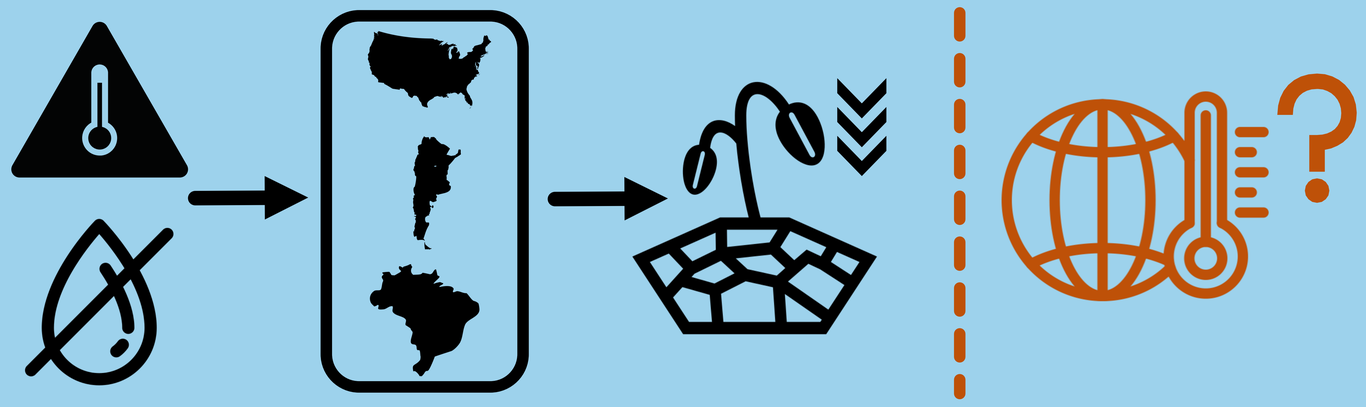
Is the global **supply chain** of **soybeans** at **increased risk** due to **climate change**?

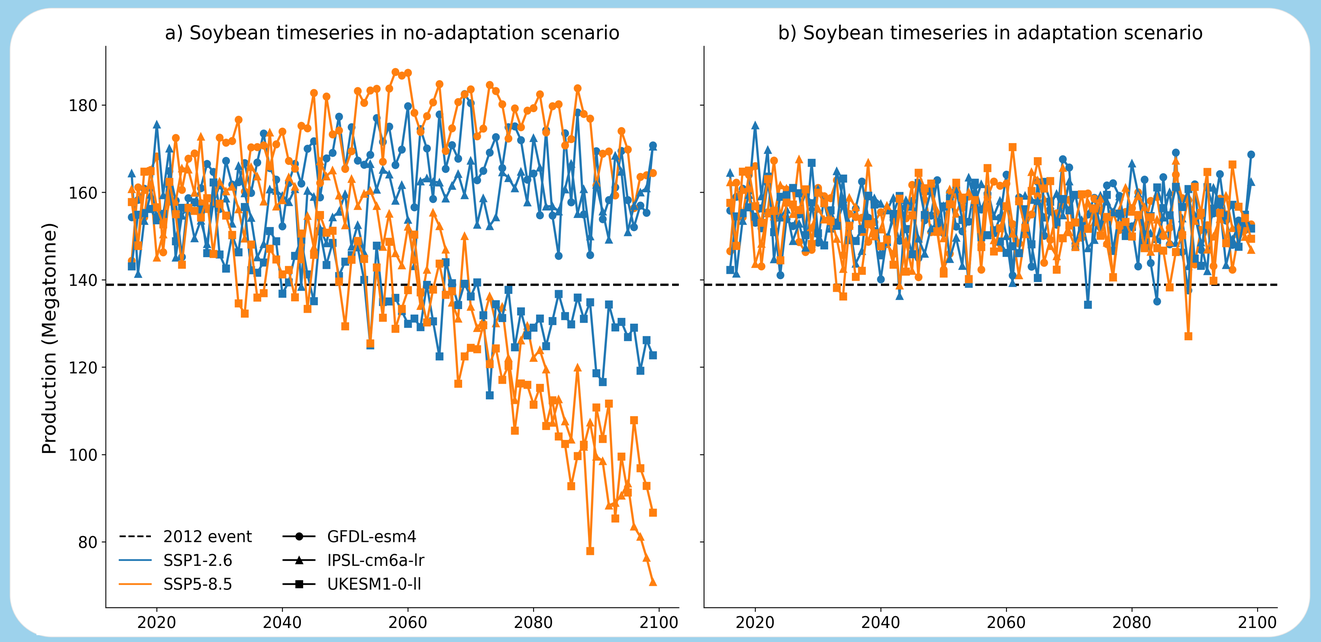
Importance

- Soybeans are important for **global** food security, with most of their production **concentrated** in the Americas.
- In 2012, **simultaneous soybean losses** in the United States, Brazil, and Argentina led to global shortages and record prices.
- We investigate how climate change may affect **future events** with similar or larger impacts than the 2012 event.



Results

- Climate change leads to an **increase in soybean failures** in the combined Americas. They are mostly driven by **changes in mean climate.**
- **Changes in climate variability** increase the frequency of **country-level** soybean losses, but **do not change simultaneous failures** across the Americas.
- Successful **adaptation** measures against changes in mean climate could considerably **reduce** the **future risk of extreme events** like the 2012 event.

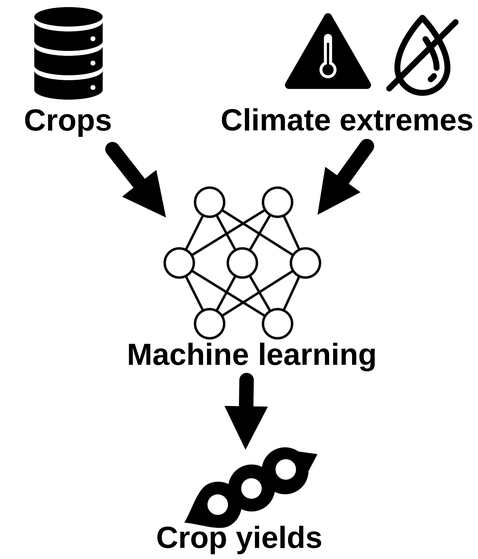


Methods

- We use our newly developed hybrid model to assess the frequency and magnitude of extreme soybean losses in different future climate scenarios.
- We consider both changes due to total climate change (no-adaptation scenario), as well as isolated changes in climate variability (adaptation scenario).

Hybrid model

- Combining physically simulated crops and climate extreme data to predict crop yield, using novel machine learning techniques



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Goulart, H. M. D., van der Wiel, K., Folberth, C., Boere, E., & van den Hurk, B. (2023). Increase of simultaneous soybean failures due to climate change. *Earth's Future*

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