Adaptation to extreme heat in the agricultural sector – SSP dependent scenarios for mechanization deployment

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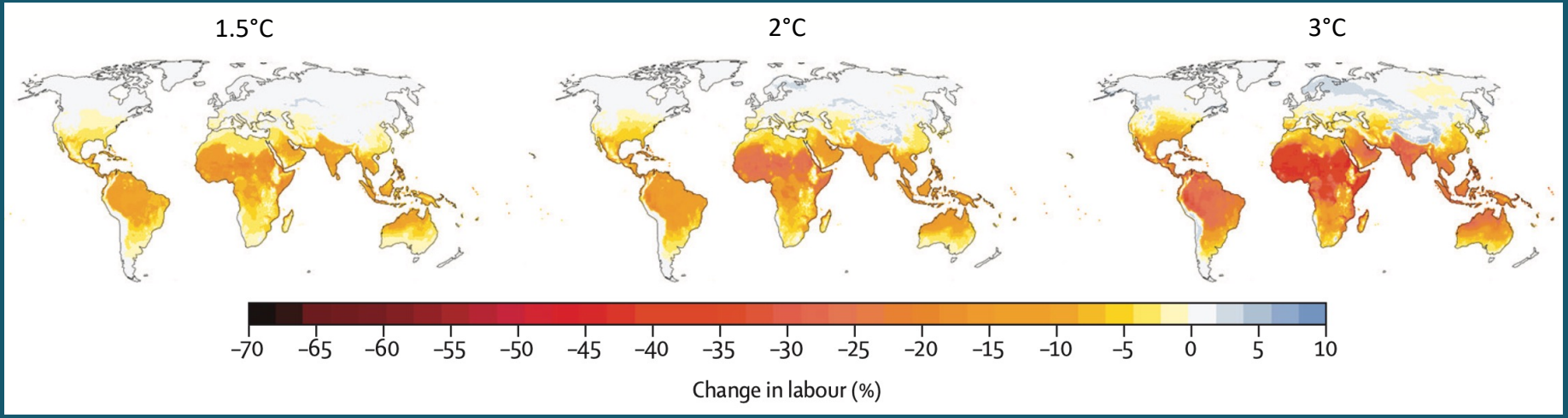
NH1.1 Extreme heat events:
processes, impacts and adaptation

Introduction

- Last years study finds that effective labour could be halved at 3°C global warming
- When assessing future impacts of heat, adaptation is currently being ignored (or assessed in a highly stylized manner)
- Ignoring adaptation or just assuming a certain level of adaptation is misleading
- Need for quantitative scenarios exploring the future possibilities and constraints of adaptation
- Focus on agricultural mechanisation



Effects of climate change on effective labour relative to 1986-2005 (Dasgupta, van Maanen et al., 2021)

Approach

CLIMATE ANALYTICS

According to the 5th Assessment Report of the IPCC..

- Adaptation is the process of adjustment to actual or expected climate stimuli and its effects
- Adaptive capacity is the ability to adjust to these changing conditions
- Adaptive capacity is highly dependent on the socioeconomic conditions of countries

Assess the current level of adaptation to extreme heat globally by defining a quantitative index for each country

Analyse which socioeconomic factors from the Shared Socioeconomic Pathways (SSPs) can best explain the variation across countries

Build a statistical model using the identified variables and project potential mechanisation deployment alongside the SSPs

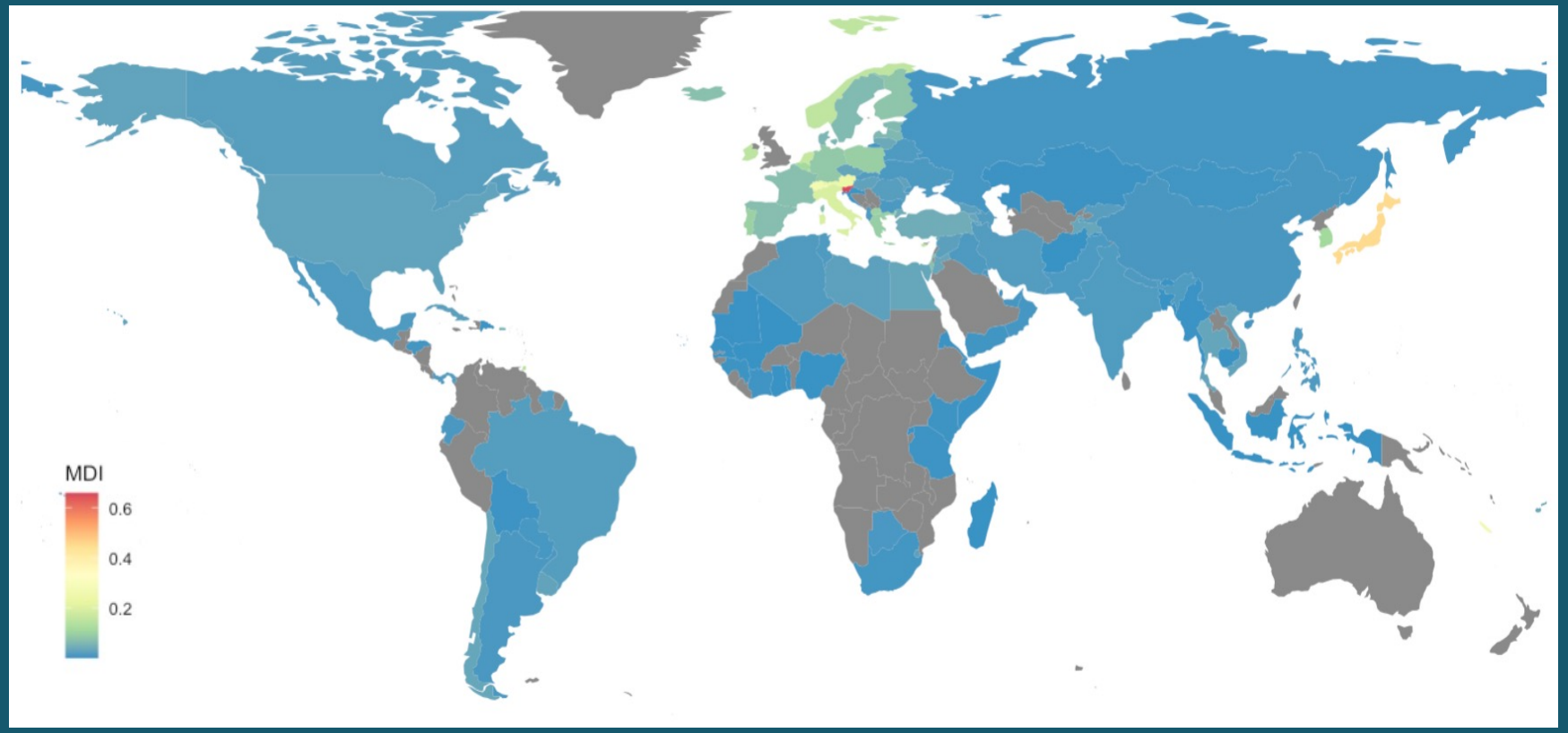
Include projections in integrated assessments of climate change and identify which factors are constraining adaptive capacity

Assessing the current level of adaptation

CLIMATE ANALYTICS

"Agricultural mechanisation as one of the pertinent strategies to cope with extreme heat and labour shortage" (Aryal et al., 2021)

Mechanization Deployment Index (MDI)



Mechanization Deployment Index (1996-2005)

Explore socioeconomic variables..

CLIMATE ANALYTICS

SSP1: Sustainability

SSP2: Middle of the Road

SSP3: Regional Rivalry

SSP4: Inequality

SSP5: Fossil-fueled Development

Quantified variables

- Population
- GDP
- Urbanization
- Education
- Governance
- Gender inequality
- Human development
- Income inequality

Mechanization Deployment Index (MDI)

Preliminary results

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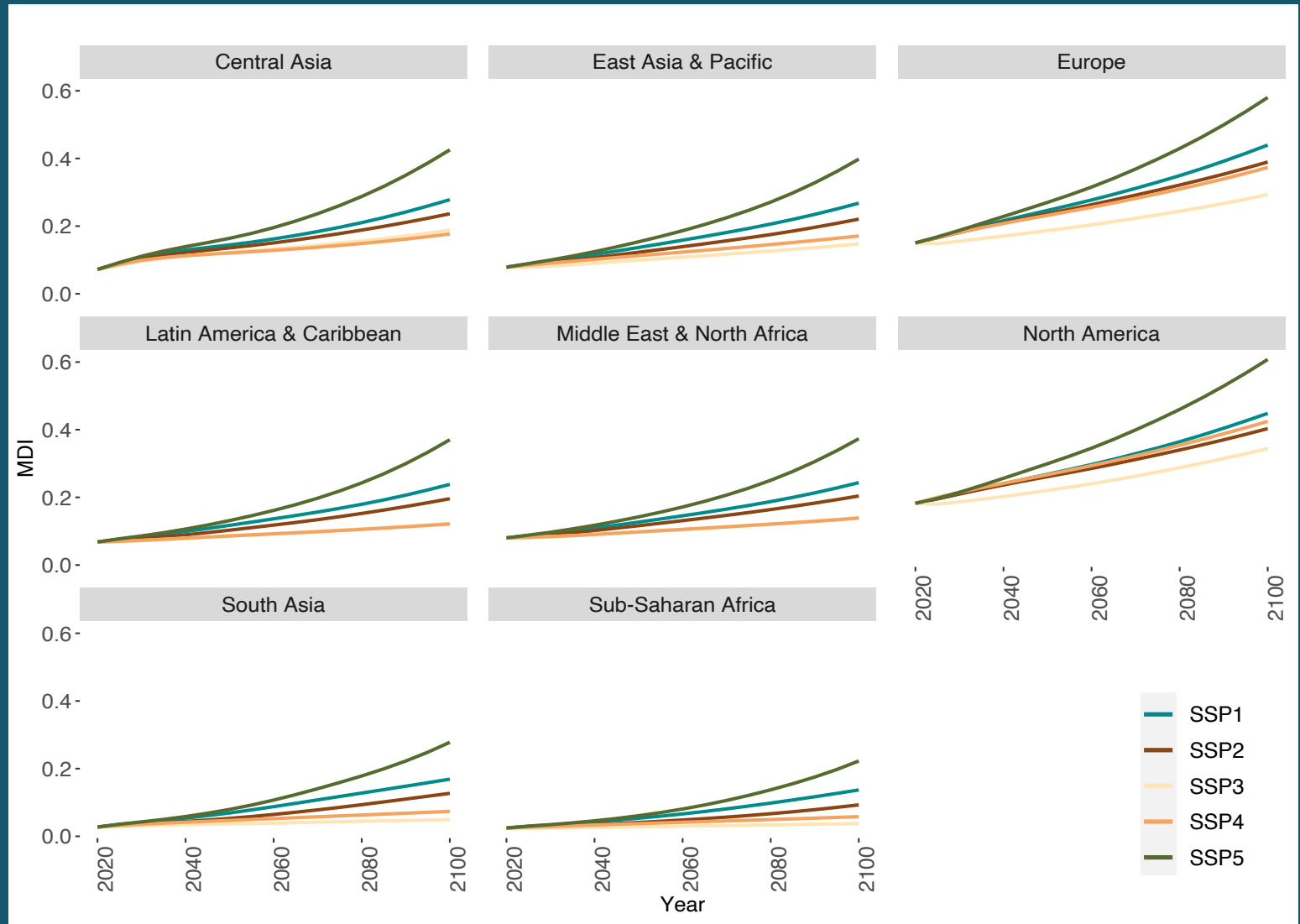

WORK IN PROGRESS

- Regional trajectories for agricultural mechanisation in line with socioeconomic scenarios in the 21st century
- High potential for agricultural mechanisation remains
- Variations between scenarios and regions
- SSP1 and SSP5 are the most optimistic scenarios

Summary and conclusion

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- There is an increasing need for quantitative scenarios exploring **the potential of adaptation and adaptive capacity**
- We try to assess how socioeconomic conditions are related to current level of agricultural mechanization and explore **future possibilities and constraints** of its deployment
- The SSPs are already widely deployed in climate science, allowing for a **broad uptake** of the projections
- Assessing the future adaptive capacity of countries and including this information in integrated assessments of climate change will be of key importance **to assess pathways to climate resilience**

Thank you!

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