



FS Club Events



Environmental Data Meets Financial Risk: AI Solutions For A Changing World

**Dr Giuseppe Brandi | Assistant Professor in
Data Science, Northeastern University
London**

11:00, Tuesday, 16 September 2025



Platinum Sponsor



Gold Sponsor



Silver Sponsor



Expect Excellence



Bronze Sponsor



Contributor Sponsor





FS Club Events

A Word From Our Chairman



Simon Mills

Associate

Z/Yen Group



FS Club Events

Today's Agenda

- 11:00 - 11:05 Chairman's Introduction
- 11:05 - 11:25 Keynote Presentation - Dr Giuseppe Brandi
- 11:25 - 11:45 Questions & Answers



FS Club Events

Today's Speaker



Dr Giuseppe Brandi
Assistant Professor in Data Science
Northeastern University London

Environmental Data Meets Financial Risk: AI Solutions For A Changing World

Dr. Giuseppe Brandi

Assistant Professor in Data Science

Northeastern University London

giuseppe.brandi@nulondon.ac.uk

Why This Matters Now



CLIMATE IMPACTS INTENSIFY;
DECISIONS CAN'T WAIT.



DATA IS COMPLEX, PATCHY, AND
OFTEN COARSE OR BIASED.



WE NEED TO TRANSLATE CLIMATE
SIGNALS INTO ACTIONABLE
FINANCIAL INSIGHT.

Three Core Challenges

Data Limitations

- Gaps, biases, frequency mismatches

Scale Mismatch

- Global models vs local/sector-specific needs

Translation Gap

- Scenarios → financially consistent outcomes

How AI & Analytics Help

Fuse

Fuse observations + models + constraints.

Generate

Generate high-resolution, decision-grade indicators.

Link

Link hazards to exposures, cashflows, and policy levers.

Three AI & Data Analytics Solutions

How Advanced Methods Address Climate Finance Gaps

Example 1: Machine Learning Model Selection

Problem: Some climate models overestimate losses

Solution: Unsupervised clustering to filter biased model projections

Example 2: AI-Powered Spatial Enhancement

Problem: 110km climate models are too coarse for local decisions

Solution: Neural networks increase resolution to 2km precision

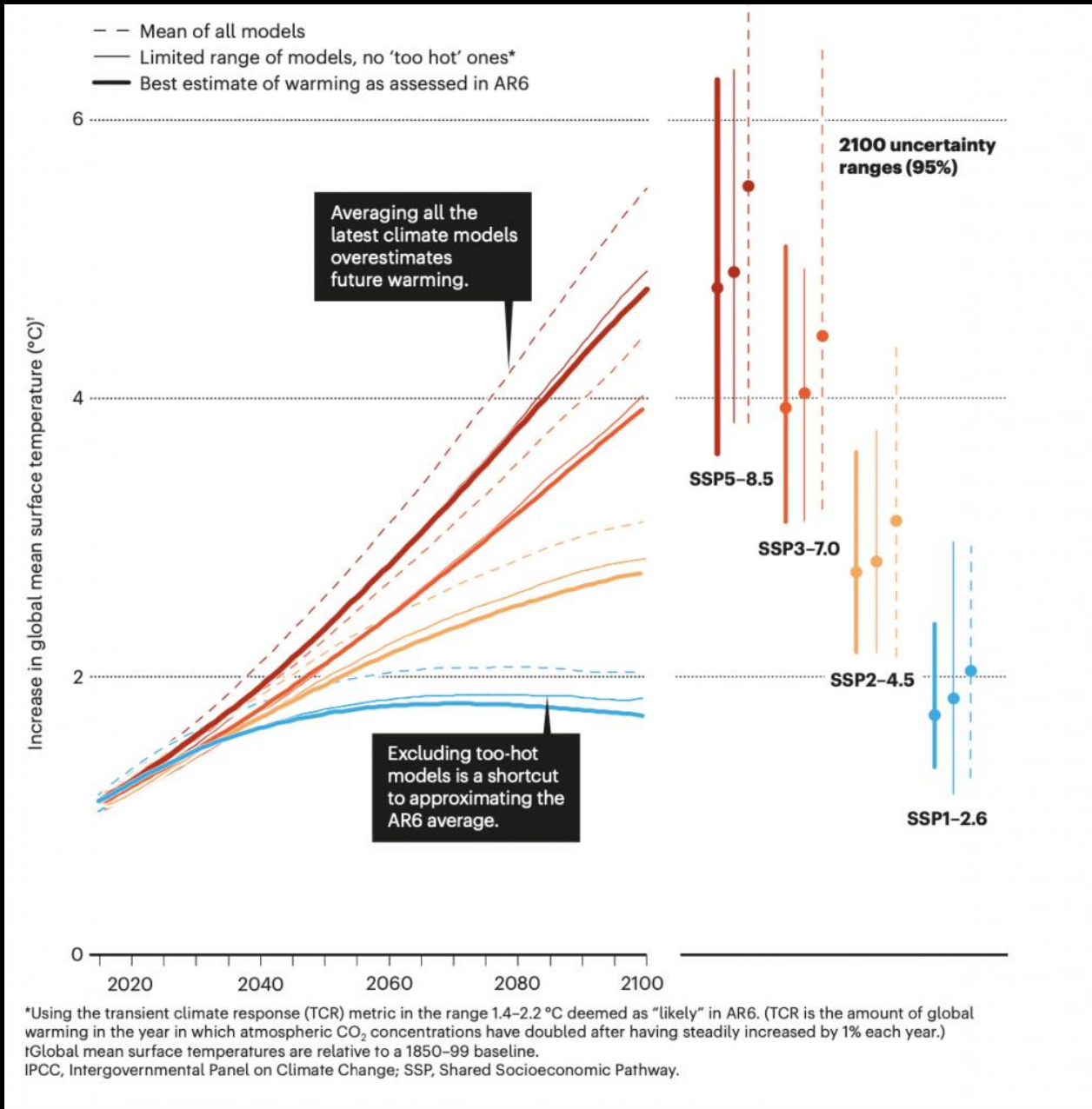
Example 3: Investment Risk Optimisation

Problem: Complex trade-offs between carbon, biodiversity, and fire risk

Solution: Multi-objective optimisation for forestry portfolios

Each example demonstrates how data analytics transforms climate science into actionable financial intelligence

The Hot model problem: Climate Model Clustering



Problem: Biased Ensembles



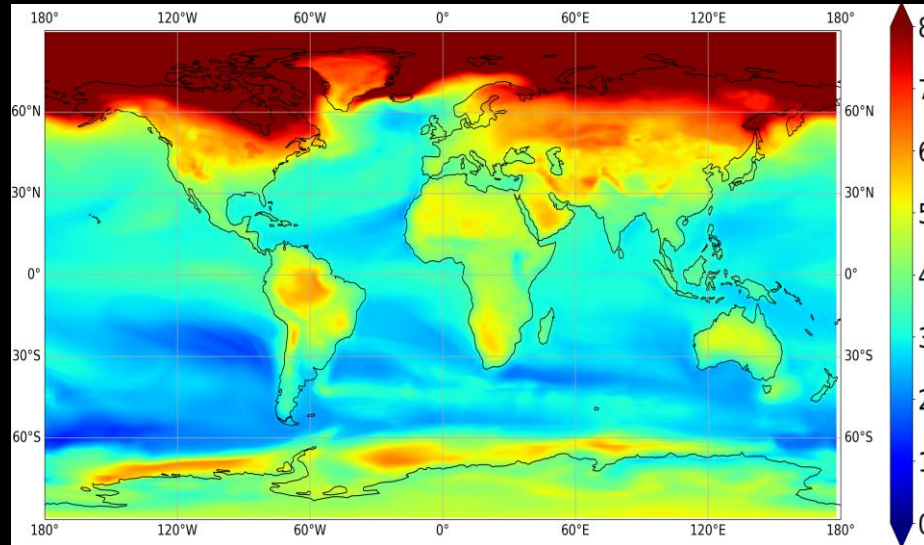
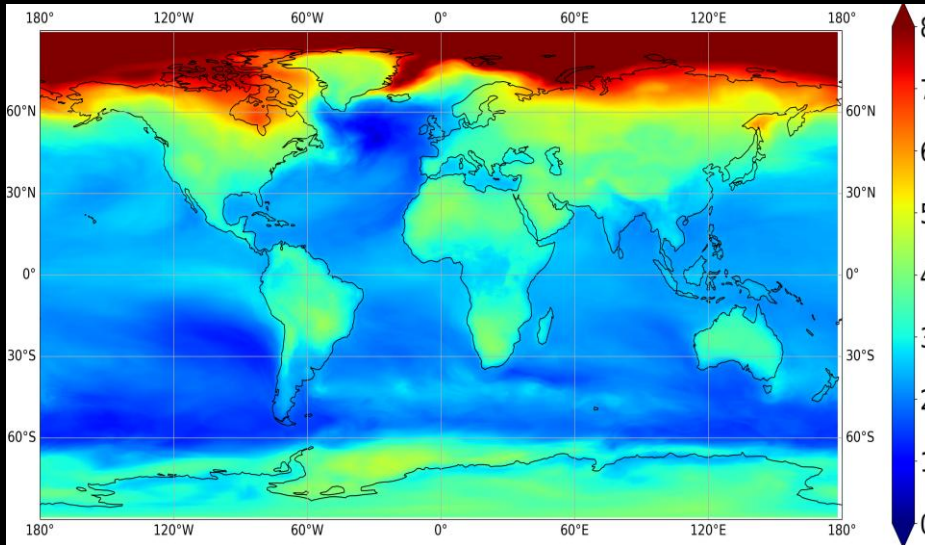
SOME MODELS
OVERPREDICT WARMING
(‘TOO HOT’).



IF INCLUDED UNCRITICALLY,
THEY CAN OVERSTATE
DAMAGES AND RISK.

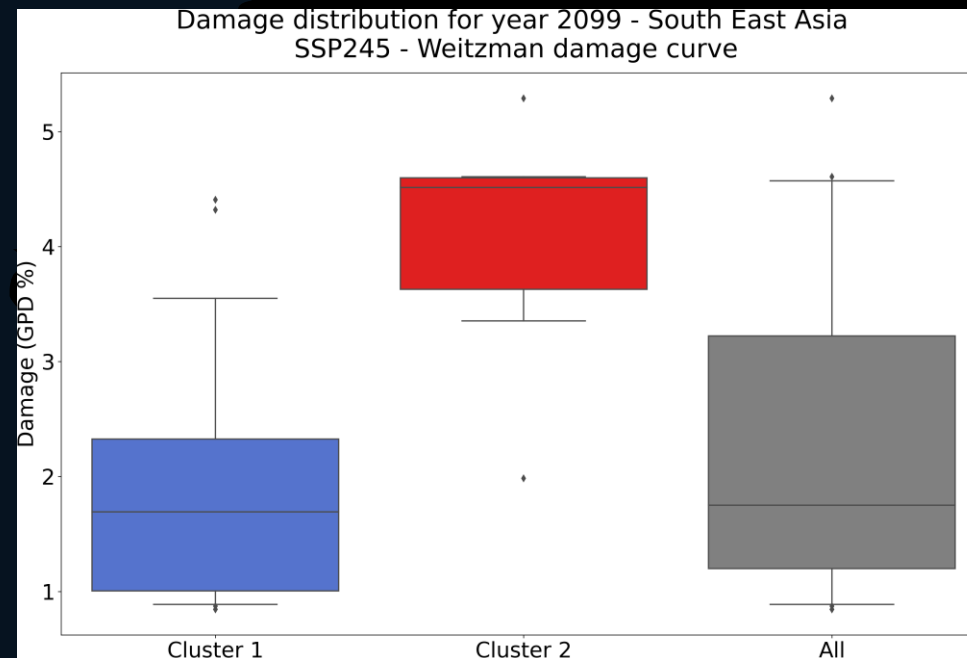
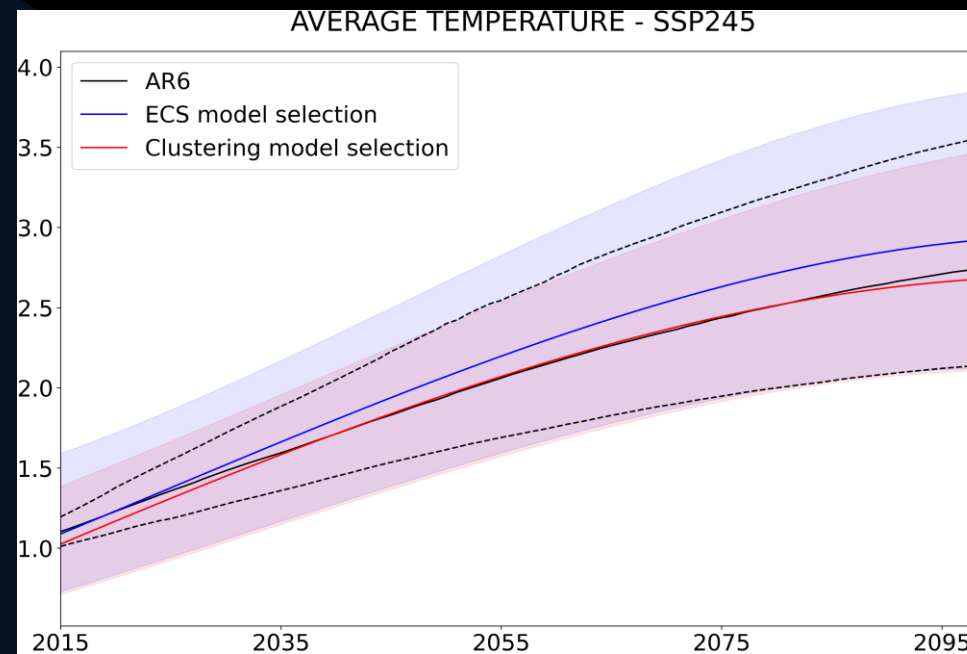


PHYSICS-BASED FILTERS ARE
DATA- AND ASSUMPTION-
INTENSIVE.



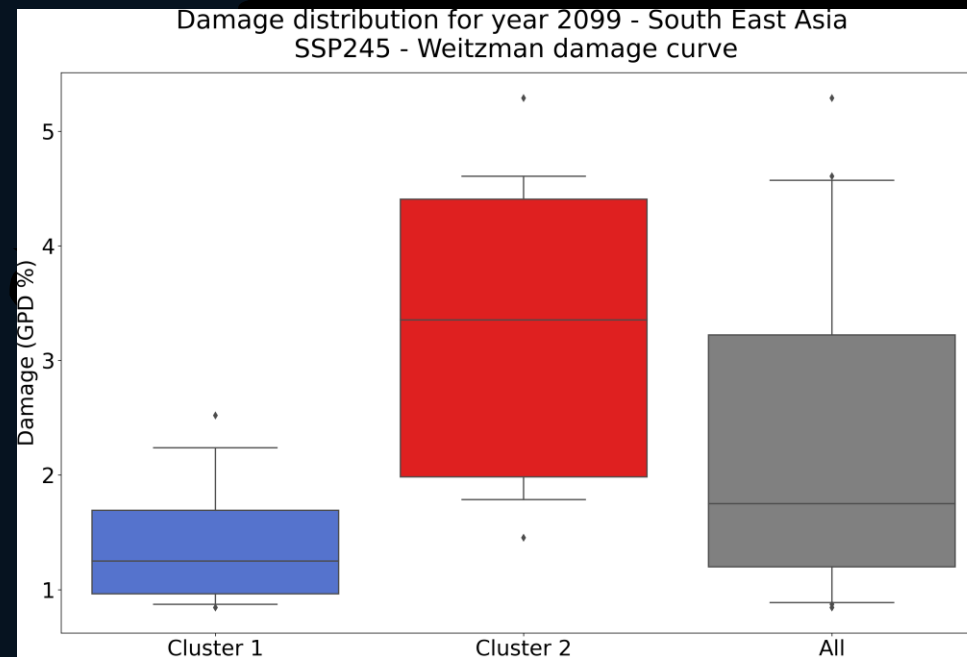
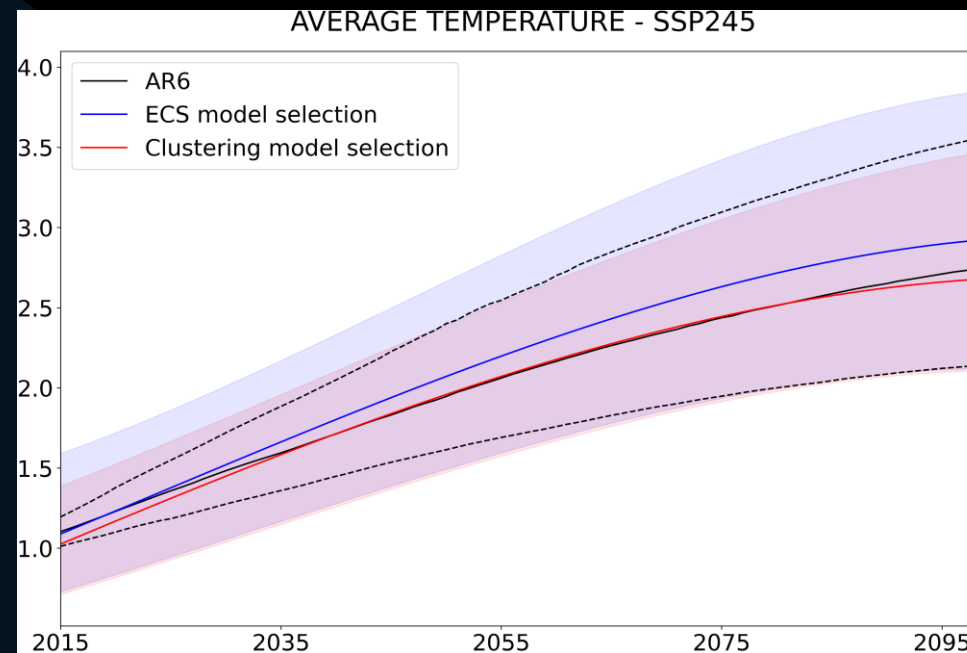
Solution: Unsupervised Screening

- Approach
 - Cluster temperature anomaly trajectories
 - Ensemble of methods; majority vote
- No physics variables required; aligned with ECS/TCR-informed filters.
- Outcome: 'warm' set stabilises loss estimates; improves stress tests.
- **Using ECS for regional analyses shows that physics-based filters create logical inconsistencies**

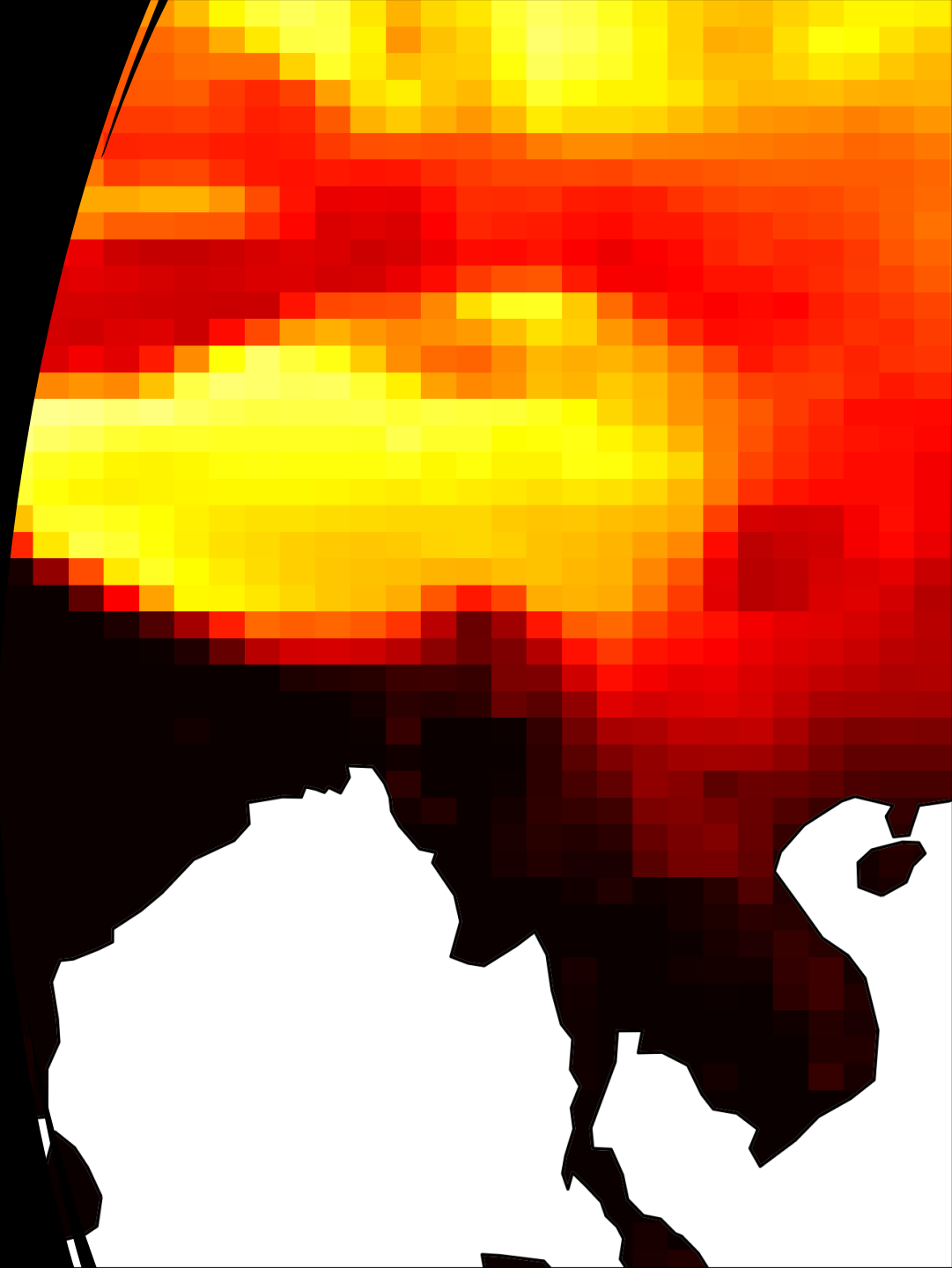


Solution: Unsupervised Screening

- Approach
 - Cluster temperature anomaly trajectories
 - Ensemble of methods; majority vote
- No physics variables required; aligned with ECS/TCR-informed filters.
- Outcome: 'warm' set stabilises loss estimates; improves stress tests.
- **Using validated data-driven approaches for regional analyses shows much more reliable results**



Hyper- Downscaling



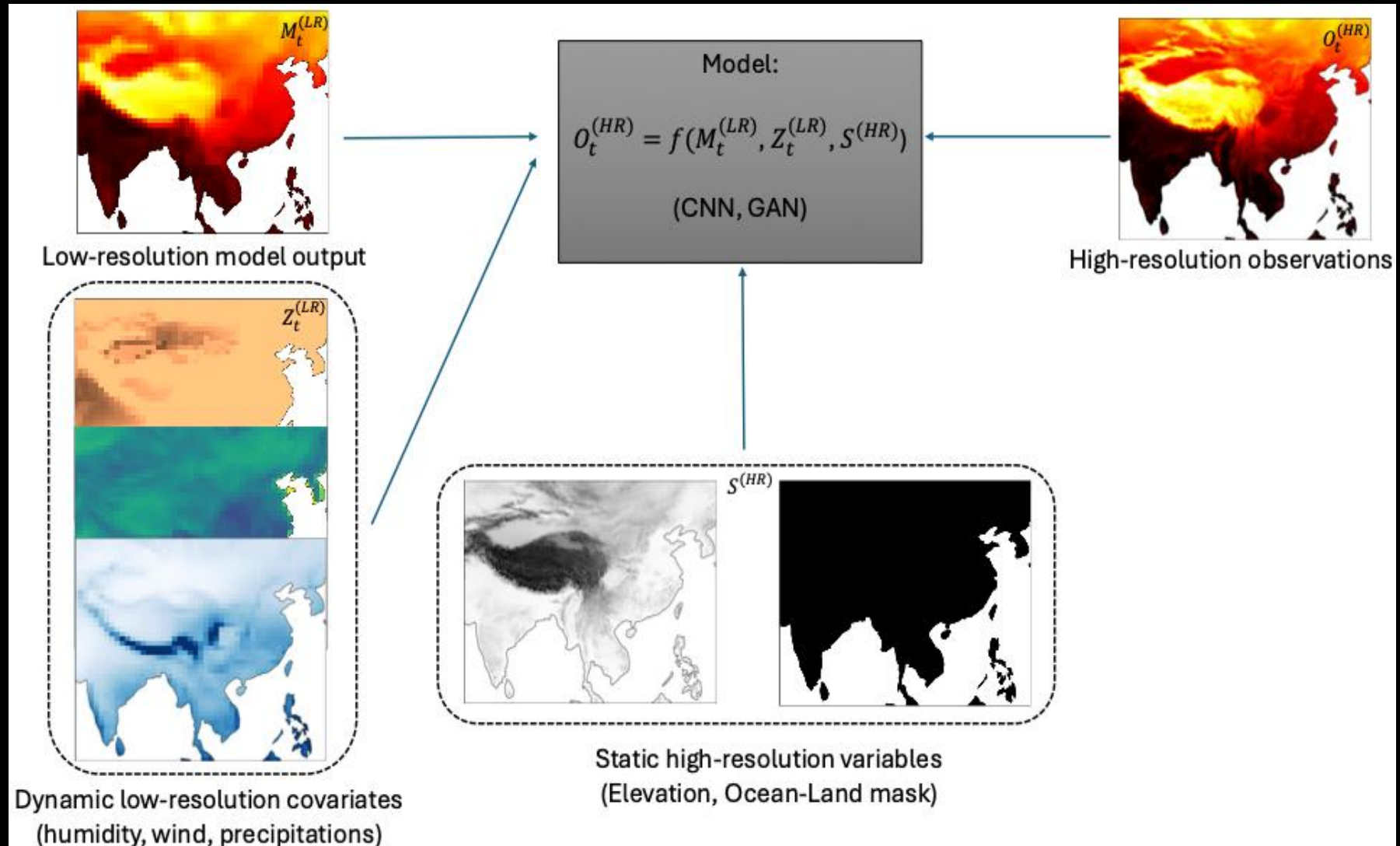
Problem:
Global
Models, Local
Decisions

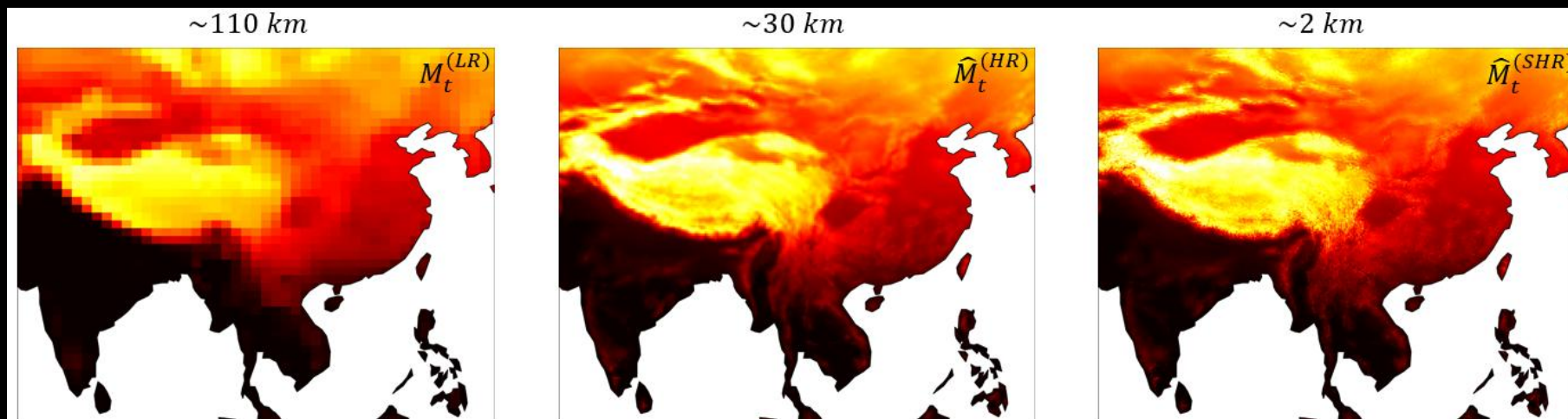
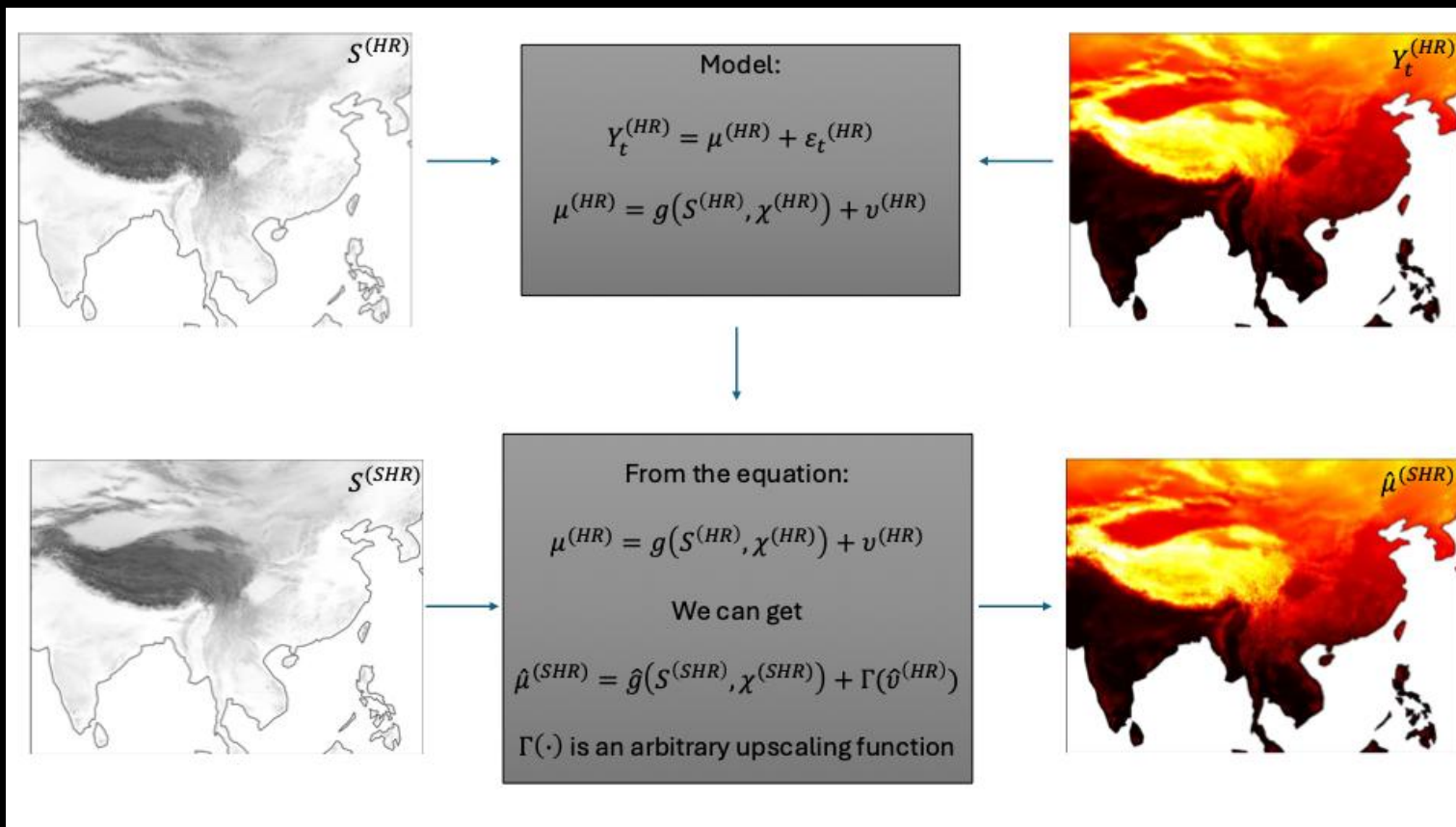
Typical GCM
resolution ~100–200
km; assets need 1–
10 km (or finer).

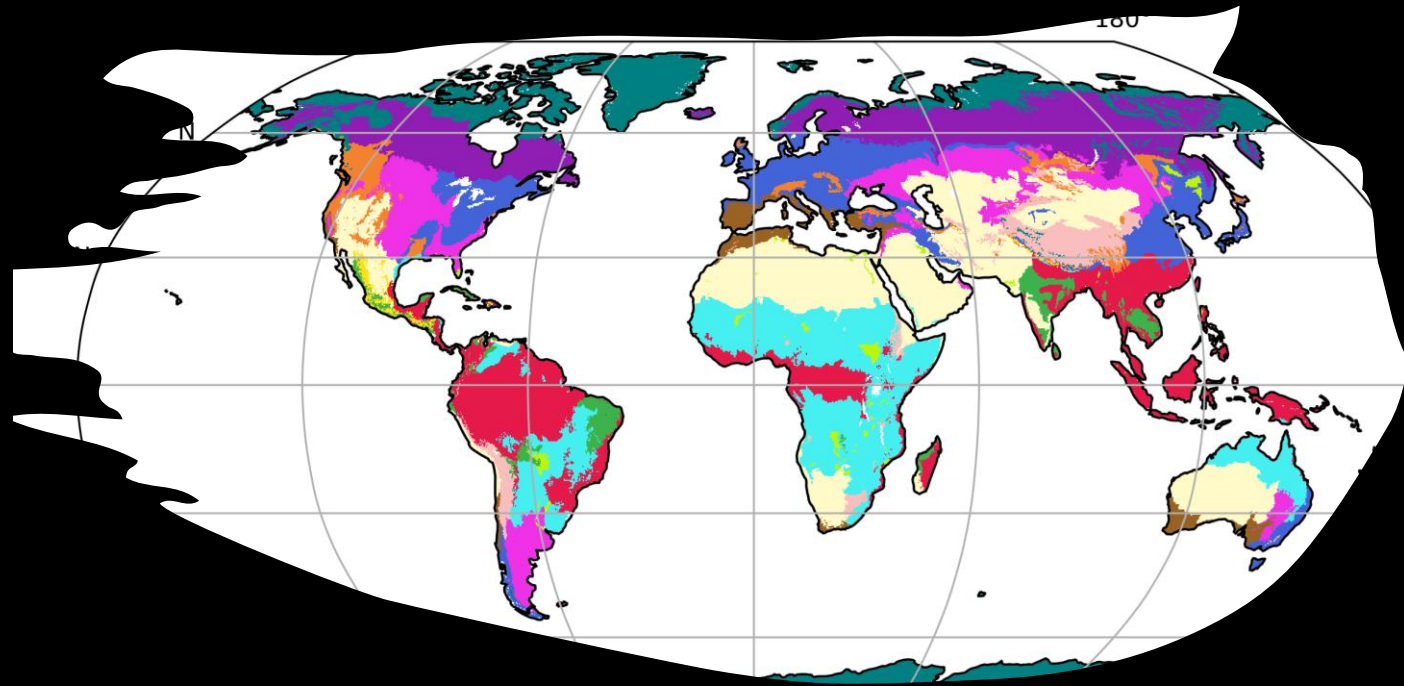
Interpolation adds
artifacts and can
break physical
consistency.

We need high-
resolution, bias-
aware climate fields.

Super-Resolution with Physical Structure



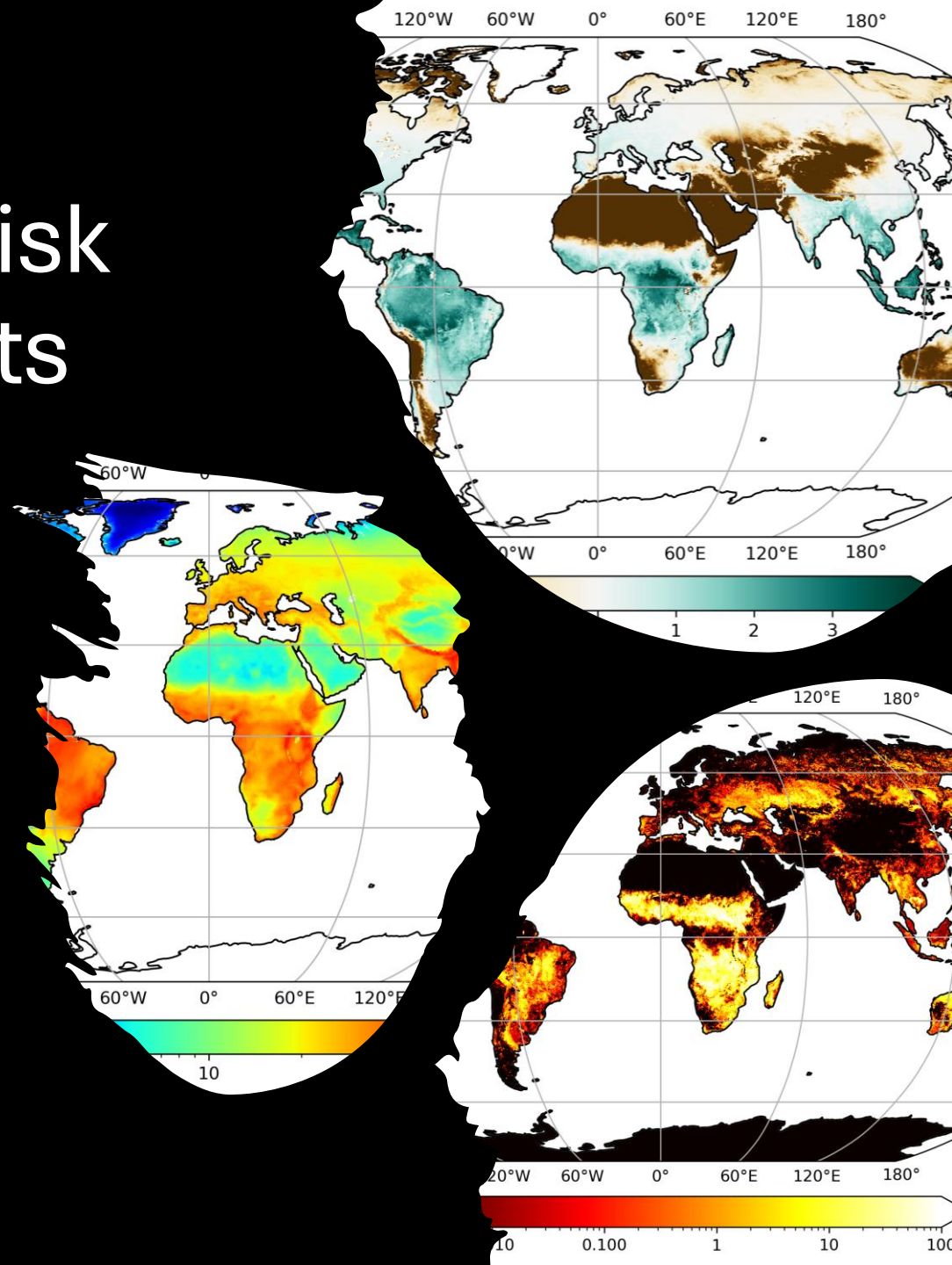


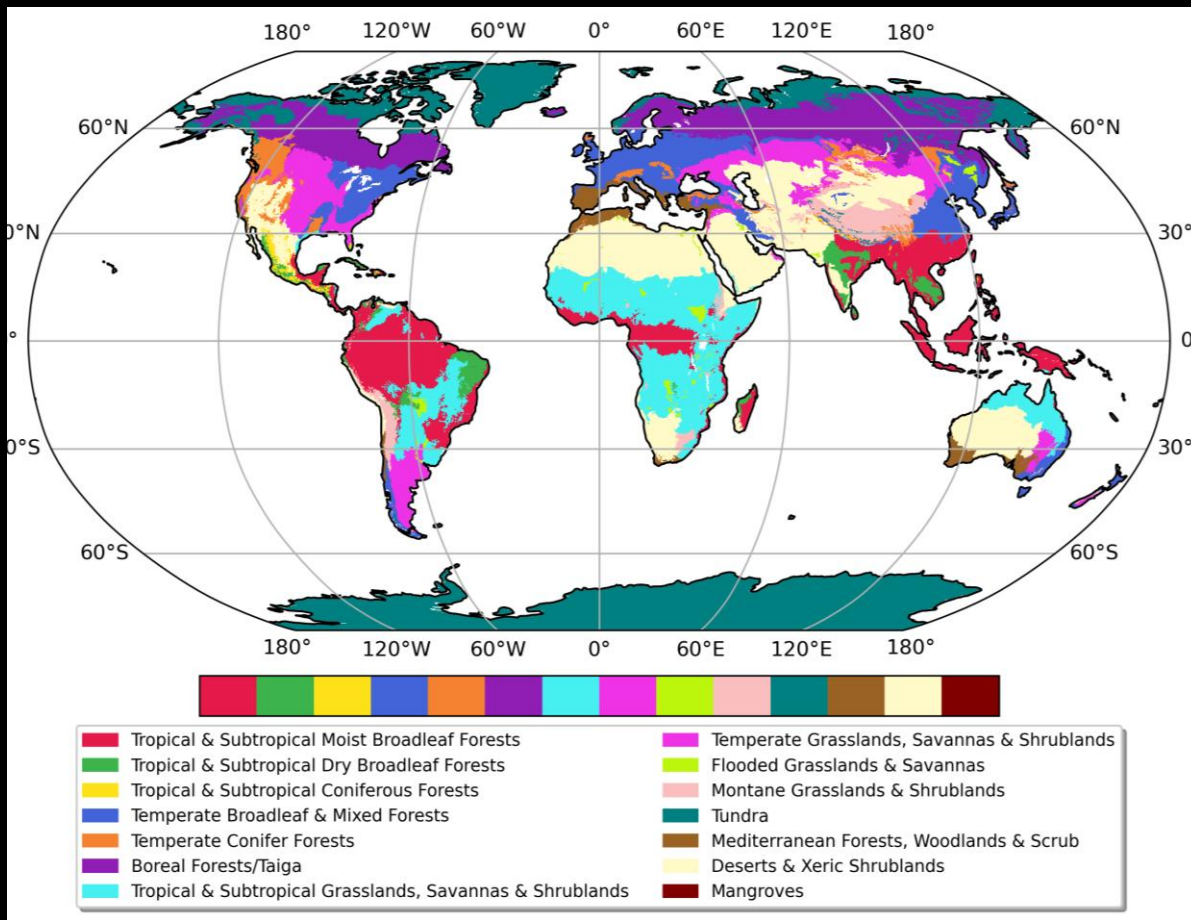


Wildfire Risk & Carbon-Negative Assets

Problem: Fire Risk in Carbon Assets

- Forestry-backed assets hinge on sequestration durability.
- Wildfire can reverse gains; some biomes are fire-dependent.
- Need to balance carbon, biodiversity, and fire regimes.



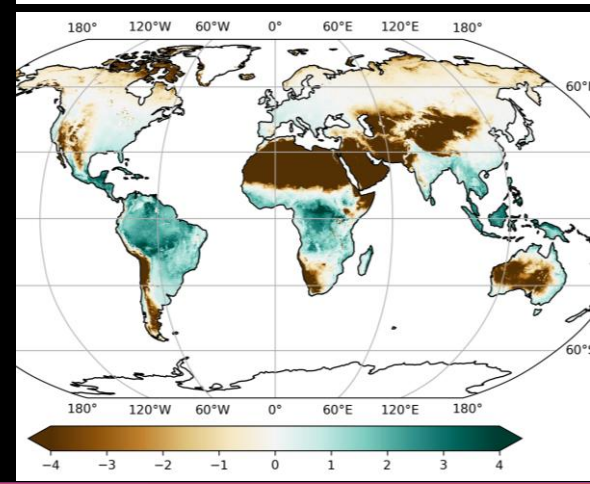
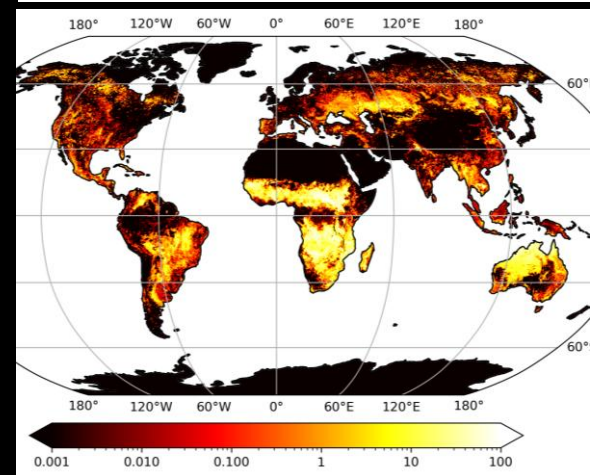
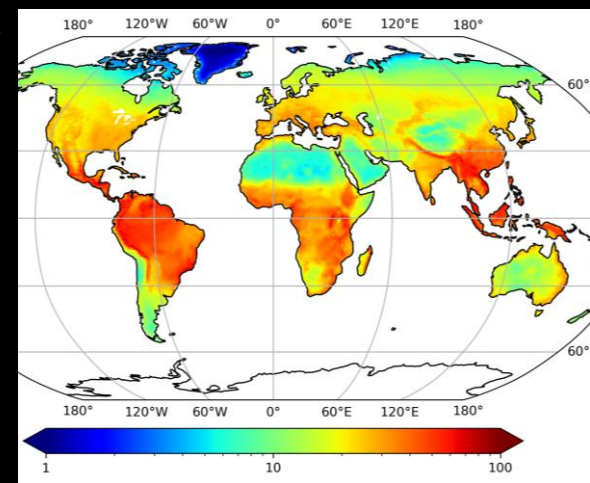


Trade-offs between co-benefits and risks are needed

B
i
o
d
i
v
e
r
s
i
t
y

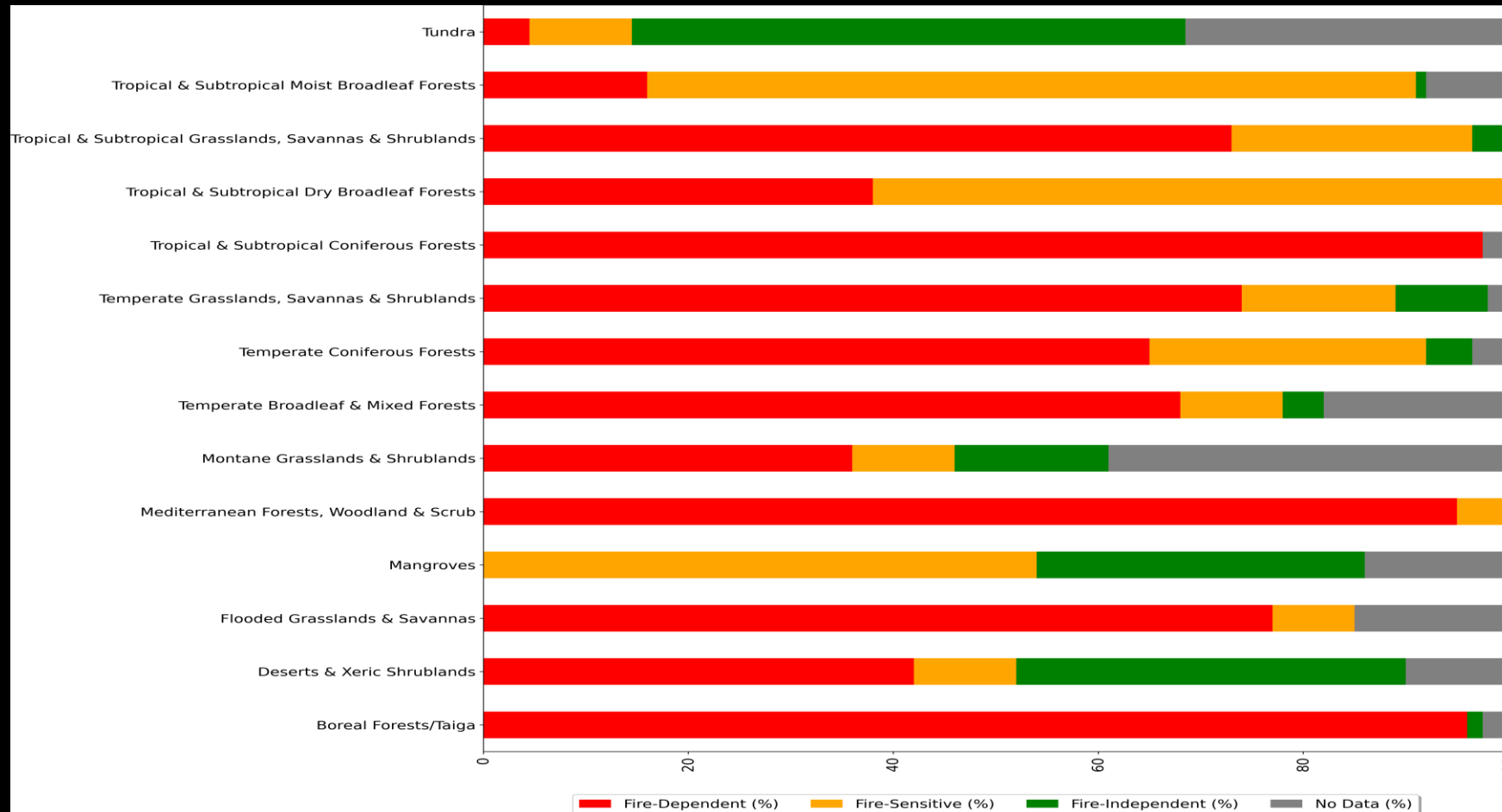
B
u
r
n
e
d
a
r
e
a

C
a
r
b
o
n
S
p



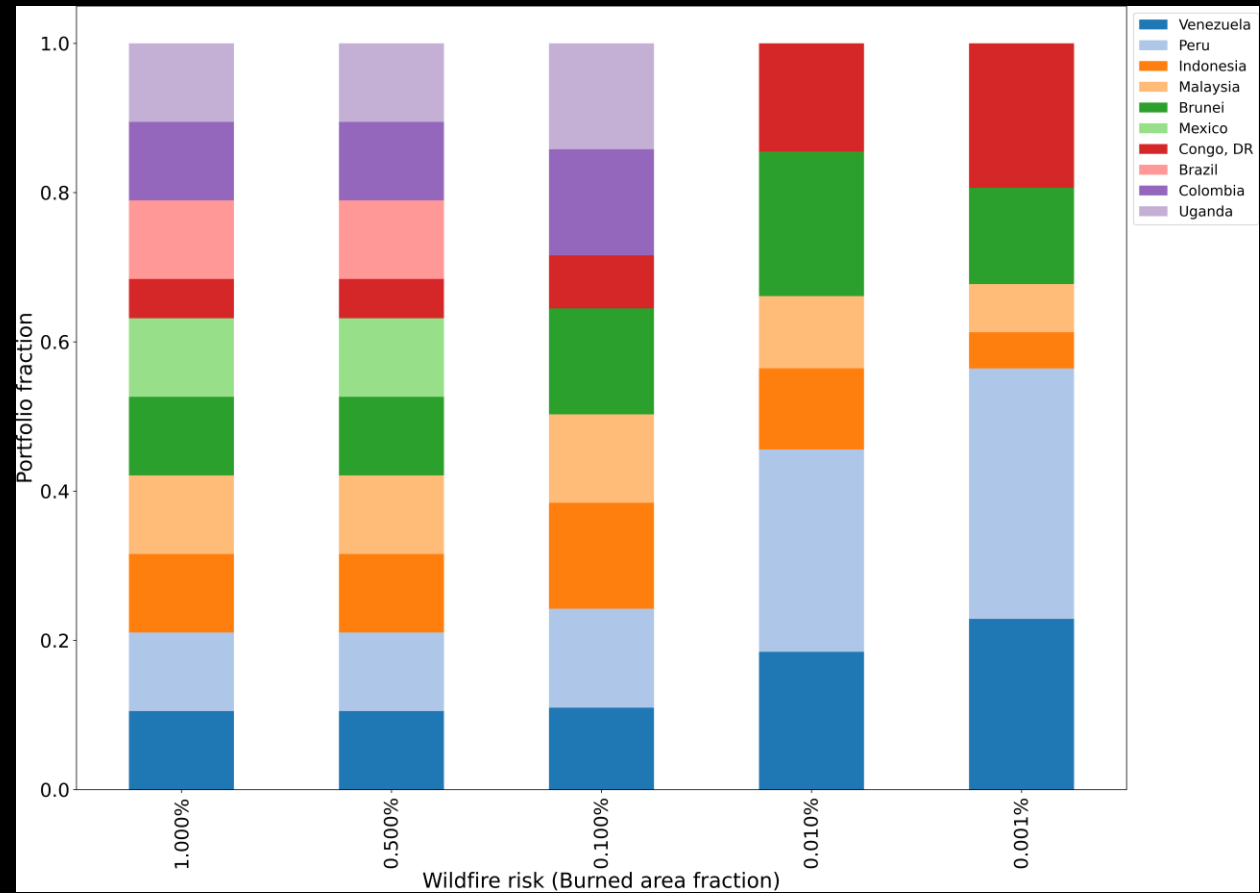
Design Levers

- Biome-aware screening: avoid intrinsically fire-dependent projects.
- Geographic diversification; risk tranching/insurance.
- Optimise on 'carbon–biodiversity–wildfire' trade-offs.



Portfolio Illustration

- Tighter wildfire tolerance → regional mix shifts.
- Improves durability and investor fit.



The Missing Piece — A Common Ground for Carbon Price

Markets/policymakers need consistent signals to align incentives

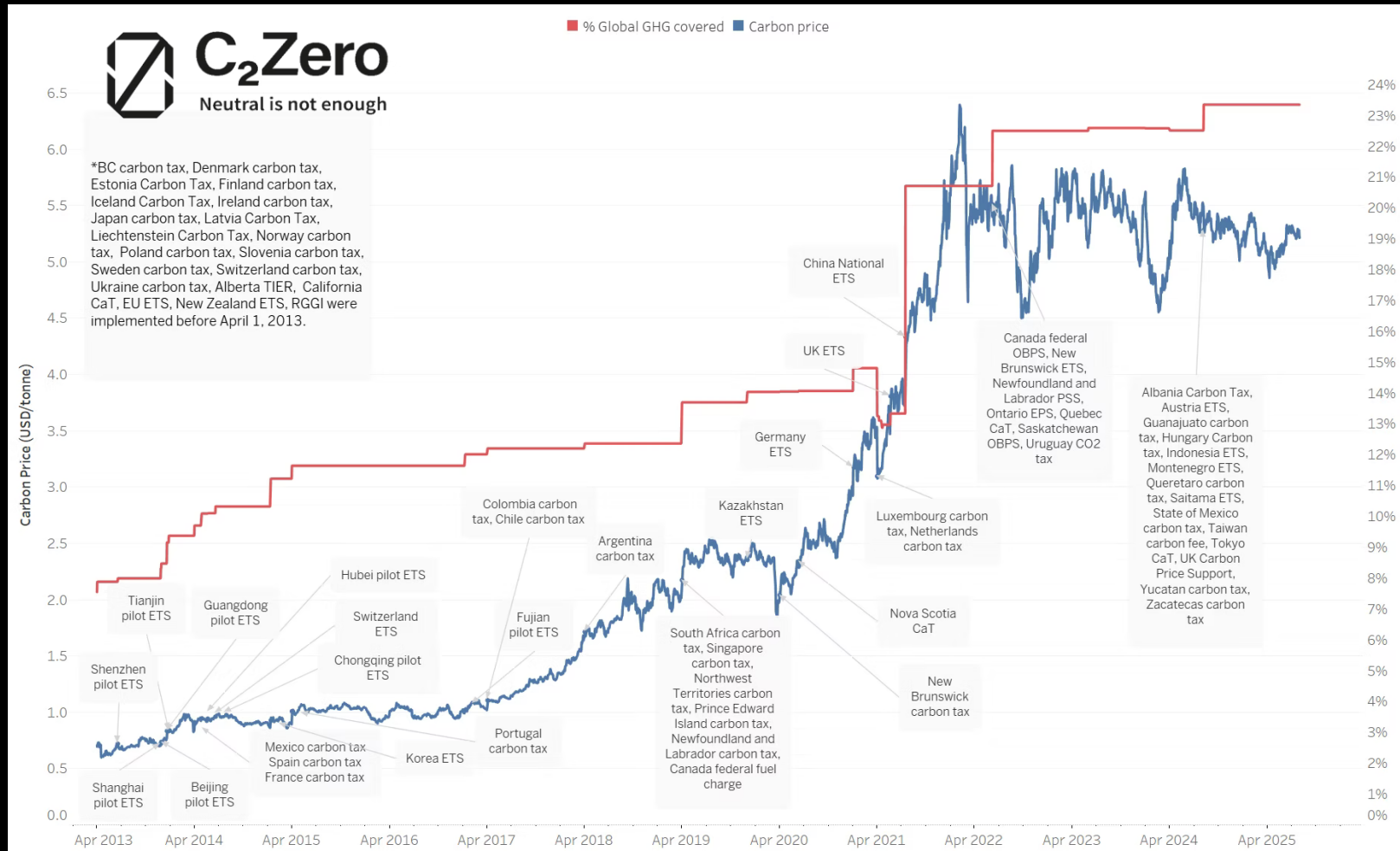
```
graph TD; A[Markets/policymakers need consistent signals to align incentives] --> B[Fragmented carbon pricing → uncertainty, weak planning]; B --> C[A transparent, daily index helps anchor decisions];
```

Fragmented carbon pricing → uncertainty, weak planning

A transparent, daily index helps anchor decisions

Solution: C2Zero's Carbon Price Index

- Provides a daily carbon price signal built on regulated markets.
- Designed to be transparent/auditable for real-world decisions.



Key Takeaways

- Unsupervised clustering algorithms can automatically identify climate models that produce biased projections, reducing economic loss overestimation without requiring complex physics calculations.
- Neural networks combined with statistical models can enhance climate resolution by 50x (from 110km to 2km), providing the city-level precision that investment and insurance decisions actually require.
- Machine learning can simultaneously optimise multiple conflicting objectives, such as balancing carbon sequestration potential against wildfire risk and biodiversity protection in forestry investments.
- Reliable and consistent data, together with adequate AI modelling, is the key to change.

Thank You

Q&A

Giuseppe Brandi

Assistant Professor in Data Science

Northeastern University London

giuseppe.brandi@nulondon.ac.uk



FS Club Events

Comments, Questions & Answers



觀光案内所

Question & Answer

问讯处 詢問處 안내소



Platinum Sponsor



Gold Sponsor



Silver Sponsor



Expect Excellence



Bronze Sponsor



Contributor Sponsor





FS Club Events

Forthcoming Events

- Thursday, 25 September 2025 (09:00 - 09:45 BST) Launch Of Global Financial Centres Index 38
- Wednesday, 15 October 2025 (18:00 - 20:00 BST) A Walking & Drinking Tour Of The Historic Pubs Of The Fleet Street & The City
- Tuesday, 21 October 2025 (11:00 - 11:45 BST) What Makes A Leader Credible? (with Dr Amanda Goodall)

Visit: <https://fsclub.zyen.com/events/forthcoming-events/>

Watch past webinars: <https://www.youtube.com/zyengroup>