

# A typology of compound climate and weather events

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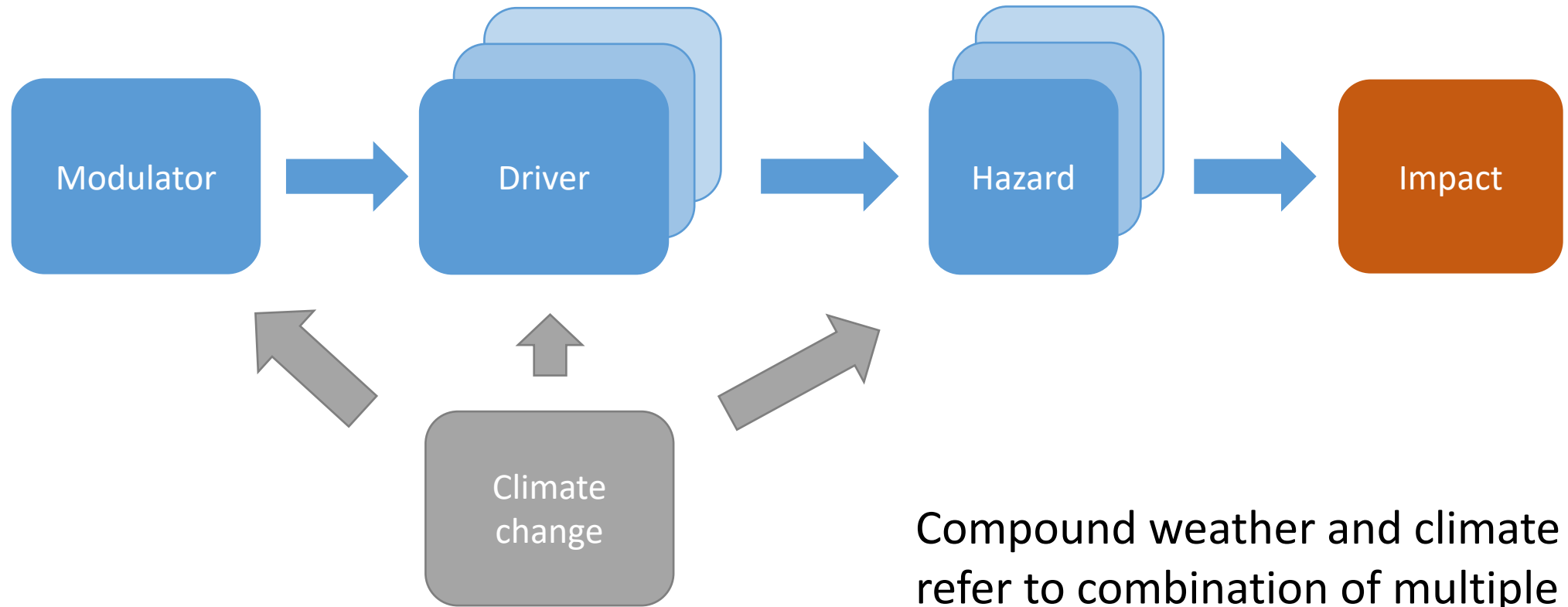
# Compound weather and climate events

Compound weather and climate events refer to

*“the combination of **multiple drivers and/or hazards** that contributes to societal or environmental **risk**.”*

- Links compound events with the IPCC risk concept.
- Is being used in the current IPCC cycle.

# Elements of a compound event

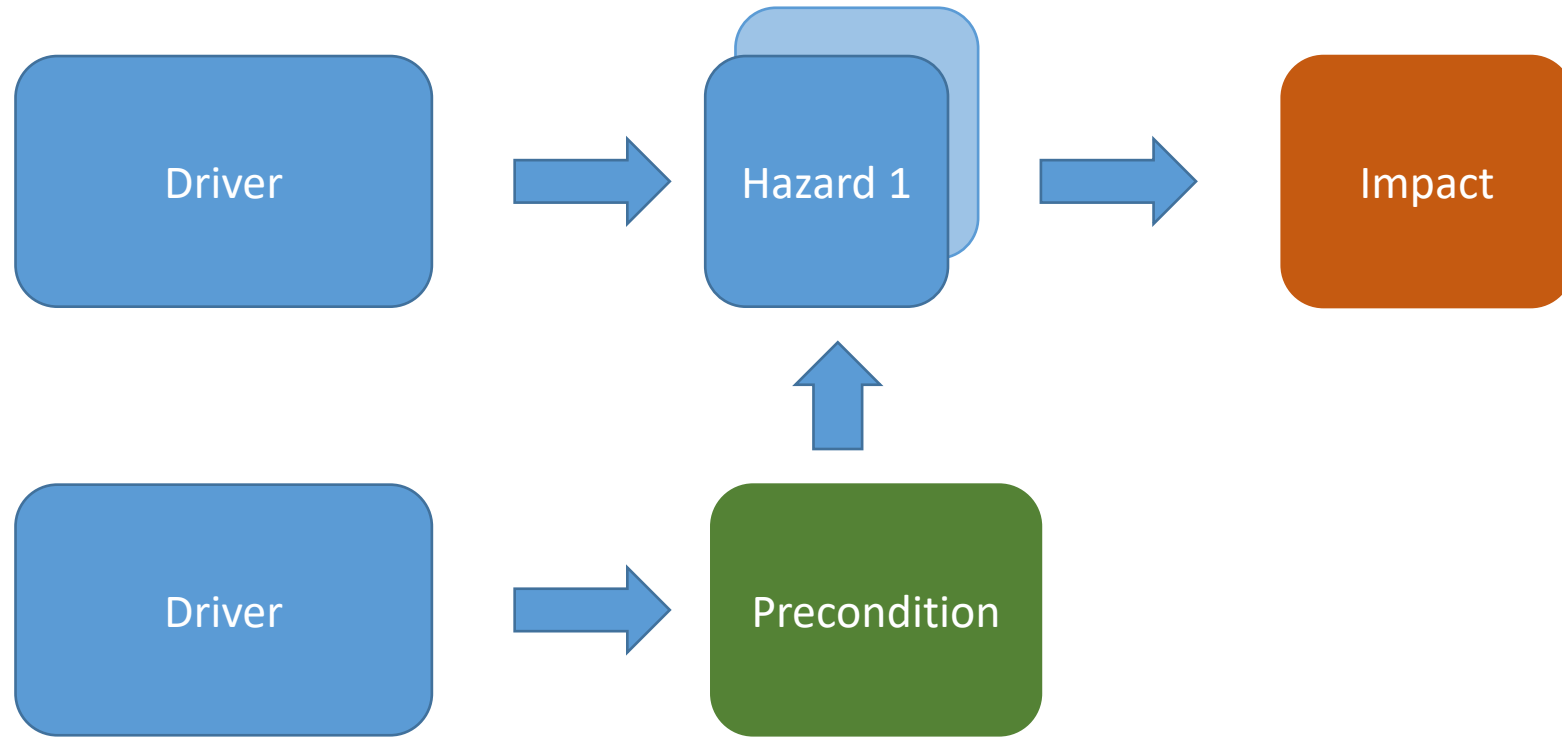


Compound weather and climate events refer to combination of multiple drivers and/or hazards that contributes to societal or environmental risk.

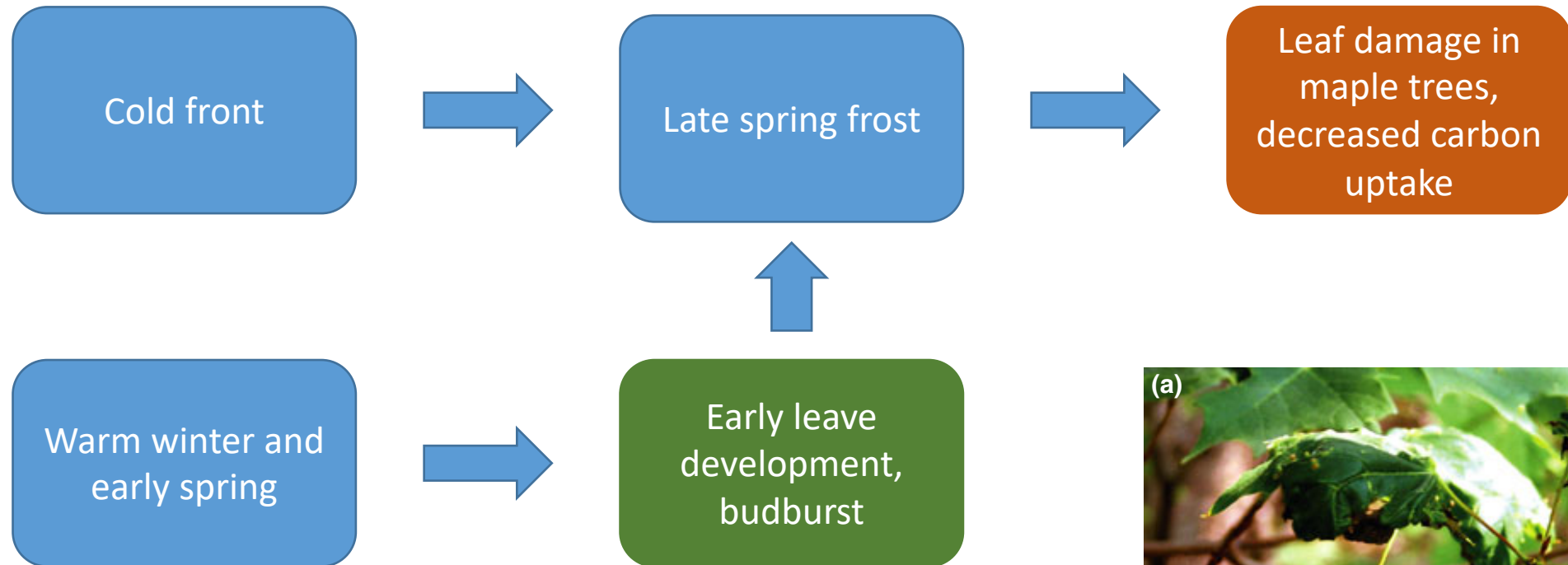
# A typology of compound events

1. Preconditioned events
2. Multivariate events
3. Temporally compounding events
4. Spatially compounding events

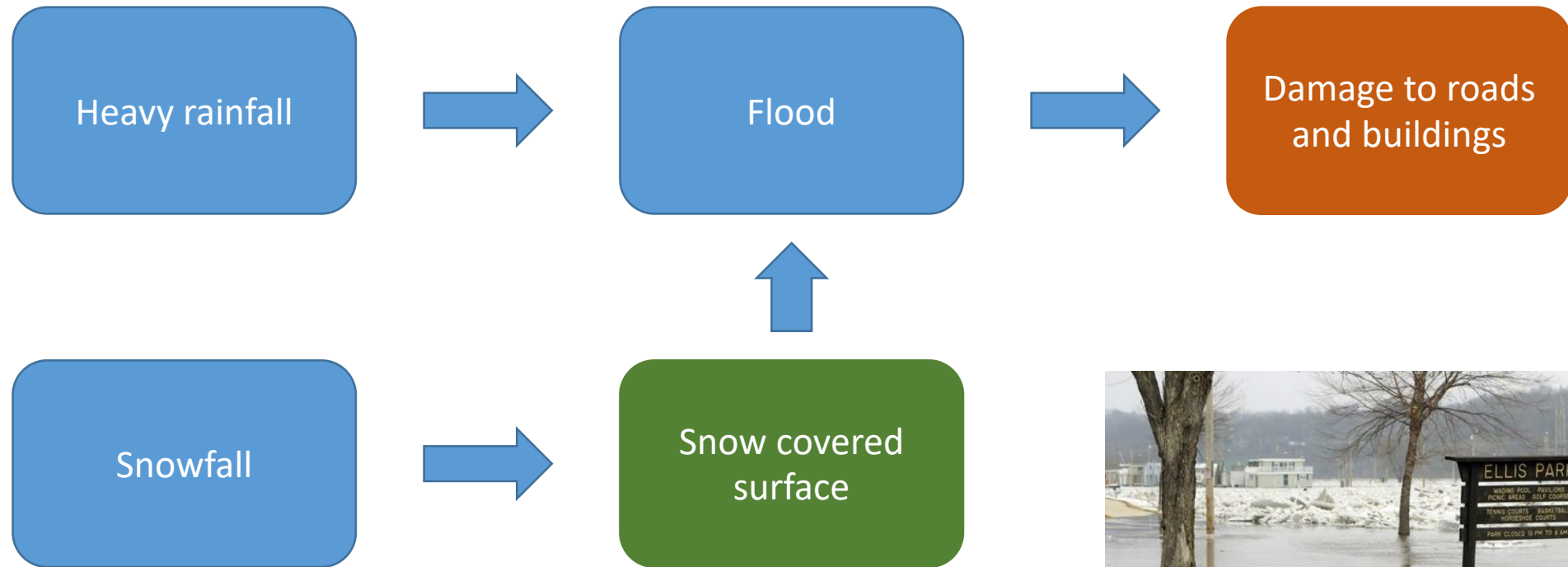
# 1. Preconditioned events



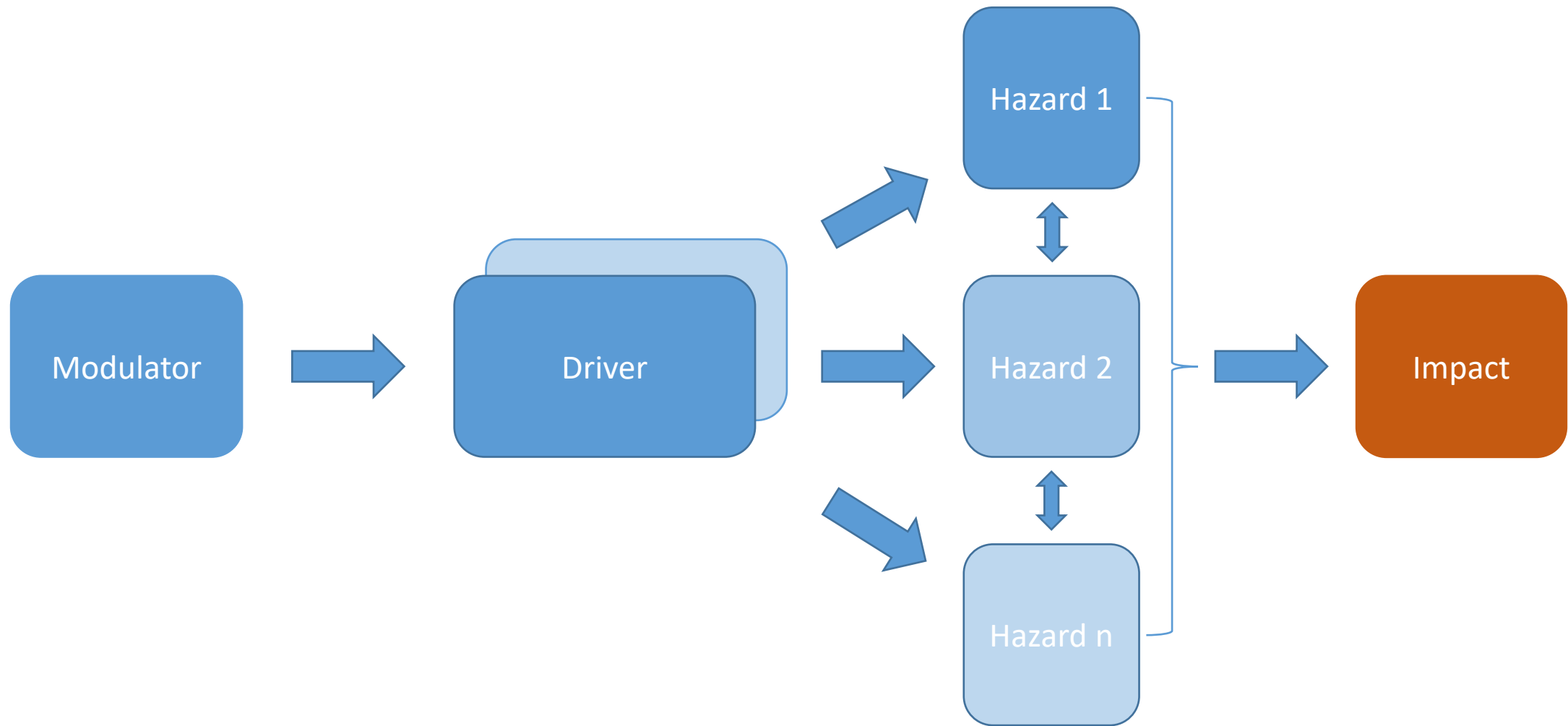
# “False” spring



# Rain on snow events

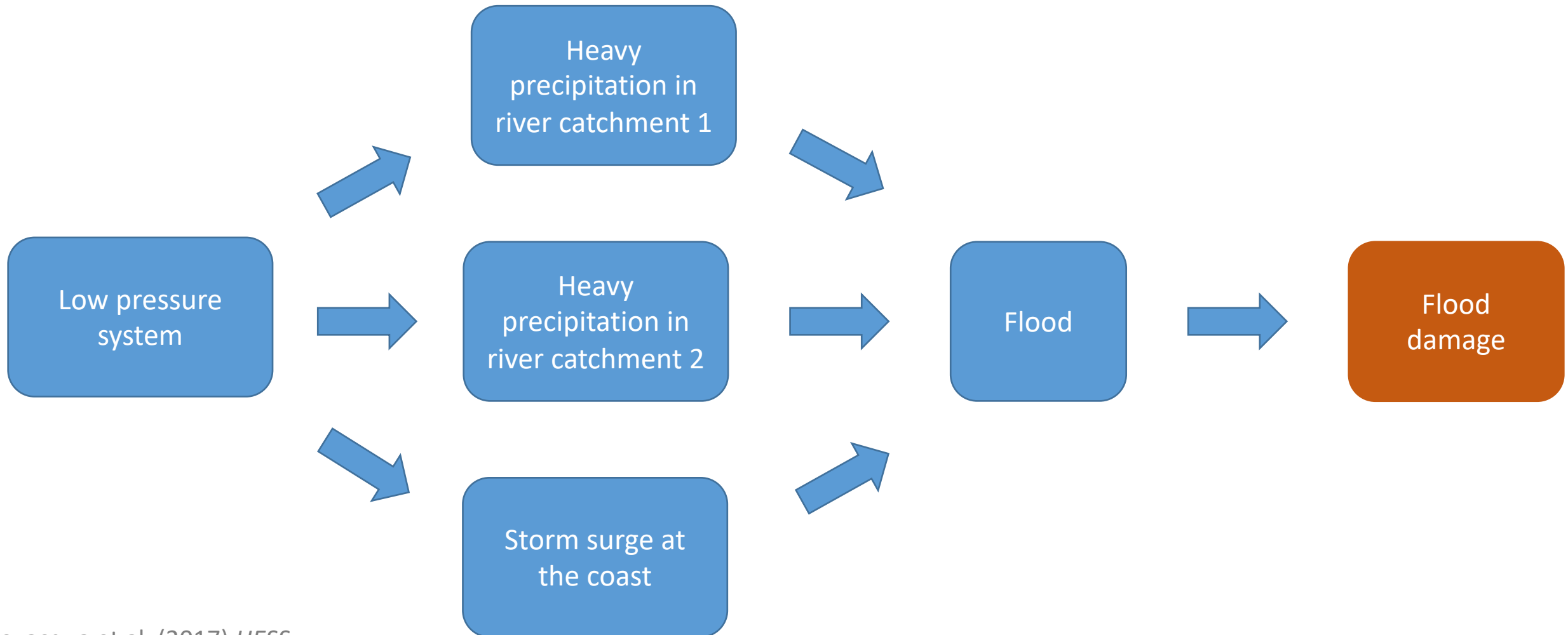


## 2. Concurrent events





# Compound flooding



# Compound flooding

Modulators: storms, tropical cyclones, atmospheric rivers, etc.

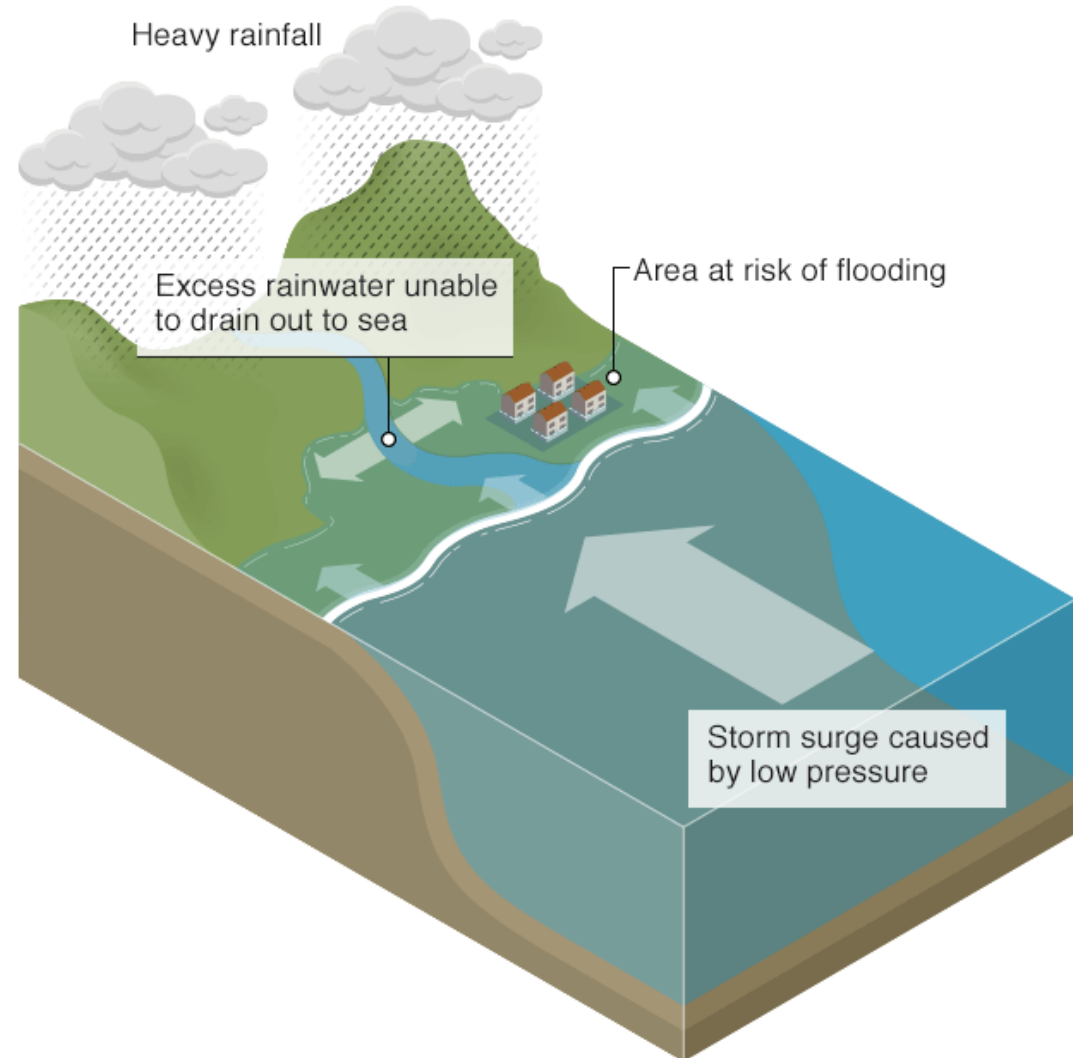
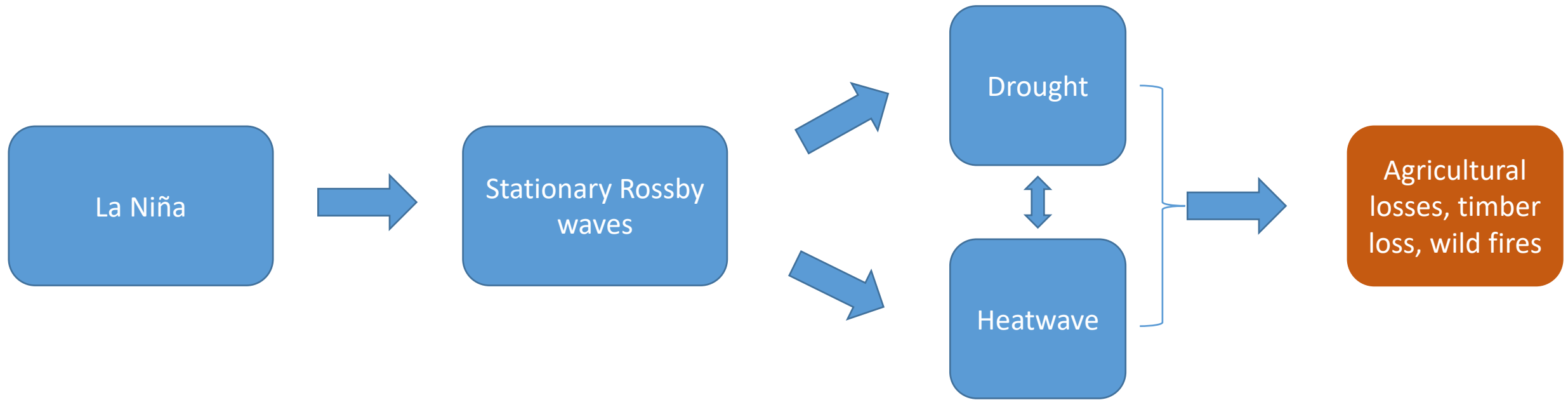
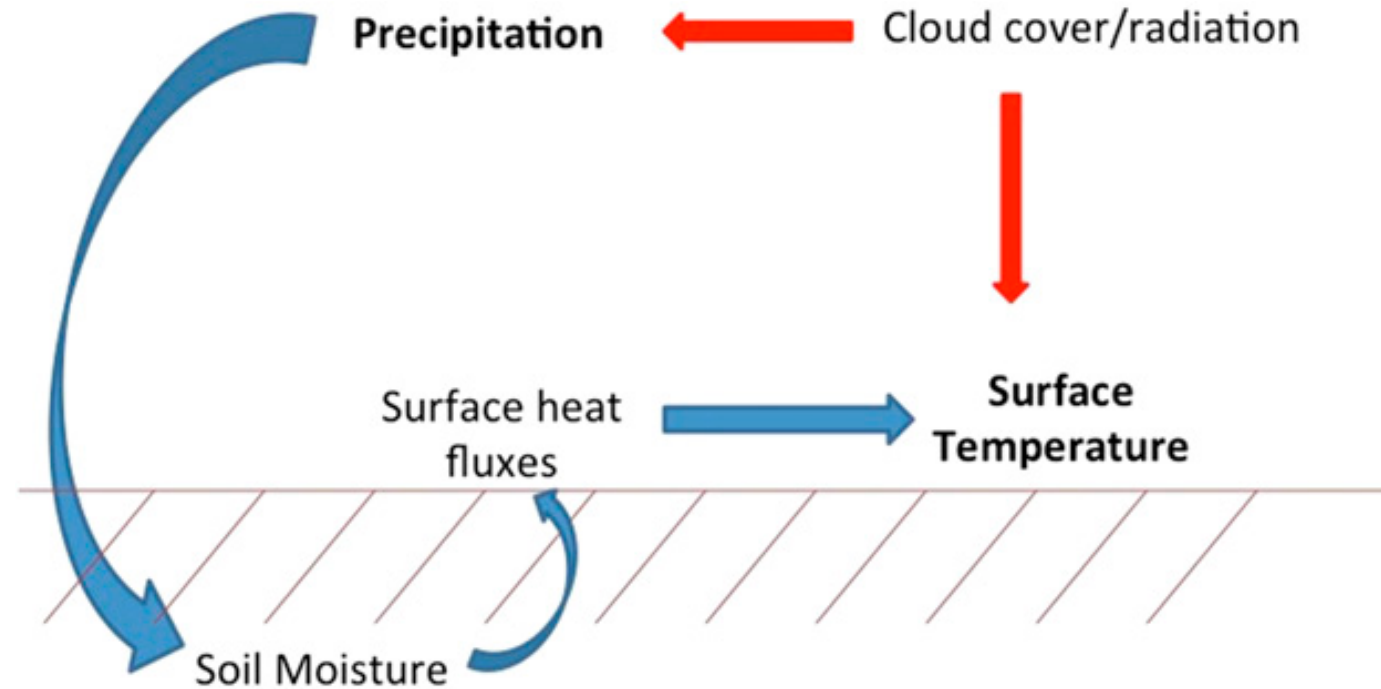


Figure credit: D. Maraun, E. Bevacqua

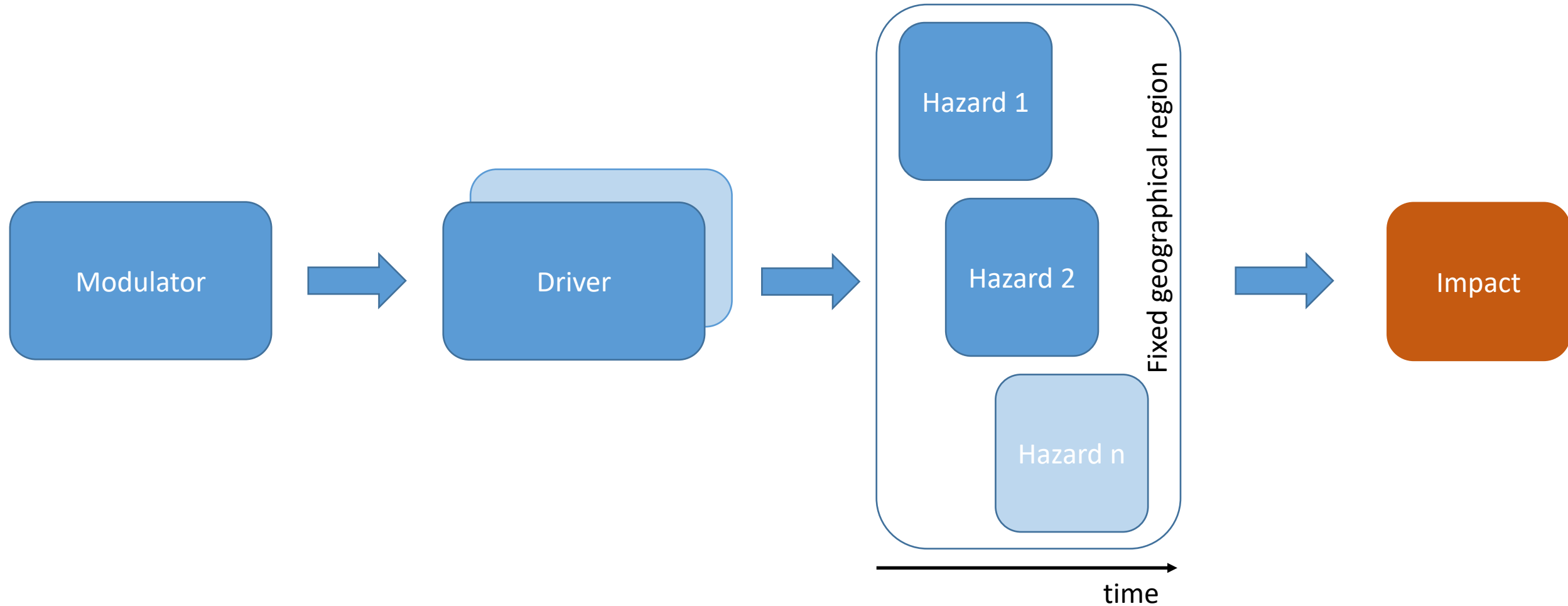
# Concurrent drought and heat



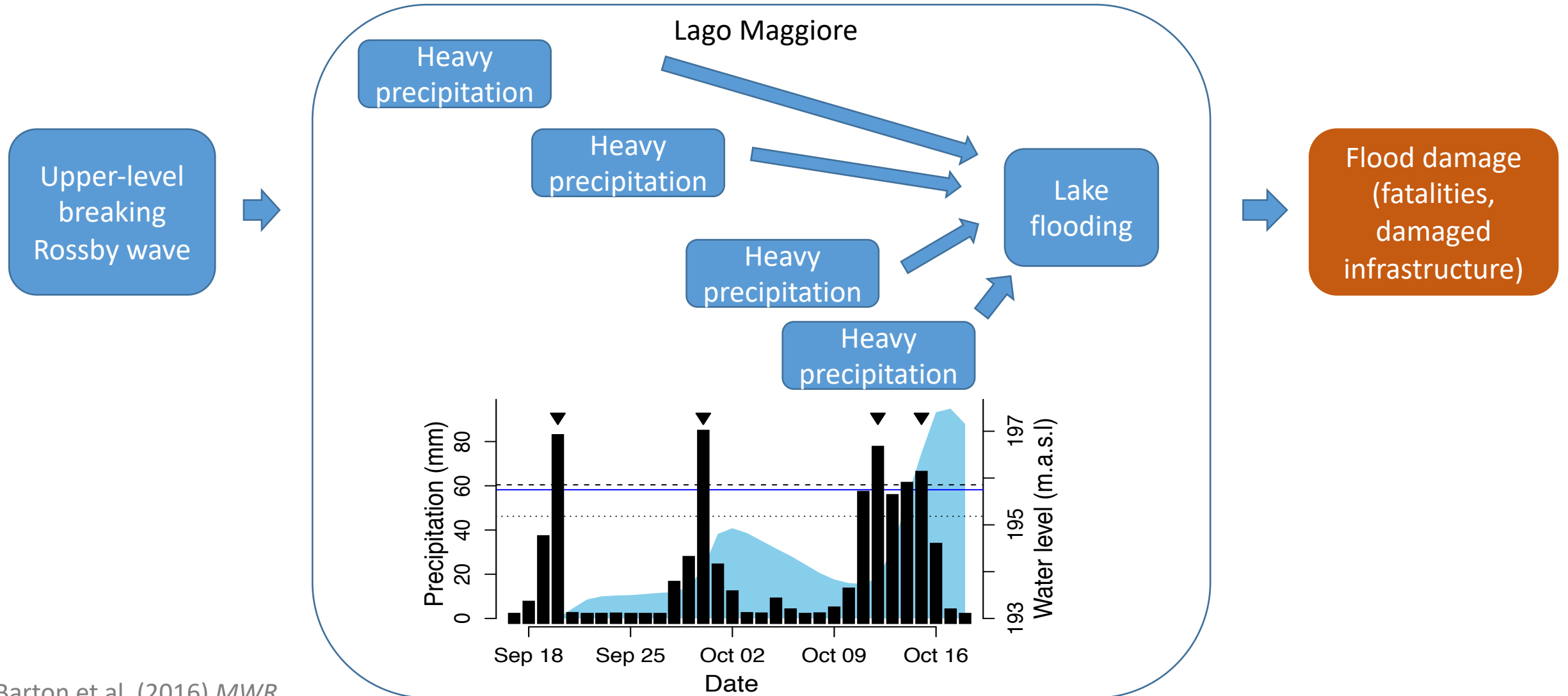
# Processes behind concurrent drought and heat



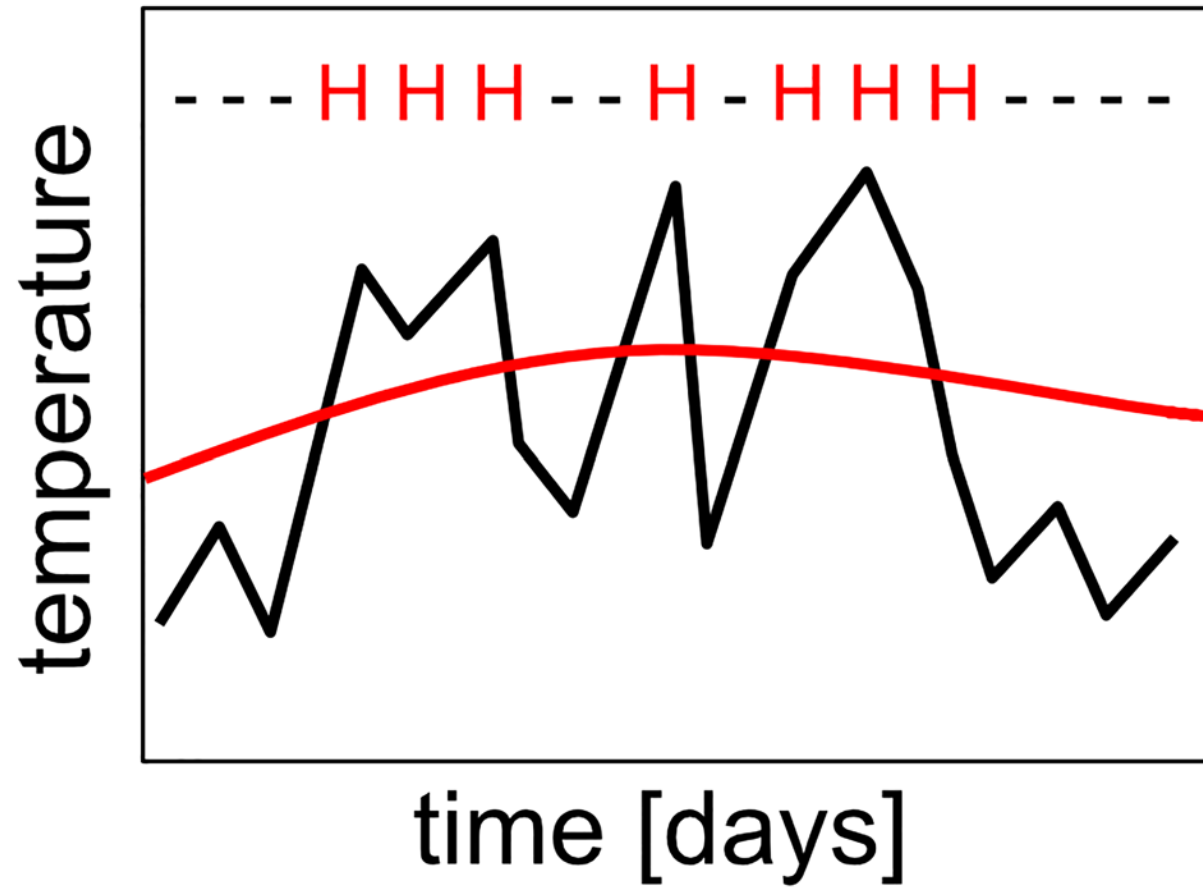
### 3. Temporally compounding



# Precipitation clustering and lake flooding



# Sequence of heatwaves



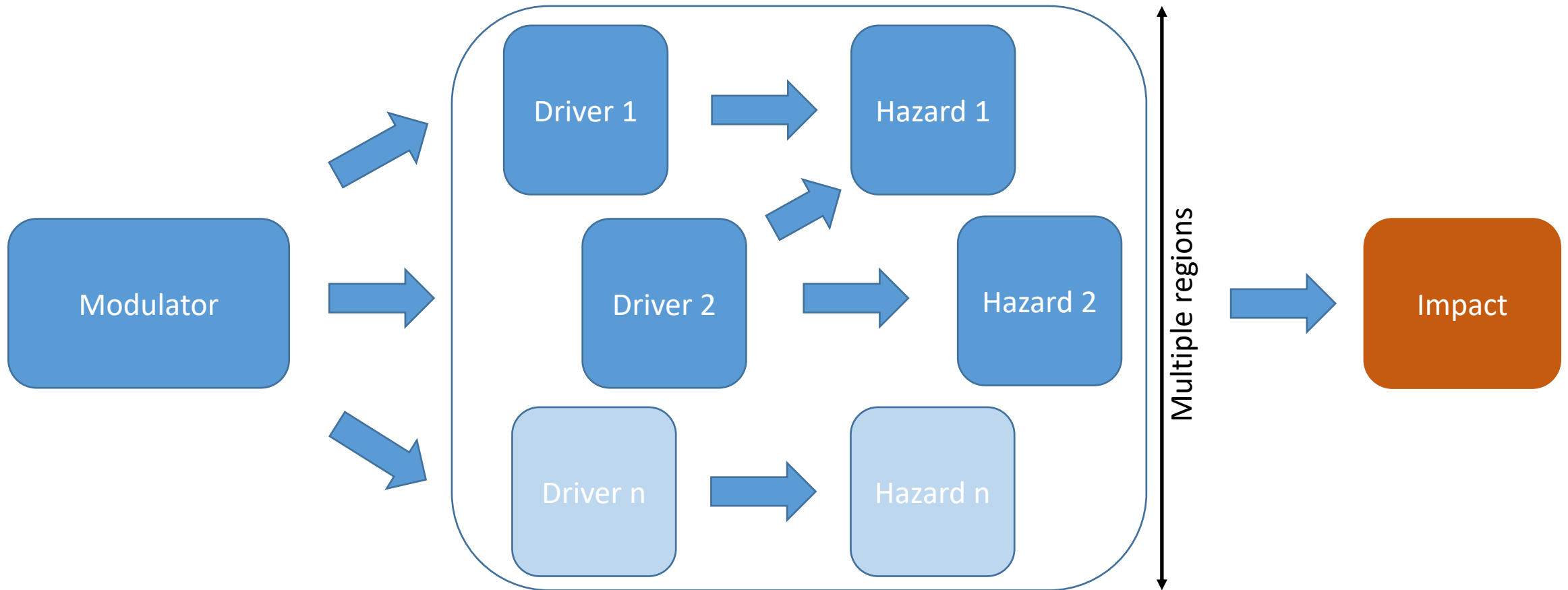
# Cluster of tropical cyclones

Katia, Irma, Jose in 2017

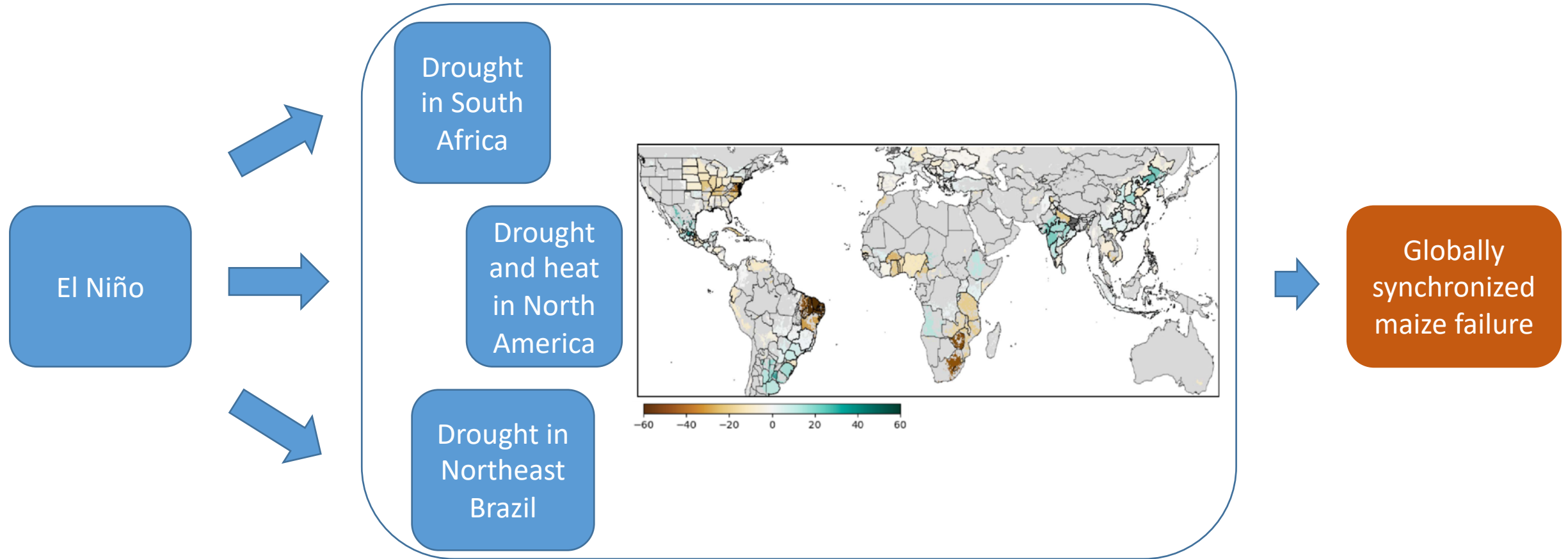




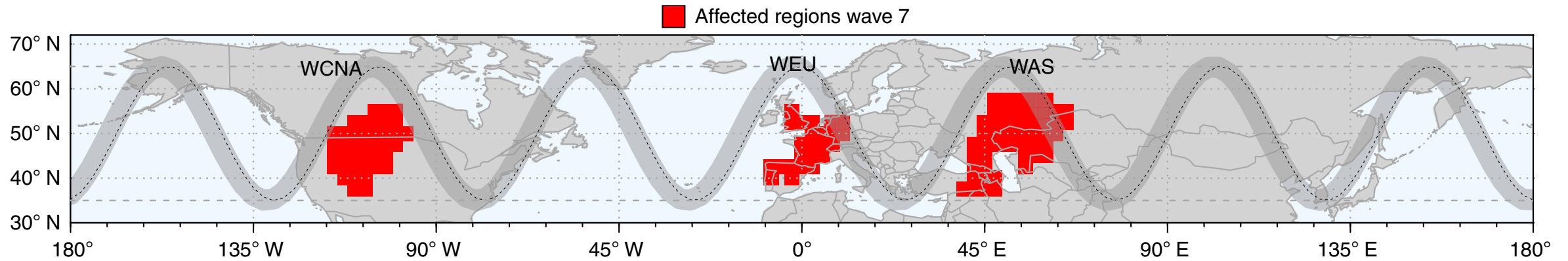
## 4. Spatially compounding



# Concurrent impacts of El Niño on crop yields

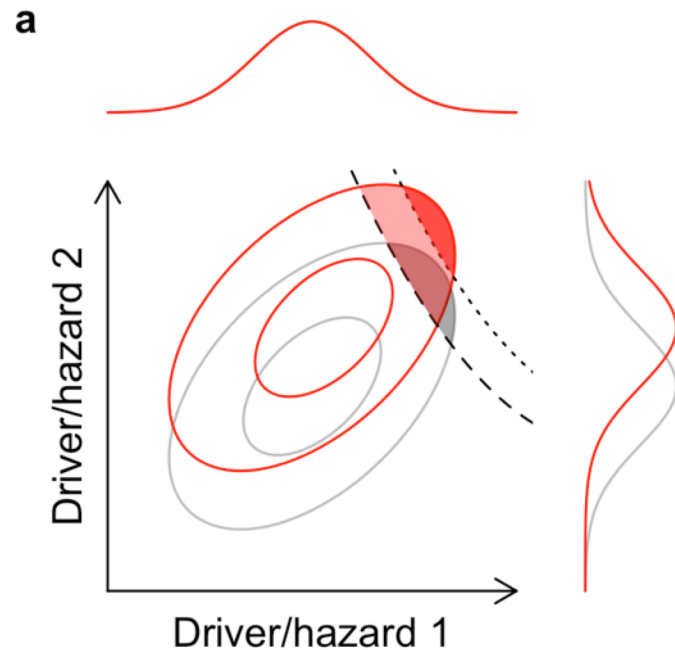


# Globally synchronized heatwaves

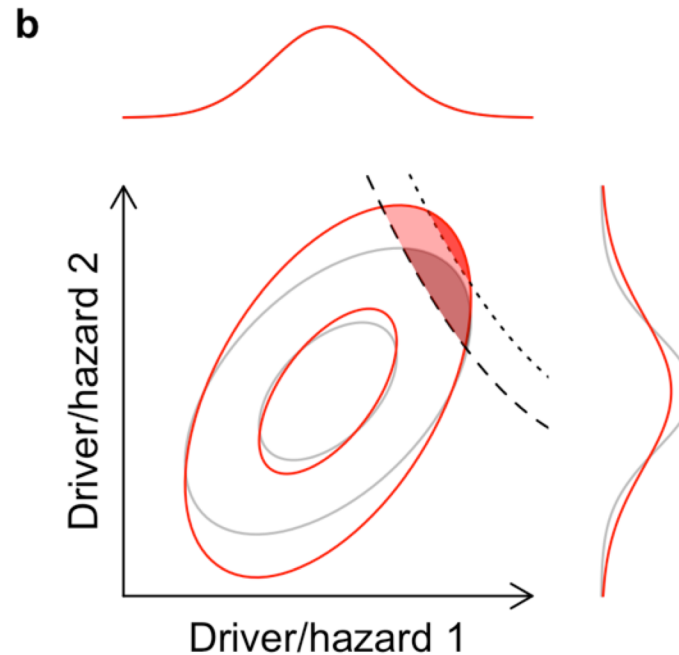


# Climate change effects on compound events

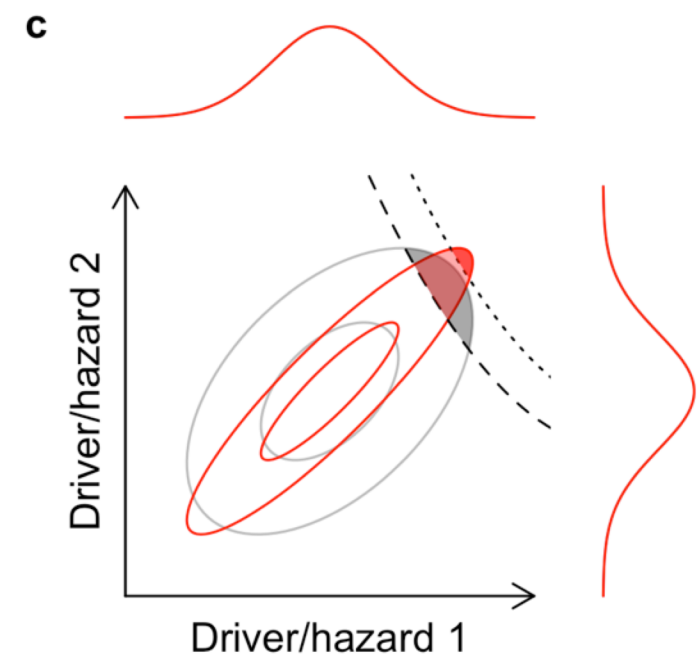
Change in the mean



Change in variability



Change in dependence



# Conclusions

- The typology facilitates our thinking about the highly diverse set of compound events
- Many events don't fit completely into a single class, but often one class covers the most important aspects of an events
- The typology can be directly aligned with analysis and modelling tools

To appear in *Nature Reviews Earth and Environment*.

# COST Action DAMOCLES

Understanding and modeling  
compound climate and weather events  
<http://damocles.compoundevents.org>

Benefit of a scientific approach  
Way of interaction

Criteria for usefulness  
Event-impact relationships

9/2018 – 9/2022



38 countries

Chair: J.Z.

Quality assessment  
Experimental design

Classification of events  
Compendium of methods

Criteria for usefulness  
Applied to what kind of hypothesis?

