



Freuchie Climate Change

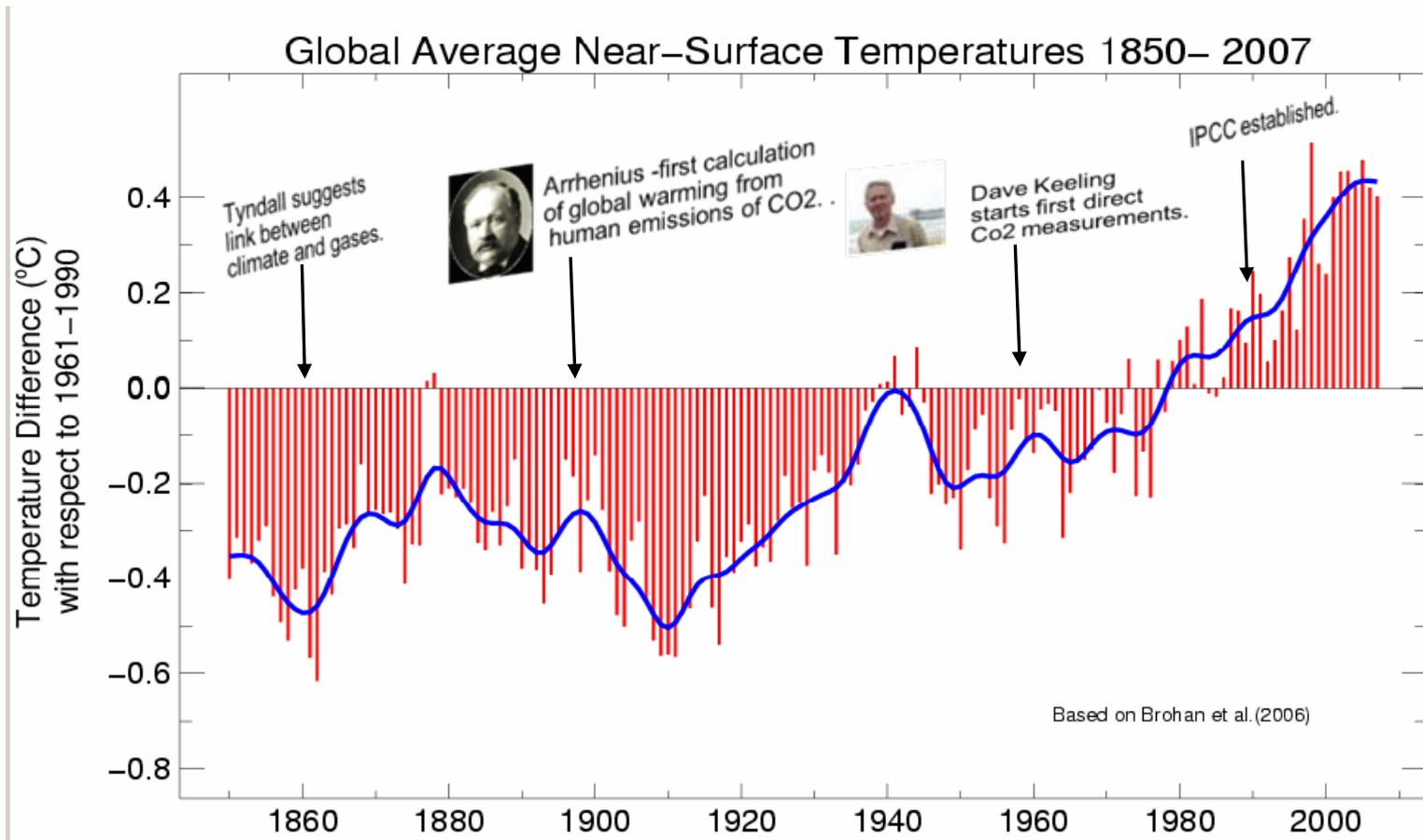
Met Office Alex Hill Chief Advisors Office Edinburgh— April 2009



Content

- Background - what we have already seen
- The influence of humans
- Some global predictions
- Some local predictions
- Adapting to change
- Questions

Observations – global





Scotland's History

(SNIFFER project CC03 + Met Office

Archives)

Element

43 yr Significant Changes

1. Rainfall

1. Averages **up** 21%

Heavy rain days **up** 8%

Intensity **up** nearly 8%

Max 5 day totals **up** 21%

Dry spells **Not Sig**

2. Temperature

2. Min temps 1.03^o **up**

Max Temps 1.21^o **up**

Heat waves **up** 6 days

Cold Spells **down** 7.5 days



Scotland's History

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Element

43 yr Significant Changes

3. Frost & Snow

3. Snow days **down** 32%

Frost days **down** 26%

4. "Storminess"

4. Nothing significant noted in this period. No clear trend as yet.

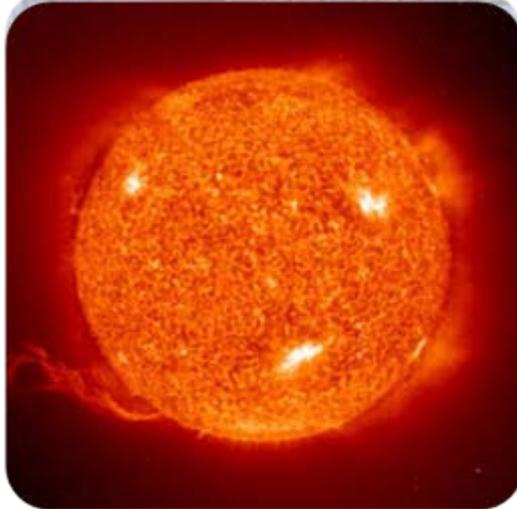
UKCP09 will update these figures

Further change already built in to the climate



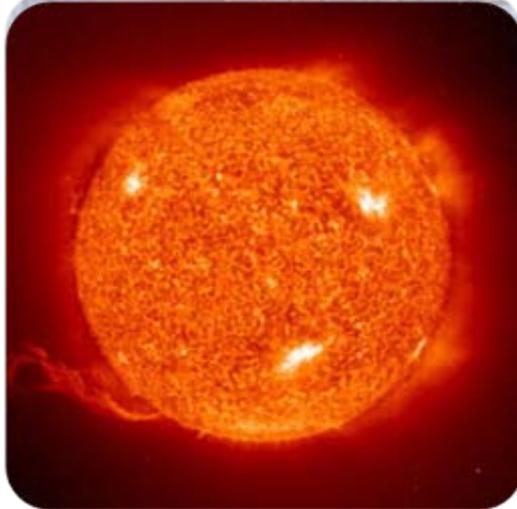
Proof of the pudding

Summary of possible reasons



- Planetary Geometry
- Solar heating variations
- Aerosols
- Enhanced Greenhouse Effect

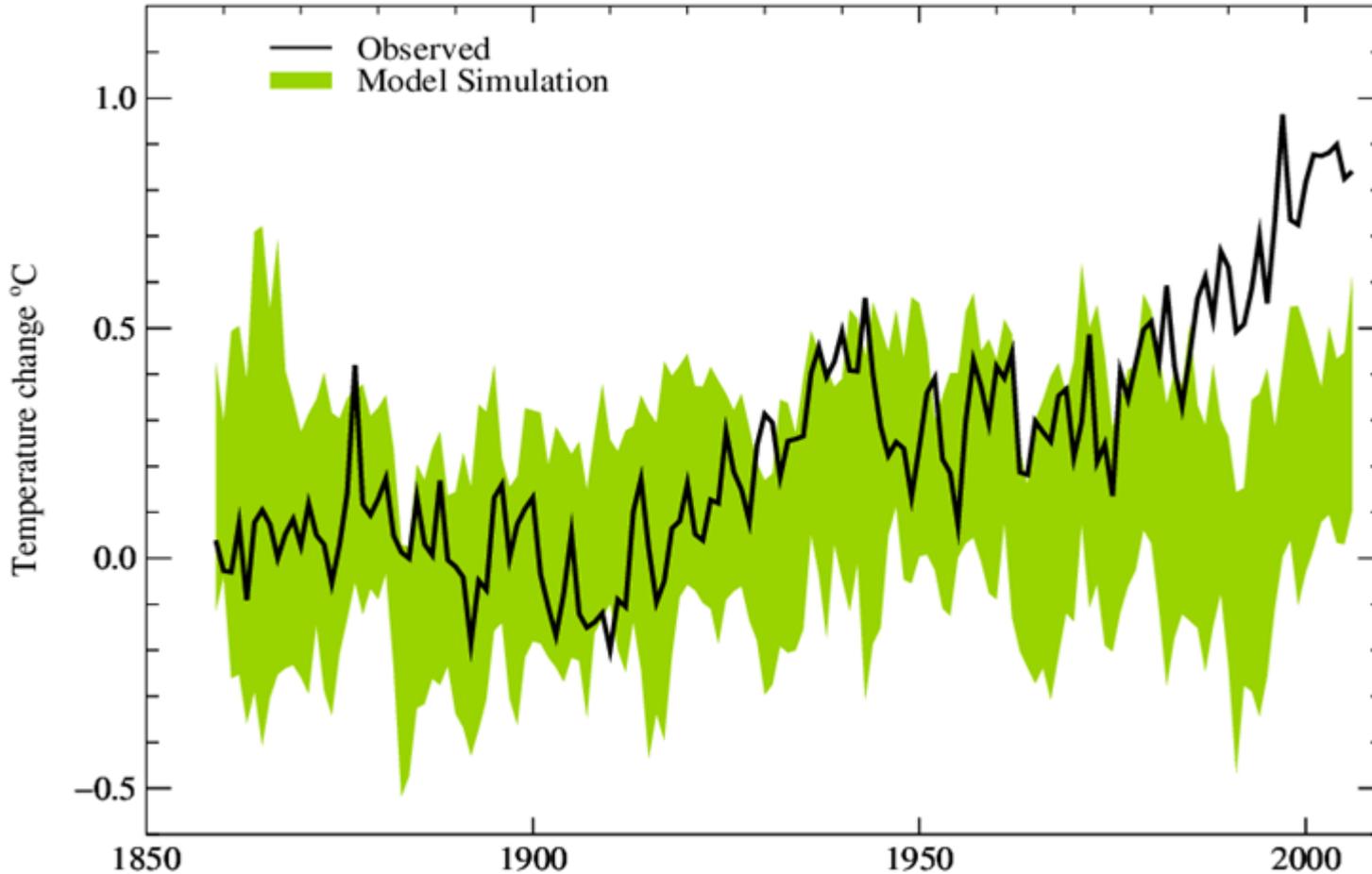
Summary of possible reasons



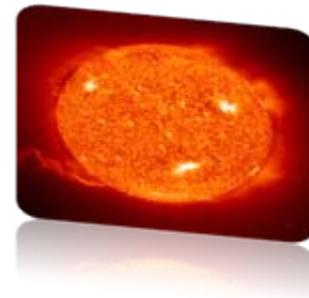
- Planetary Geometry
Too slow
- Solar heating variations
Too small
- Aerosols
Cools climate
- Enhanced Greenhouse Effect
Only possible explanation



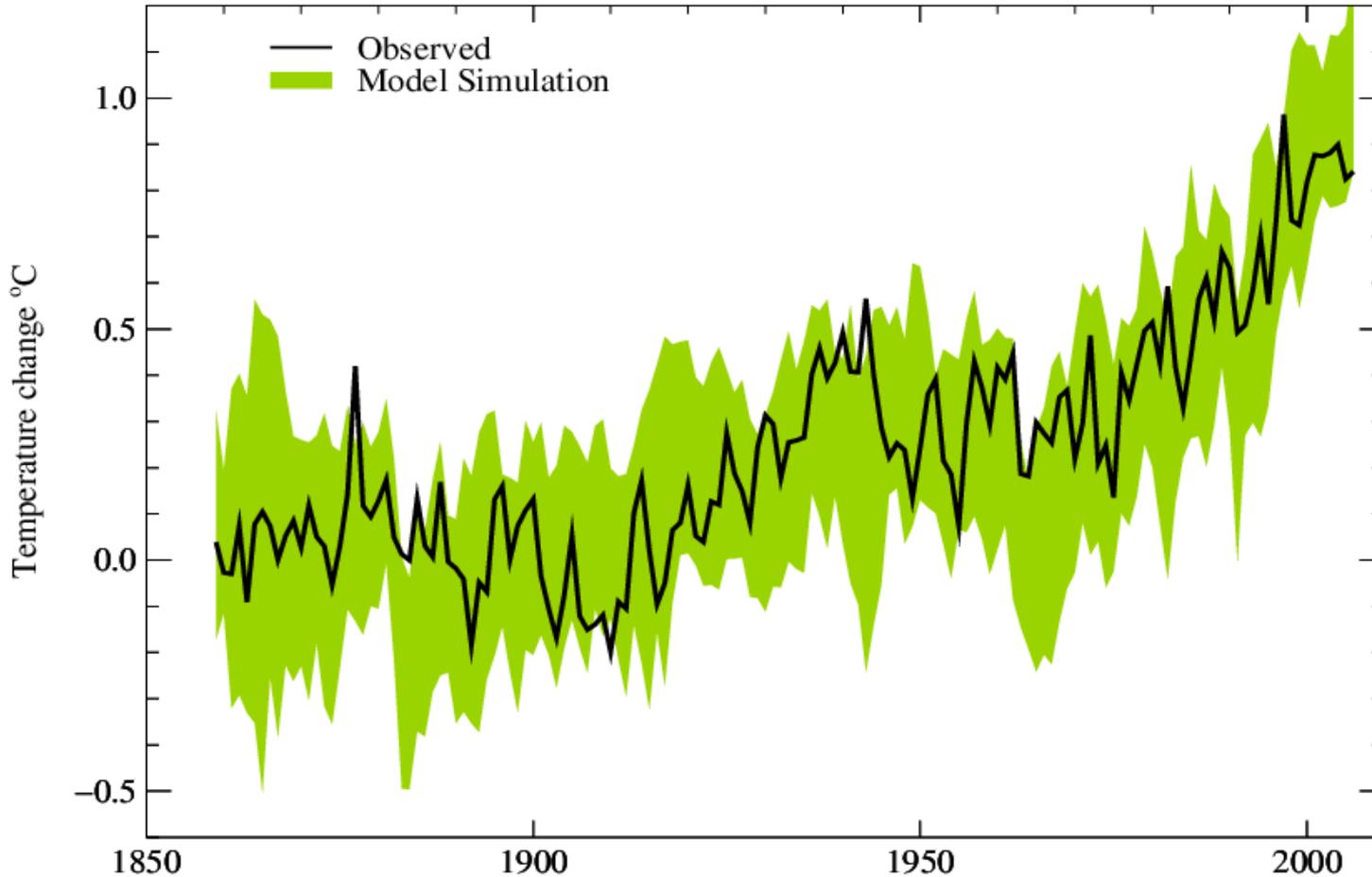
Natural Influence Insufficient



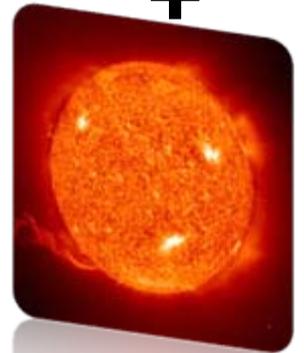
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Human Influence Fits Curve



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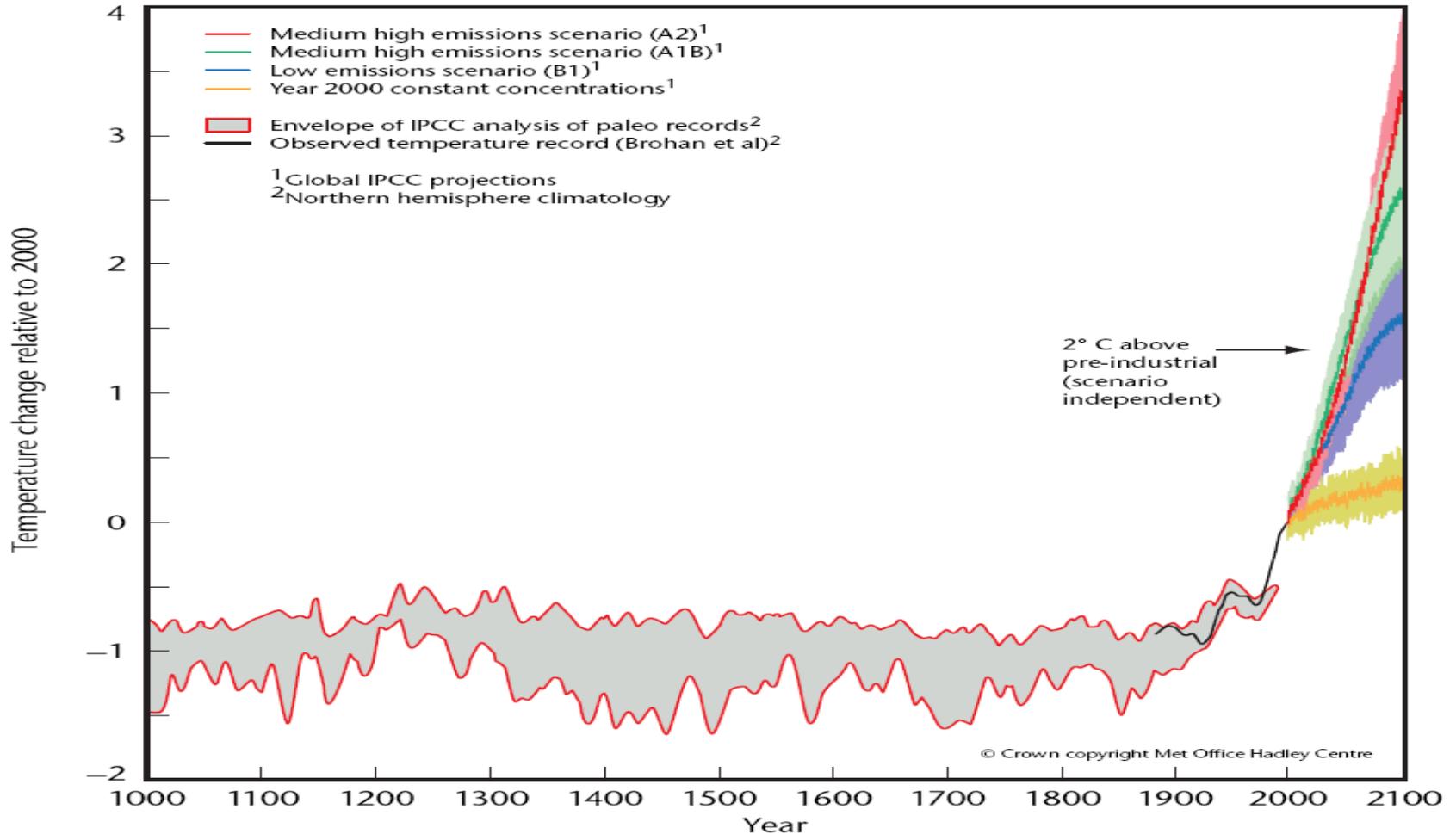


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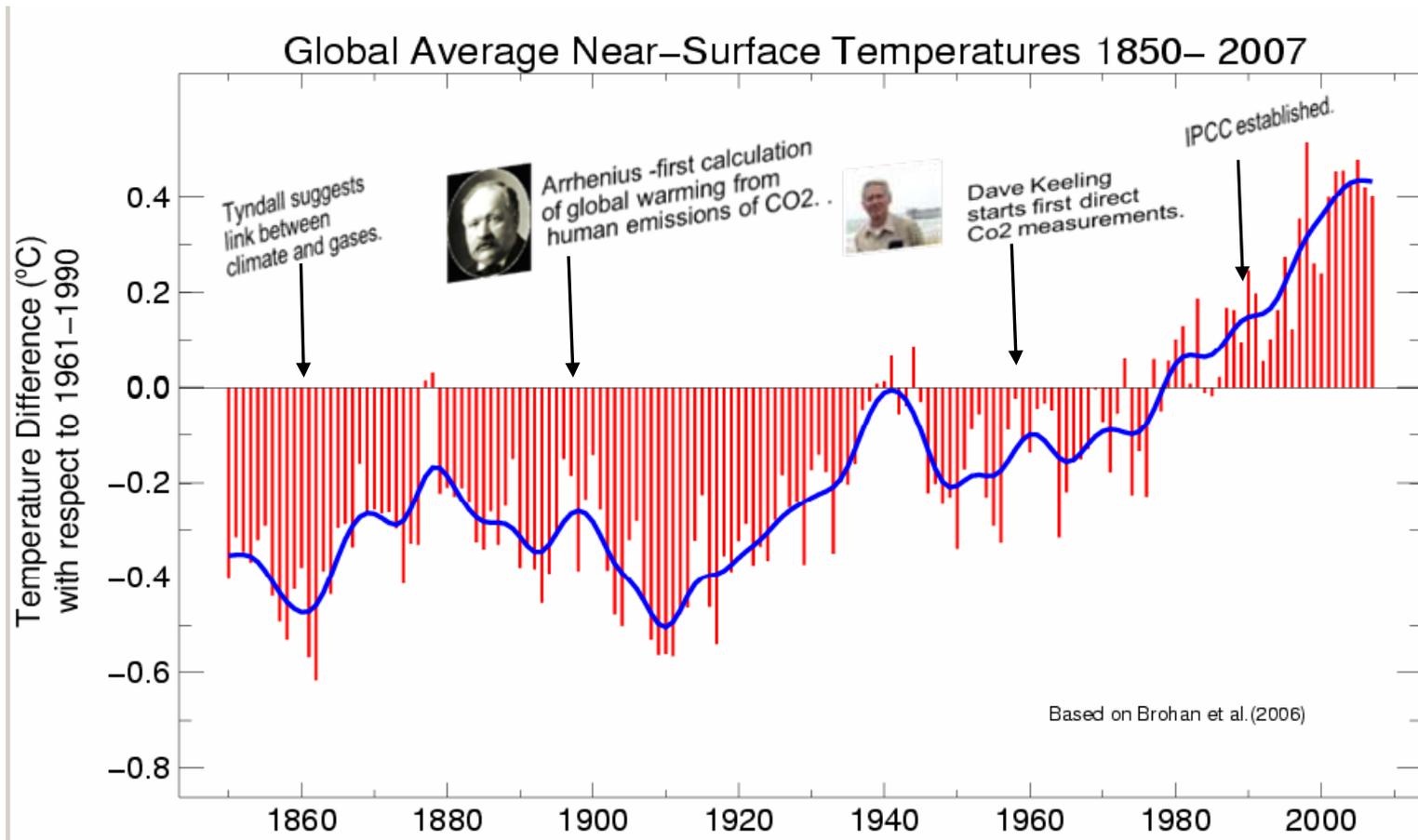
Historical temperature record and model projections (relative to 2000)





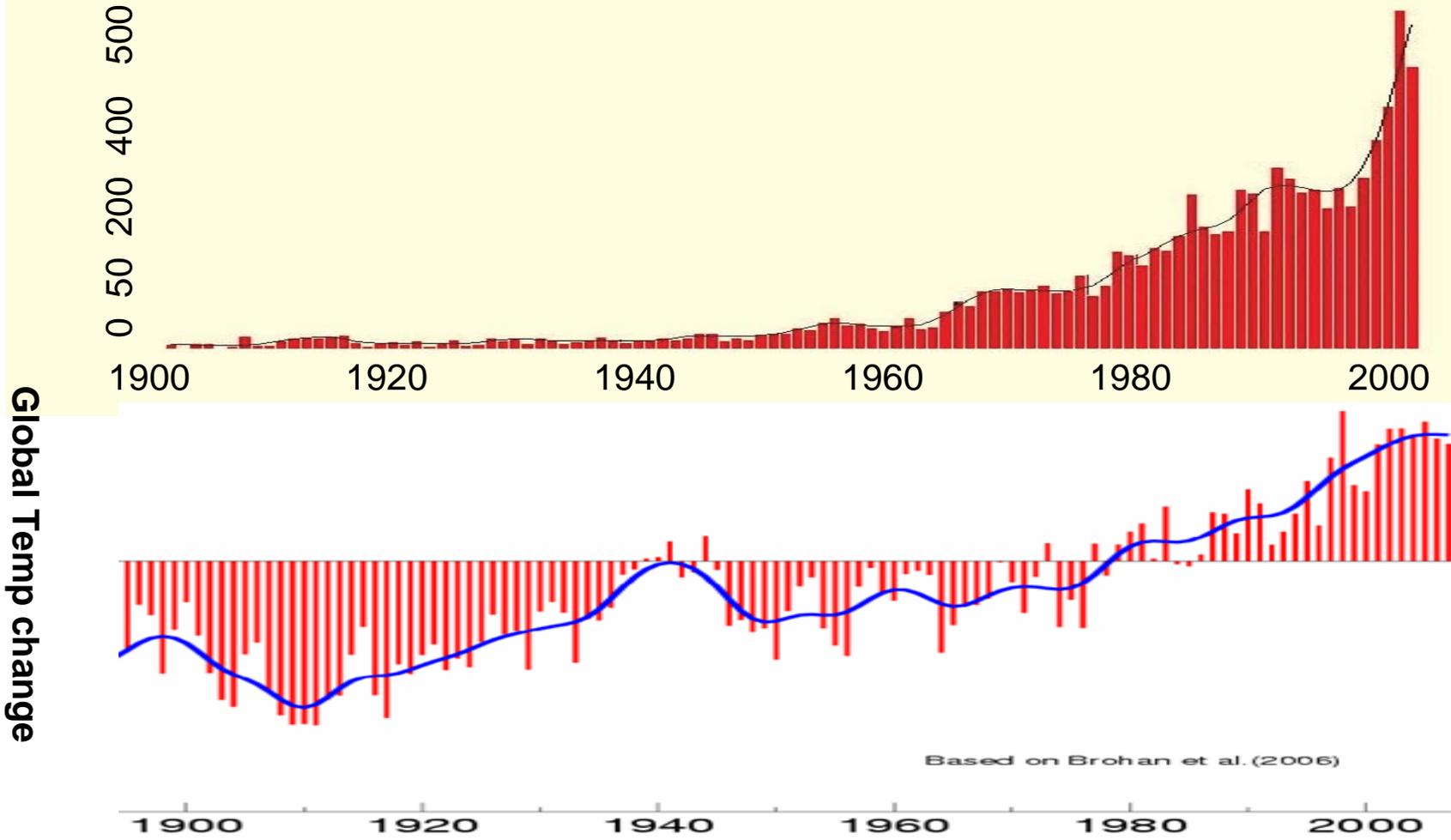
Global predictions and impacts

Observations – global





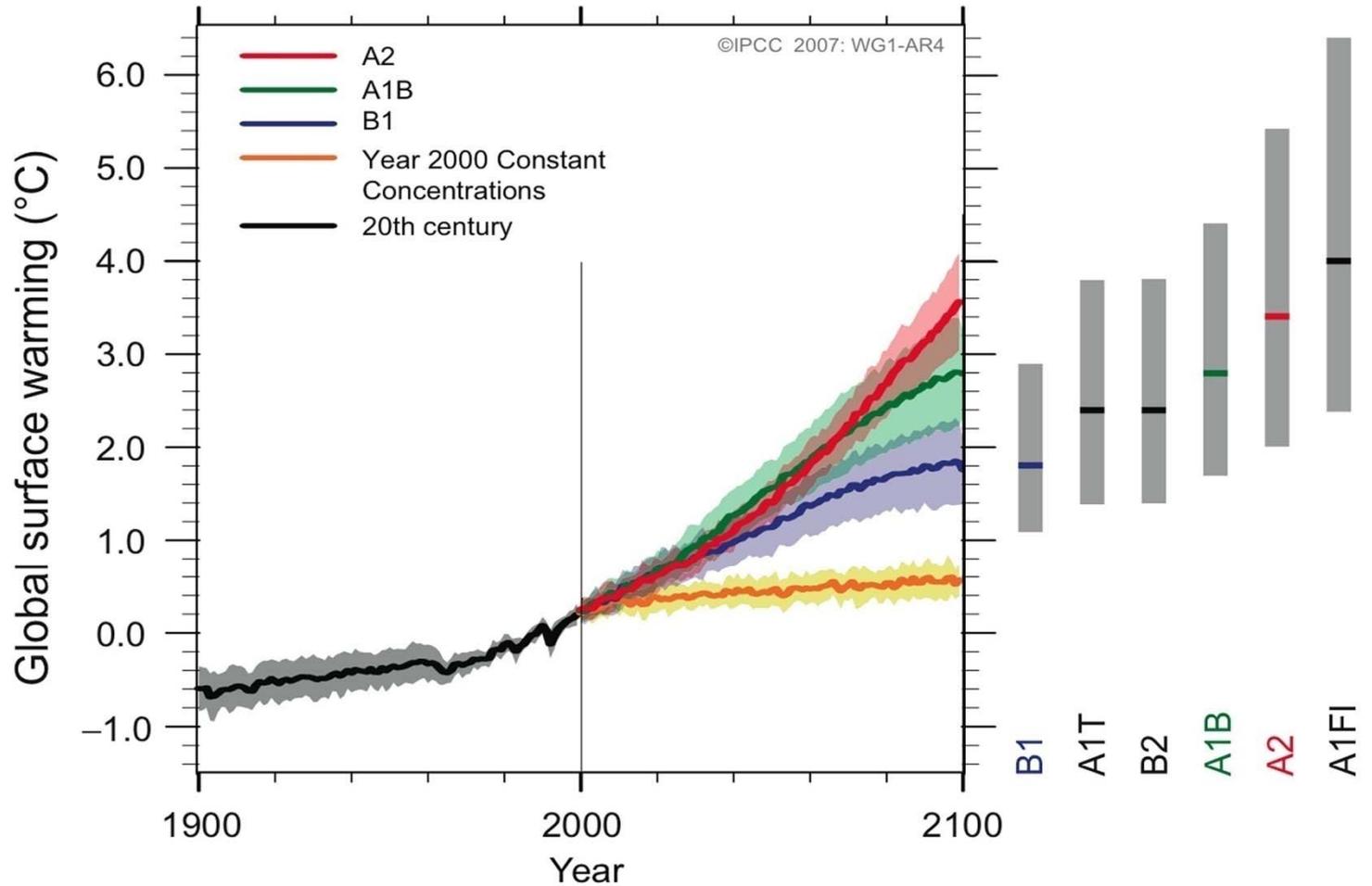
Natural disasters reported Globally



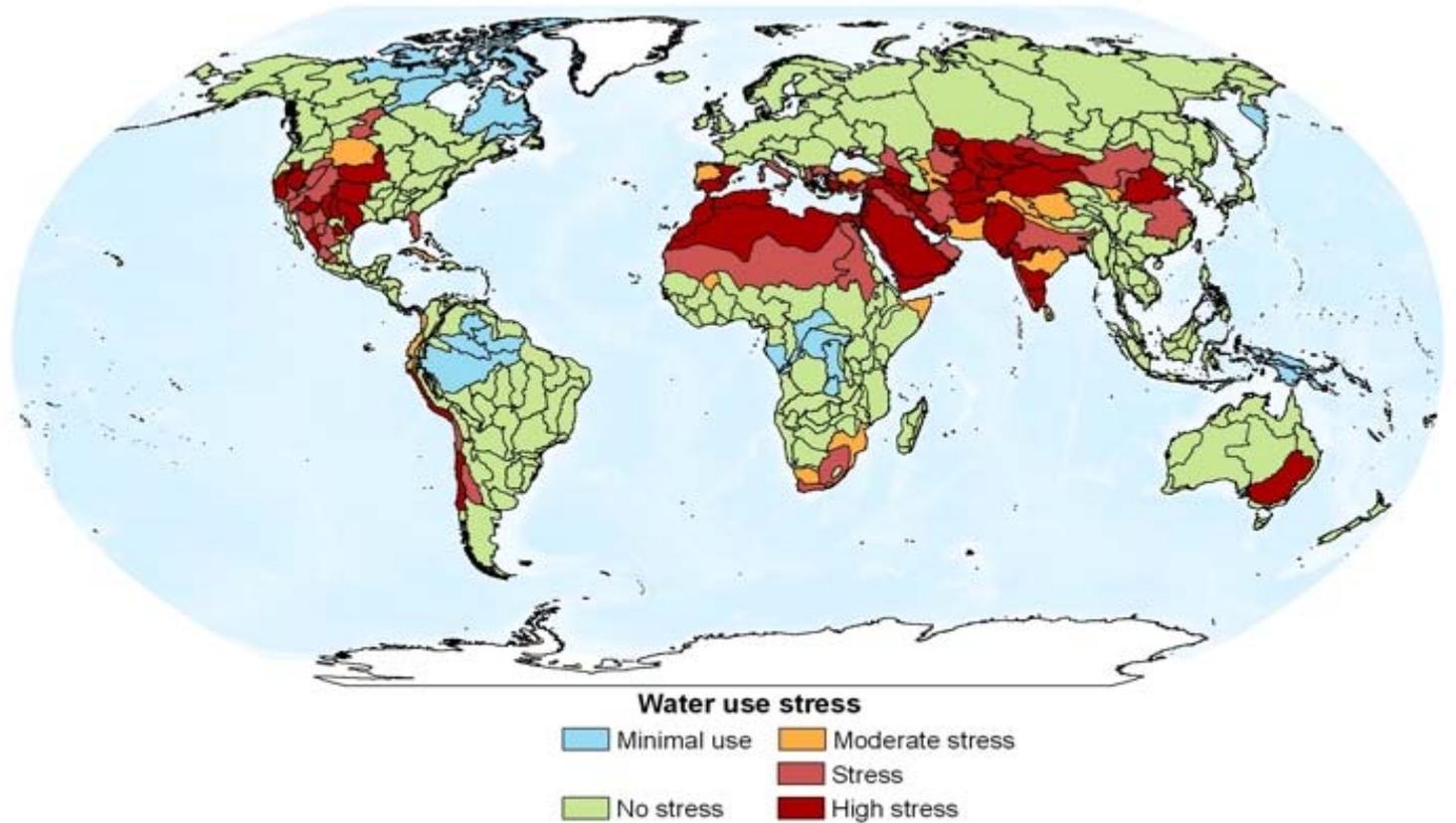
Based on Brohan et al. (2006)

Temperature

Multi-model Averages and Assessed Ranges for Surface Warming



Worldwide water stress





If Global Mean Rise = + 3°C



Coastal flooding.
Asia and small islands.
7–15 million additional
people at risk

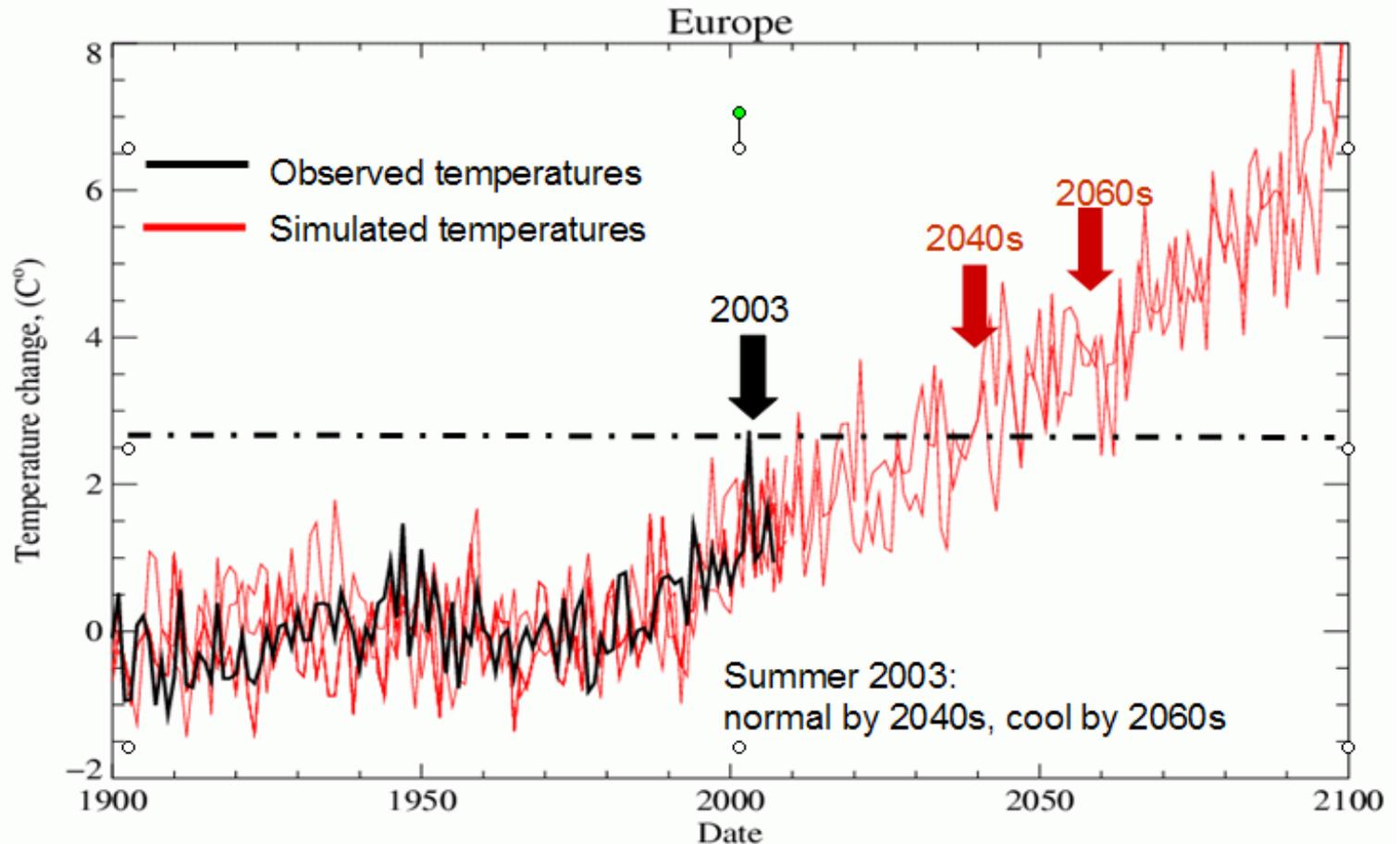


Few ecosystems can adapt
Amazon rainforest loss

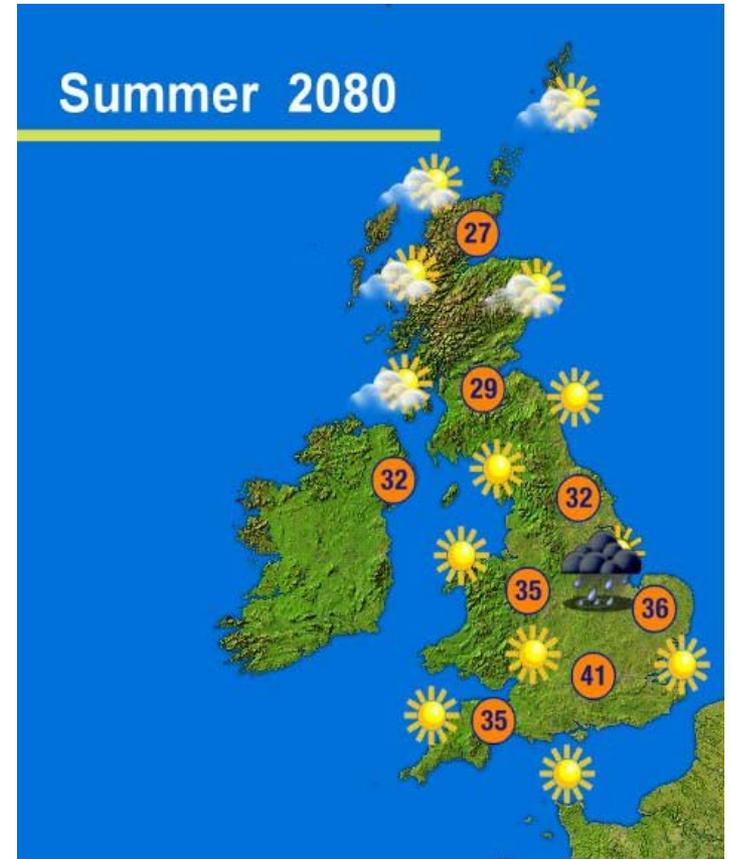


Closer to home Predictions & impacts

European summer temps



Hottest day in typical summer



Average winter's night





Impact

“The effects of climate change is a bit like crystal ball gazing with some widespread and varying predictions for the future”. **ACPOS**



Impact

Kilbirnie 1st Aug 2008



Extreme rainfall

- More rain in winter
- More extreme events
- Warming sea



Coastal Flooding



- Thermal expansion
- Ice-sheet melting
(Greenland irreversible at $>2^{\circ}\text{C}$)
- Storm surges
1953 floods: 300 drowned, 24,000 houses damaged

Possible result of the gradual rise in Sea Level.



How can we adapt?



Adapting - 4-step approach

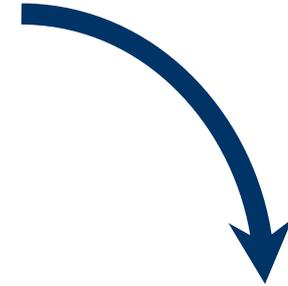
1

Assess vulnerability to
climate (current weather
and extreme events)



Adapting - 4-step approach

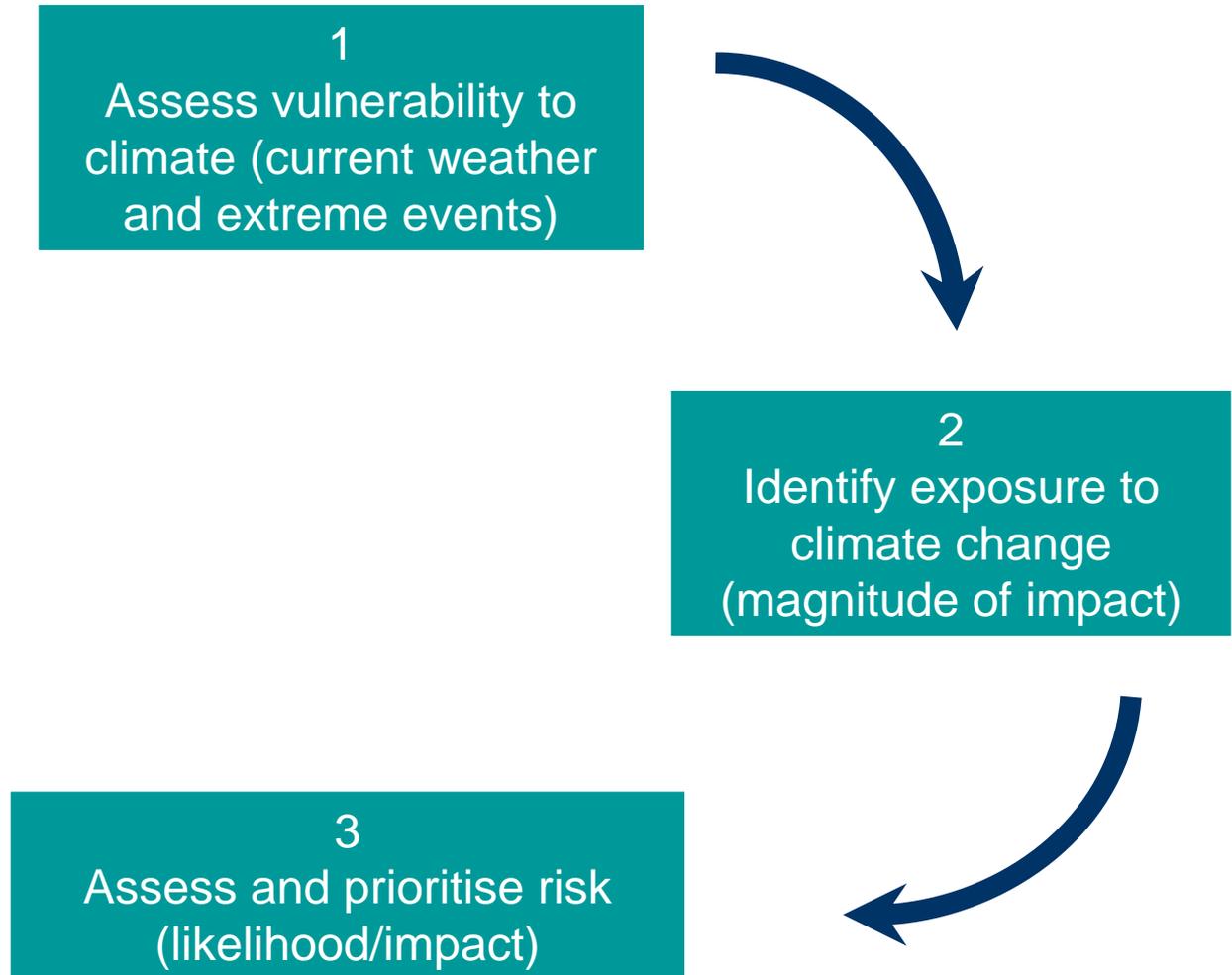
1
Assess vulnerability to
climate (current weather
and extreme events)



2
Identify exposure to
climate change
(magnitude of impact)

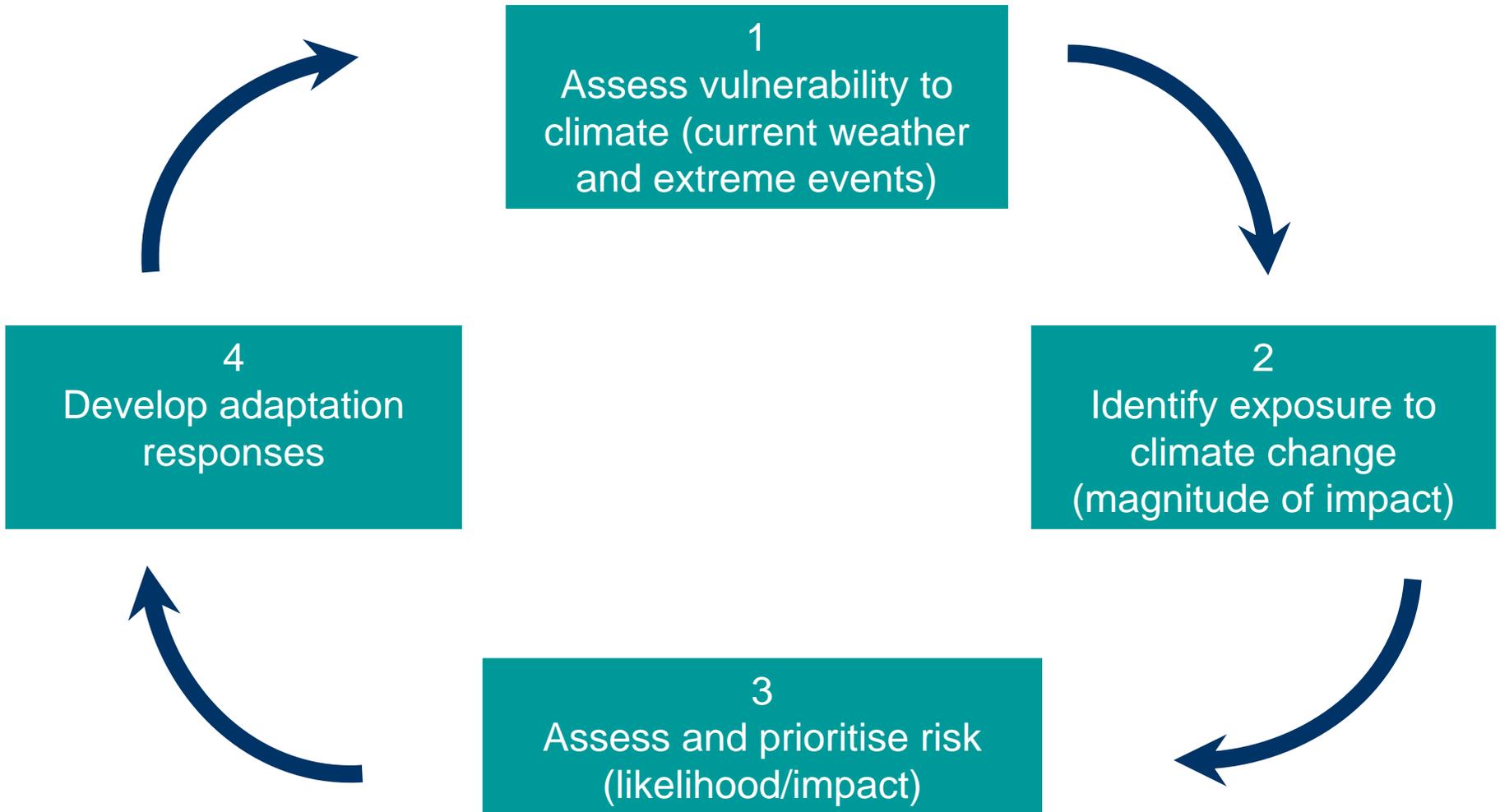


Adapting - 4-step approach





Adapting - 4-step approach





Summary

“The past is a foreign country, they do things differently there”

(L.P. Hartley)

So Must We

Questions??