Extended Data

Worldwide benefits of fair climate finance and mitigation

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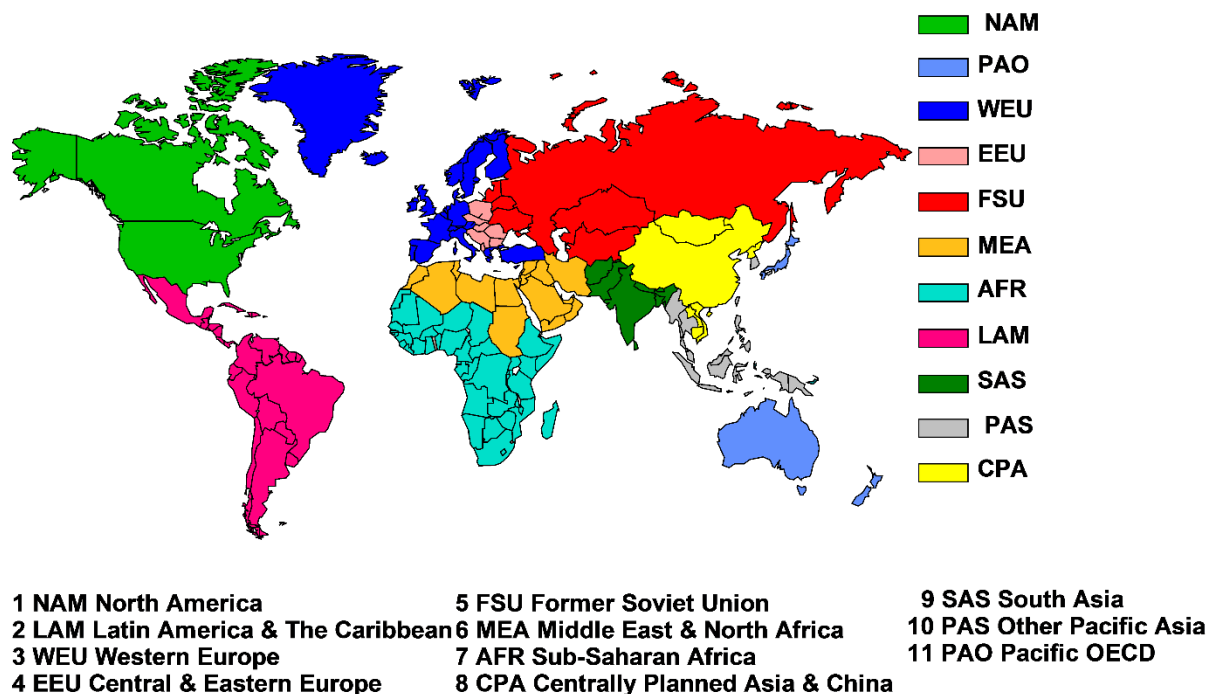[2] Centre for Environmental Policy, Imperial College London, 16–18 Prince's Gardens, London SW7 1NE, United Kingdom
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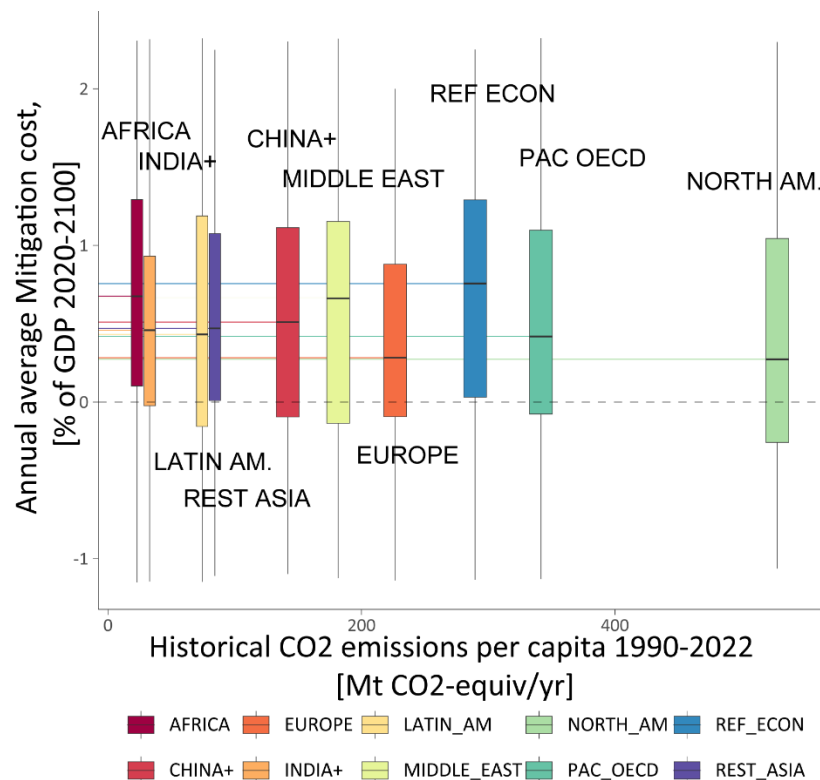
Extended Data Fig. 1. Cost-effective mitigation costs for different macroeconomic regions vs the contribution to historical emissions from the IPCC AR6 scenarios, highlighting the lack of fairness considerations.


1 NAM North America
2 LAM Latin America & The Caribbean
3 WEU Western Europe
4 EEU Central & Eastern Europe

5 FSU Former Soviet Union
6 MEA Middle East & North Africa
7 AFR Sub-Saharan Africa
8 CPA Centrally Planned Asia & China

9 SAS South Asia
10 PAS Other Pacific Asia
11 PAO Pacific OECD

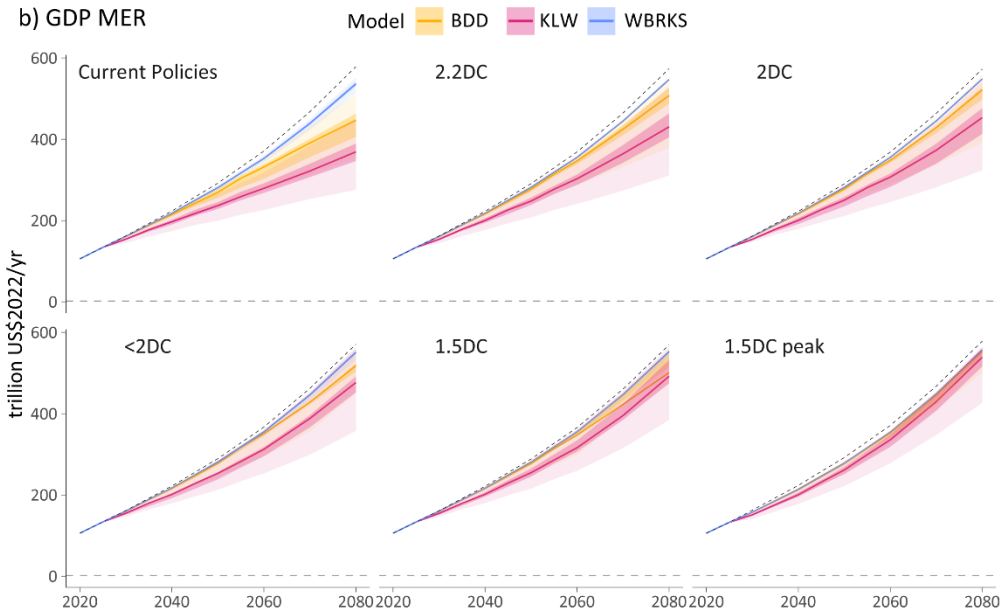*Extended Data Fig. 2. MESSAGEix-GLOBIOM regional definition. Image from the message_doc online documentation.*
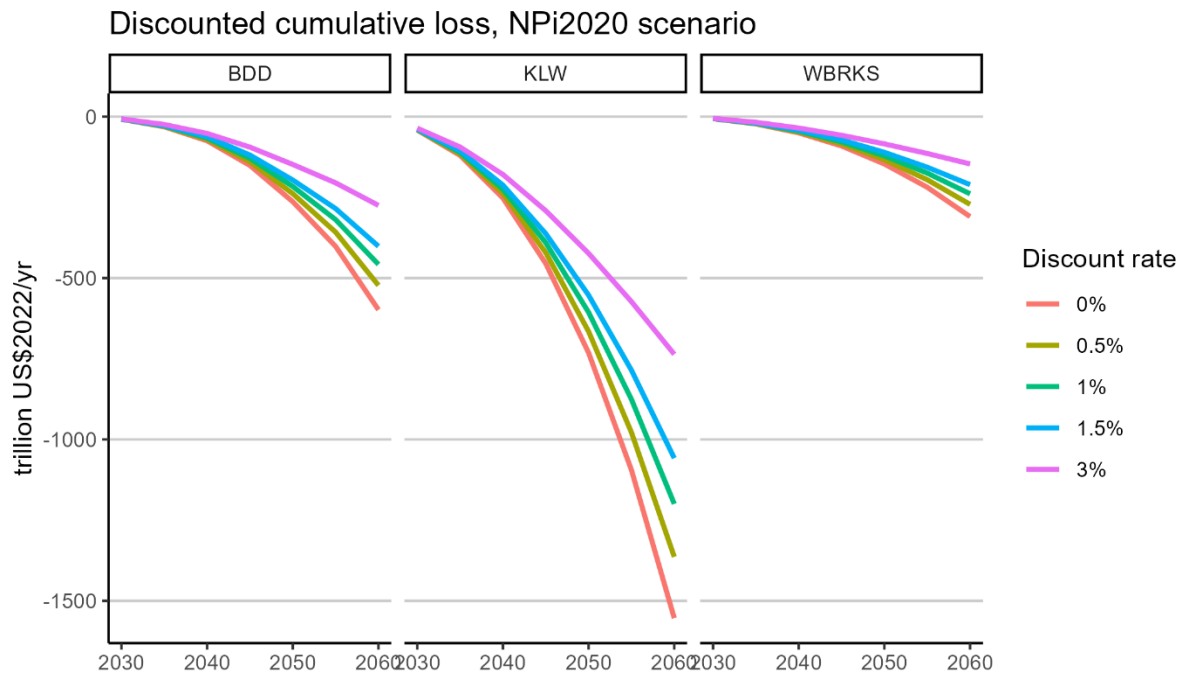
Extended Data Fig. 3. Future climate damages for three damage functions under different discount rates. The scenario Current Policies at the 50th percentile of temperature distribution is considered.
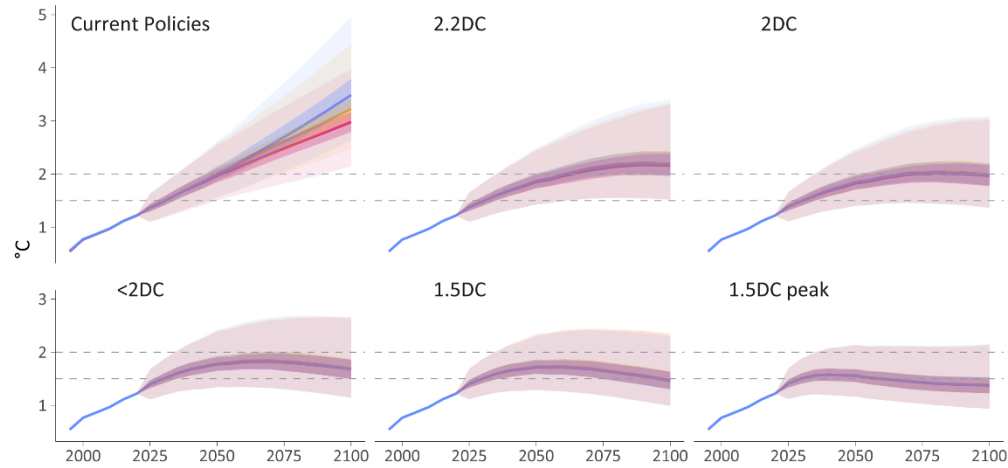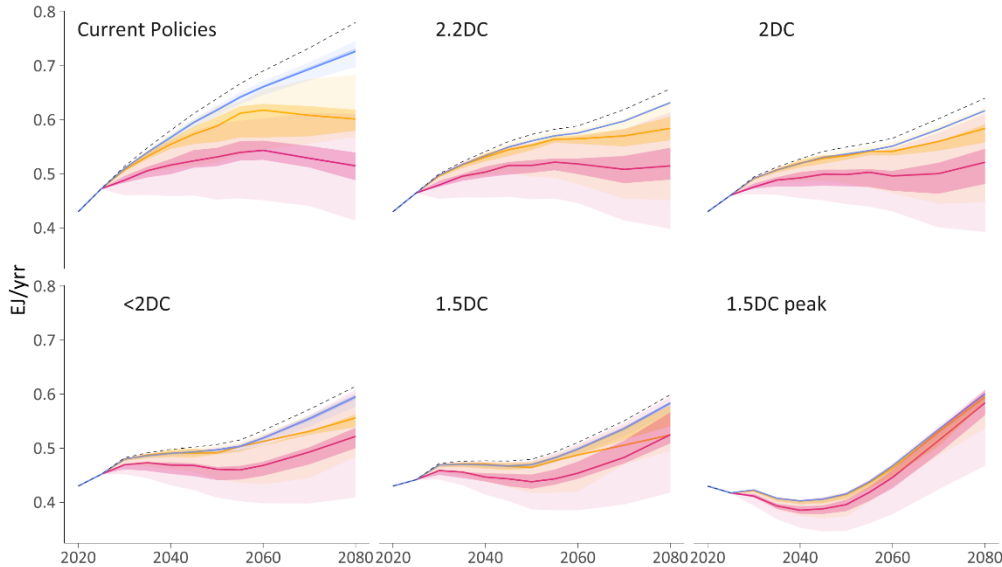
Extended Data Fig. 4. a) Global mean temperature b) Market Exchange Rate GDP c) total energy demand trends for different scenarios and damage functions (BBD, KLW and WBRKS). The line represents results for the 50th percentile of the global mean temperature distribution. The darker shared area is the range between the 33rd and 67th percentile, the lighter area is the range between the 5th and 95th percentile.

Climate-induced GDP losses in 2050 compared to no impacts: current policy scenario
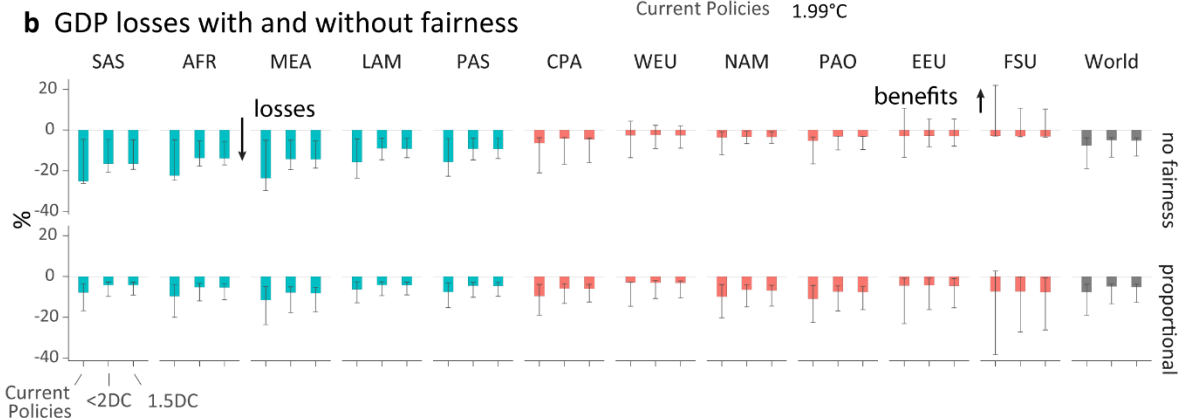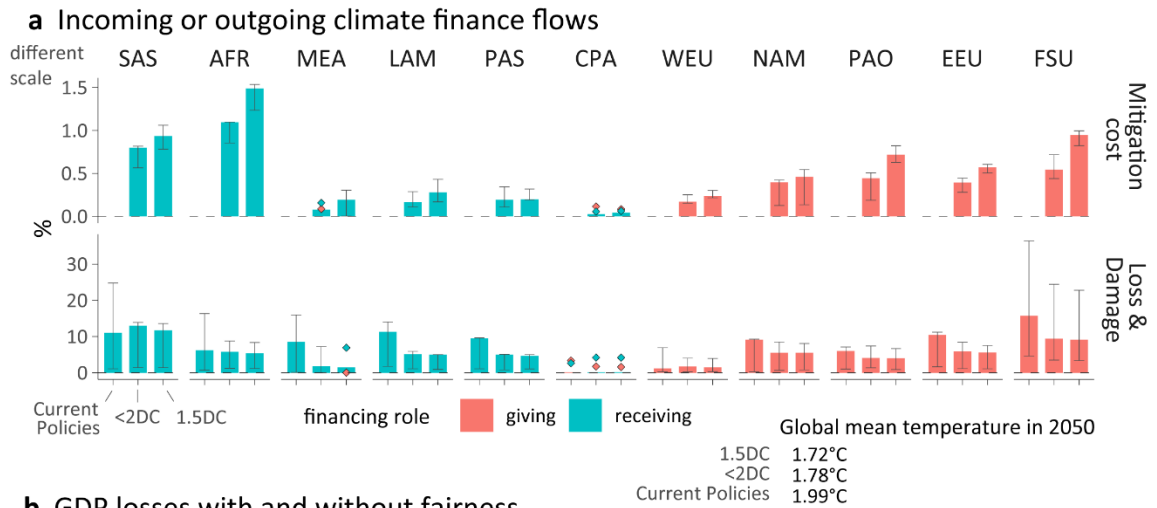
BDD

KLW

WBRKS
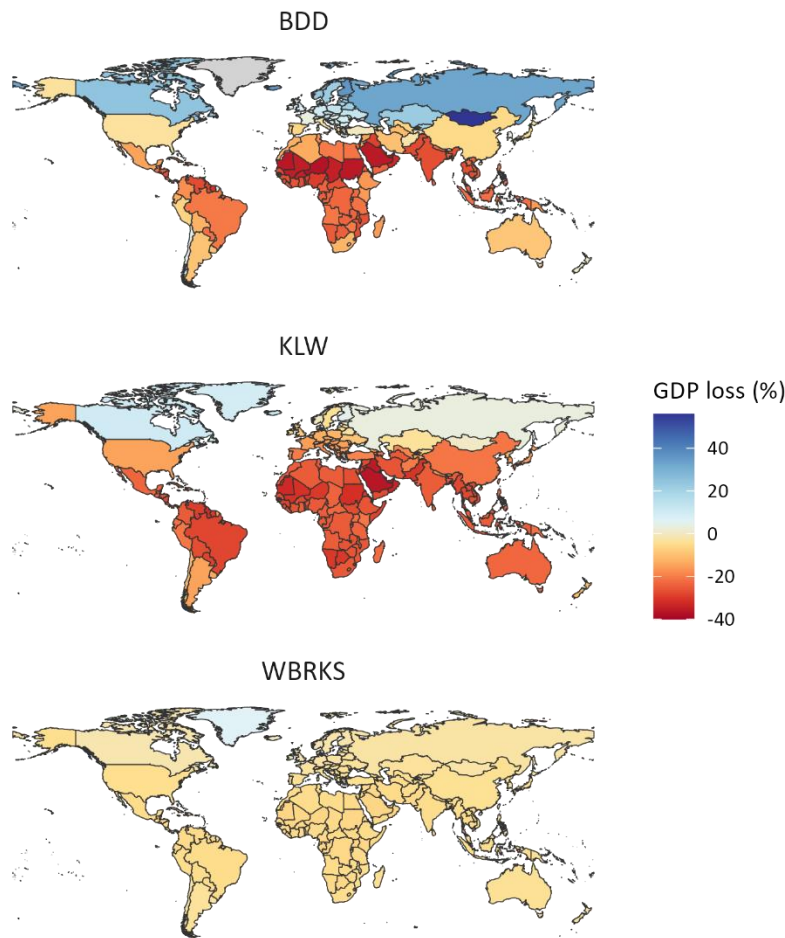
Extended Data Fig. 5. Country damages in 2050 for the Current Policies scenario across three damage functions, 50th percentile of the temperature distribution.
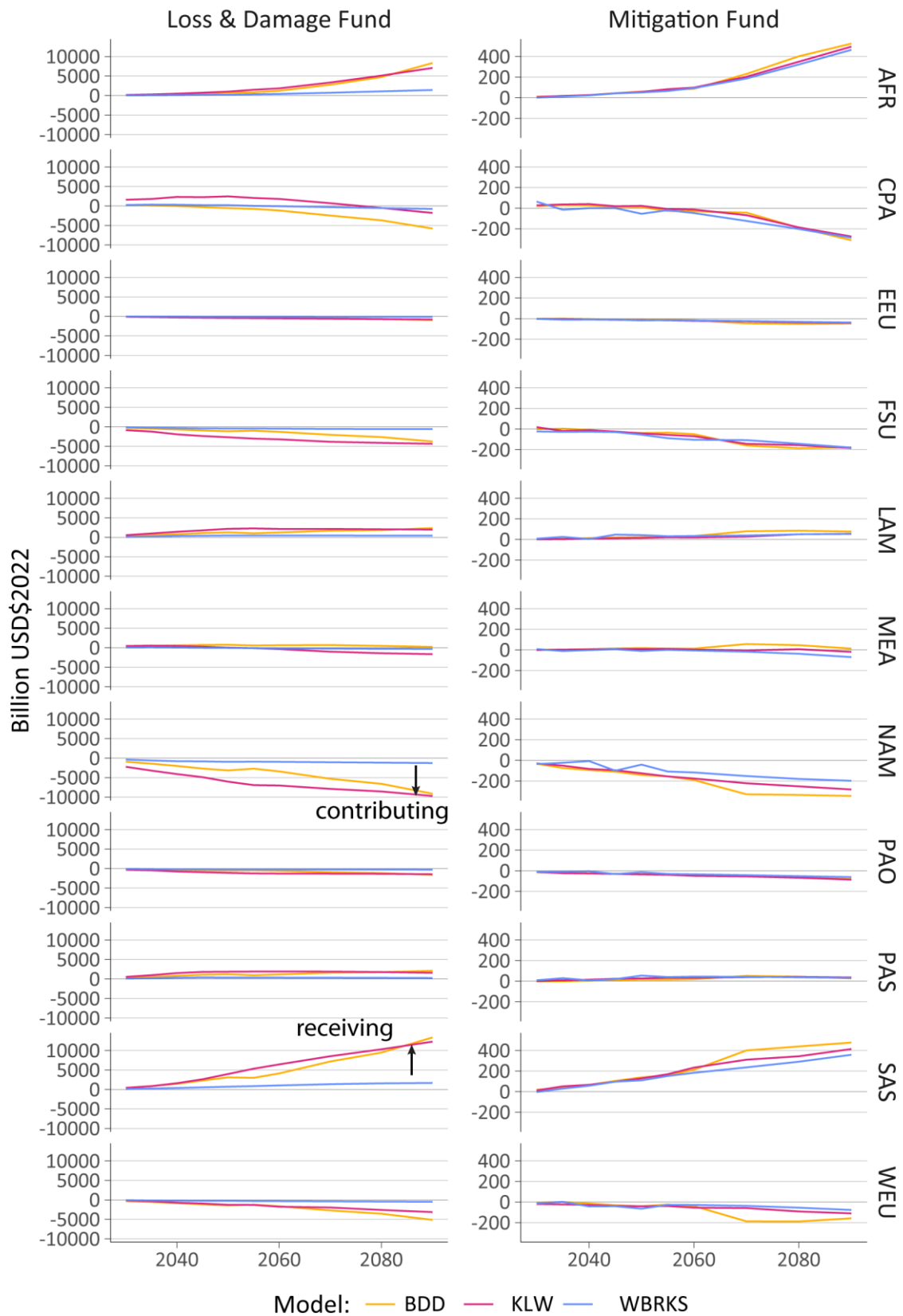
Extended Data Fig. 6. "Fair" yearly regional financial contributions to the L&D and mitigation fund in the <2DC scenario using the carbon debt fairness approach and for three damage functions.

a Incoming or outgoing climate finance flows

different scale

SAS   AFR   MEA   LAM   PAS   CPA   WEU   NAM   PAO   EEU   FSU

Mitigation cost

Loss & Damage

Current Policies   <2DC   1.5DC

financing role   ■ giving   ■ receiving

Global mean temperature in 2050

1.5DC	1.72°C
<2DC	1.78°C
Current Policies	1.99°C

b GDP losses with and without fairness

SAS   AFR   MEA   LAM   PAS   CPA   WEU   NAM   PAO   EEU   FSU   World

losses   benefits

no fairness

proportional

Current Policies   <2DC   1.5DC

Extended Data Fig. 7. a)Climate finance regional incoming or outgoing flows as a percentage of GDP. b) Total GDP losses compared to a hypothetical no-impact scenario net of 'fair' climate finance contributions. Both results for the Current Policies, <2DC and 1.5DC scenarios in the year 2050 at the 50th percentile of temperature distribution and considering fairness based on the approach proportional to cumulative emissions.
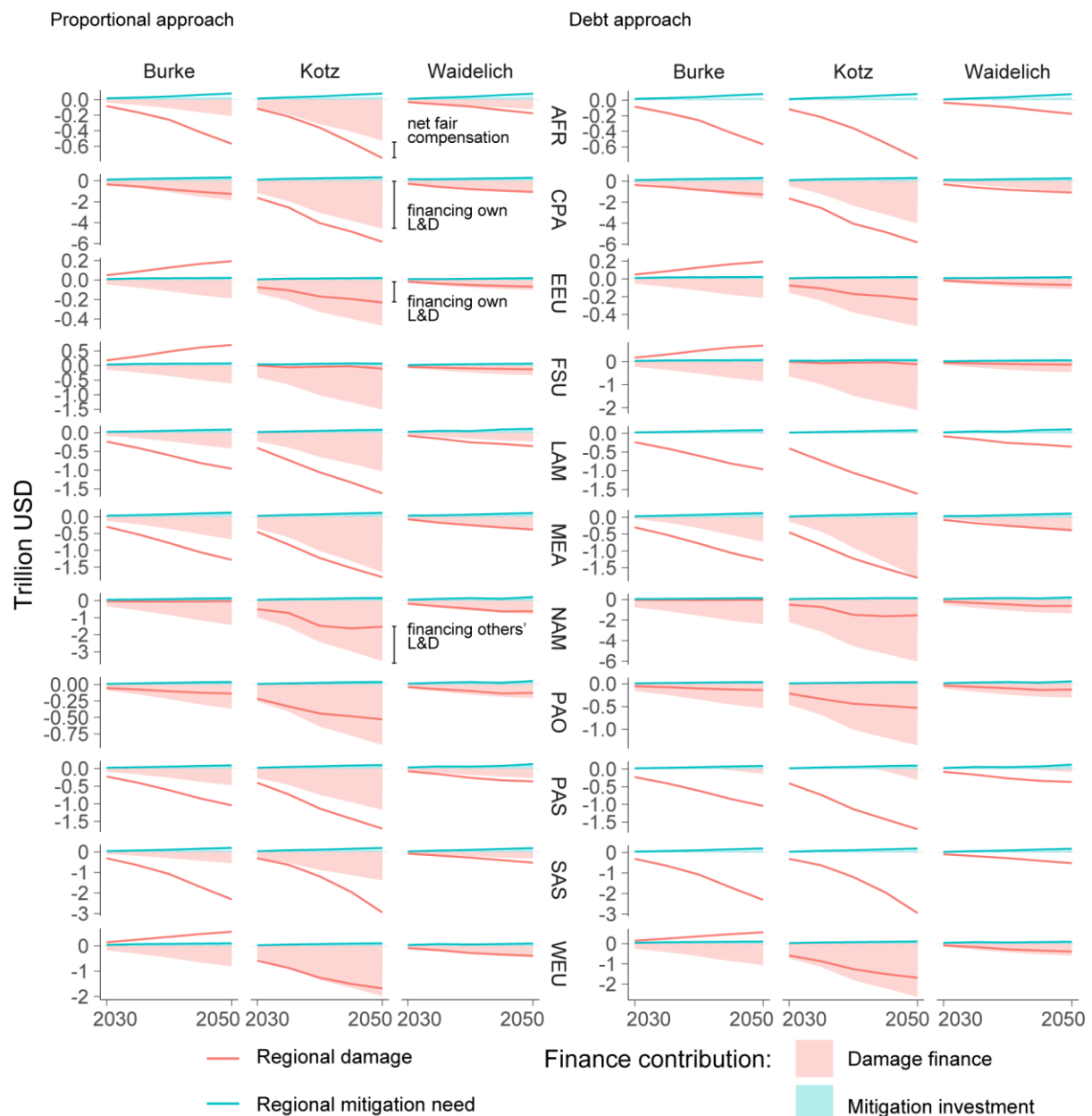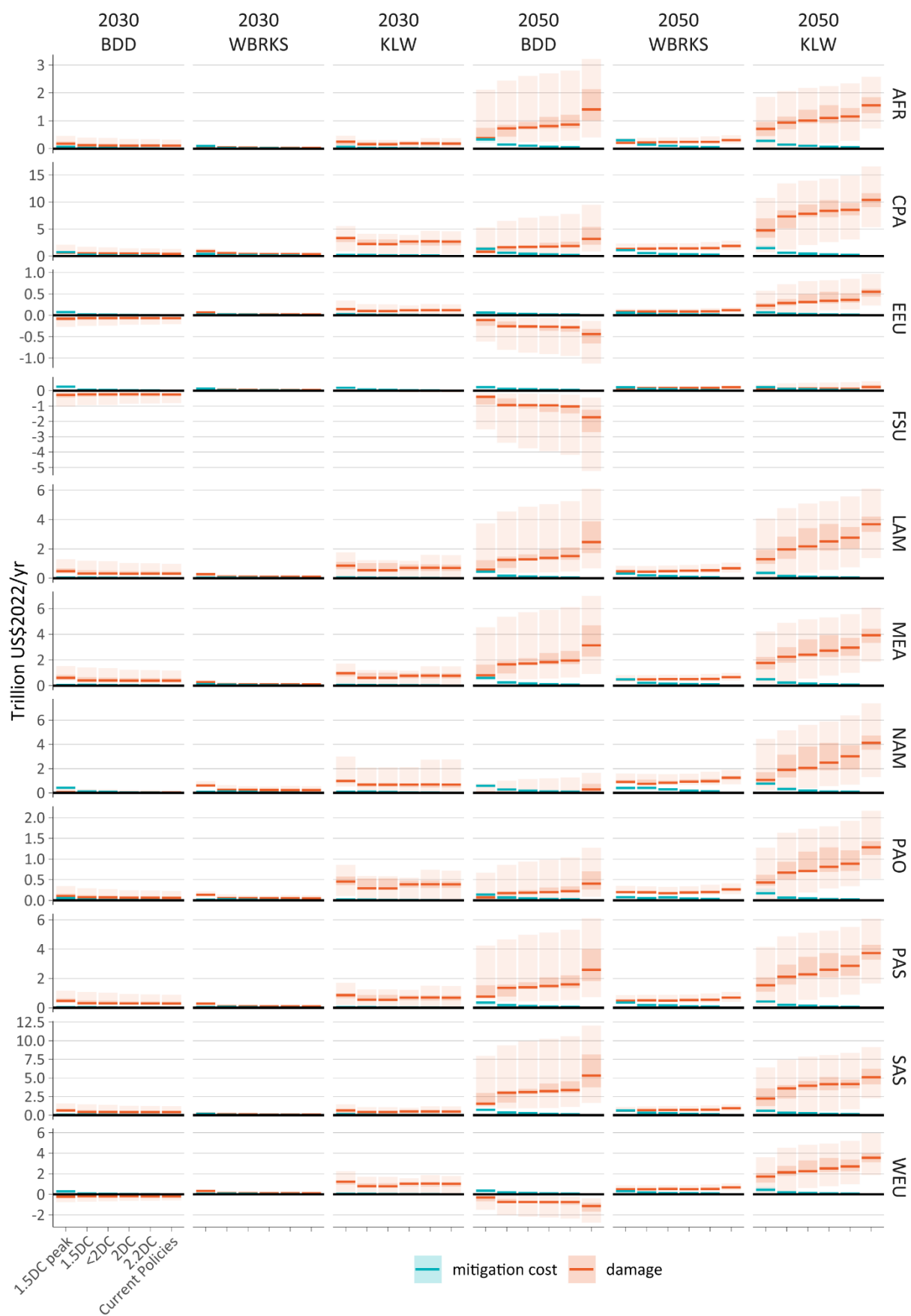
Extended Data Fig. 8. Regional total mitigation costs and damages (lines) and fair contributions (areas) for the 2DC scenario under the proportional and dept illustrative fair shares considerations. The difference between the total cost and the fair contribution determines whether a region should receive from or provide funding to other regions.
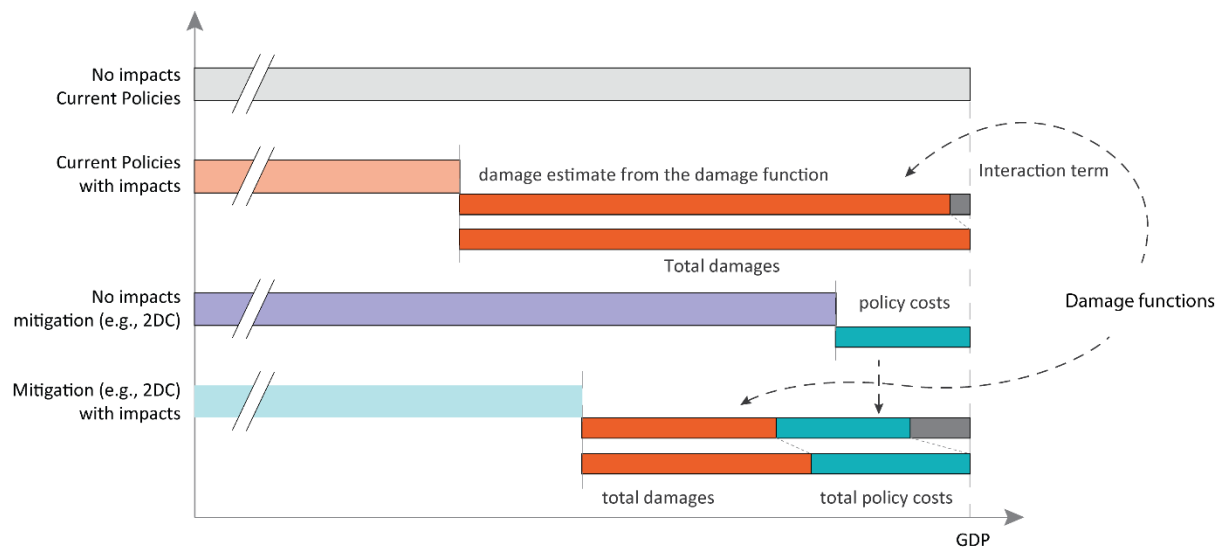
Extended Data Fig. 9. illustration of the calculation process for damages and mitigation costs. The bars represent the global or regional GDP for a specific scenario.

Extended Data Fig. 10. Regional discounted yearly GDP losses from mitigation costs and damage across scenarios before applying any fairness approach. Lines represent the median (50th percentile), the darker box 33rd and 67th percentiles, and the lighter area within the 5th and 95th percentiles of the temperature output distribution from MAGICC.