AgMIP The Agricultural Model Intercomparison and Improvement Project

Report from AgMIP8: COVID-19, Climate Change, and Food Security




Cynthia Rosenzweig
NASA GISS
UN Expert Meeting on Population and Food
October 29, 2020

AgMIP Mission and AgMIP8

Provide effective science-based agricultural decision-making models and assessments of climate variability and change and sustainable farming systems to achieve local-to-global food security

AgMIP8

Virtual Webshop
Food Systems, Shocks, and Actions

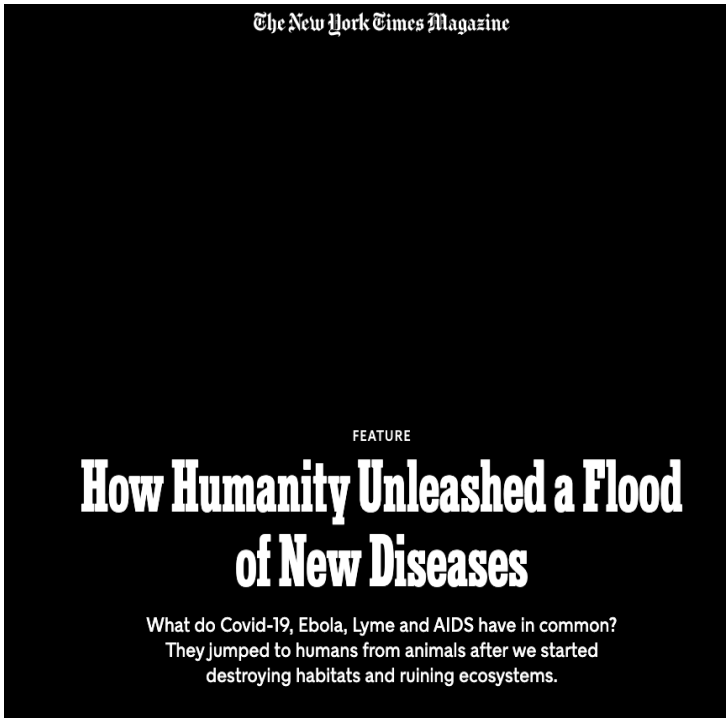
October 13 – 15, 2020
AgMIP Team Sessions, October 12 & 16, 2020

AgMIP is an international community of 1000+ **climate scientists**, **agronomists**, **economists**, and **IT experts** working to improve assessments of **current and future risks to food security**

Visit www.agmip.org for more information and to sign up for AgMIP listserv

COVID-19 links to Food System (1)

- SARS-CoV-2 infected people through zoonotic spillover event, most likely from bat, although another animal may have been involved.
- Case trace back from the December outbreak in Wuhan, China implicated a seafood wet food market.
- COVID-19 is a zoonosis, a disease that jumped from animals to humans.
- Food and agriculture have a big part in the rise of zoonotic disease. Animals in close proximity to humans; natural habitat shrunk, destroyed



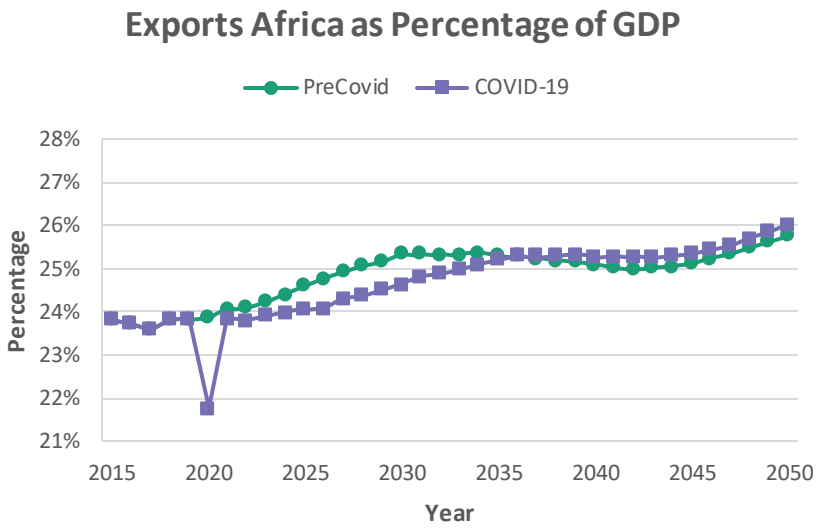
New York Times 2020. How Humanity Unleashed a Flood of New Diseases: https://www.nytimes.com/2020/06/17/magazine/animal-disease-covid.html

COVID-19 links to Food System (2)

Consequences on food systems and food security

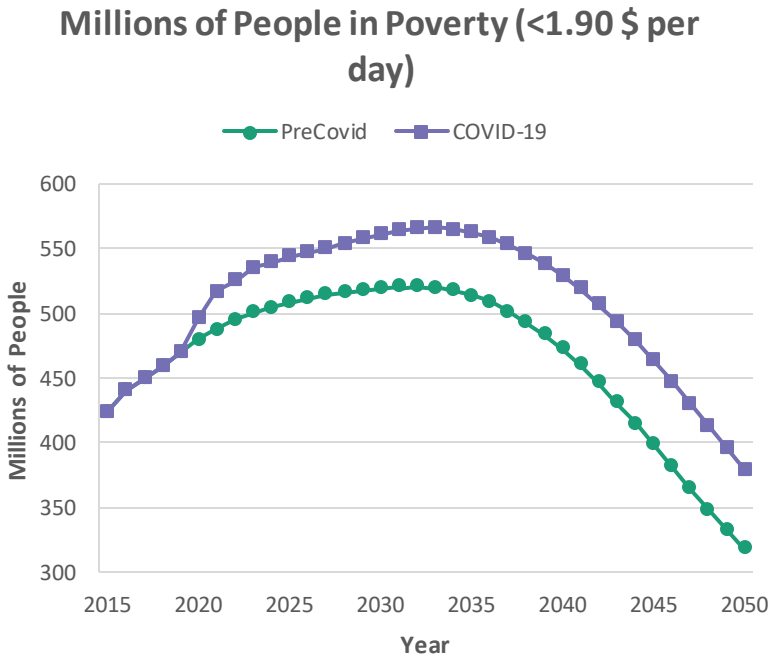
- ***Immediate***
  - **Supply chain disruption in food industry**
  - **Depressed demand *(loss in wages; restrictions on movement of people, goods and services; factory closures)***
  - ***Foot traffic in restaurants declined by 75% in Latin America; North America and Middle East markets by 90% by end of March*** *(Aislelabs, April 2020)*

- **Medium to longer term**
  - Disruption in agricultural inputs supply chains
  - Decline in GDP ➡ depressed government fiscal space ➡ limited ability to maintain safety nets



AgMIP Research on Food Shocks

- ✓ Understanding the problem: Shocks and how they impact food systems
- ✓ Structural socio-economic context
- ✓ Systems approach across multiple levels – Farm, Region, National, Global
- ✓ Dynamic and complex



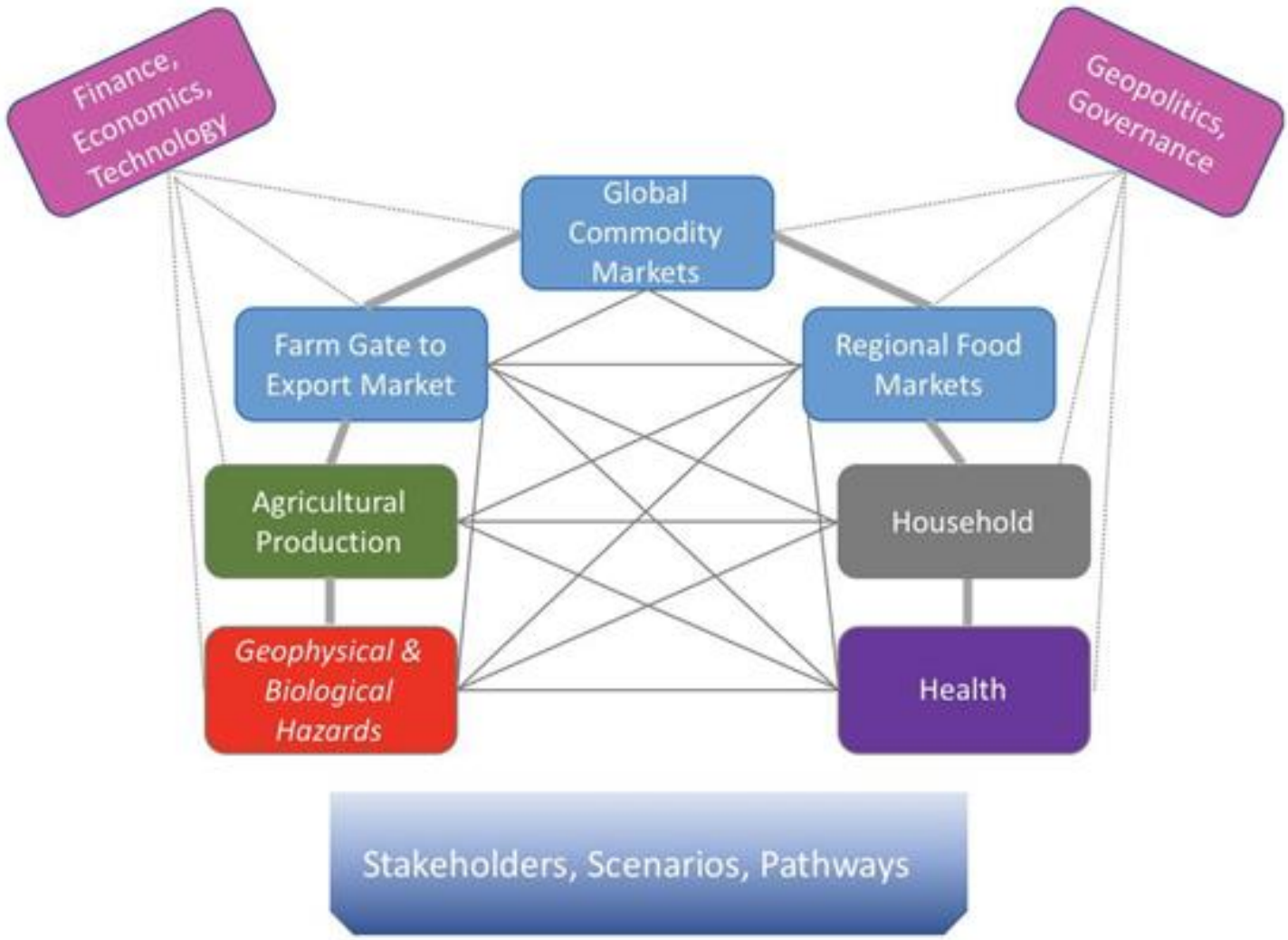
Ensuring fit-for-purpose tools and approaches: Factors highlighted by COVID-19

- Food security is NOT A SECTOR issue, neither is it a purely TECHNICAL ISSUE
- Structural societal weakness and fragilities, including poverty remain critical as much as productivity and resilience in food systems
- Response cannot be patchwork - Opportunity to recalibrate food system; resilient food for all systems

Martin Bwalya, AgMIP8 Keynote

AgMIP The Agricultural Model Intercomparison and Improvement Project

AgMIP Food Shock Protocols



Climate Change Food System Impacts are Already Here

~45 million people in southern Africa are food-insecure as a result of drought, floods and COVID-19

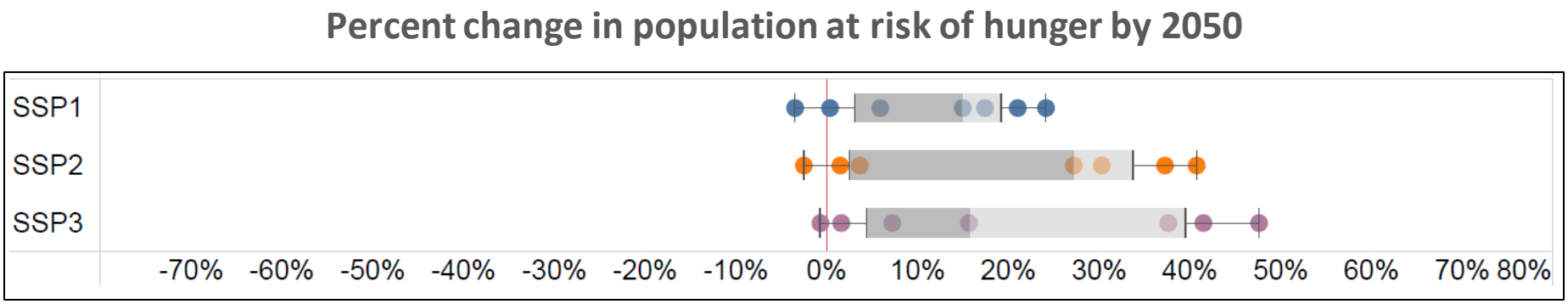
Aljazeera, 2020. Image: Rogan Ward/Reuters

Observed climate change is already affecting food security through increasing temperatures, changing precipitation patterns, and greater frequency of some extreme events (*high confidence*)

IPCC, 2019, Special Report on Land

Risk of Hunger

Food security will be increasingly affected by projected future climate change (*high confidence*)

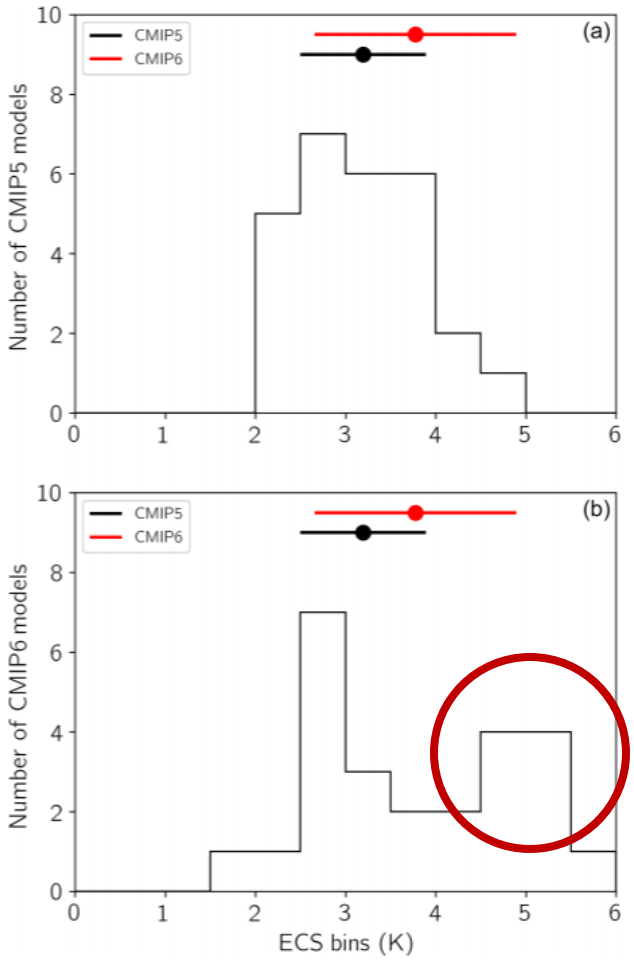


Hasegawa et al. 2018

SSPs = Shared Socio-economic Pathways
1 Green Road; 2 Middle-of-the Road; 3 Rocky Road

Climate Sensitivity

National Aeronautic and Space Administration
Goddard Institute for Space Studies



Flynn and Mauritson, 2020

Higher overall ECS in CMIP6, divergence in ESM ensemble

Table 1. List of CMIP5 models and model climate parameters.

Model	ECS	TCR
GISS-E2-H	2.33	1.69
GISS-E2-R	2.06	1.41

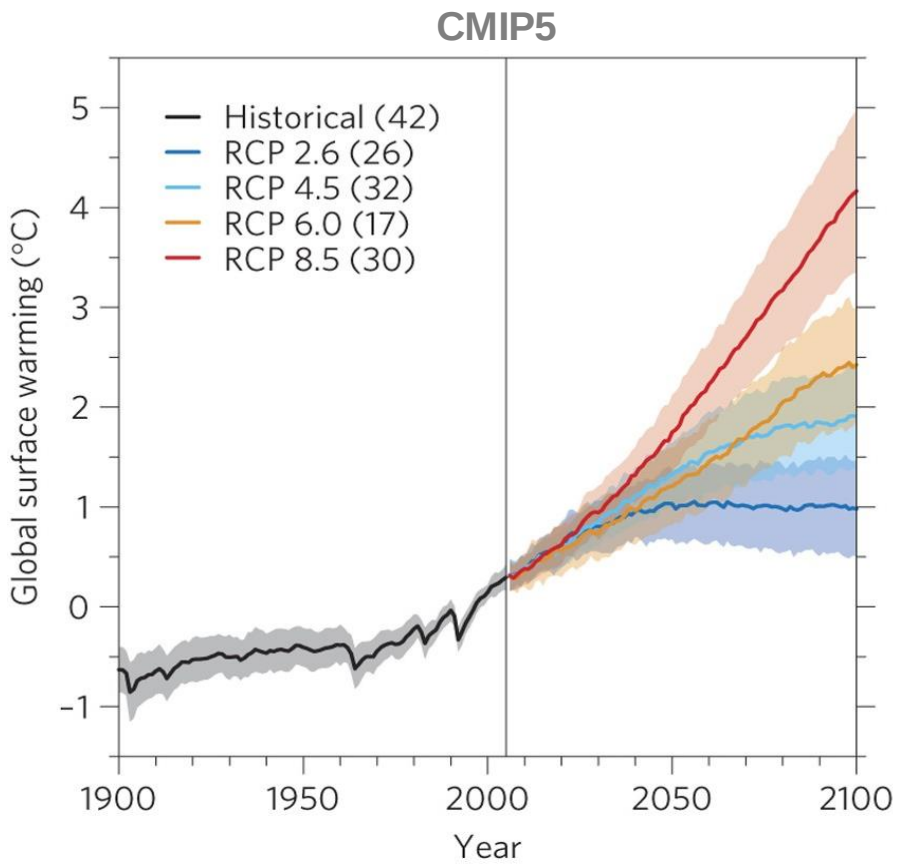
Table 2. List of CMIP6 models and model climate parameters.

Model	ECS	TCR
GISSE2-1-G	2.60	1.66
GISSE2-1-H	2.99	1.81

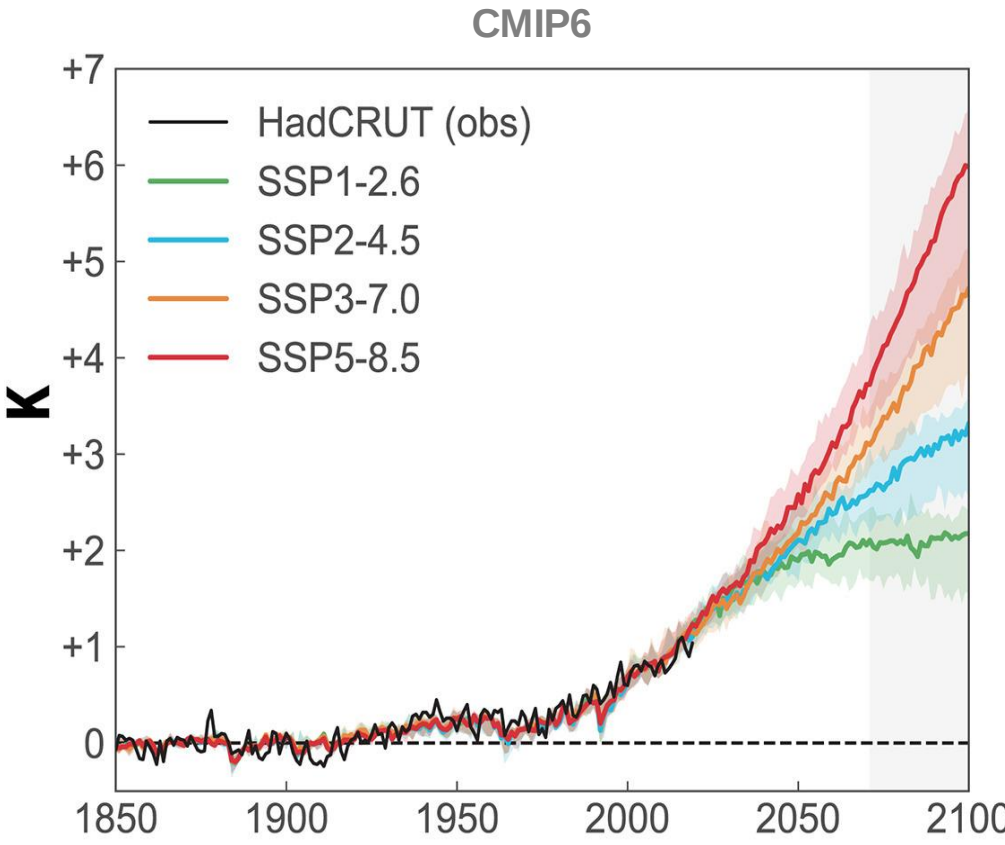
Equilibrium Climate Sensitivity >5C → HadGEM, UKESM, CESM, CanESM, E3SM

AgMIP The Agricultural Model Intercomparison and Improvement Project

Temperature Anomalies



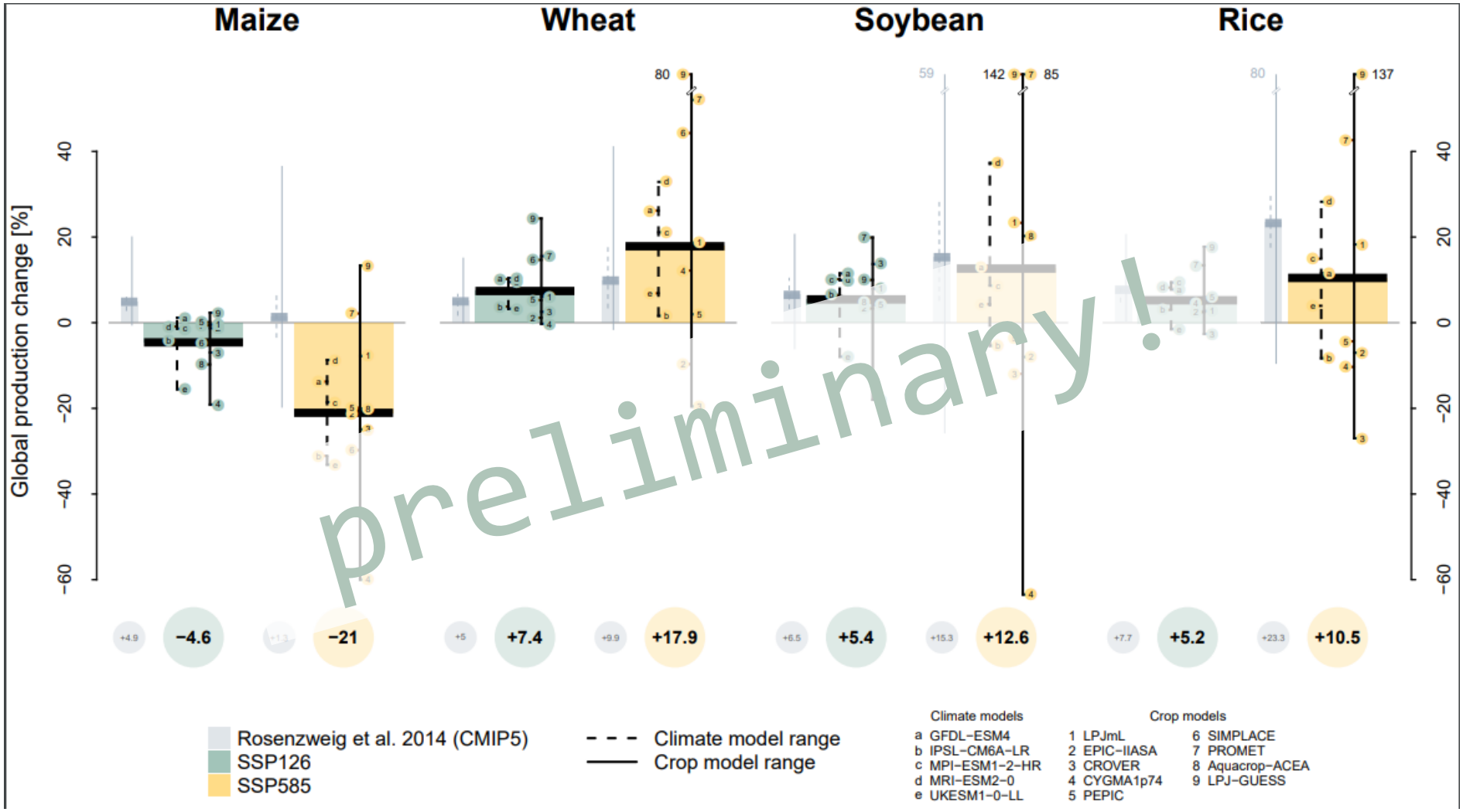
Knutti & Sedláček, 2013, Nature Climate Change



Cook et al. 2020. Earth's Future

AgMIP The Agricultural Model Intercomparison and Improvement Project

New CMIP Based Transient Future Projections



Jägermeyr et al. in prep.

AgMIP The Agricultural Model Intercomparison and Improvement Project

Conclusions

- COVID-19 and the food system are strongly related, in regard to both cause and effects.
- Complex tools and methods are needed to improve understanding of and responses to global system risks, such as the combined effects of pandemics and climate change.
- Integrated solutions much address the local level.
- Climate change effects are already occurring.
- Latest climate model projections show potential for higher temperature increases with ensuing more negative effects on agriculture.