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Driving Innovation in Crisis Management for European Resilience

CLIMATE CHANGE AS AN ENABLER OF WILDFIRE

HOW DOES CLIMATE IMPACT FIRE RISK?

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Wednesday 19th February 2020, Brussels

WHEN RISK BECOMES REALITY

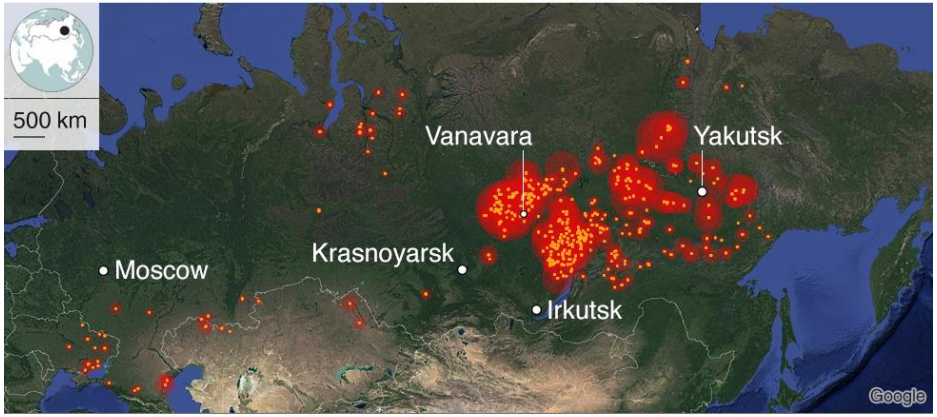
Examples from Recent Years

WHEN RISK BECOMES REALITY

2016 FORT MCMURRAY FIRE, CANADA

WHEN RISK BECOMES REALITY

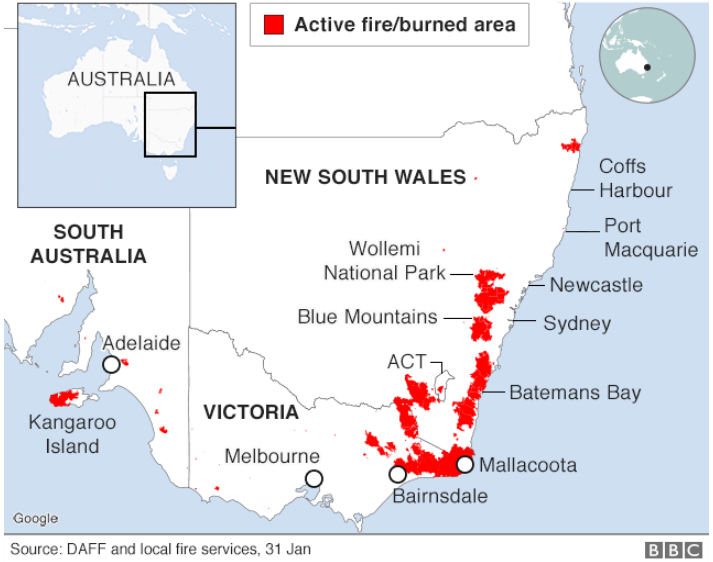
2019 SIBERIAN WILDFIRES



Sourse: ScanEx, Nasa

WHEN RISK BECOMES REALITY

2019-2020 BUSHFIRE SEASON, SOUTHEAST AUSTRALIA



WHEN RISK BECOMES REALITY

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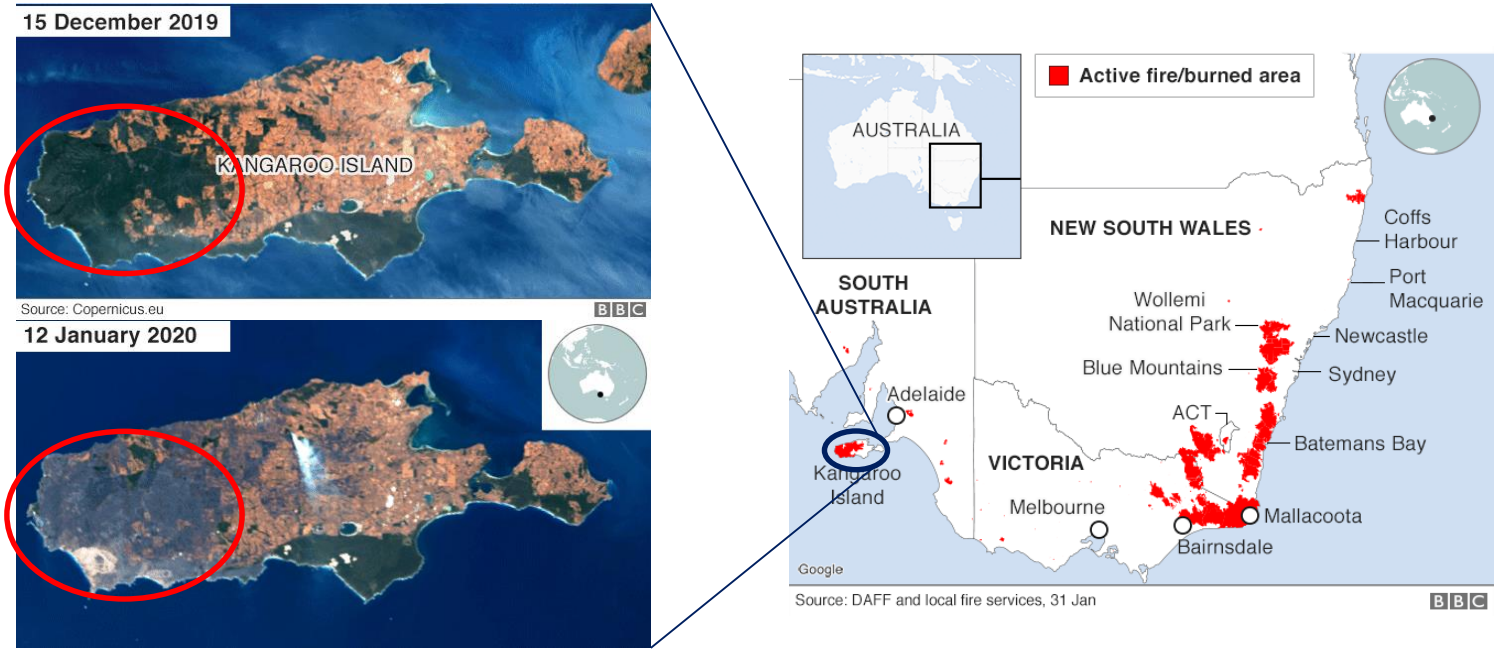

WHEN RISK BECOMES REALITY

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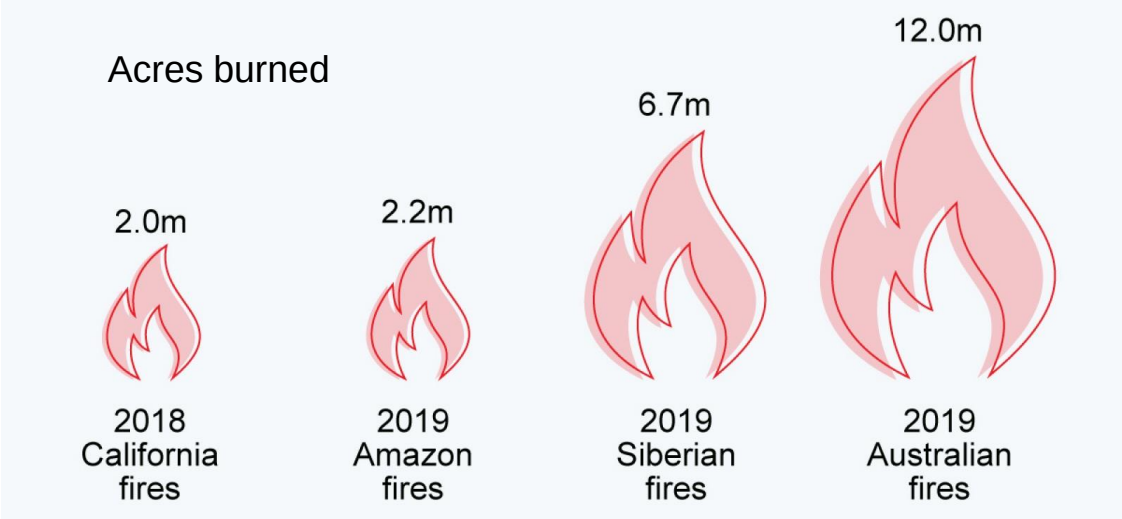
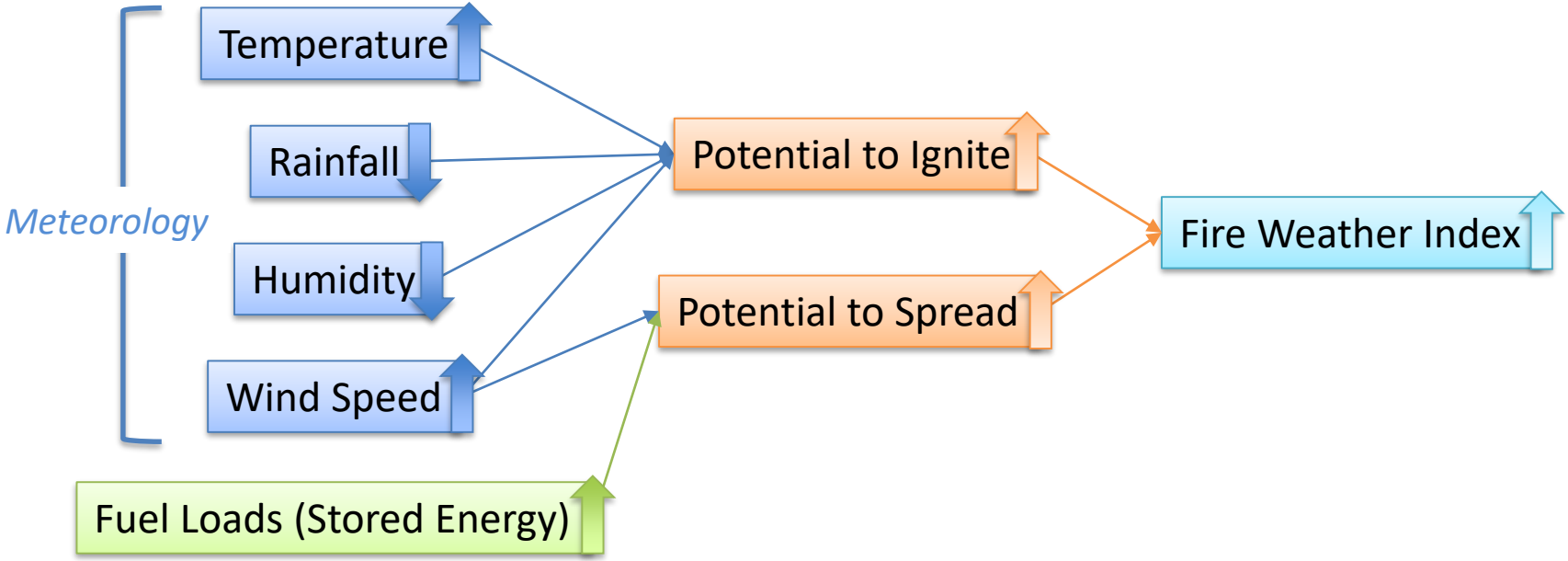


CLIMATIC CONTROLS ON FIRE RISK

Flammability in a Warming World

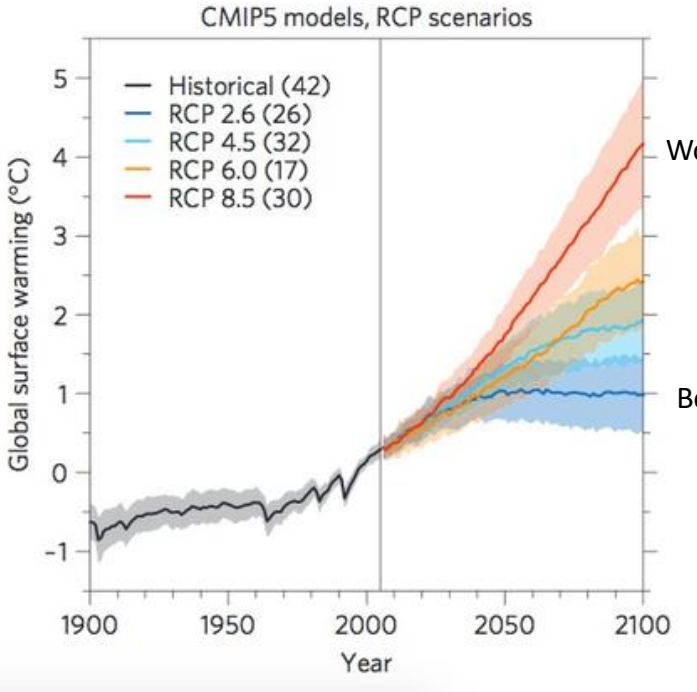
FIRE WEATHER

MEASURING LANDSCAPE FLAMMABILITY



CLIMATE CHANGE AND FIRE WEATHER

GLOBAL TEMPERATURE INCREASES

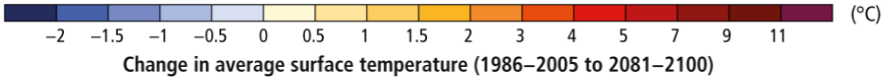


Worst-case scenario

Best-case scenario

RCP8.5

RCP2.6



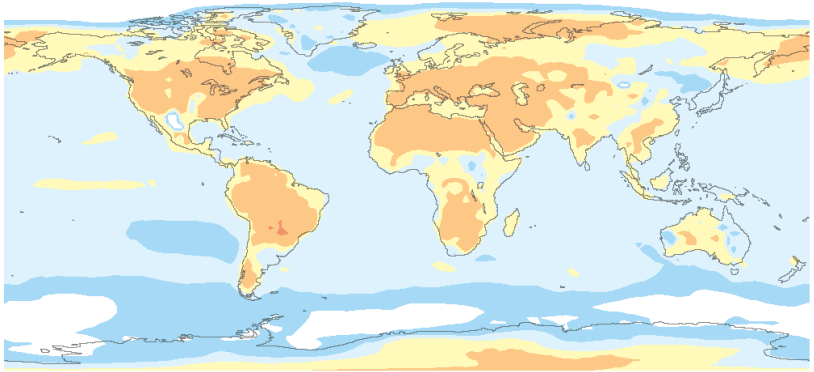
IPCC 5th Assessment Report

CLIMATE CHANGE AND FIRE WEATHER

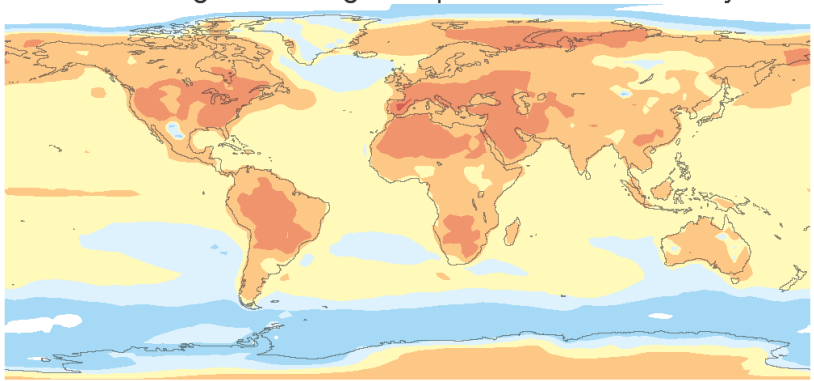
RISE OF THE EXTREMES

Best-case scenario → Moderate Scenario

+ 1.5°C: Change in average temperature of hottest days



+ 2.0°C: Change in average temperature of hottest days



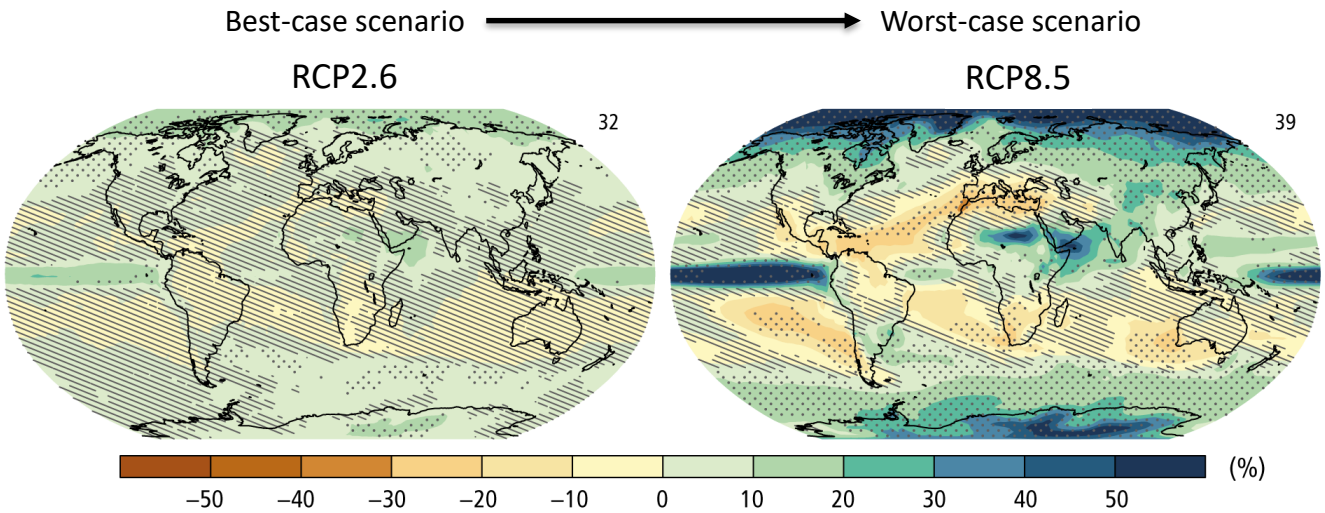
°C

0.0 0.5 1.0 1.5 2.0 3.0 4.0 6.0 8.0 10.0

IPCC Special Report on Global Warming of 1.5 C

CLIMATE CHANGE AND FIRE WEATHER

GLOBAL CHANGES IN PRECIPITATION



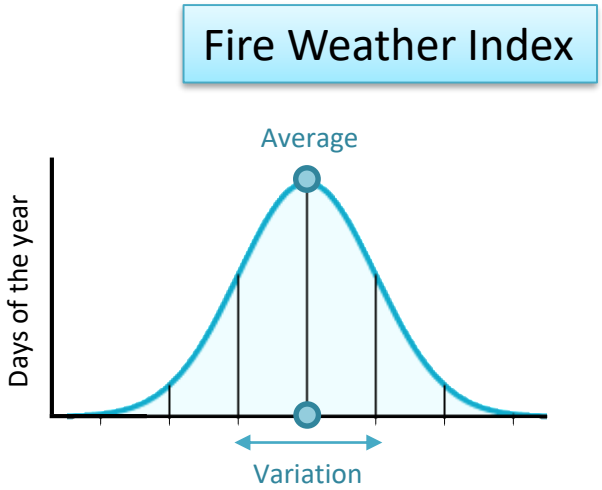
Change in average precipitation (1986–2005 to 2081–2100)

GLOBAL IMPACTS OF CLIMATE CHANGE ON FIRE WEATHER

Observations and Projections

DETECTING TRENDS IN FIRE WEATHER

SHIFTING DISTRIBUTIONS OF FIRE WEATHER INDICES

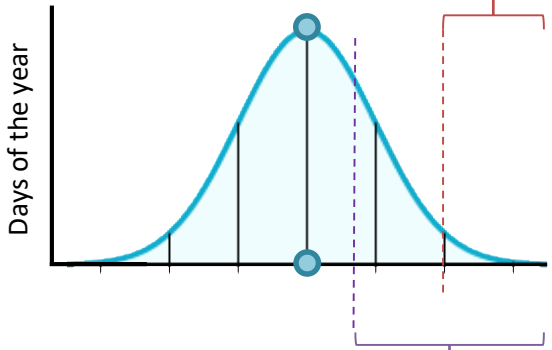


DETECTING TRENDS IN FIRE WEATHER

SHIFTING DISTRIBUTIONS OF FIRE WEATHER INDICES

Fire Weather Index

Baseline period



Severe fire weather days

Days with weather conditions that support the most severe fires

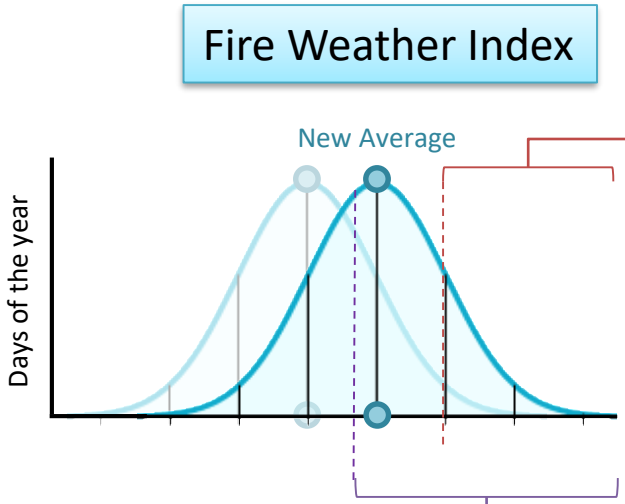
Fire weather season length

The number of days per year above an FWI threshold that optimally explains inter-annual variability in burned area

DETECTING TRENDS IN FIRE WEATHER

SHIFTING DISTRIBUTIONS OF FIRE WEATHER INDICES

New climate that is more fire-prone

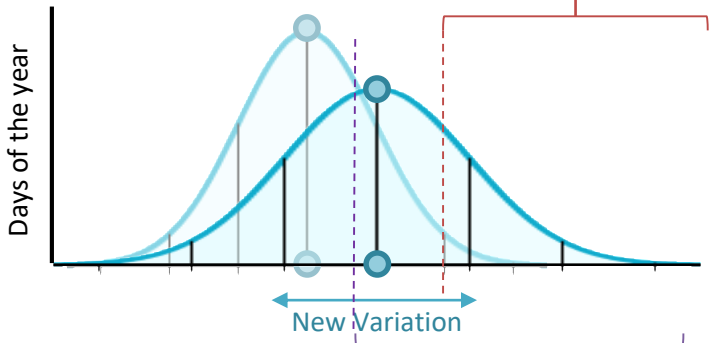


DETECTING TRENDS IN FIRE WEATHER

SHIFTING DISTRIBUTIONS OF FIRE WEATHER INDICES

New climate with more extreme variability

Fire Weather Index



Severe fire weather days

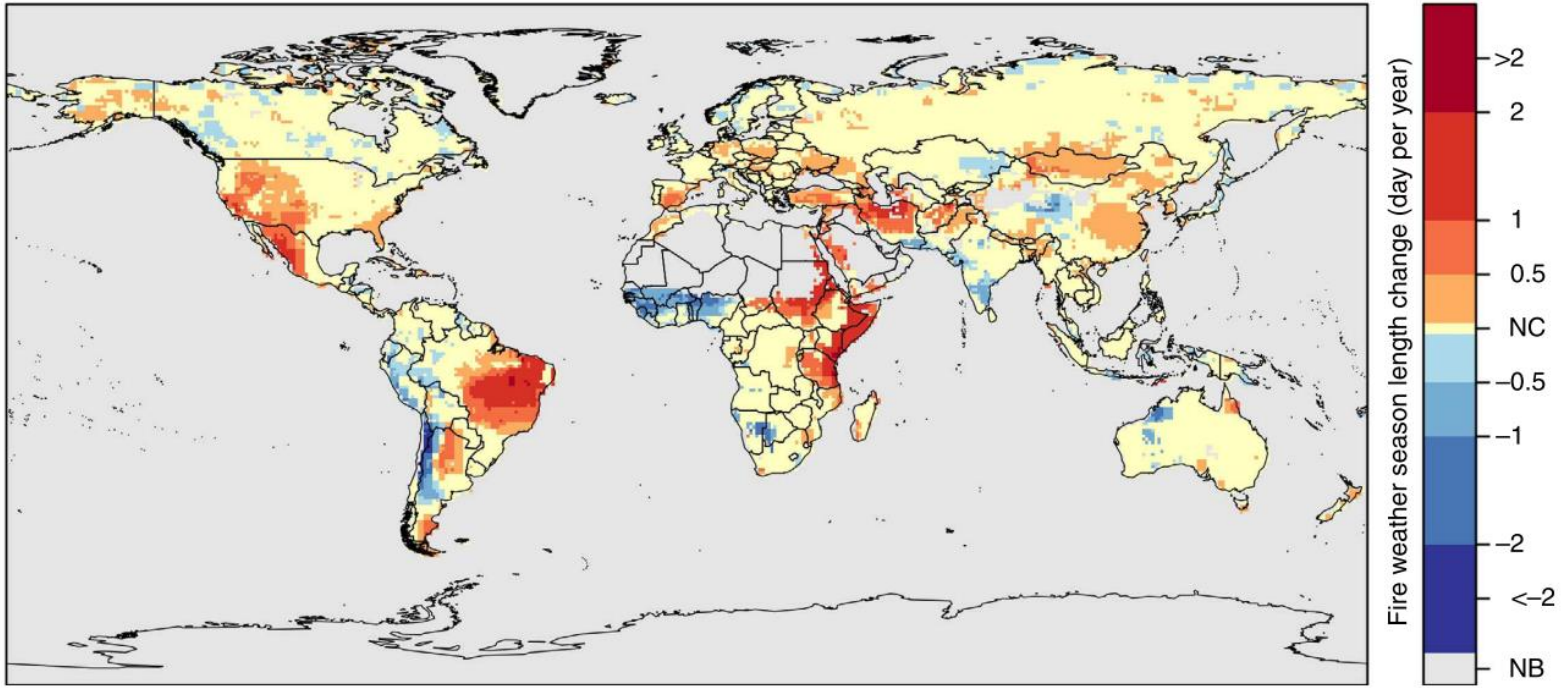
Days with weather conditions that support the most severe fires

Fire weather season length

The number of days per year above an FWI threshold that optimally explains inter-annual variability in burned area

OBSERVED TRENDS IN FIRE WEATHER

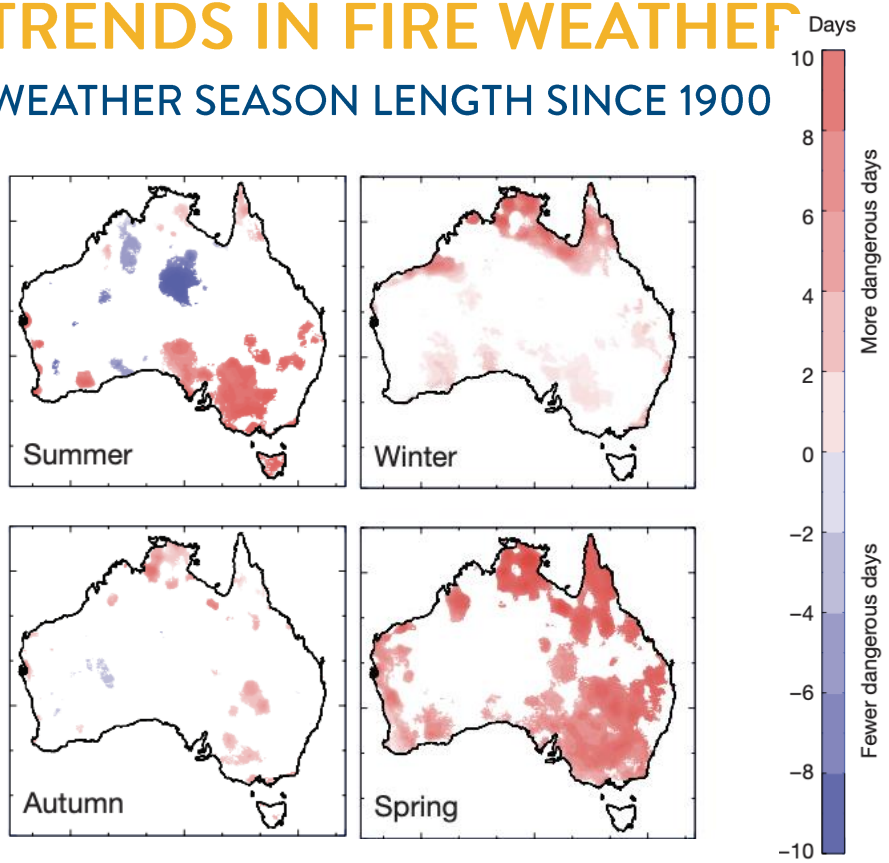
CHANGES IN FIRE WEATHER SEASON LENGTH FROM 1973 TO 2013



Jolly et al. (2013) Nature Communications

OBSERVED TRENDS IN FIRE WEATHER

CHANGES IN FIRE WEATHER SEASON LENGTH SINCE 1900



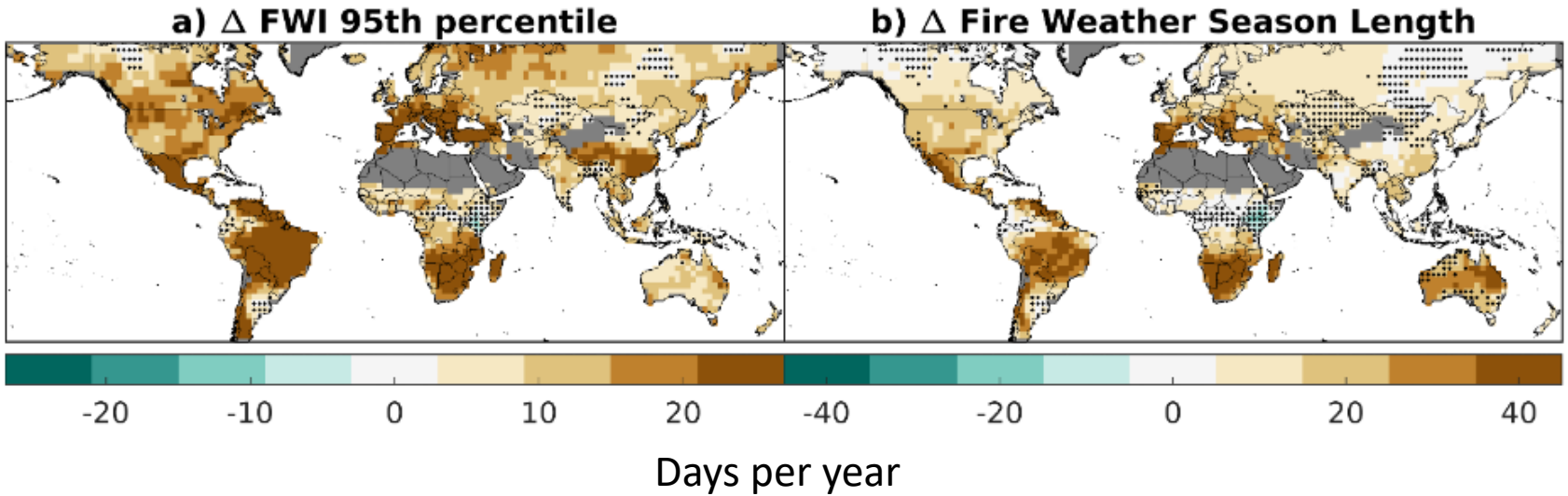
Dowdy (2018) Journal of Applied Meteorology and Climatology

PROJECTED TRENDS IN FIRE WEATHER

MODELLED CHANGES IN FIRE WEATHER FROM THE PRE-INDUSTRIAL PERIOD TO 2045-2060

Severe fire weather days

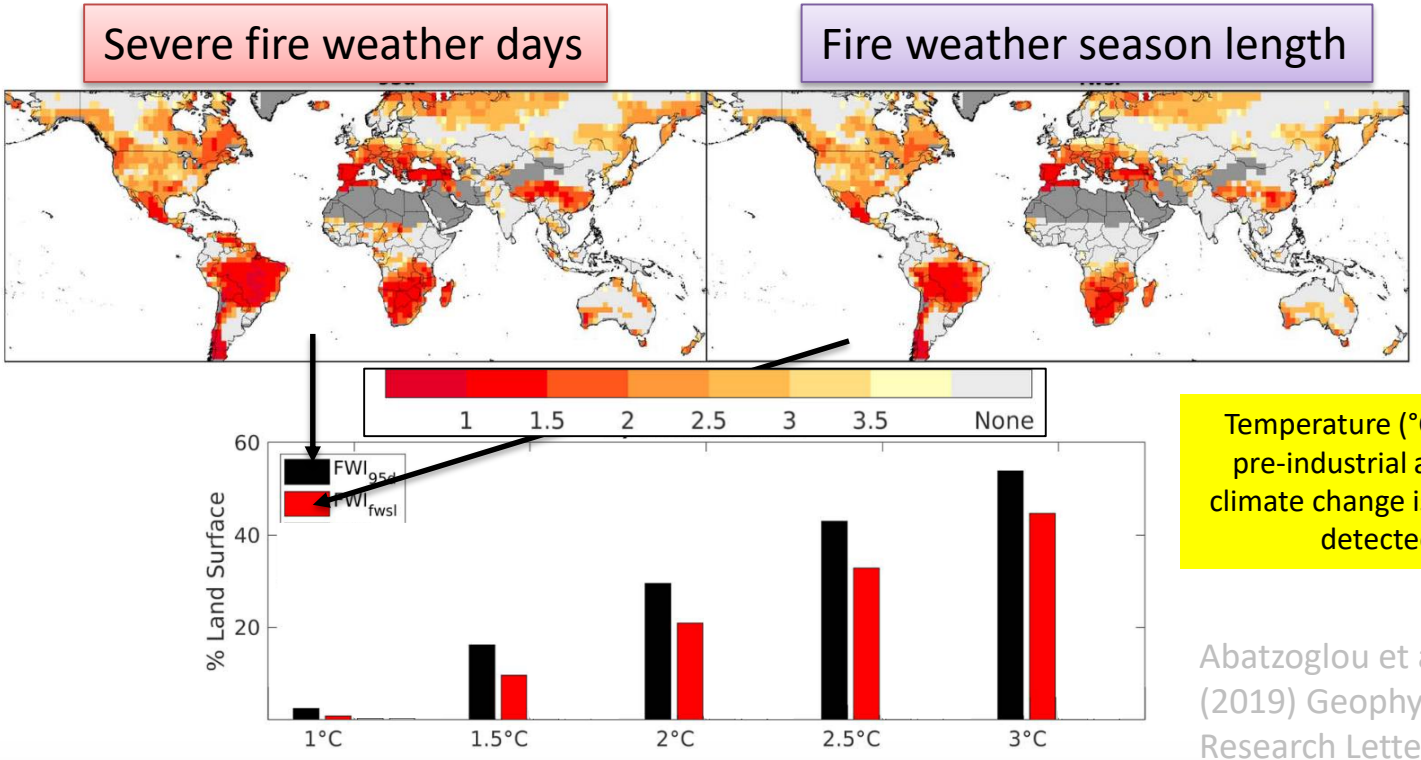
Fire weather season length



Abatzoglou et al. (2019) Geophysical Research Letters

ATTRIBUTING CHANGES IN FIRE WEATHER TO CLIMATE CHANGE

DETECTING THE CLIMATE CHANGE SIGNAL USING CLIMATE MODELS



Temperature (°C) above pre-industrial at which climate change is formally detected

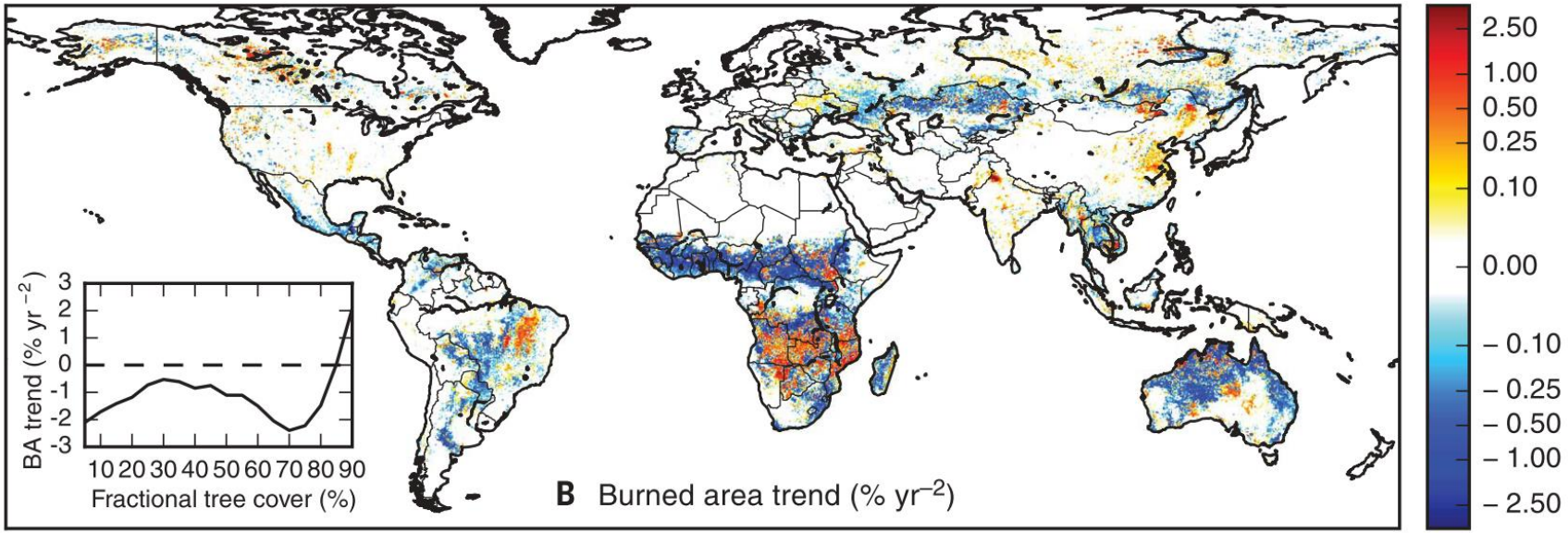
Abatzoglou et al. (2019) Geophysical Research Letters

GLOBAL TRENDS IN FIRE ACTIVITY

Climatic and Human Controls

OBSERVED TRENDS IN FIRE ACTIVITY

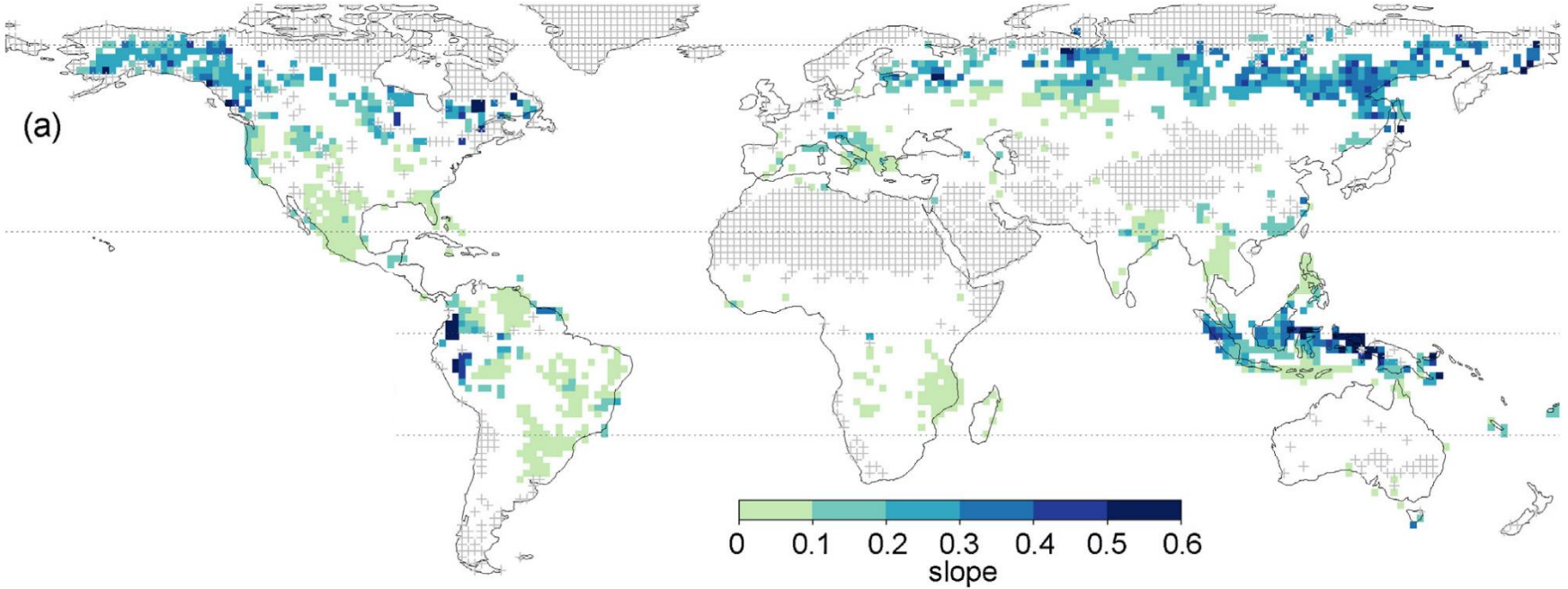
CONTRASTING TRENDS IN FORESTS AND OTHER LAND COVERS



Andela et al. (2017) Science

WHERE DOES FIRE WEATHER CONTROL FIRE ACTIVITY?

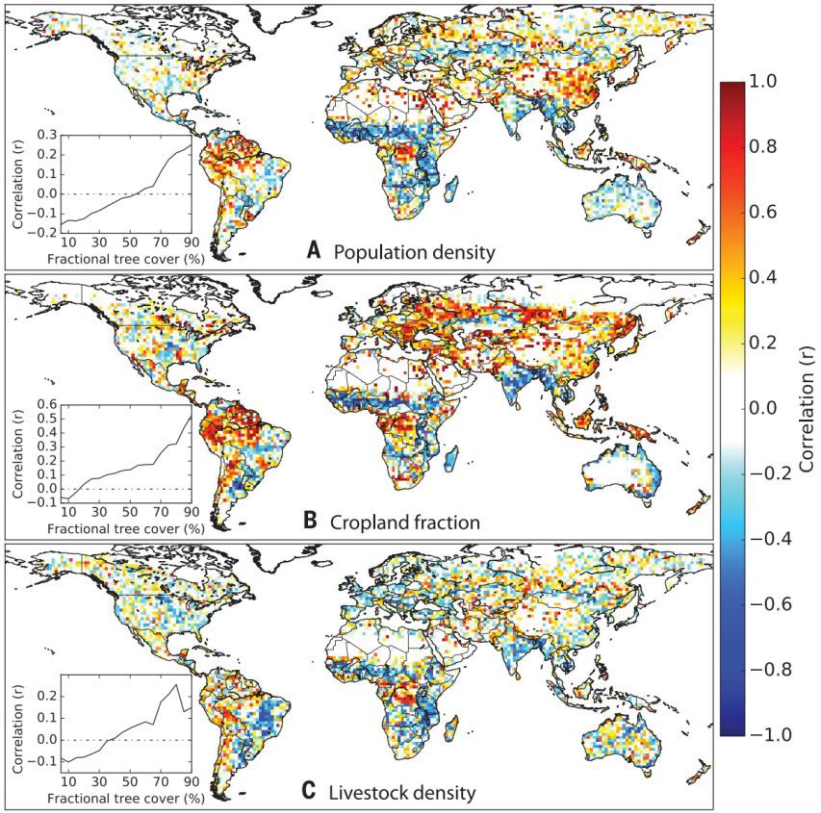
CORRELATION OF FIRE WEATHER AND BURNED AREA



Bedia et al. (2015) Agricultural and Forest Meteorology

HUMAN CONTROLS ON FIRE ACTIVITY

CORRELATIONS BETWEEN BURNED AREA AND HUMAN FACTORS

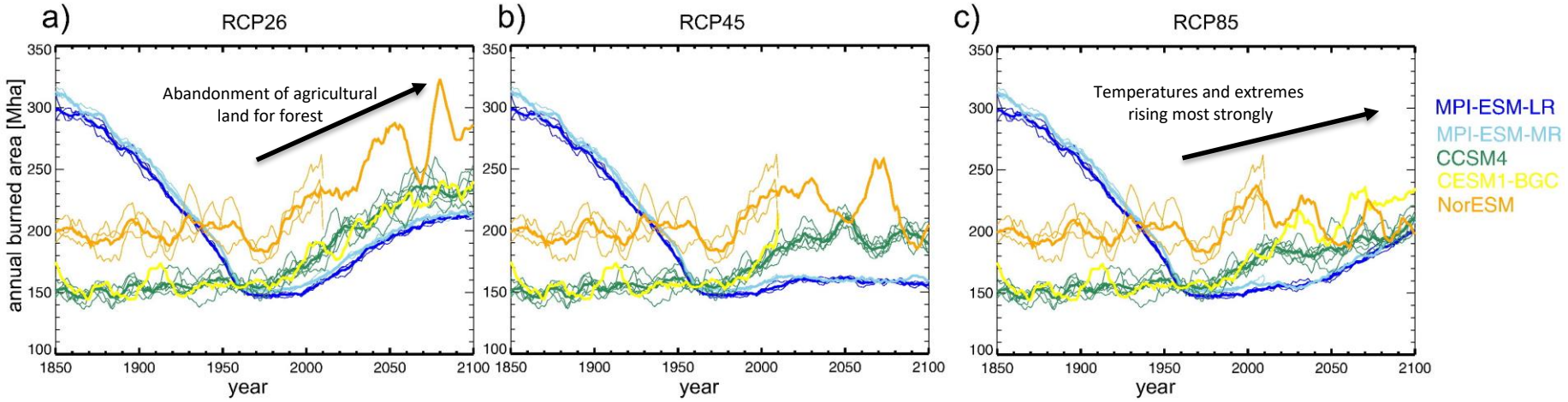


Andela et al. (2017) Science

PROJECTED TRENDS IN GLOBAL FIRE ACTIVITY

CLIMATE MODELS OFFER A GLIMPSE INTO POSSIBLE FUTURES

Best-case scenario → Worst-case scenario



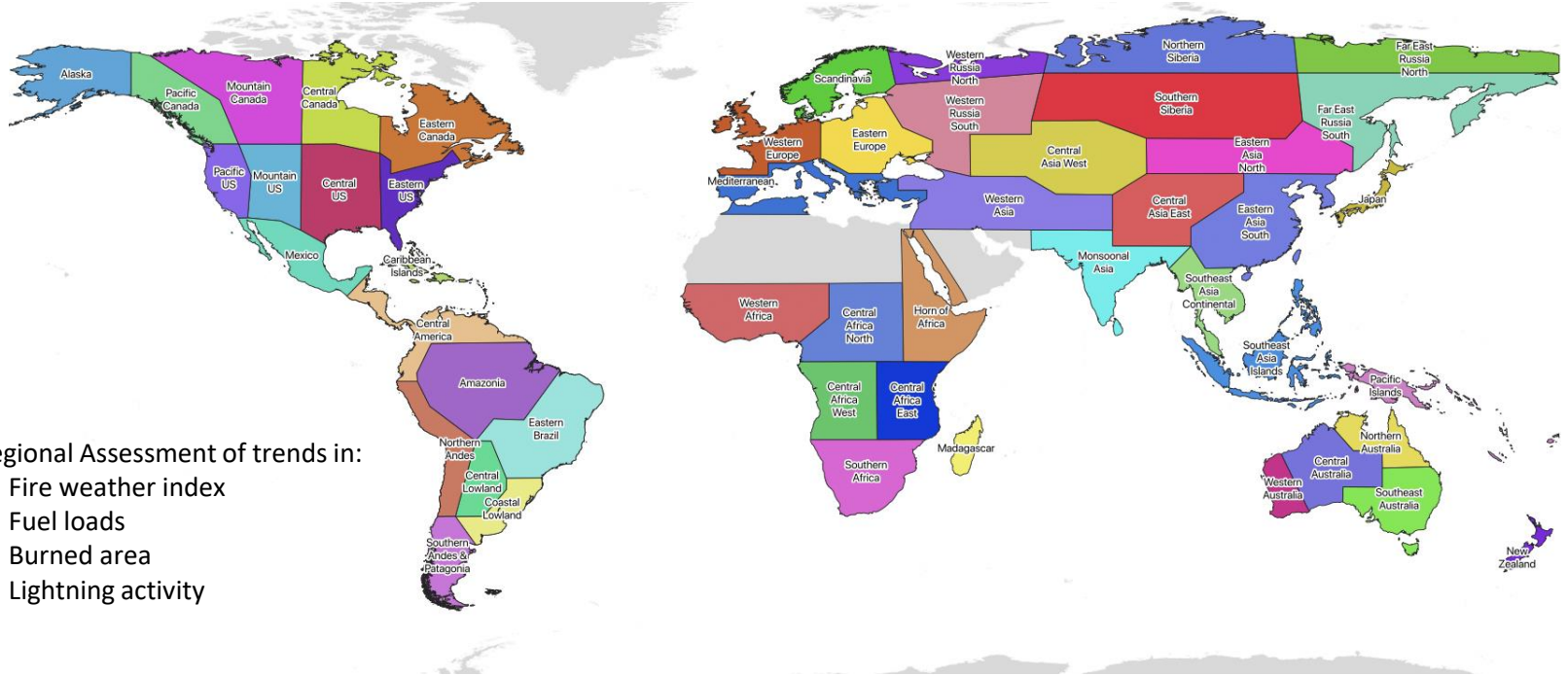
CONCLUSIONS

CLIMATE CHANGE IS AN ENABLER OF WILDFIRE. THIS RISK IS A REALITY IN FORESTS.

- Anthropogenic climate change is already increasing the global frequency and severity of fire weather.
- There has been a reduction in global burned area in recent decades, except in forests.
- Human controls (land use change and fire suppression) reduce fire activity globally, except in forests.
- In forests, fire weather is strongly associated with fire activity and direct human drivers exacerbate the climate drivers.
- Fire weather becomes more frequent and severe for each added degree of global warming, increasing the risk of forest fires.

REGIONALISING THE STUDY OF FIRE

WATCH THIS SPACE



Regional Assessment of trends in:

- Fire weather index
- Fuel loads
- Burned area
- Lightning activity

THANK YOU.

ANY QUESTIONS?

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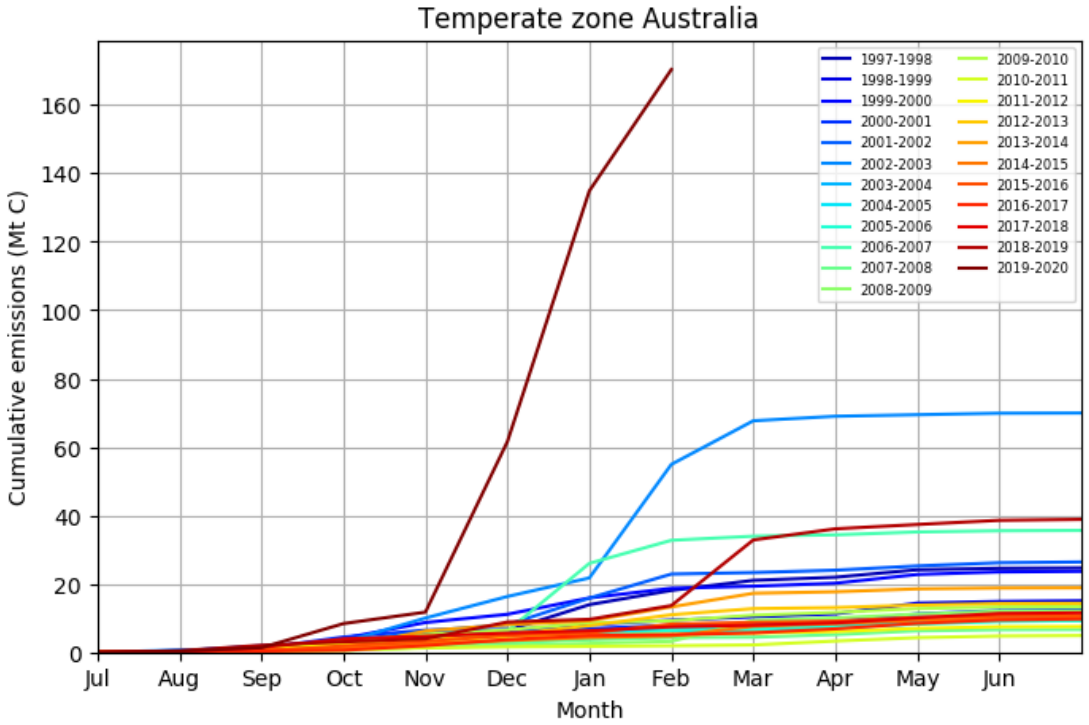
APPENDIX: CARBON EMISSIONS FROM WILDFIRES

Do Fires Themselves Contribute to Climate Change? It Depends.

MONITORING CARBON EMISSIONS

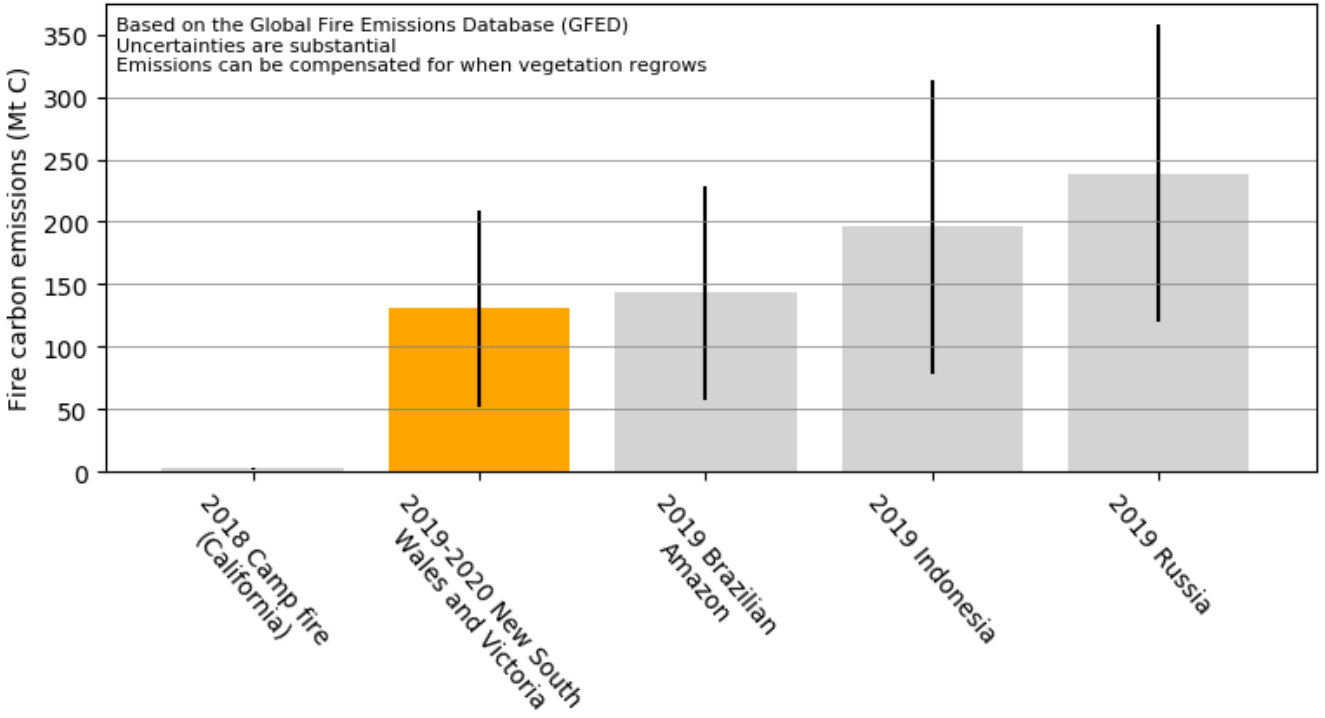
AUSTRALIAN BUSHFIRES OF 2019/2020



globalfiredata.org | @GuidovanderWerf

EMISSIONS FROM RECENT FIRE EVENTS

A MIXTURE OF WILDFIRES AND DEFORESTATION FIRES



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RECENT FIRE EVENTS

IS CARBON LOST FOR GOOD?