



Ireland's Changing Climate

Teagasc Sustainable Agriculture Webinar Series – 31st Jul 2020

Keith Lambkin, Senior Climatologist

Met Éireann – The Irish Meteorological Service

Keith.Lambkin@met.ie



Climate Change – The Basics

How do we know our climate is changing?

What can we expect in the future?

By knowing this how can it help us now?

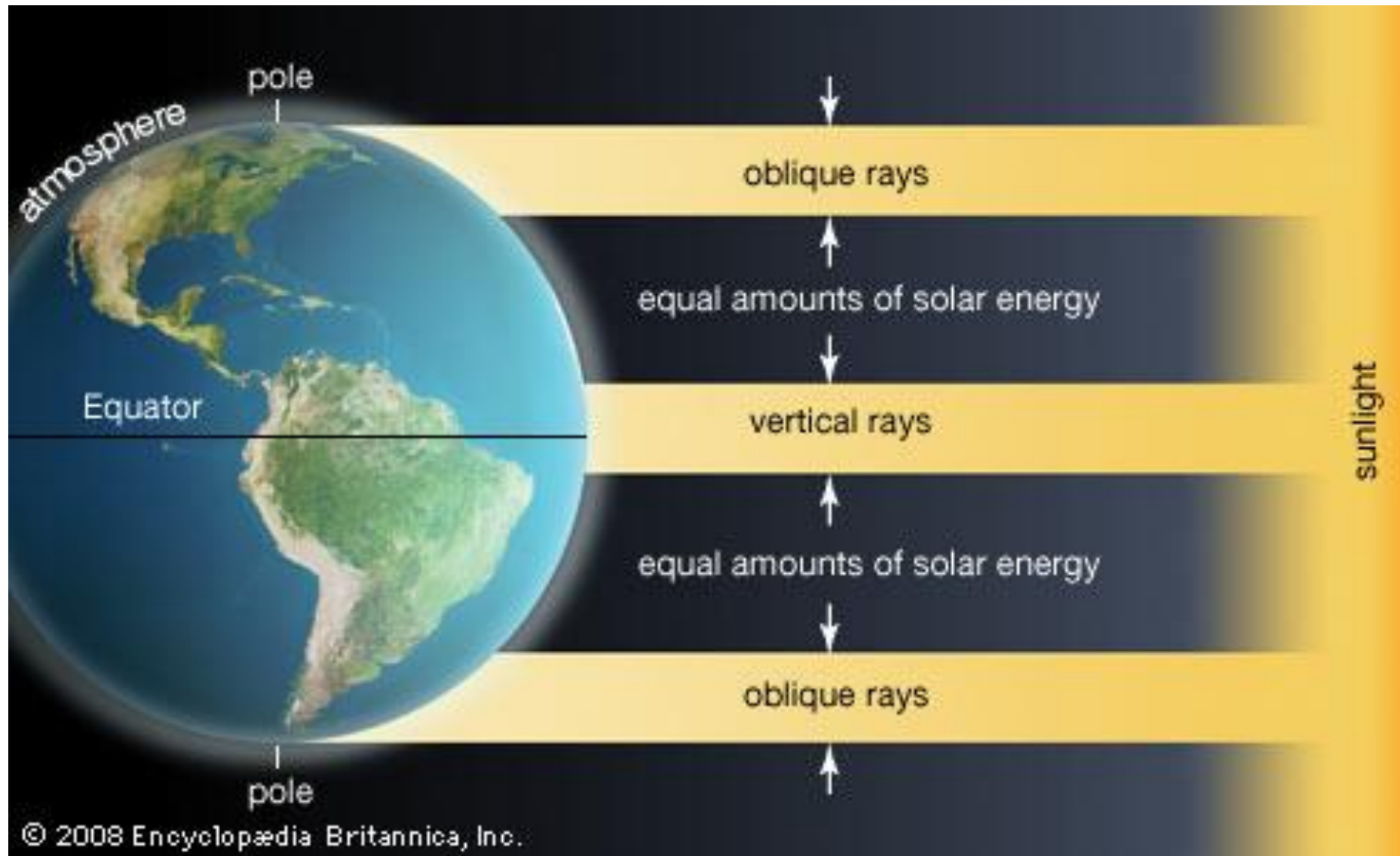
Climate Change – The Basics

How do we know our climate is changing?

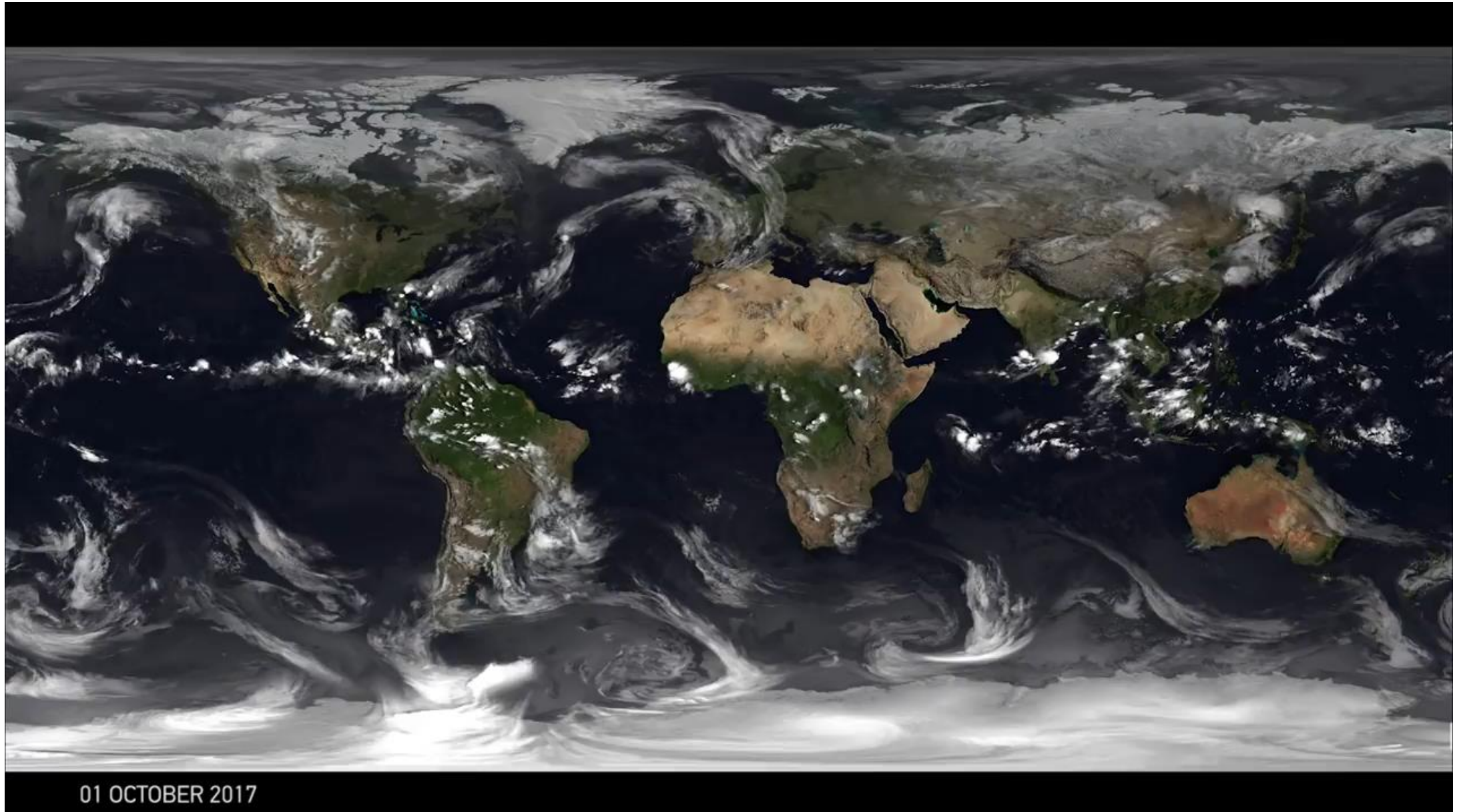
What can we expect in the future?

By knowing this how can it help us now?

Solar Angle



Atmospheric circulation patterns



Energy Balance

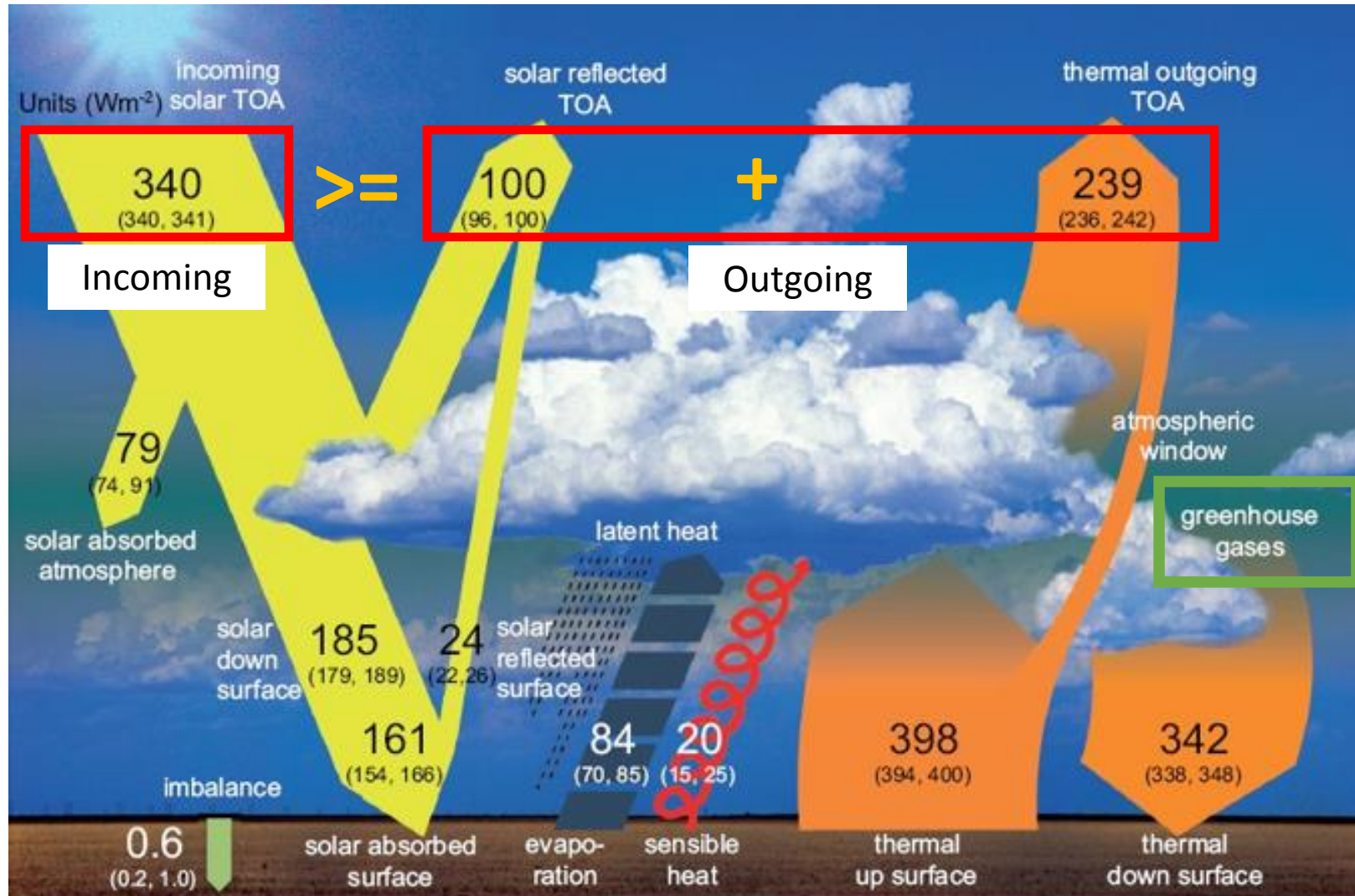


Figure 2.11 from the WG1 report of the 2013 IPCC 5AR. Adapted from Wild et al. 2013

Climate Change – The Basics

How do we know our climate is changing?

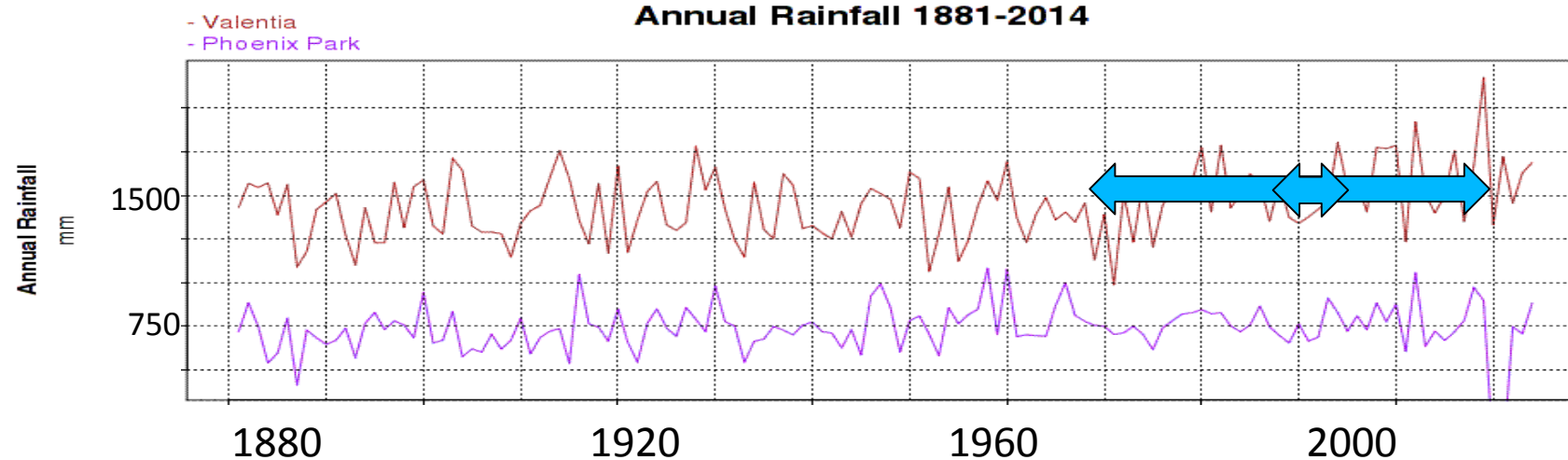
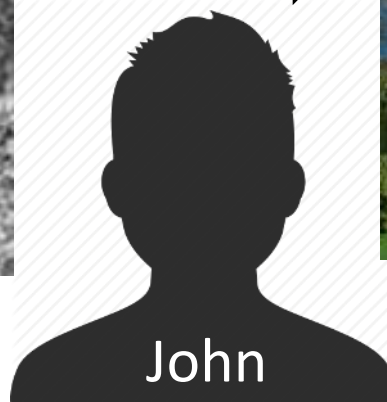
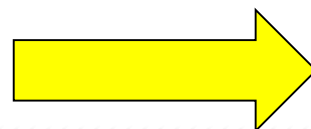
What can we expect in the future?

By knowing this how can it help us now?

Long term Observations



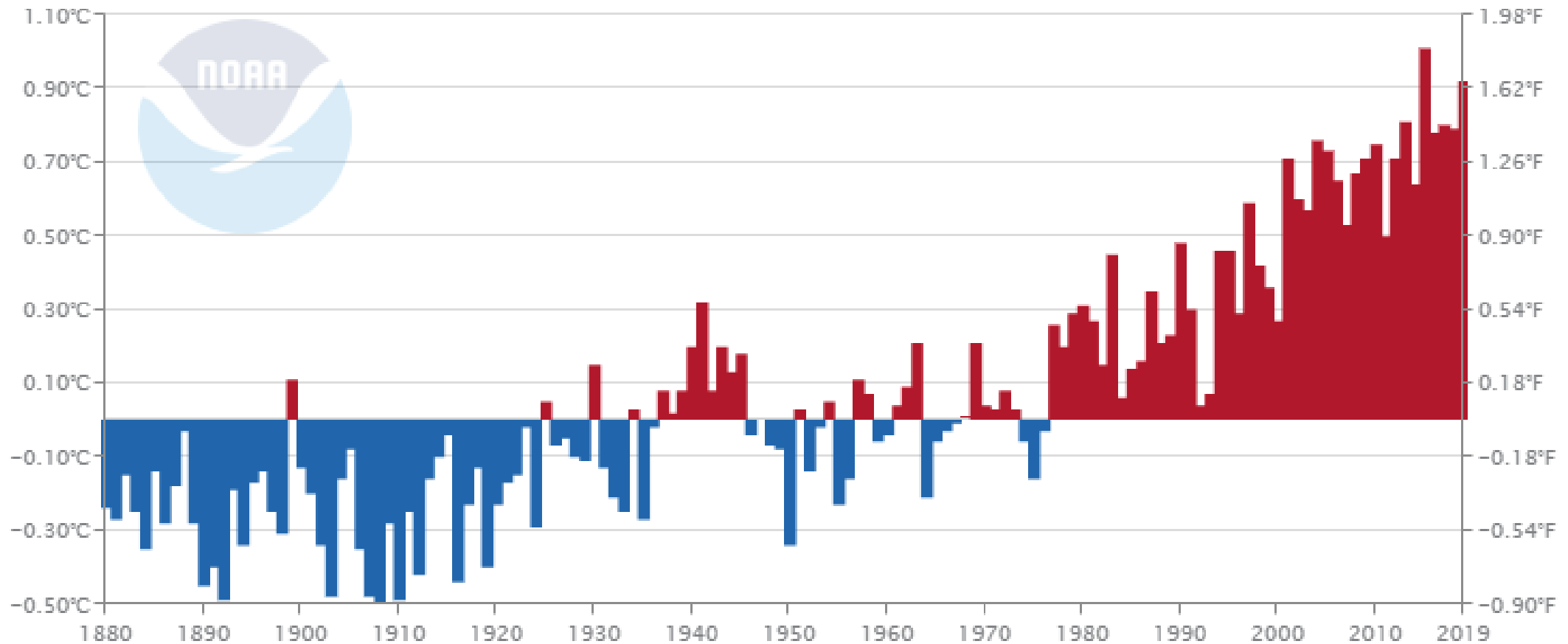
100 years



Global temperature trend

Global Land and Ocean

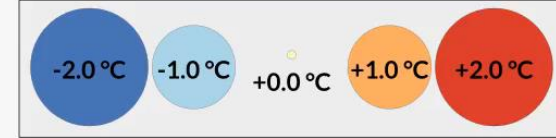
November Temperature Anomalies



Temperature anomalies by country

Temperature Anomalies by Country Years 1880 - 2017

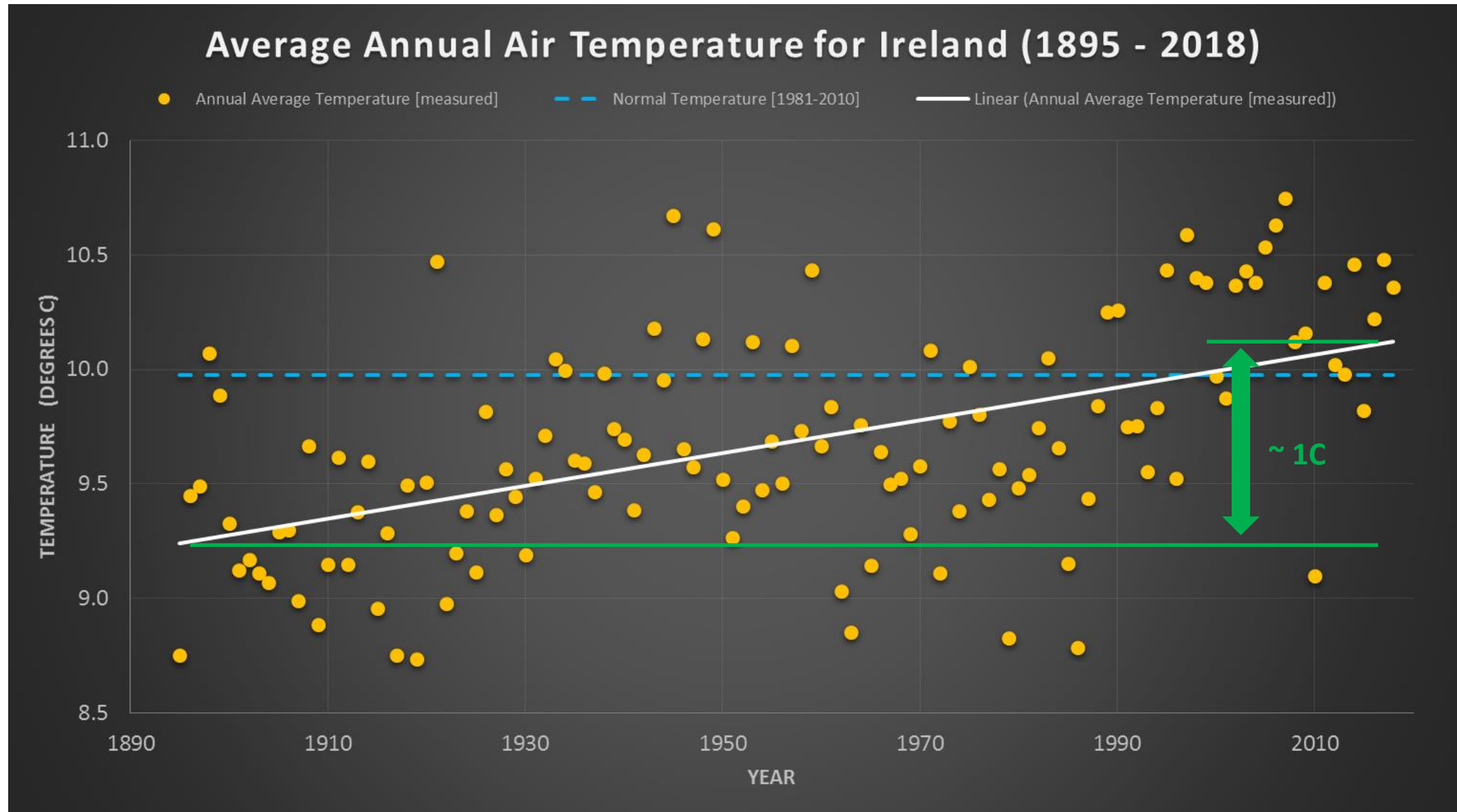
1880



Data Source:
NASA GISS, GISTEMP Land-Ocean Temperature Index (LOTI), ERSSTv5, 1200km smoothing
<https://data.giss.nasa.gov/gistemp/>
Average of monthly temperature anomalies. GISTEMP base period 1951–1980.

Video license: CC-BY-4.0
Antti Lipponen (@anttilip)

Climate is what you expect, weather is what you get



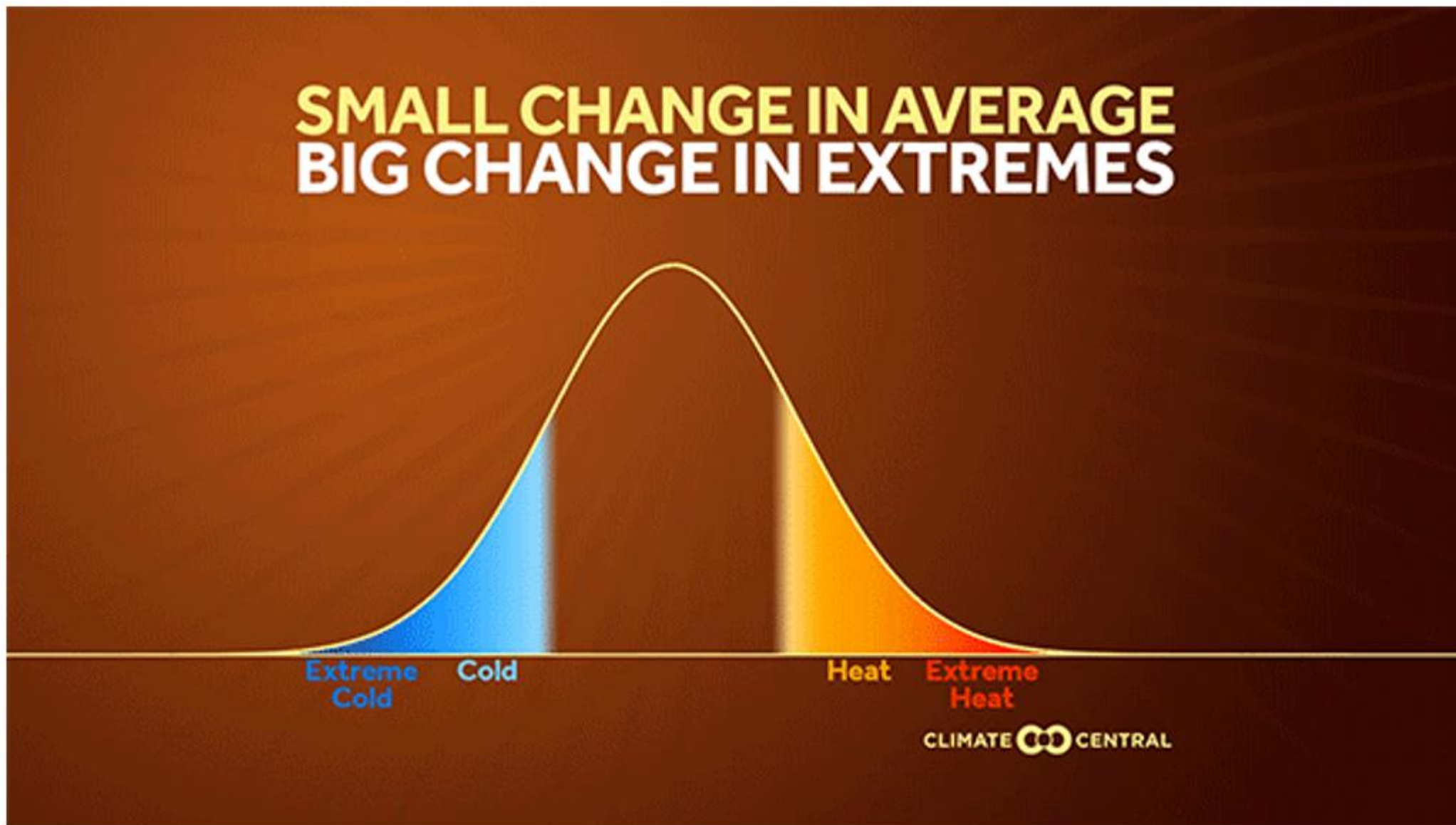
Change in climate average

**SMALL CHANGE IN AVERAGE
BIG CHANGE IN EXTREMES**

Extreme Cold Cold

Heat Extreme Heat

CLIMATE CO CENTRAL



Change in climate average

**SMALL CHANGE IN AVERAGE
BIG CHANGE IN EXTREMES**

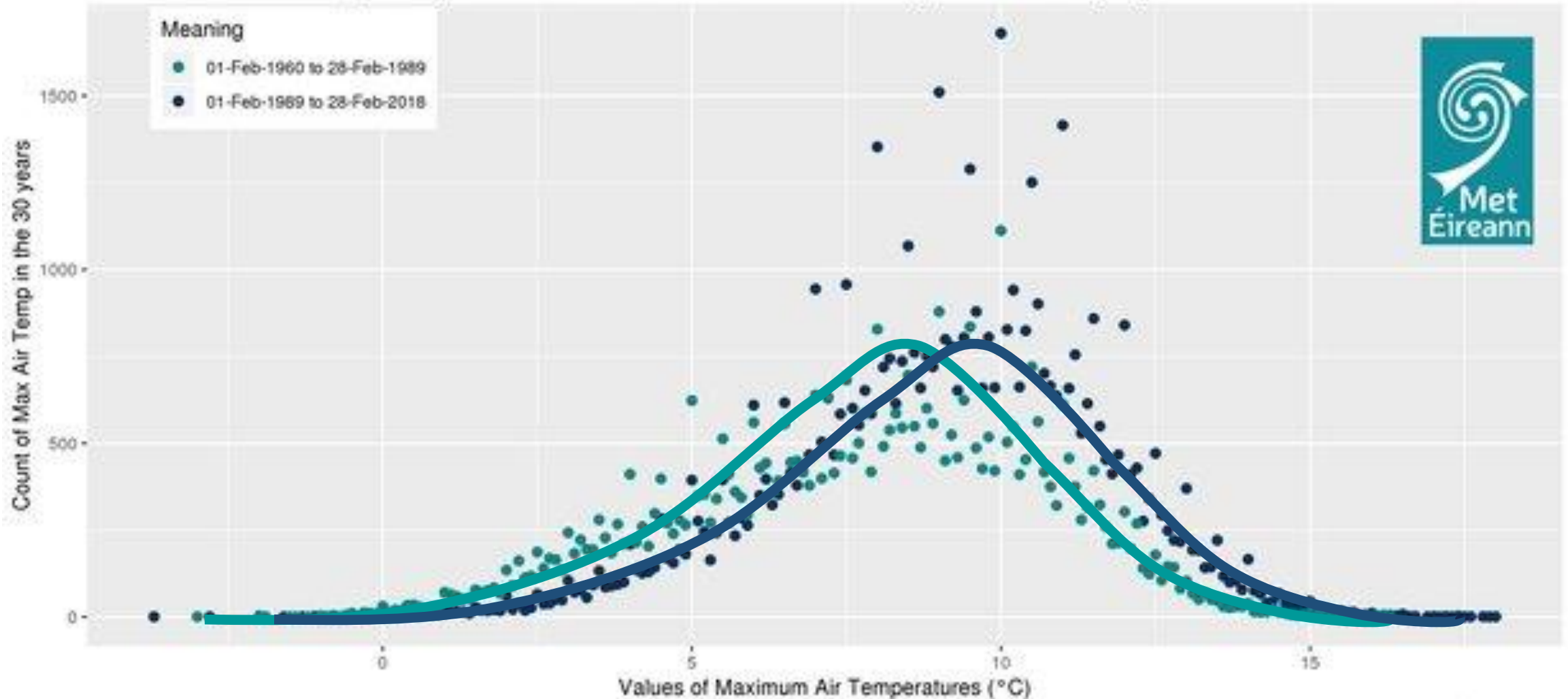
Extreme
Cold Cold

Heat Extreme
Heat

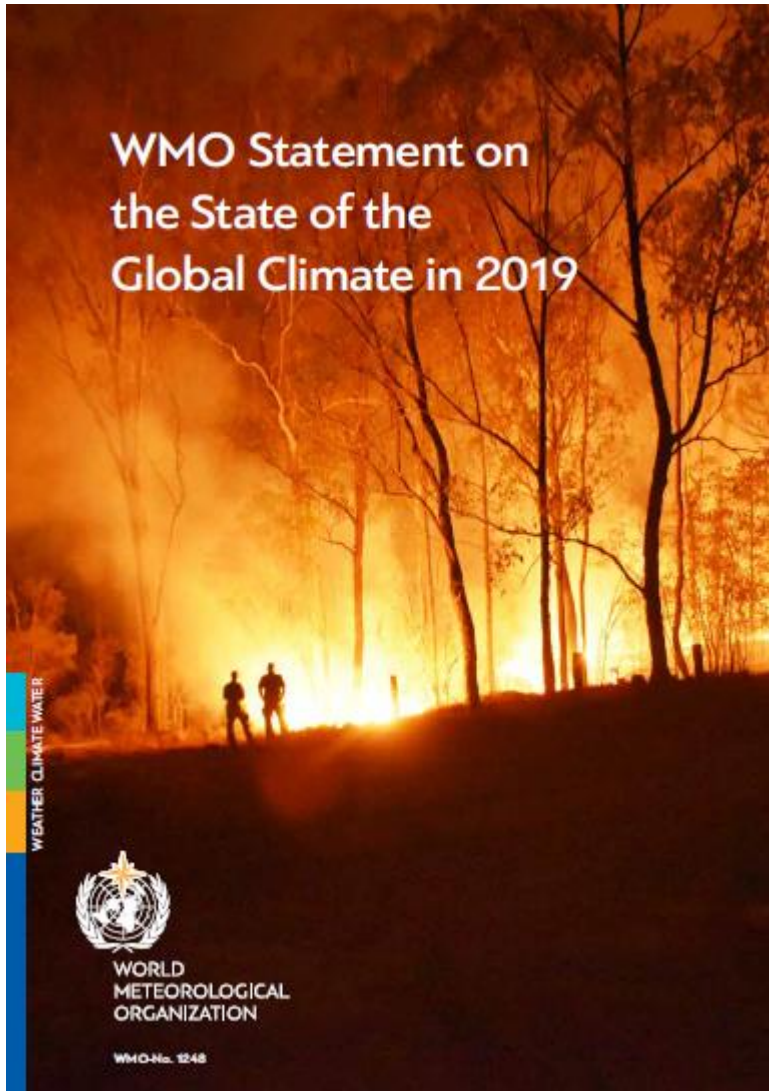
CLIMATE  CENTRAL

Evidence of changing normal climate

Ireland February Daily Surface Maximum Air Temperatures (°C)



Source: National Climate Data Archive at Met Éireann (2019)



“We are currently way off track to meeting either the 1.5°C or 2°C targets that the Paris Agreement calls for. We need to reduce greenhouse gas emissions by 45% from 2010 levels by 2030 and reach net zero emissions by 2050.”

Key Messages from 2019:

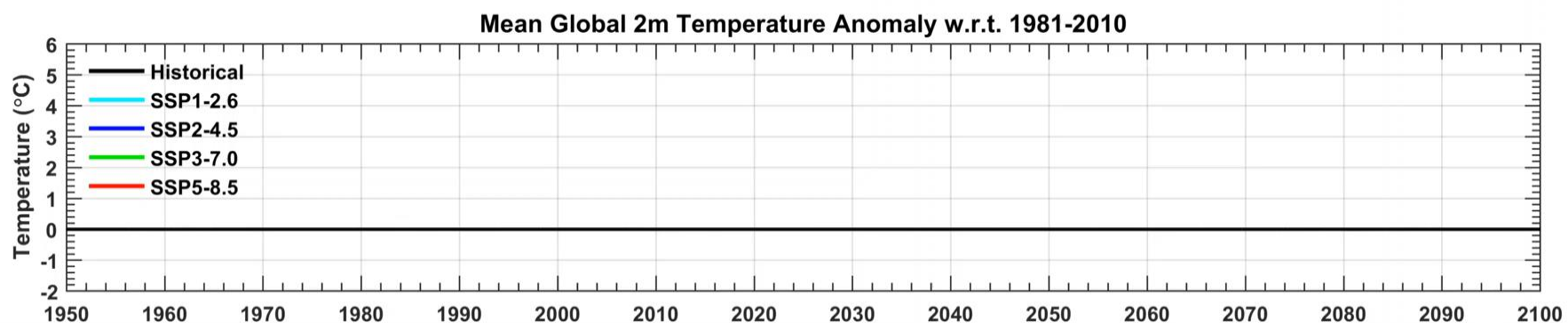
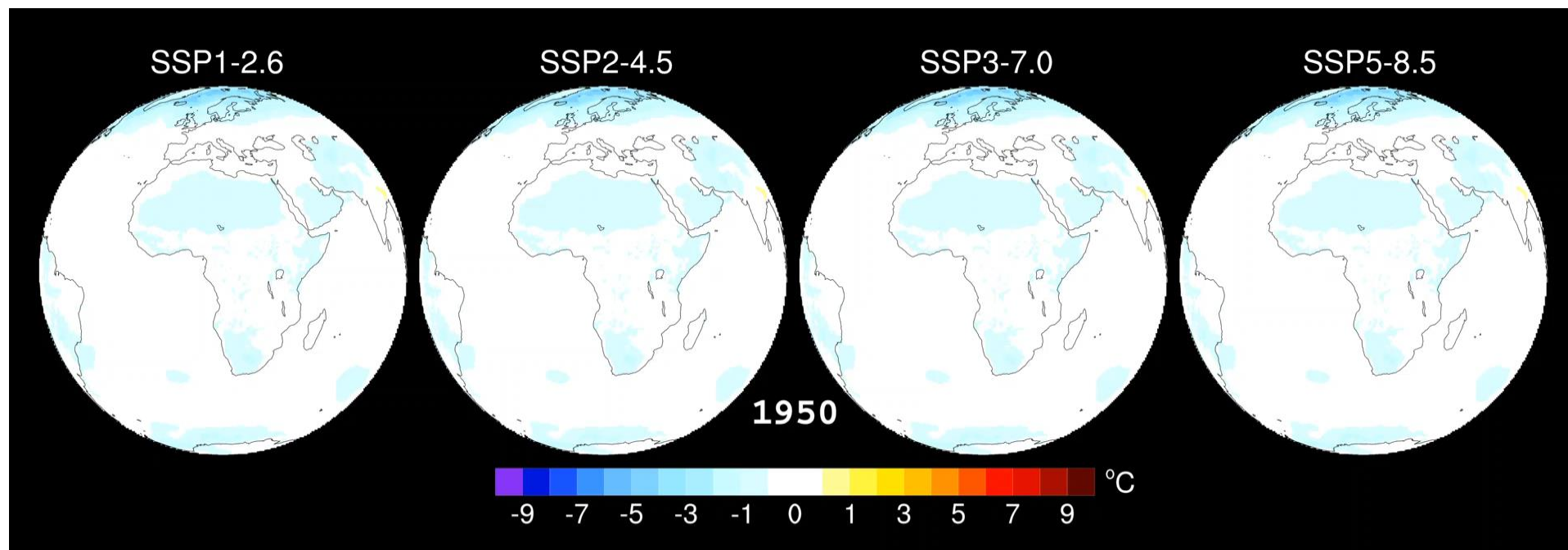
- Global mean temperature 1.1°C above pre-industrial levels
- Record levels of CO₂ in atmosphere.
- The ocean absorbs around 90% of the heat that is trapped by greenhouse gases.
- The warming ocean expands, raising sea levels.

Climate Change – The Basics

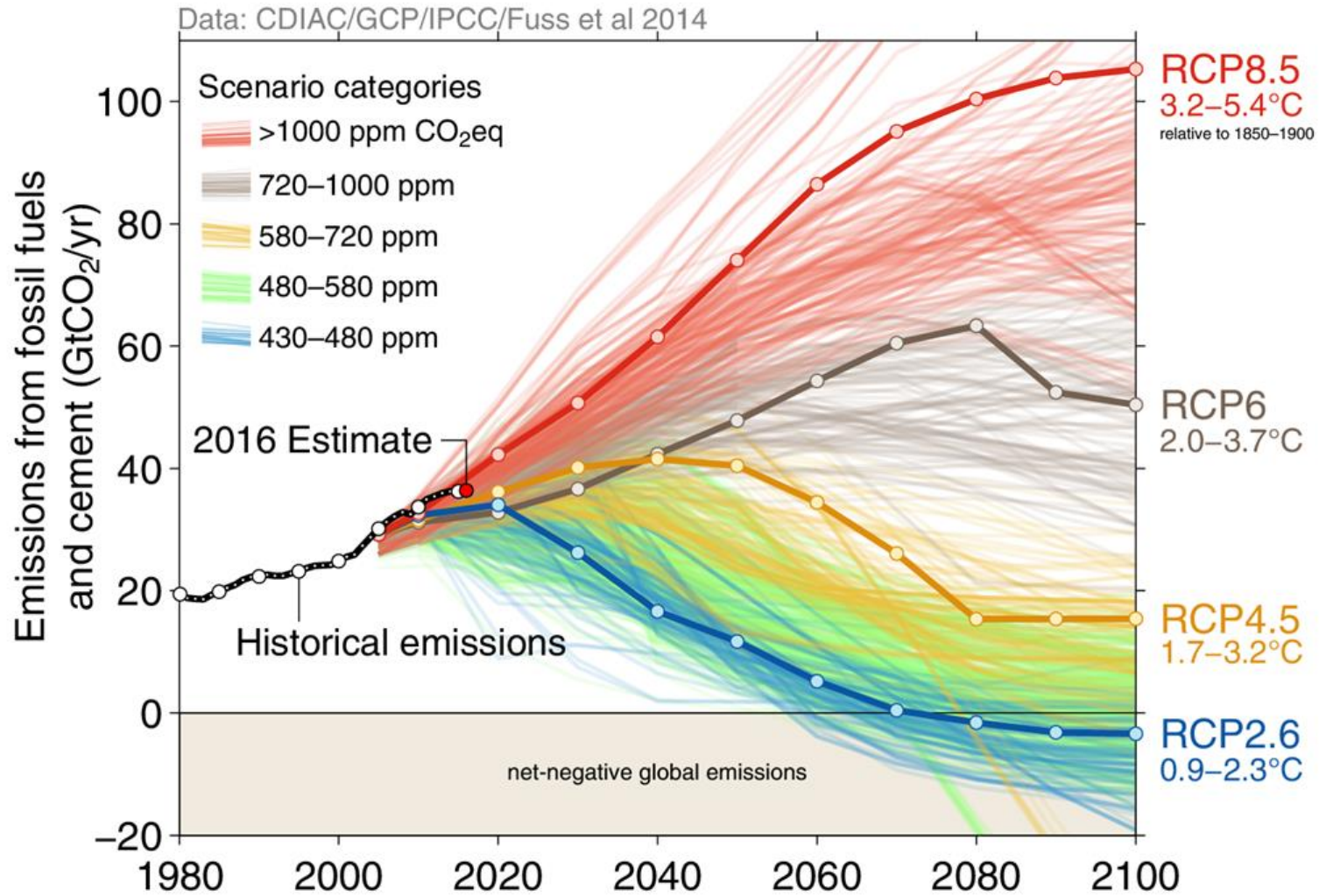
How do we know our climate is changing?

What can we expect in the future?

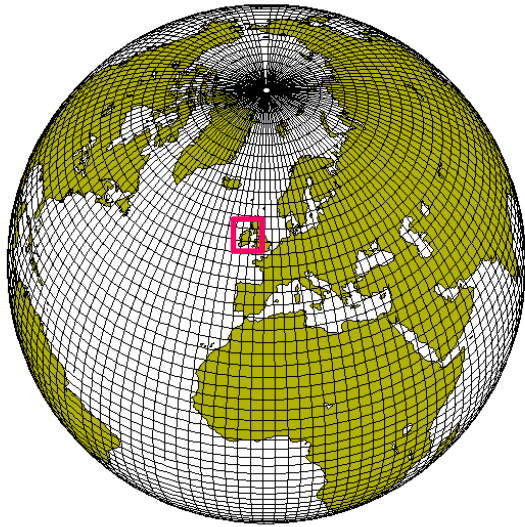
By knowing this how can it help us now?



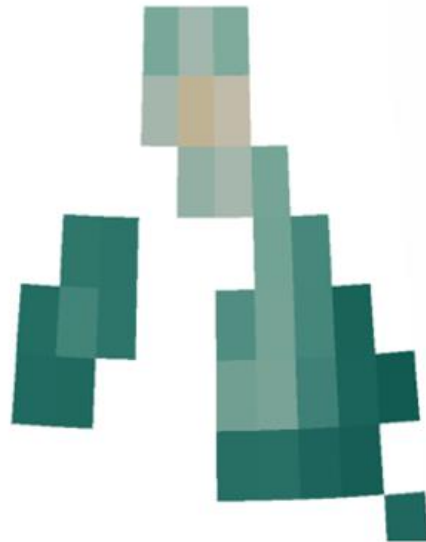
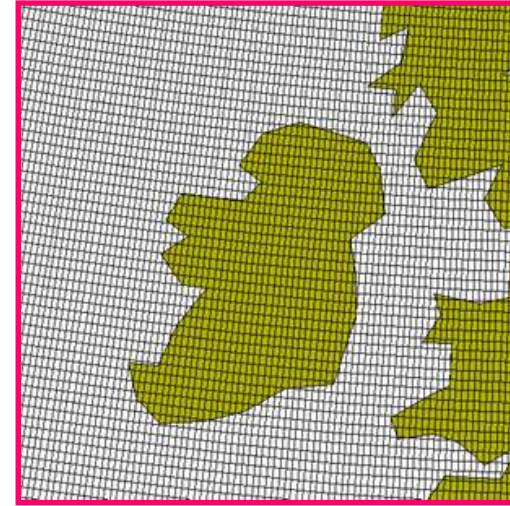
Representative Concentration Pathways (RCP)



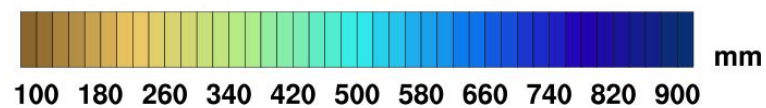
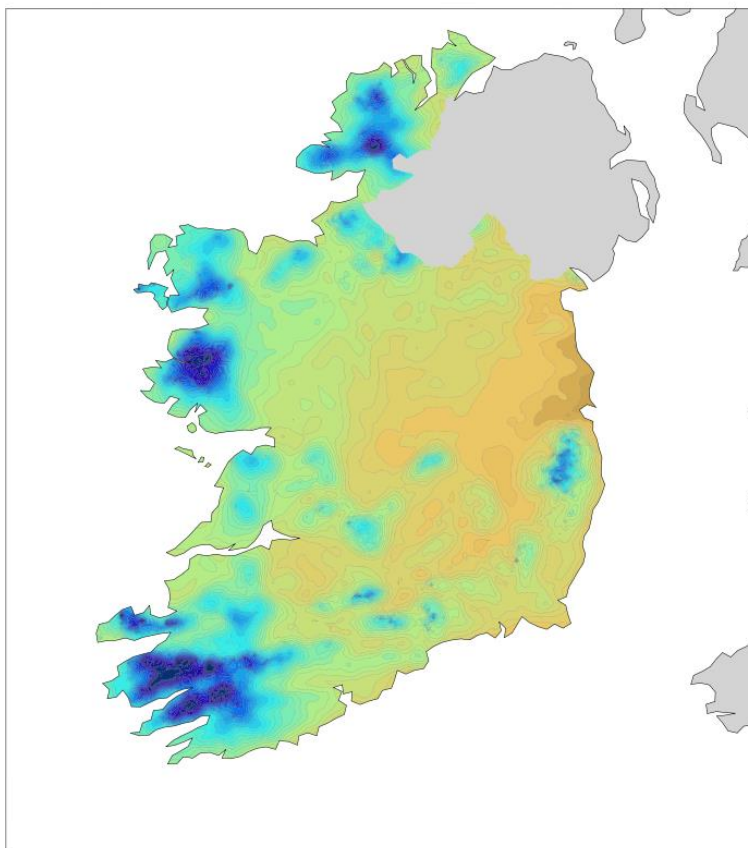
Downscaling for more regional information



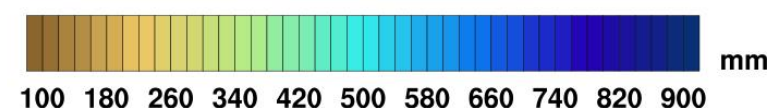
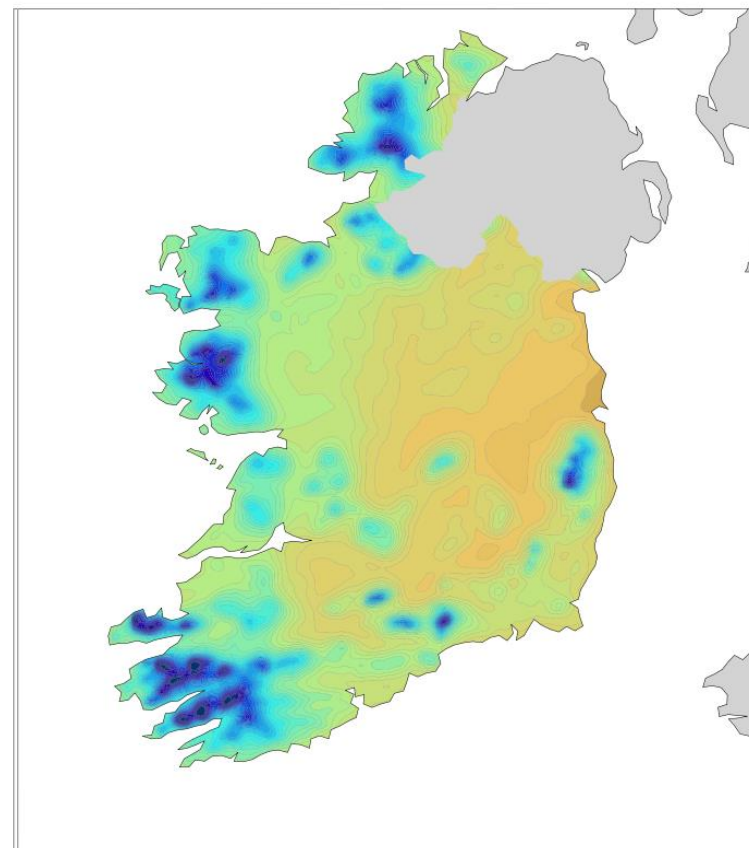
Global Model
to Regional Model



Observed Winter Rainfall (1982-2014)

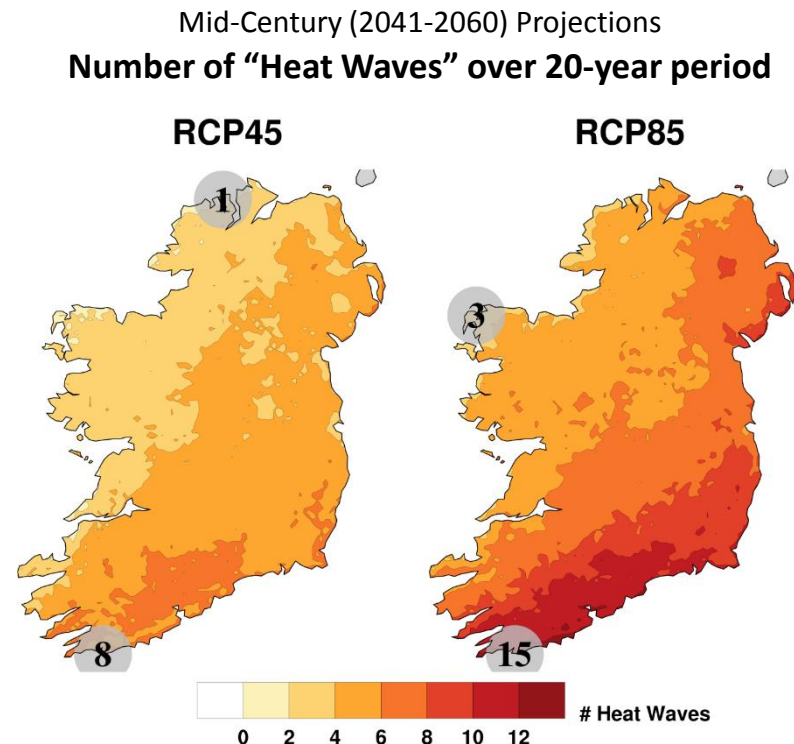


WRF Winter Rainfall (1982-2014), 2km



Model findings, Mid Century (2041-2060) Projections:

- Mean annual temperatures will increase by 1–1.6°C
- Hot days will get warmer by 0.7-2.6°C
- Cold nights will get warmer by 1.1-3.1°C
- The number of frost days is projected to decrease by over 50%
- The average length of the growing season will increase
- Increase in number of heatwaves by mid-century
- Heavy rainfall events will increase in winter and autumn
- Storms affecting Ireland will decrease in frequency, but increase in intensity



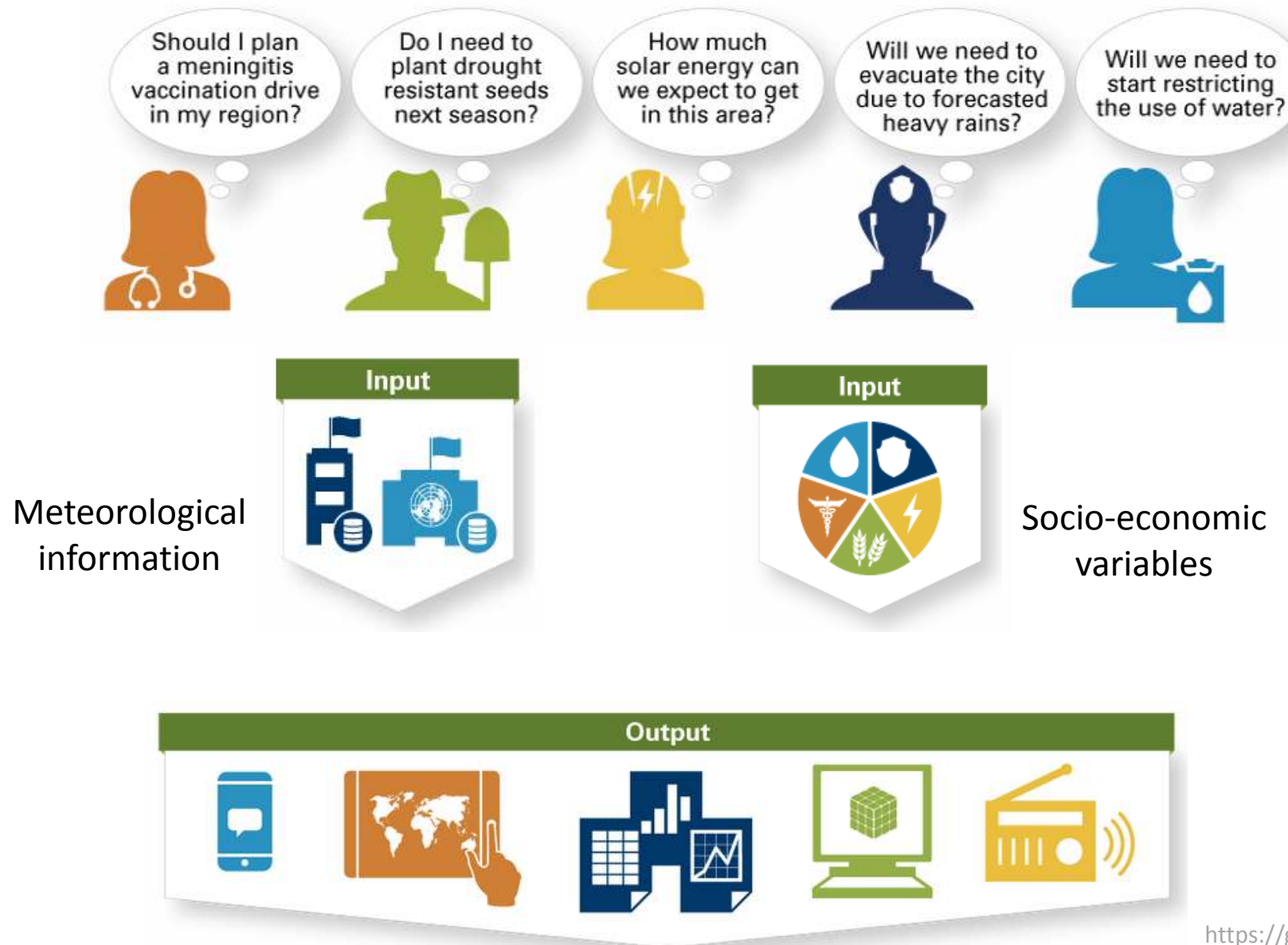
Climate Change – The Basics

How do we know our climate is changing?

What can we expect in the future?

By knowing this how can it help us now?

Climate Services



Worldwide Impacts



