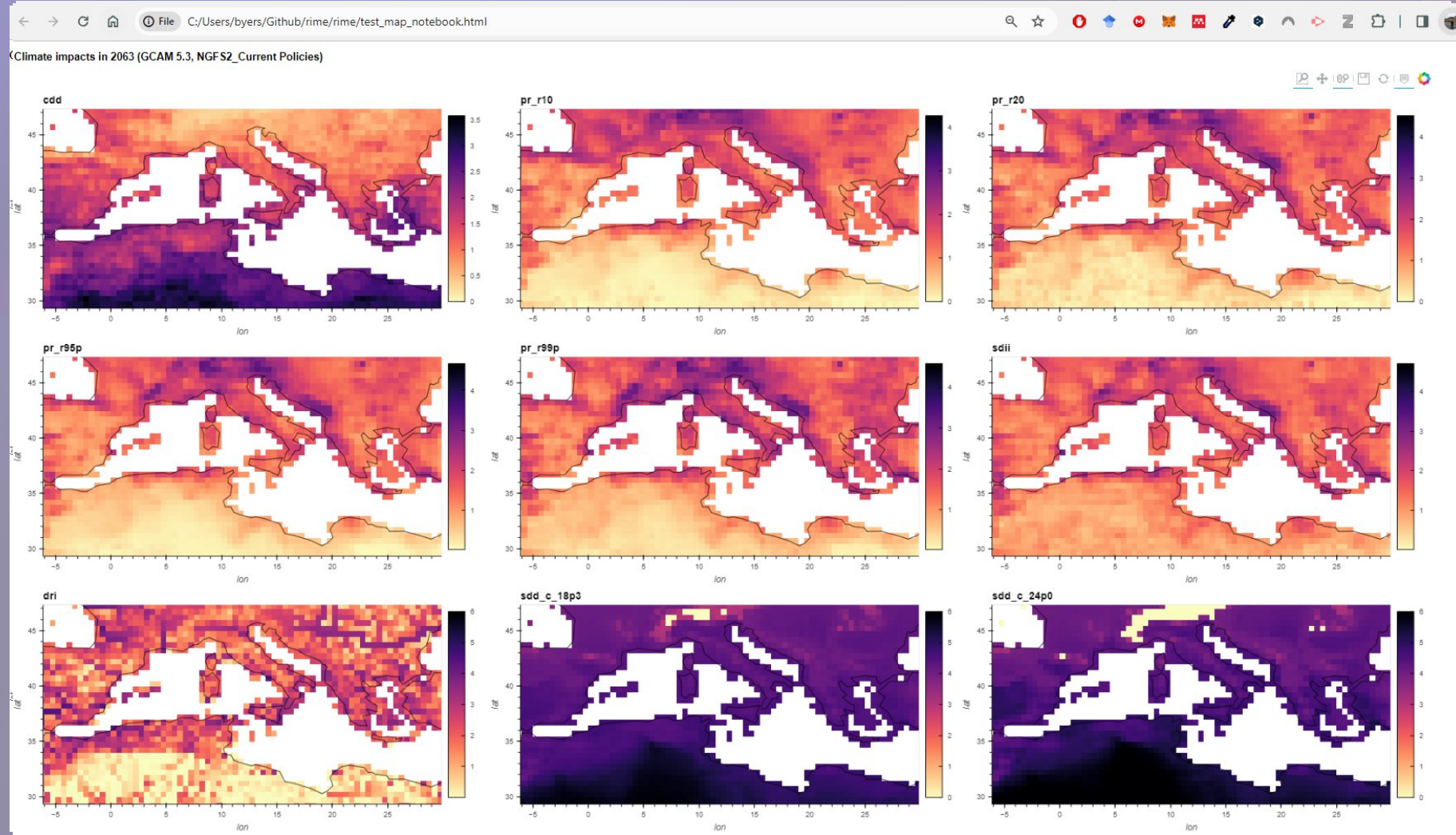


Example results for 3 IPCC illustrative pathways

2070 Exposure in North America



Interactive html dashboards



Software and data – pre-release in the wild!

www.github.com/iiasa/rime

Pre-release v0.4

<https://zenodo.org/records/10868066>

github.com/iiasa/rime

rime Private

generated from iiasa/python-stub

main 3 branches 0 tags

Go to file Add file <> Code

About

Rapid Impact Model Emulator

Readme

GPL-3.0 license

Activity

0 stars

4 watching

0 forks

Releases

No releases published

Create a new release

Packages

No packages published

Publish your first package

Languages

Jupyter Notebook 84.6% Python 15.4%

GitHub

Implementation

zenodo

Search records...

Communities My dashboard

Published March 28, 2024 | Version 0.4

Dataset Open

Edit

New version

Share

660 VIEWS 176 DOWNLOADS

Show more details

Versions

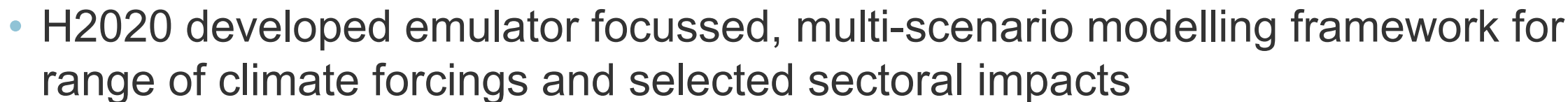
Version	Date
Version 0.4	Mar 28, 2024
Version 0.3	Nov 30, 2023
Version 0.2	Jul 11, 2023
Version 0.1	May 31, 2023

View all 4 versions

Cite all versions? You can cite all versions by using the DOI 10.5281/zenodo.7971429. This DOI represents all versions, and will always resolve to the latest one. Read more.

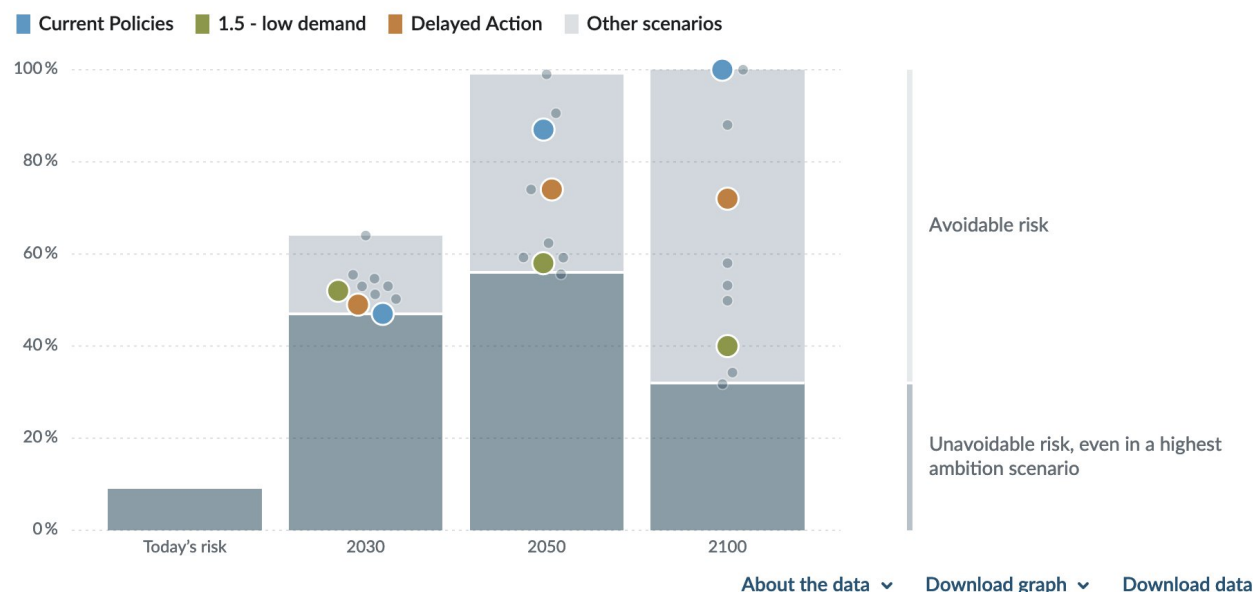


www.climate-solutions-explorer.eu

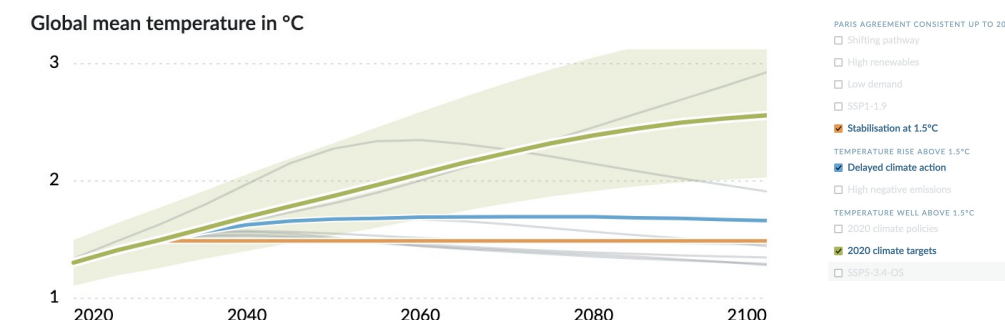


PROVIDE - Climate Risk Dashboard

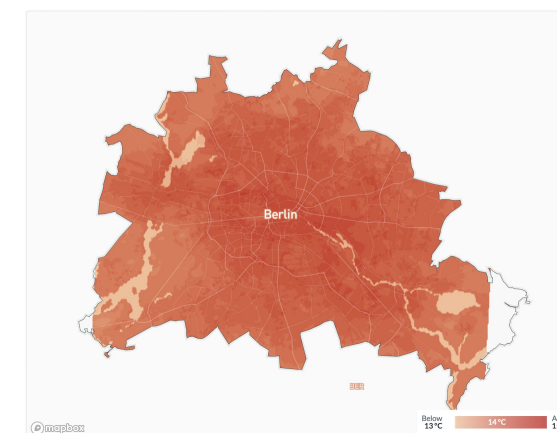
Assessment of avoidable/unavoidable climate risks



Climate projections for AR6 WG3 scenarios



Urban level climate information



- **First version of emulator based dashboard online:**
<https://climate-risk-dashboard.climateanalytics.org>
- Ongoing development and integration of sectoral climate variables

22-26 April 2024. PIK, Potsdam

Thank you.

