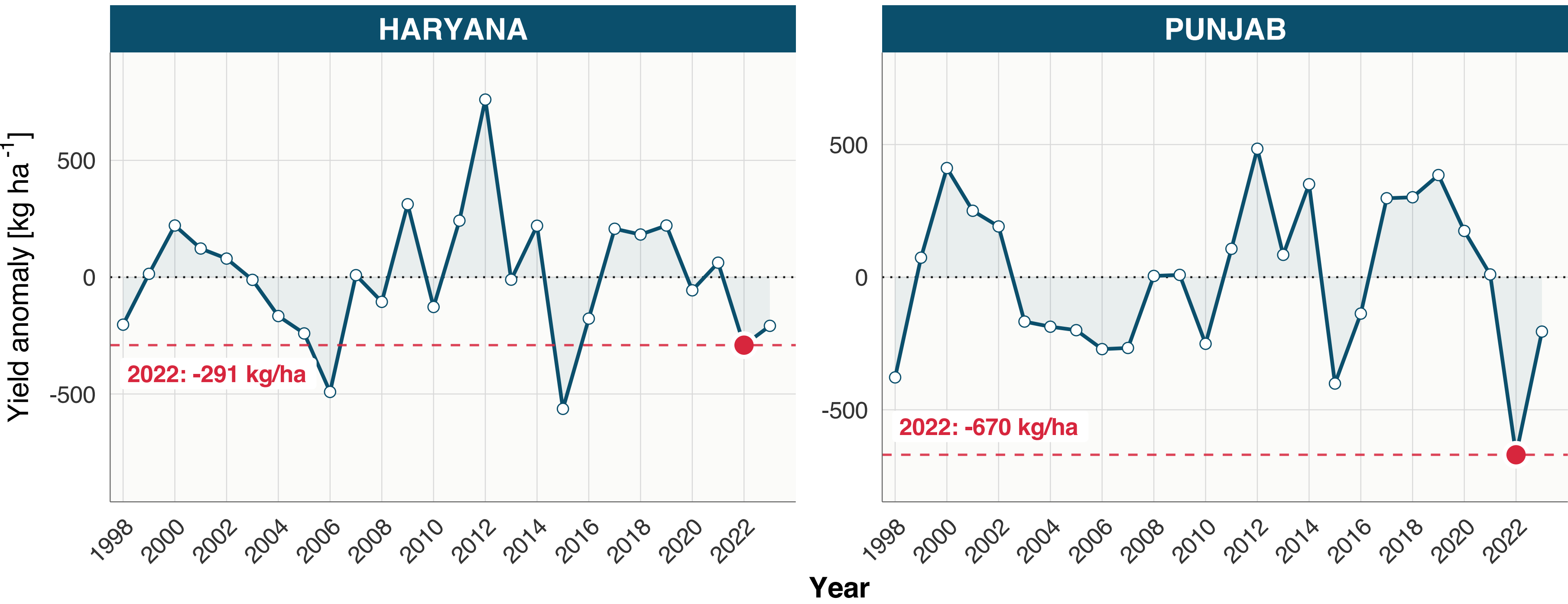


Attributing climate change impacts on wheat yields in northern India in the heatwave year 2022

Heatwave 2022 and its impacts on wheat yields in Punjab and Haryana

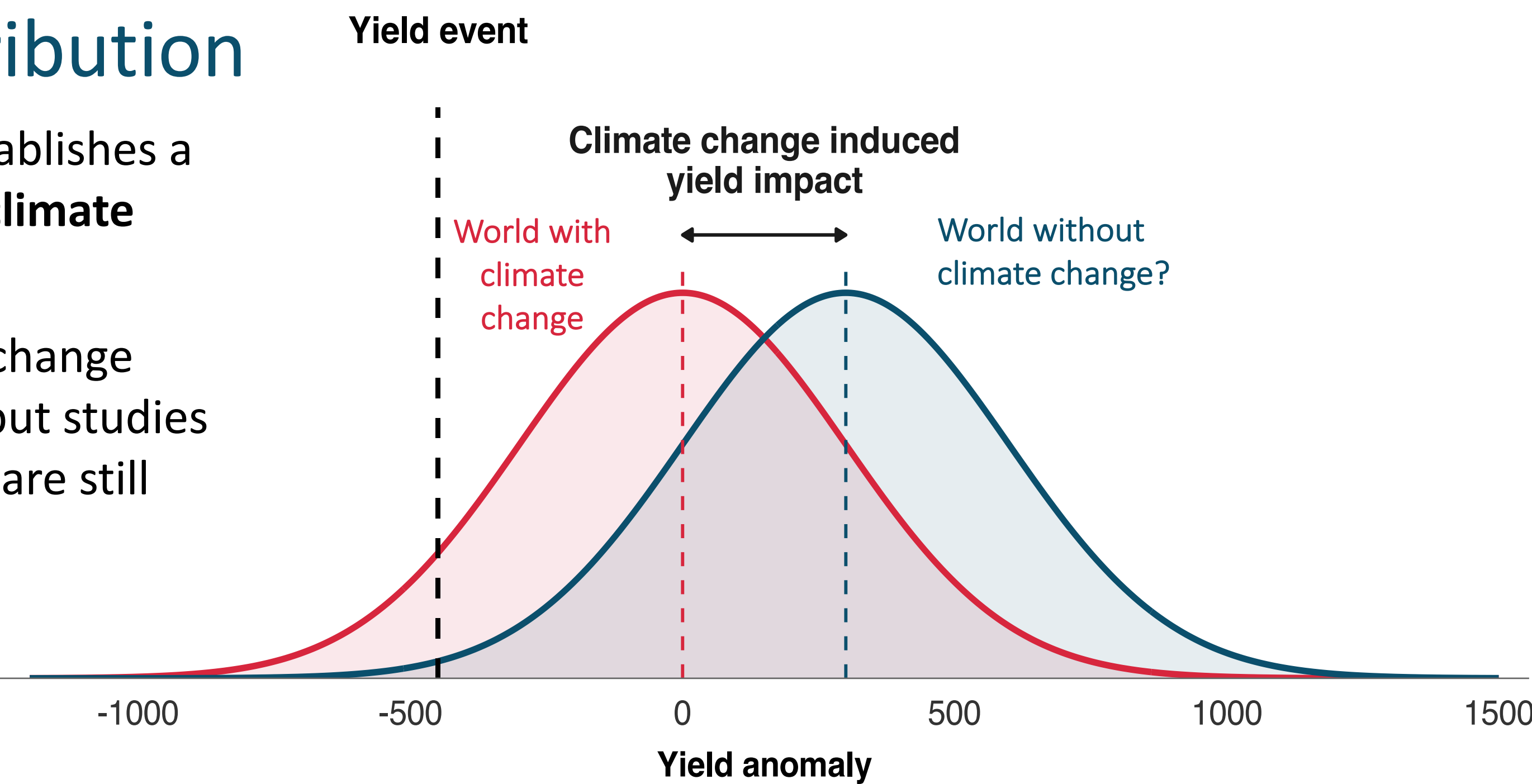
In March and April of 2022, an **early-onset heatwave** affected wheat cultivation in its **terminal heat-sensitive growing phases** in northern India. The elevated temperatures accelerated crop maturity and reduced grain filling durations, leading to yield losses.

? Has anthropogenic climate change impacted the likelihood of such an event?



Climate impact attribution

- Climate impact attribution establishes a **link between anthropogenic climate change and its consequences**
- Robust evidence that climate change amplified weather extremes, but studies that attribute climate impacts are still scarce
- Can inform risk management, adaptation planning and climate policy



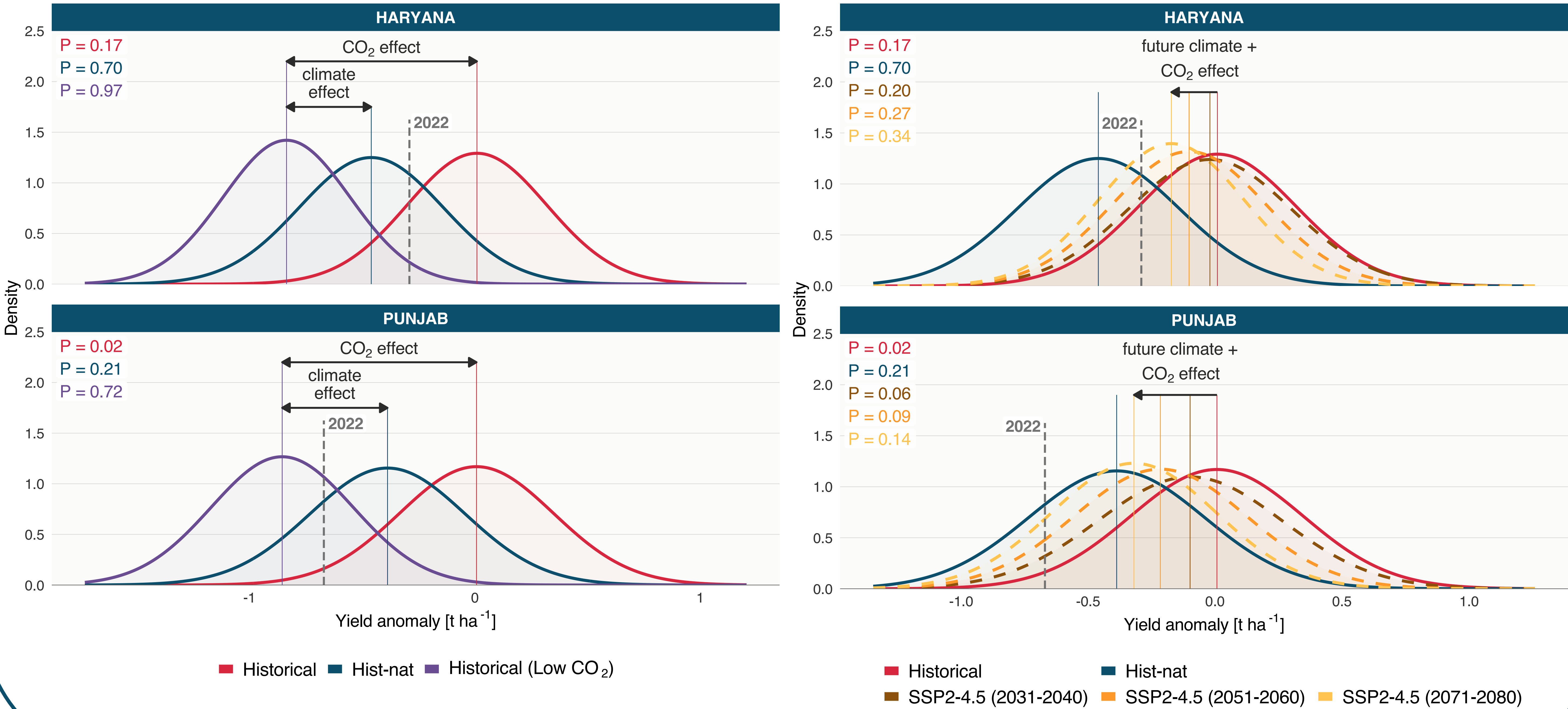
Methods and data

APSIM Next Generation was used to simulate wheat yields in Punjab and Haryana under

- A historical and hist-nat scenario
- A CO₂ sensitivity scenario
- SSP2-4.5 future scenarios (2030s, 2050s, 2070s)

Probabilities of yield anomalies lower than those observed in 2022 were compared among the scenarios.

Impact of anthropogenic climate change on wheat yields in Punjab and Haryana



Conclusion

- Anthropogenic climate change decreased the probability of a low-yield event** such as the 2022 event in Punjab and Haryana
- This is mainly **driven by the positive effect of CO₂** which outweighs the negative weather — mostly temperature — impact
- Future wheat yields are projected to decrease**, and the probability of low-yield events, such as the 2022 event, is projected to increase