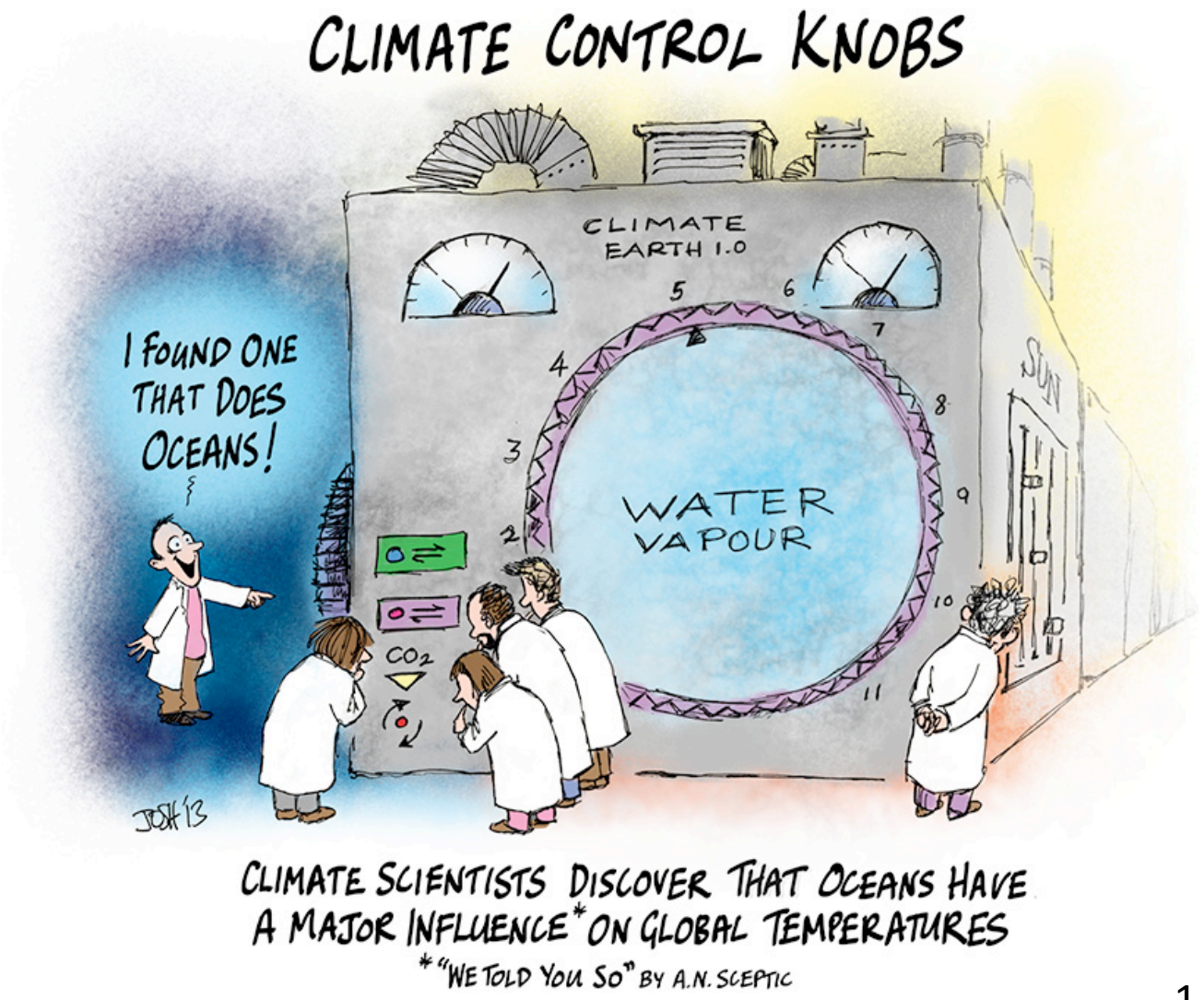
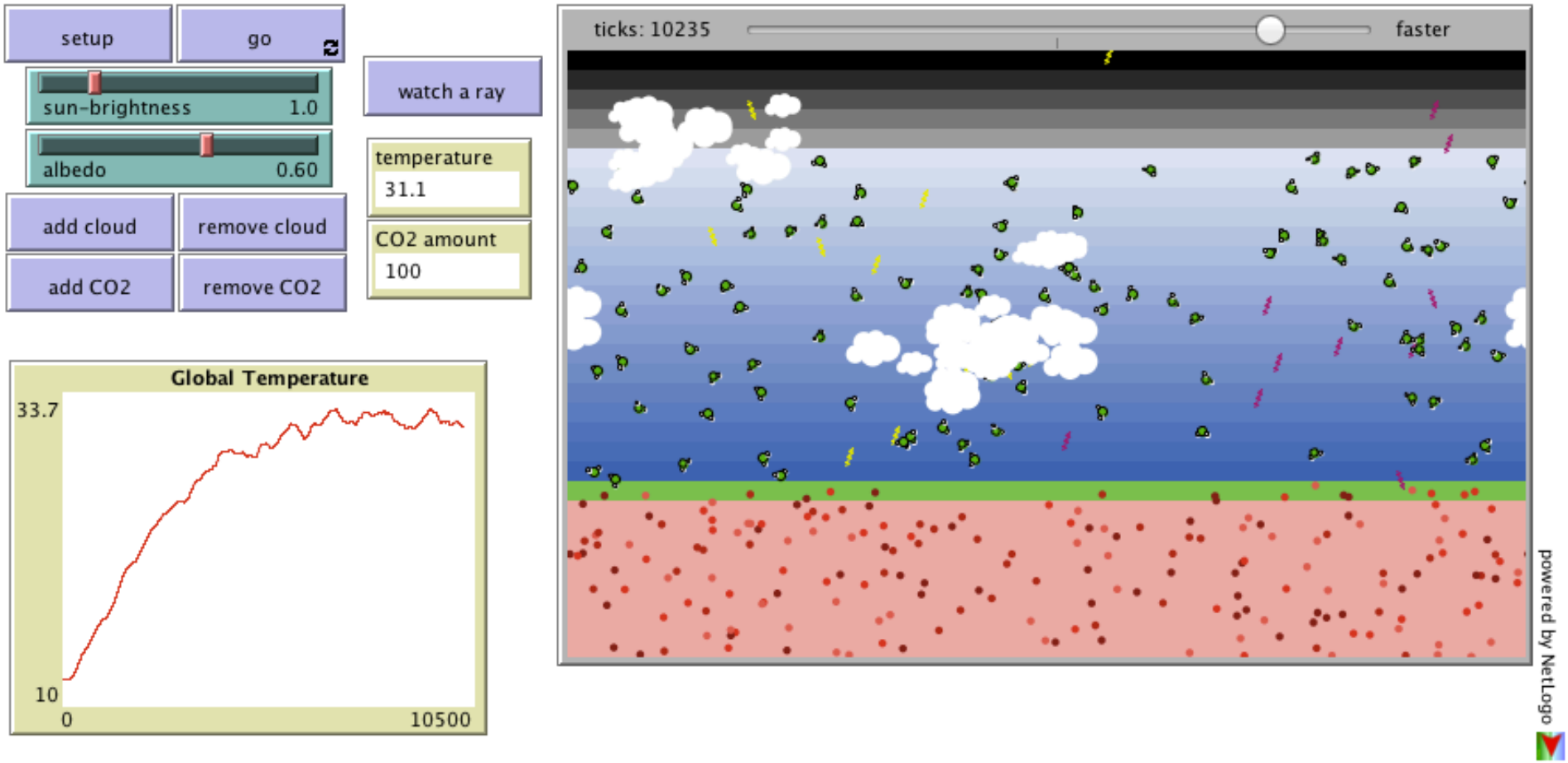
Climate Models

Simulation Review

Climate Models

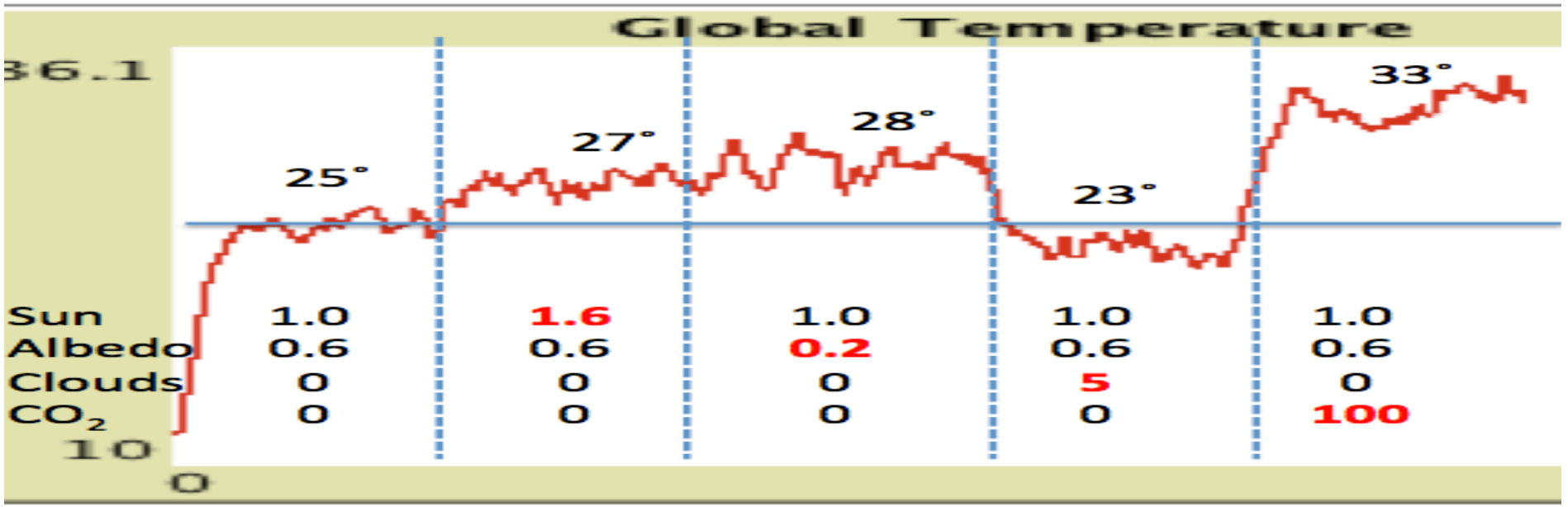


Simulation Review



http://netlogoweb.org/launch#http://netlogoweb.org/assets/modelslib/Sample Models/Earth Science/Climate Change.nlogo

Simulation Review



Temperature = Suns' Rays + Albedo + Clouds + CO_2

More Red Balls
Higher Temp

More Sun
Higher Temp

Reduce Albedo
Higher Temp

More Clouds
More Reflection Out
Lower Temp

More Clouds
More Reflection In
Higher Temp

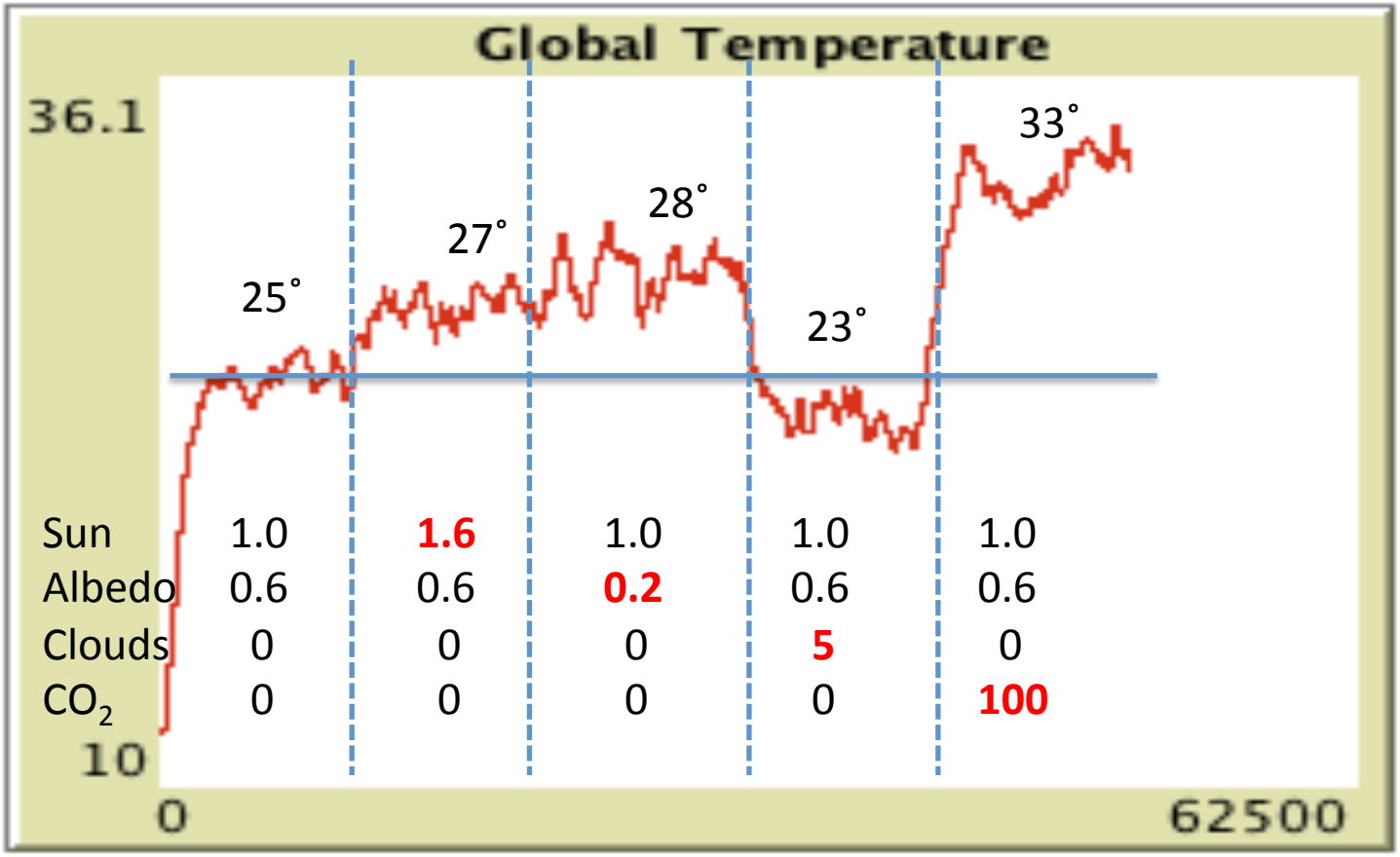
More CO_2
Higher Temp

Simulation Review

Group Discussion:

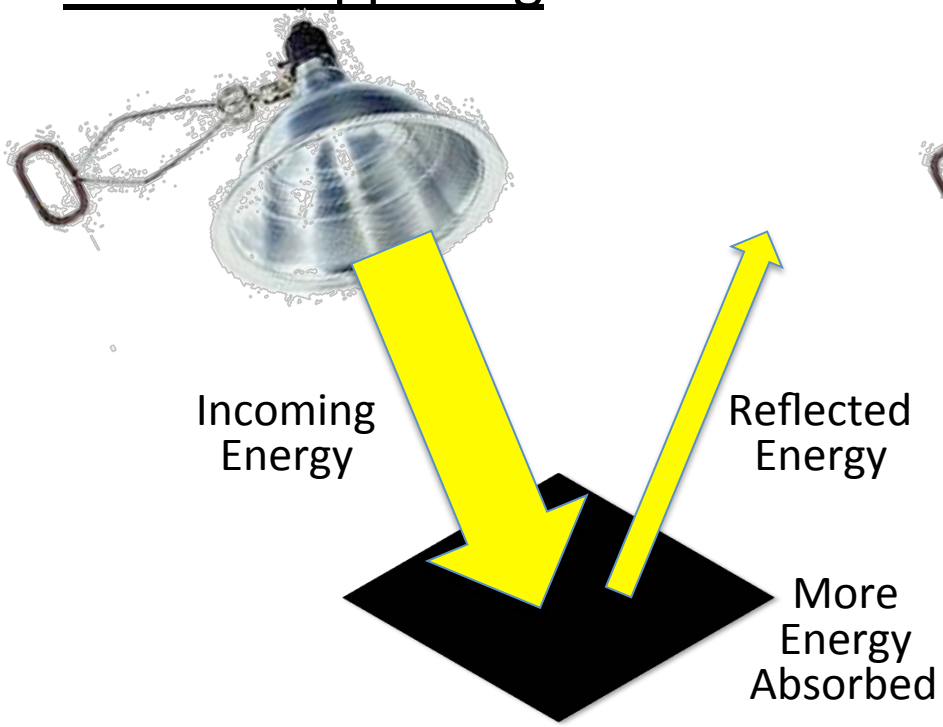
1) Strengths of simulation ??

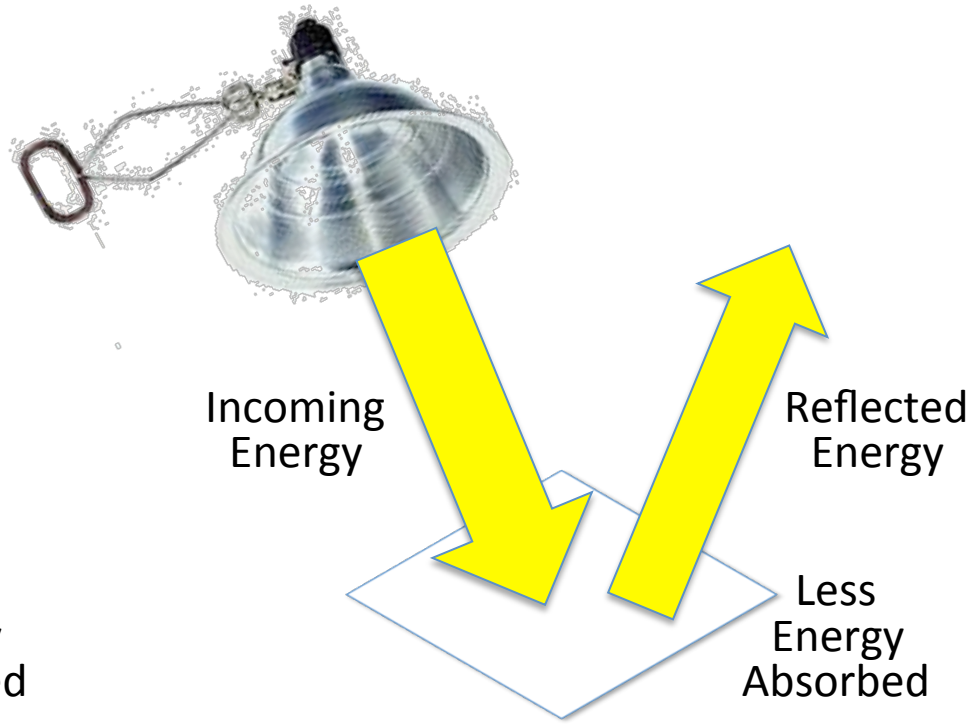
2) Weaknesses ??



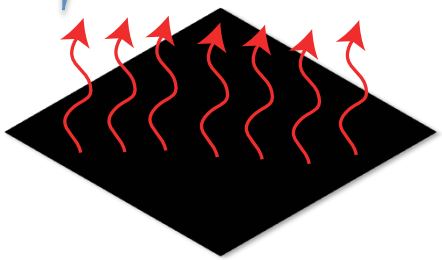
Climate Box Review – Black & White

What's Happening

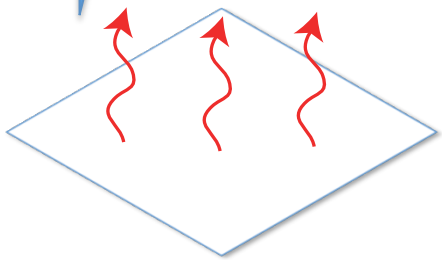




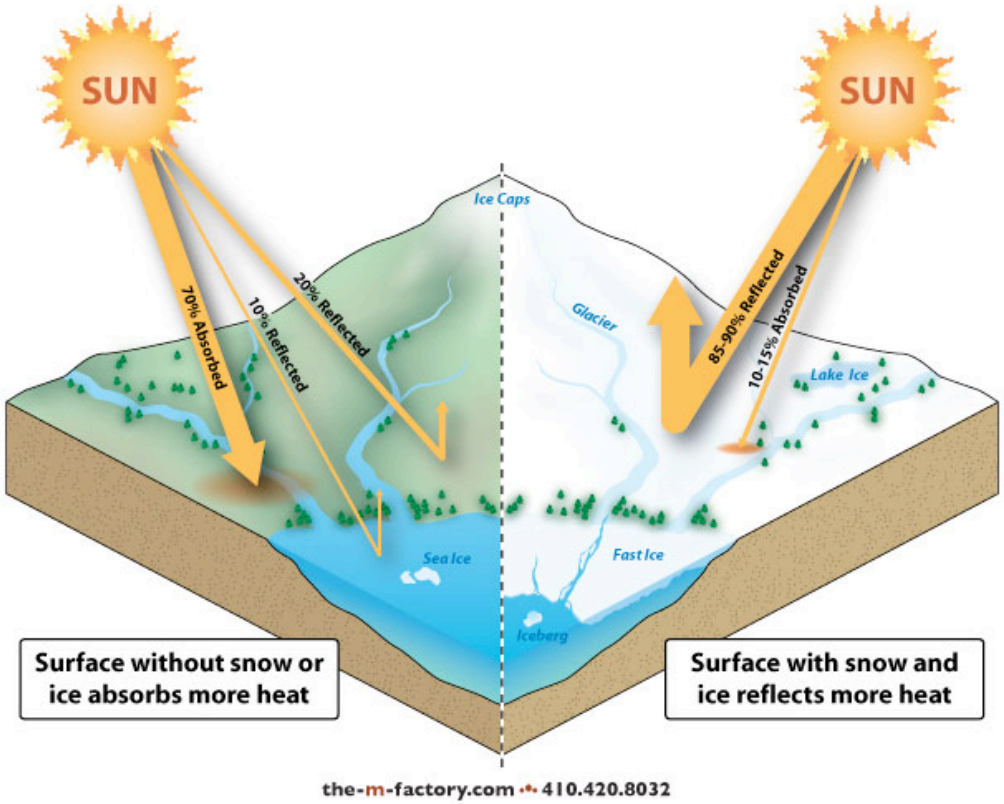
More Energy Absorbed → Plastic Warms Faster → Adjacent Air Warmed Faster & More

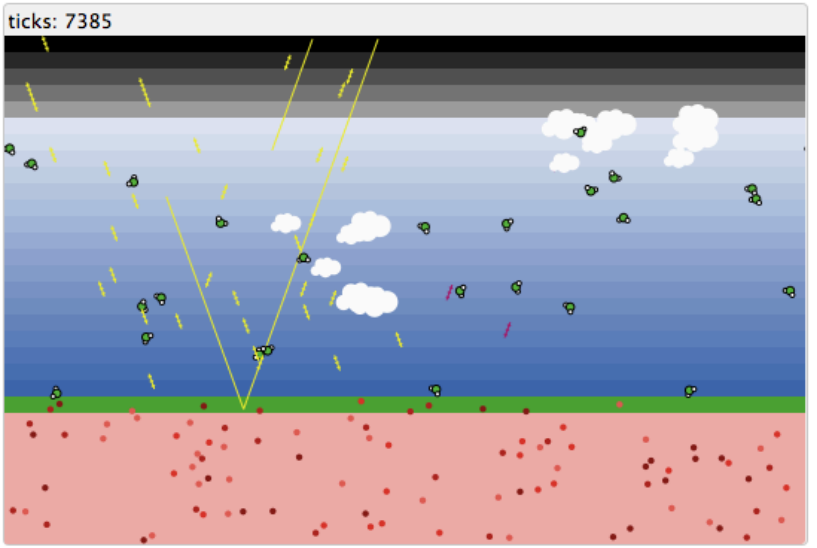


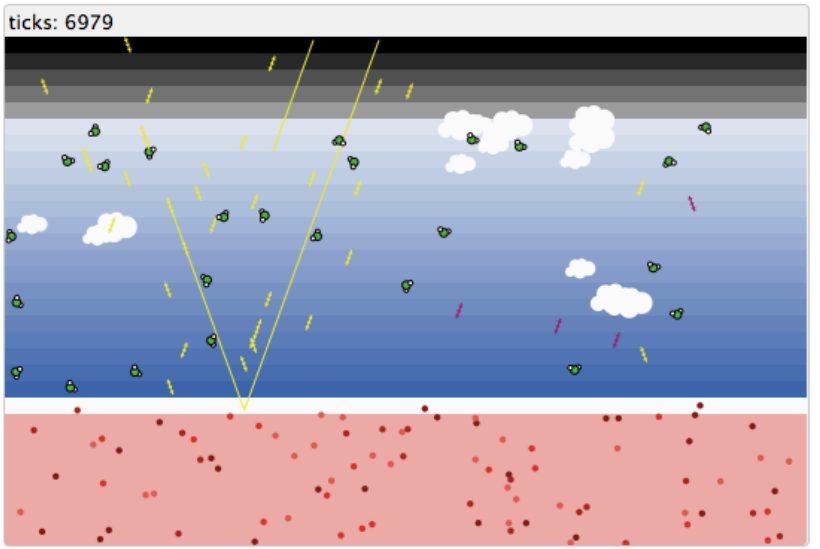
Less Energy Absorbed → Plastic Warms Slower → Adjacent Air Warmed Slower & Less



Simulation Review - Albedo

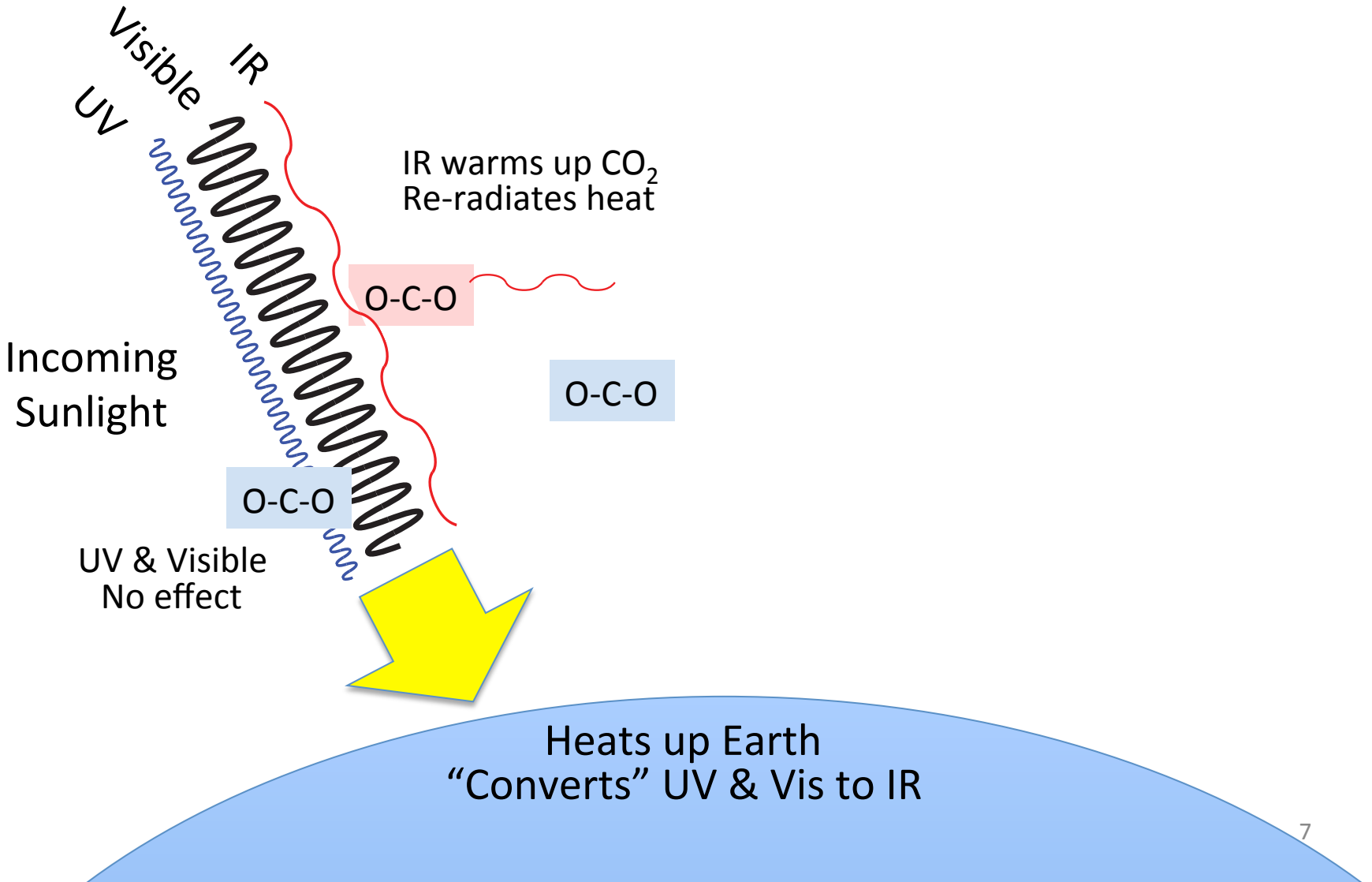






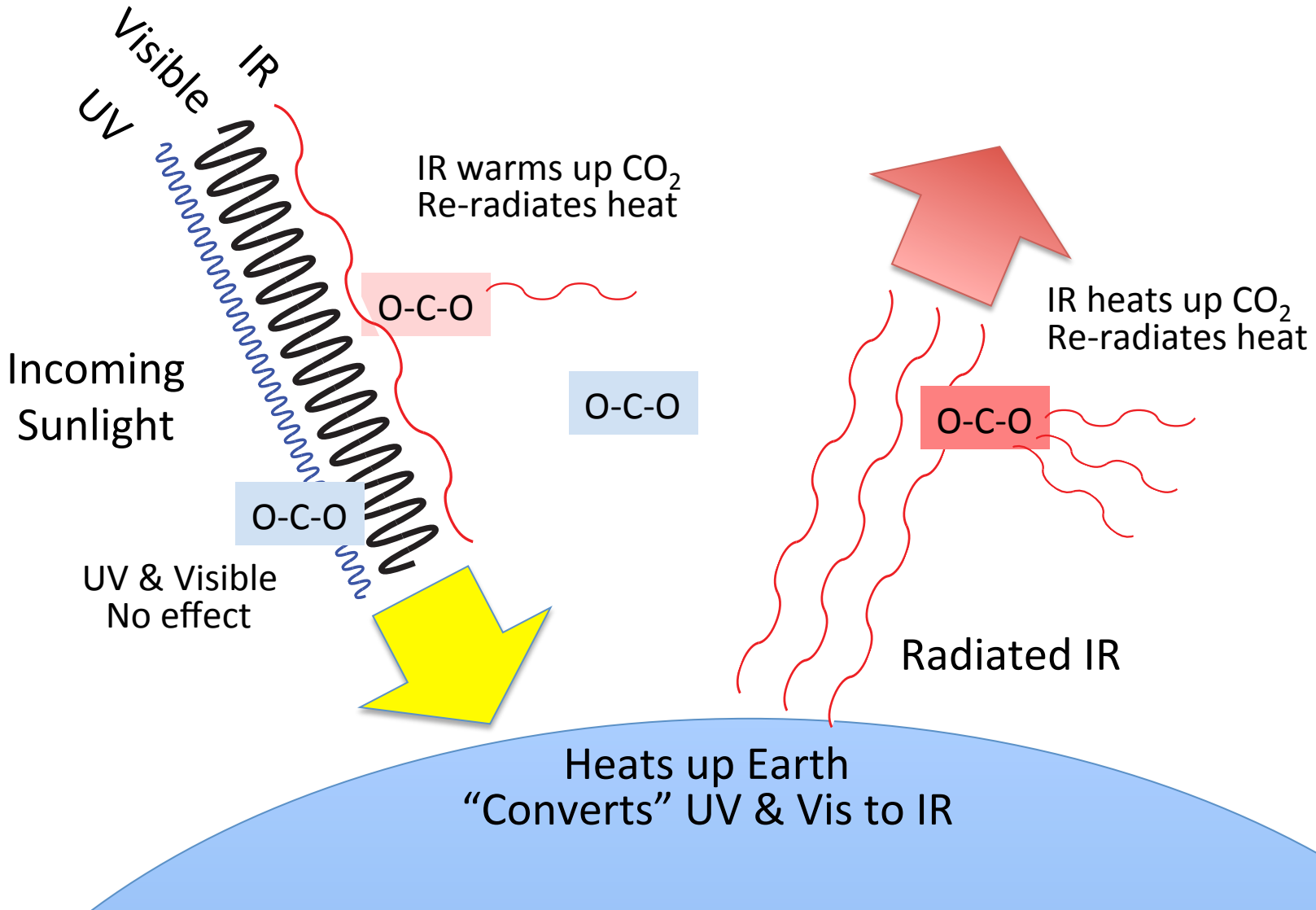
Greenhouse Effect

Greenhouse Gases



Greenhouse Effect

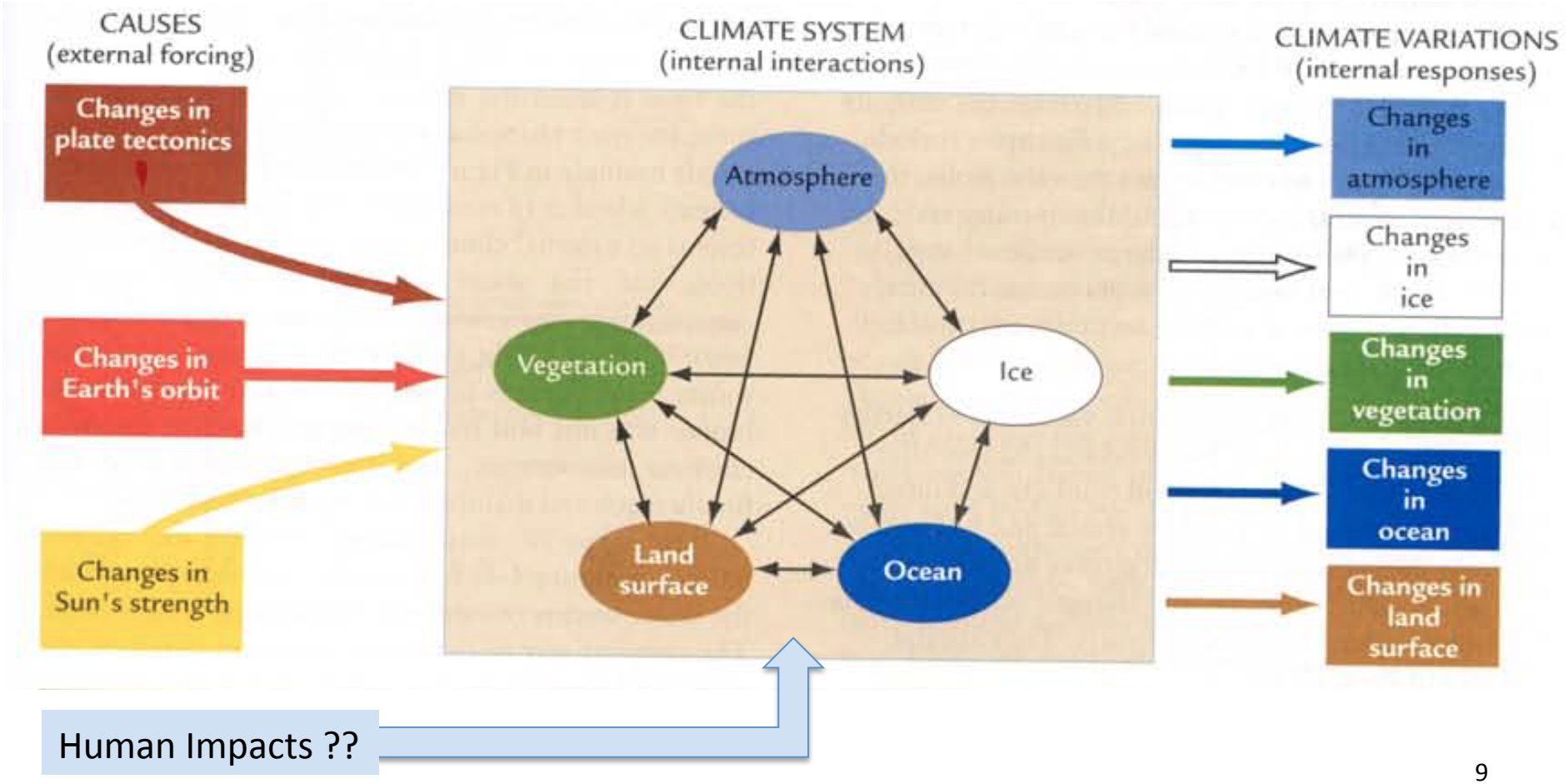
Greenhouse Gases



Climate Prediction

Global Circulation Models - Conceptual

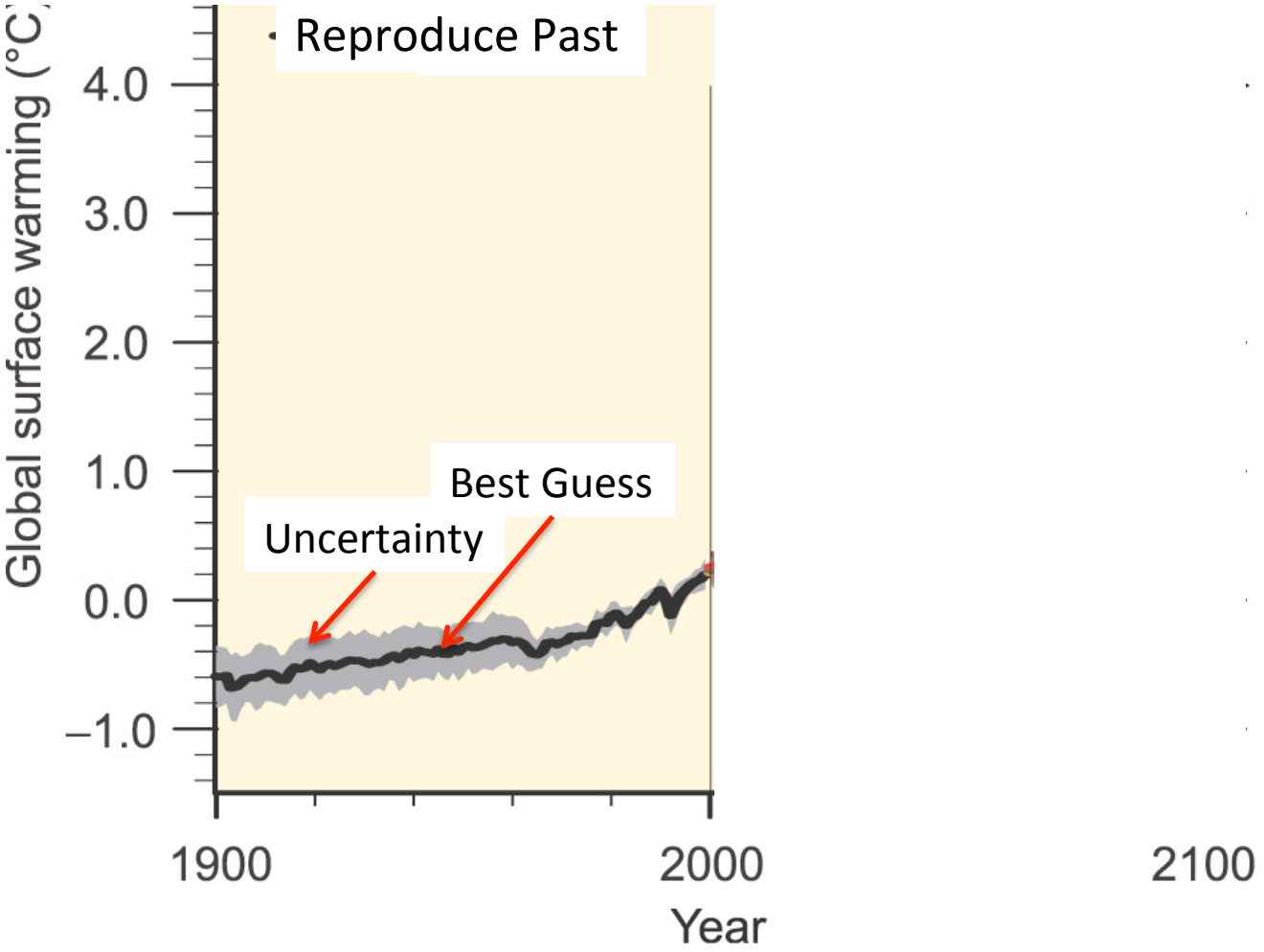
Suped-Up Weather Forecasts



Climate Prediction

Global Circulation/Climate Models ➔ Suped-Up Weather Forecasts

Step 1 - Calibrate Models

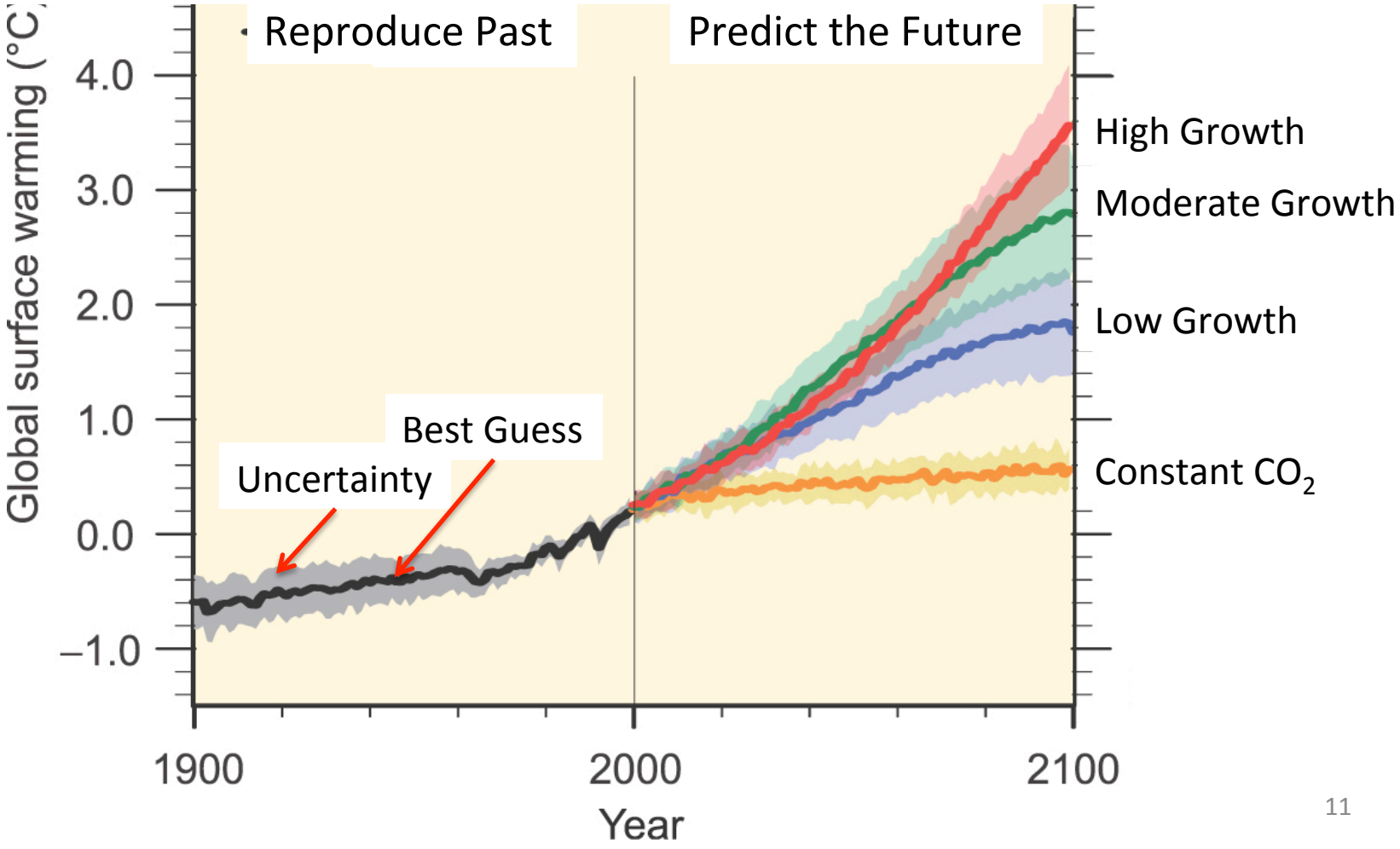


Climate Prediction

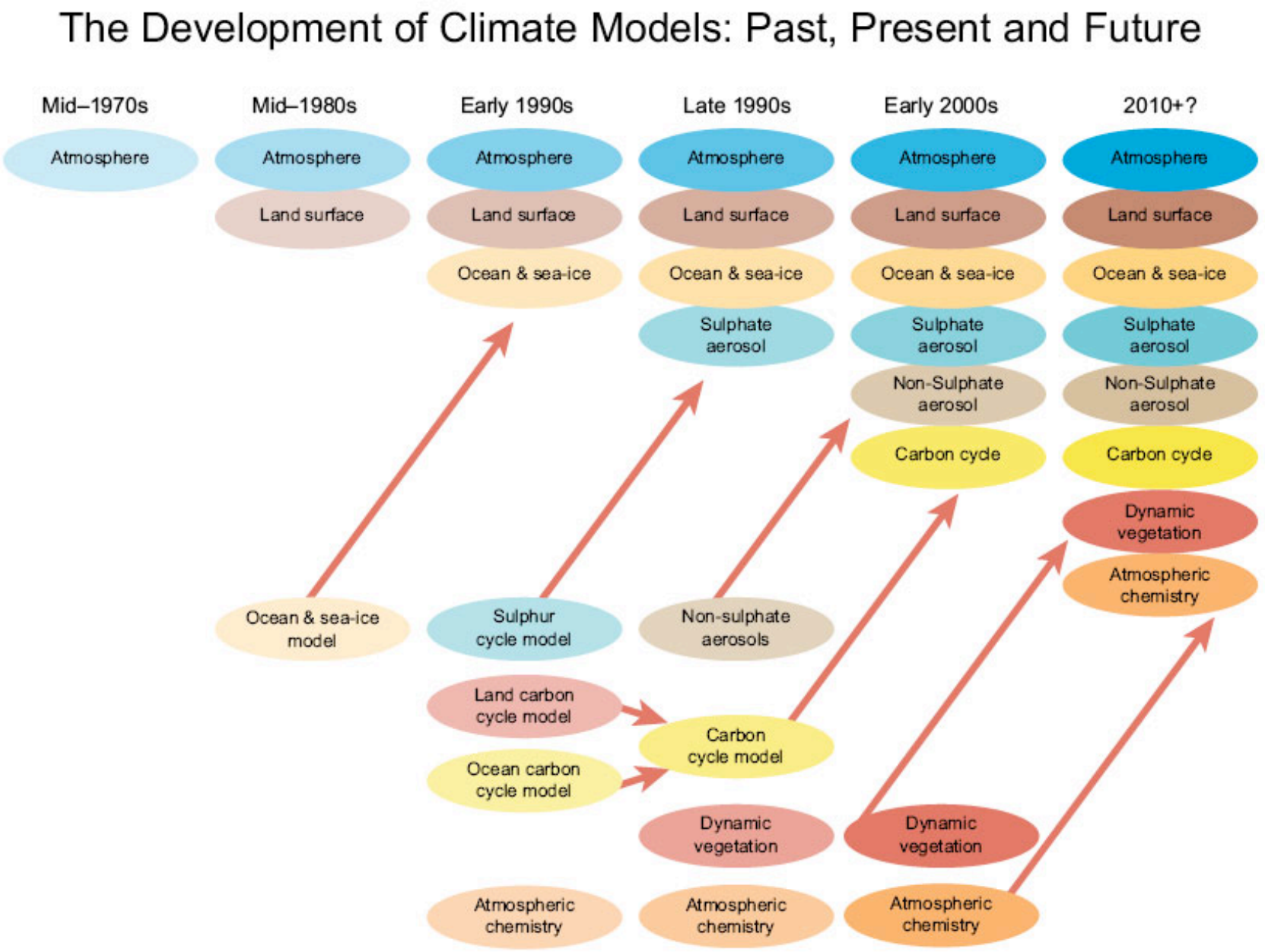
Global Circulation/Climate Models

Step 1 - Calibrate Model

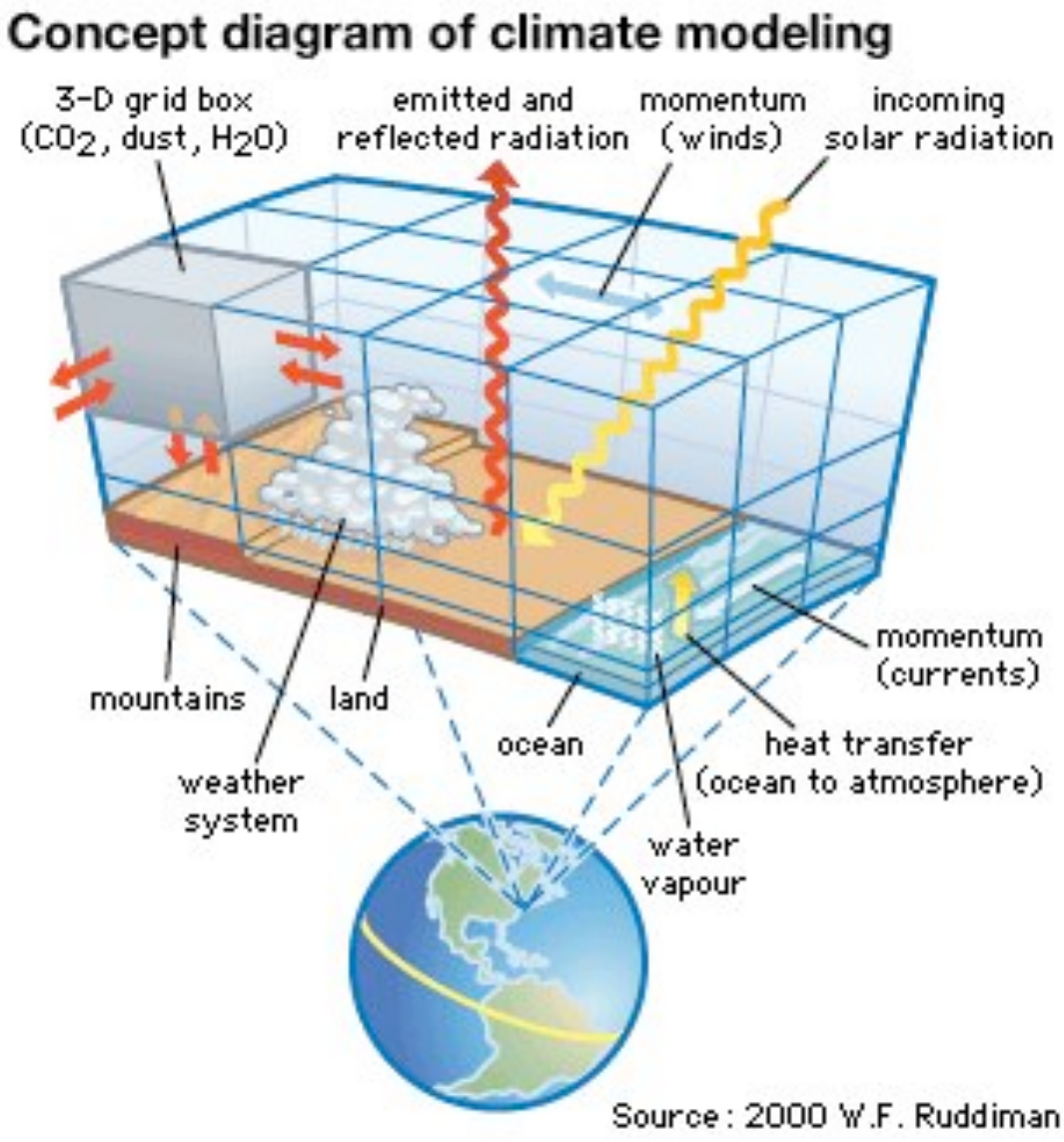
Step 2 – Apply Model



Climate Prediction



Climate Prediction

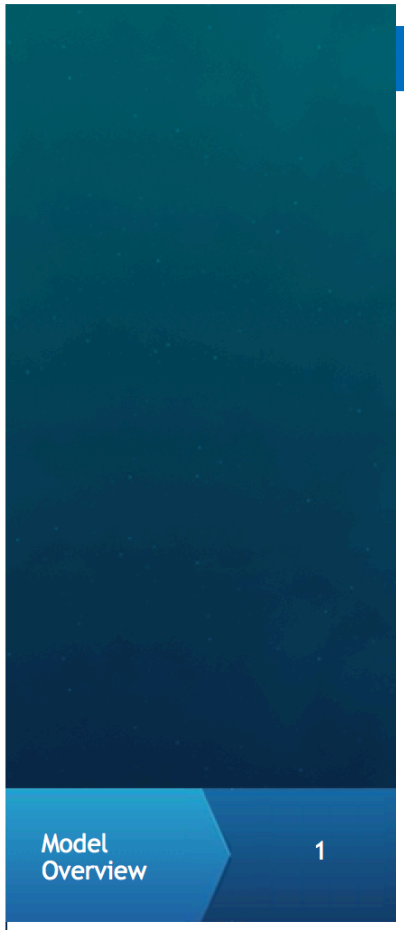


Climate Prediction

https://www3.epa.gov/climatechange/science/future.html#

Climate Models and Scenarios

Projecting future climate change requi
GHG concentrations to project resultir



EPA United States Environmental Protection Agency

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This page is being updated.

Thank you for your interest in this topic. We are currently updating our website to reflect EPA's priorities under the leadership of President Trump and Administrator Pruitt. If you're looking for an archived version of this page, you can find it on the January 19 snapshot.

Here's what our Public Affairs Office released about these changes.

Other ways to help you find what you are looking for:

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- See our list of website topics
- Browse our A-Z index of terms and topics
- Search frequently asked questions or submit a question
- Search EPA Web Archive
- Browse EPA's snapshot website as of January 19, 2017
- Report a website issue
- Go to our home page

You can also search our site.

What are you looking for?

sites production files signpost cc

Search EPA.gov

Climate Prediction

Extra Reading – About Climate Models

www.carbonbrief.org/qa-how-do-climate-models-work

www.skepticalscience.com/climate-models-basic.htm
www.skepticalscience.com/climate-models-intermediate.htm

www.climate.gov/maps-data/primer/climate-models

Climate Prediction

Extra Reading – Climate Model Skeptics

www.realclearscience.com/blog/2017/01/23/a_skeptical_journalists_view_on_climate_models.html

wattsupwiththat.com/2017/07/06/bombshell-study-temperature-adjustments-account-for-nearly-all-of-the-warming-in-government-climate-data/

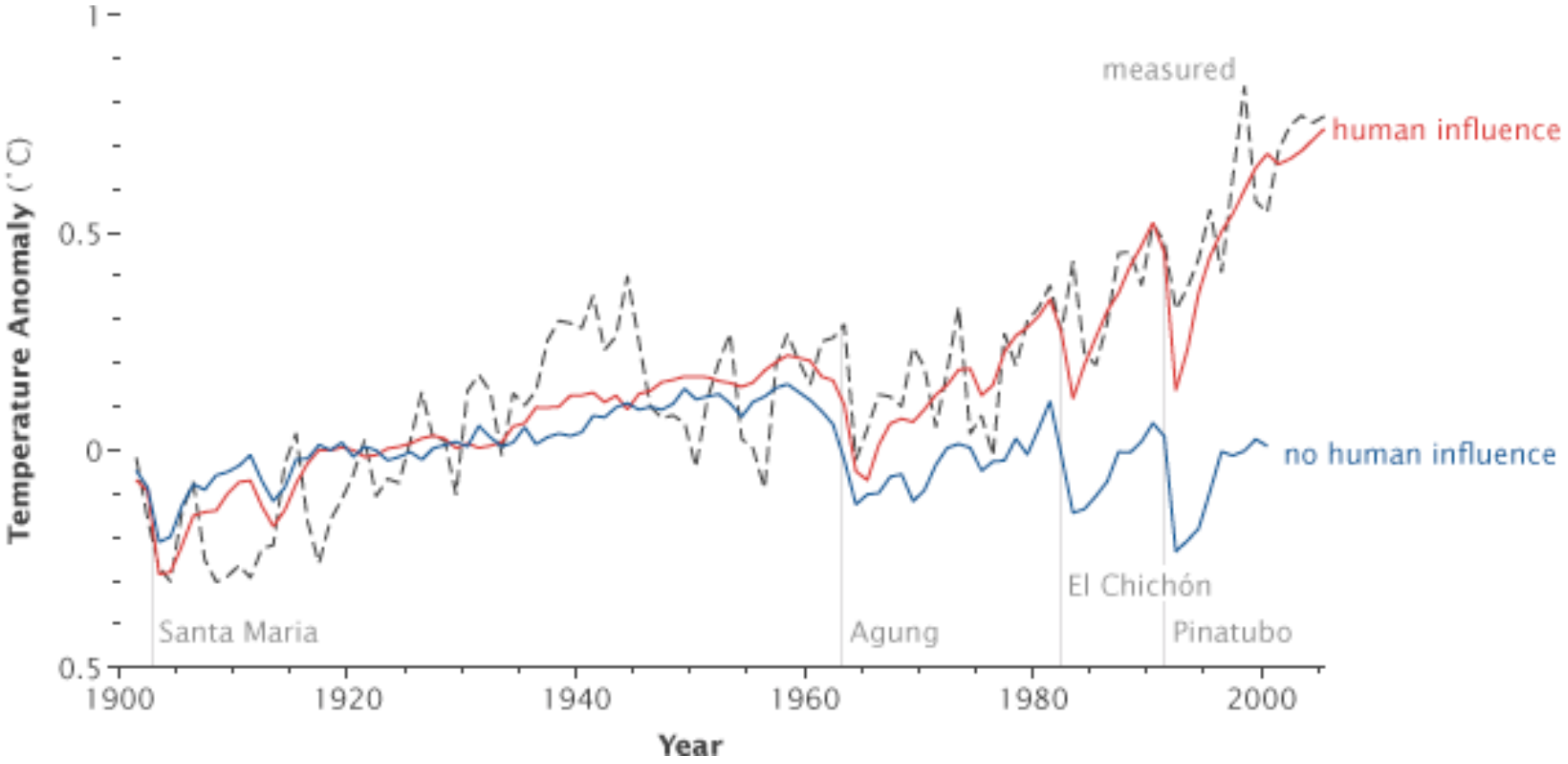
https://www.theblaze.com/news/2017/07/23/commentary-the-6-biggest-reasons-im-a-climate-change-skeptic-and-why-you-should-be-a-skeptic-too

The Gloom & Doom of Climate Change / Global Warming

What aspect(s) of Climate Change concerns you the most?

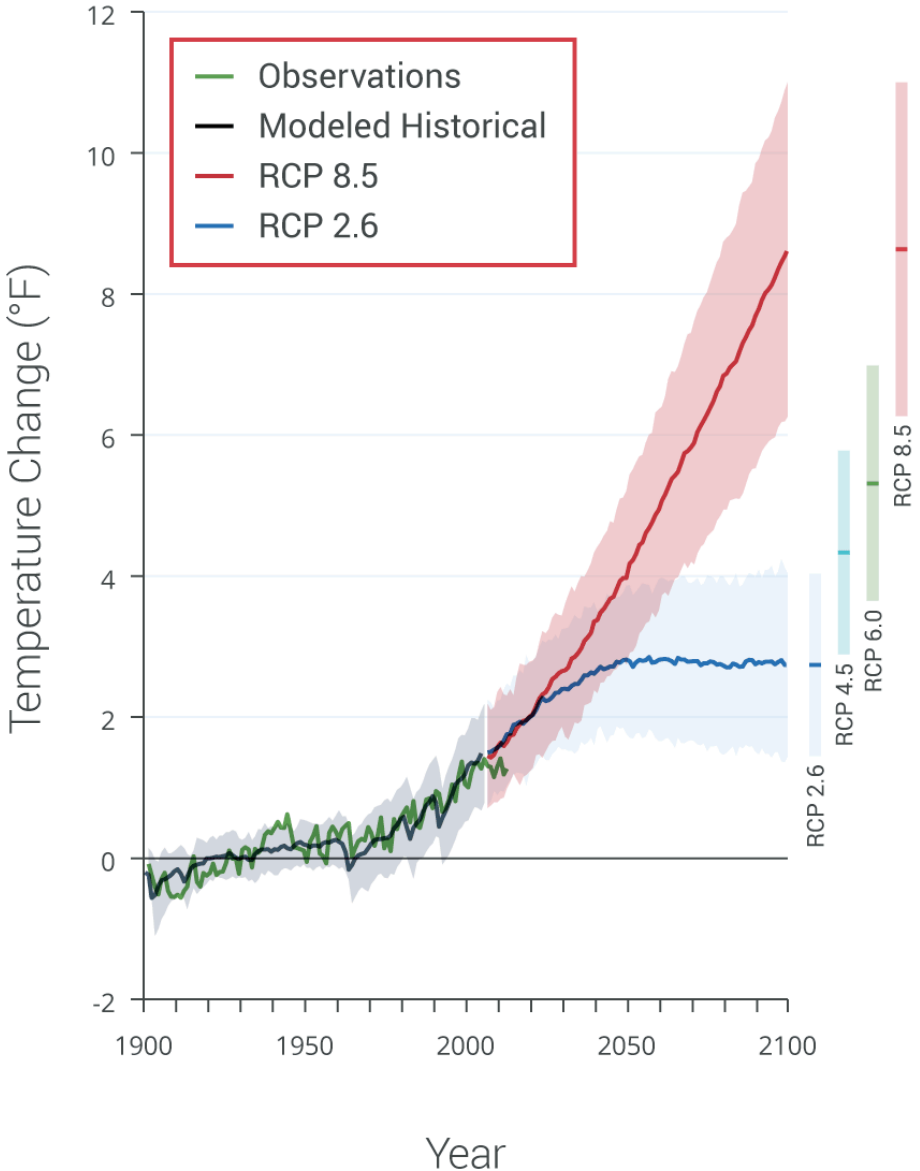
Climate Prediction

Model Predictions - Temperature



Climate Prediction

Model Predictions - Temperature



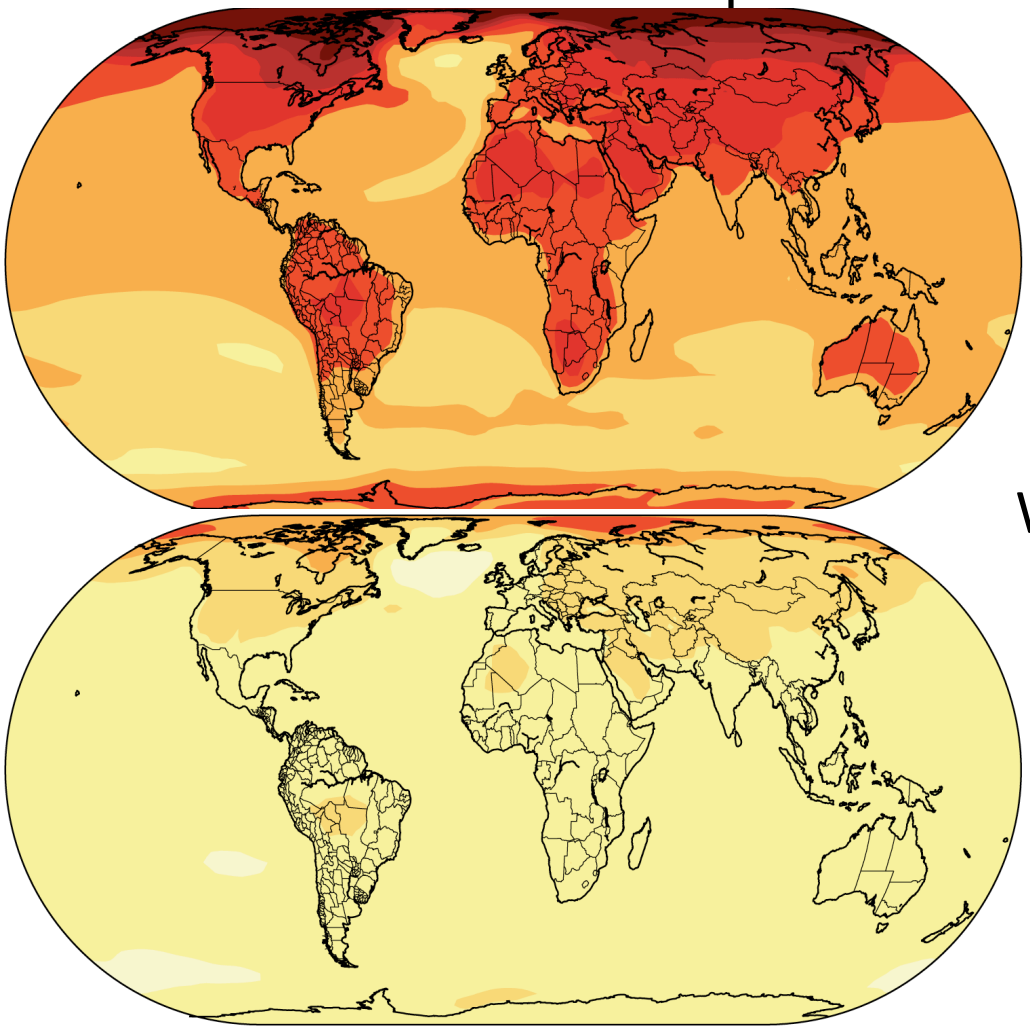
continued increases in emissions
(8 ˚F increase)

immediate & rapid reductions in emissions
(2.5 ˚F increase)

http://nca2014.globalchange.gov/report/our-changing-climate

Climate Prediction

Model Predictions - Temperature



continued increases in emissions
(8 ˚F increase)

Where are the biggest changes?

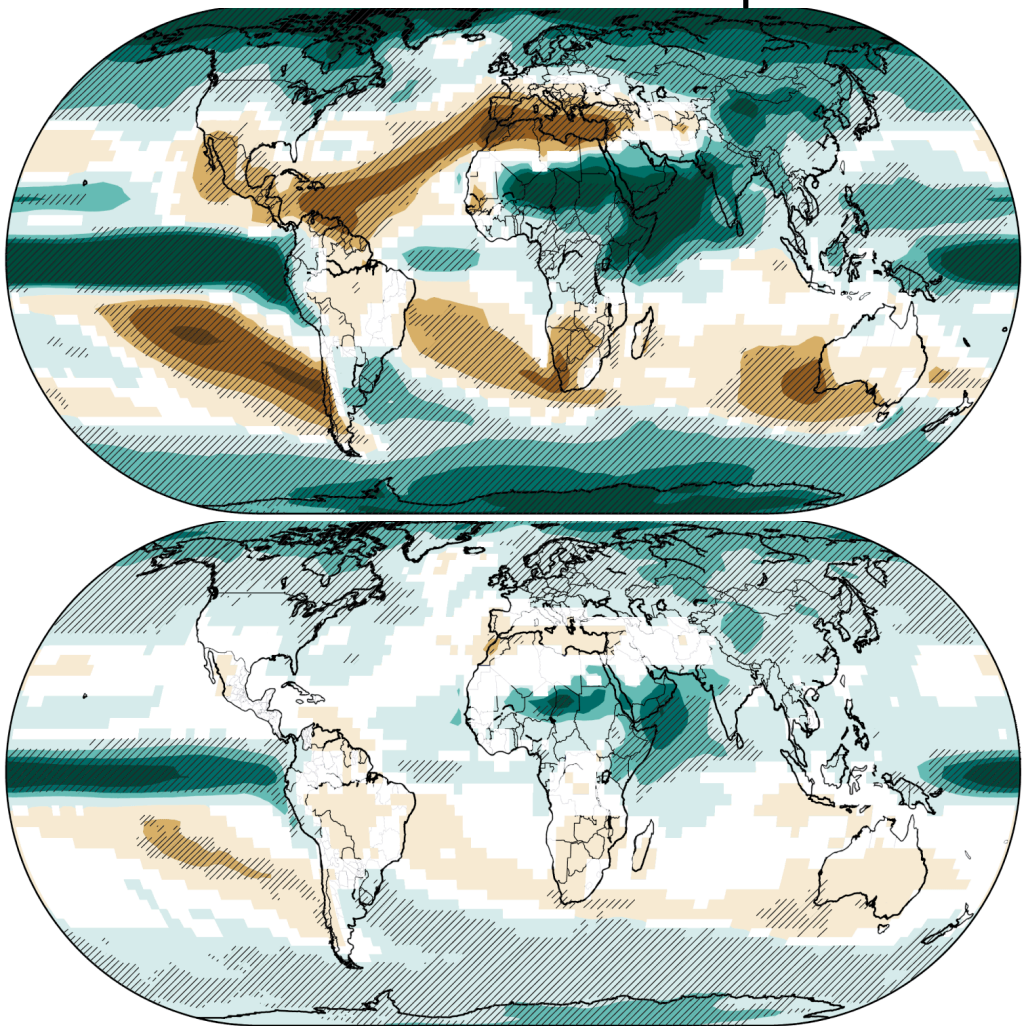
immediate & rapid reductions in emissions
(2.5 ˚F increase)

Temperature Change (ºF)

1 3 5 7 9 11 13 15 →

Climate Prediction

Model Predictions - Precipitation

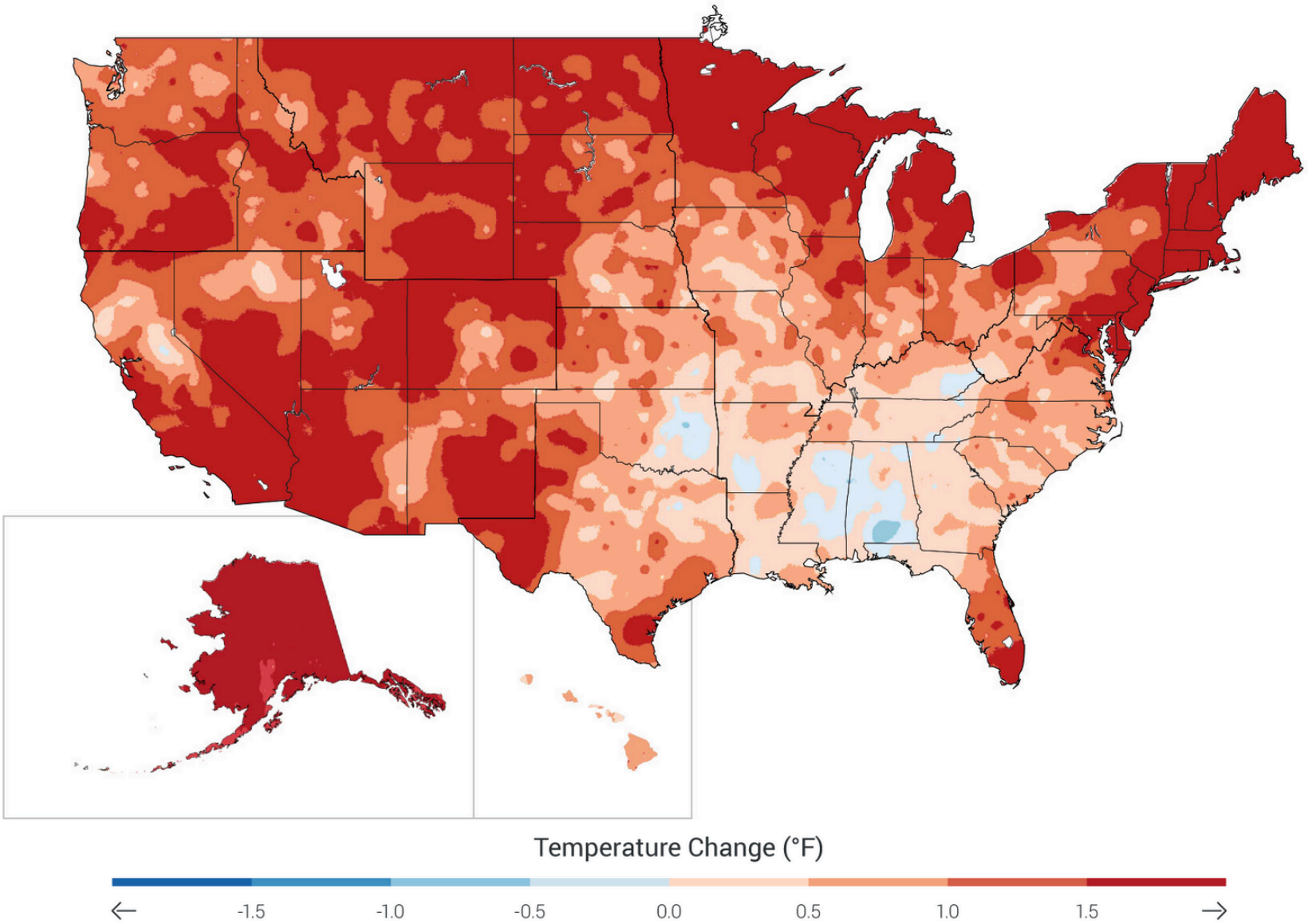


continued increases in emissions
(8 ˚F increase)

immediate & rapid reductions in emissions
(2.5 ˚F increase)

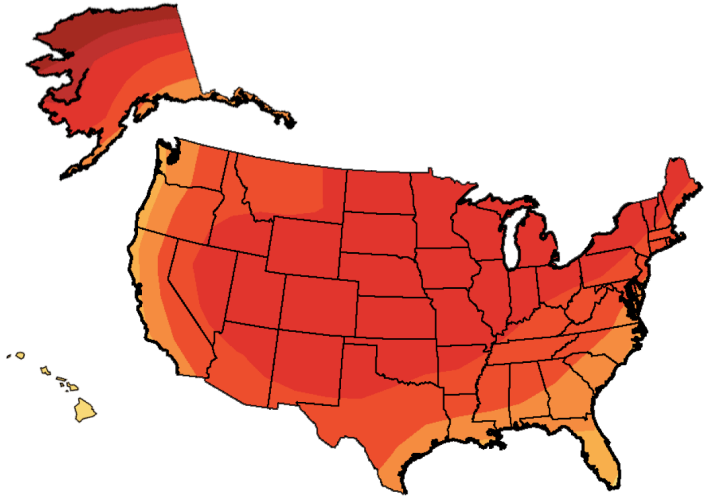
Climate Prediction

Recent Temperature Trends (past 22 years)

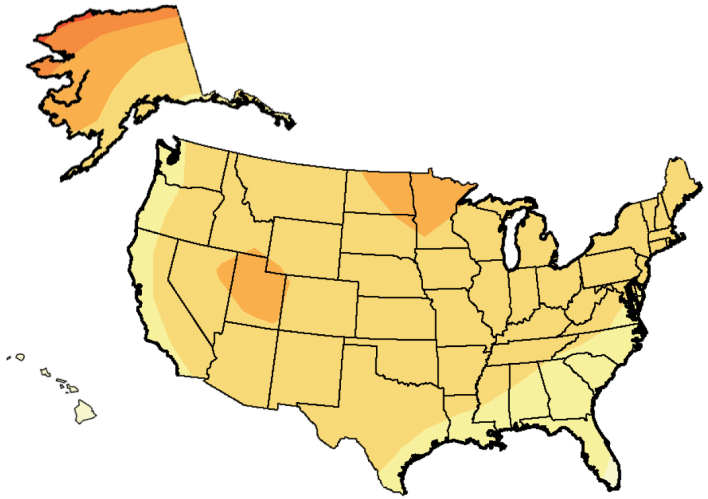


Climate Prediction

Model Predictions - Temperature



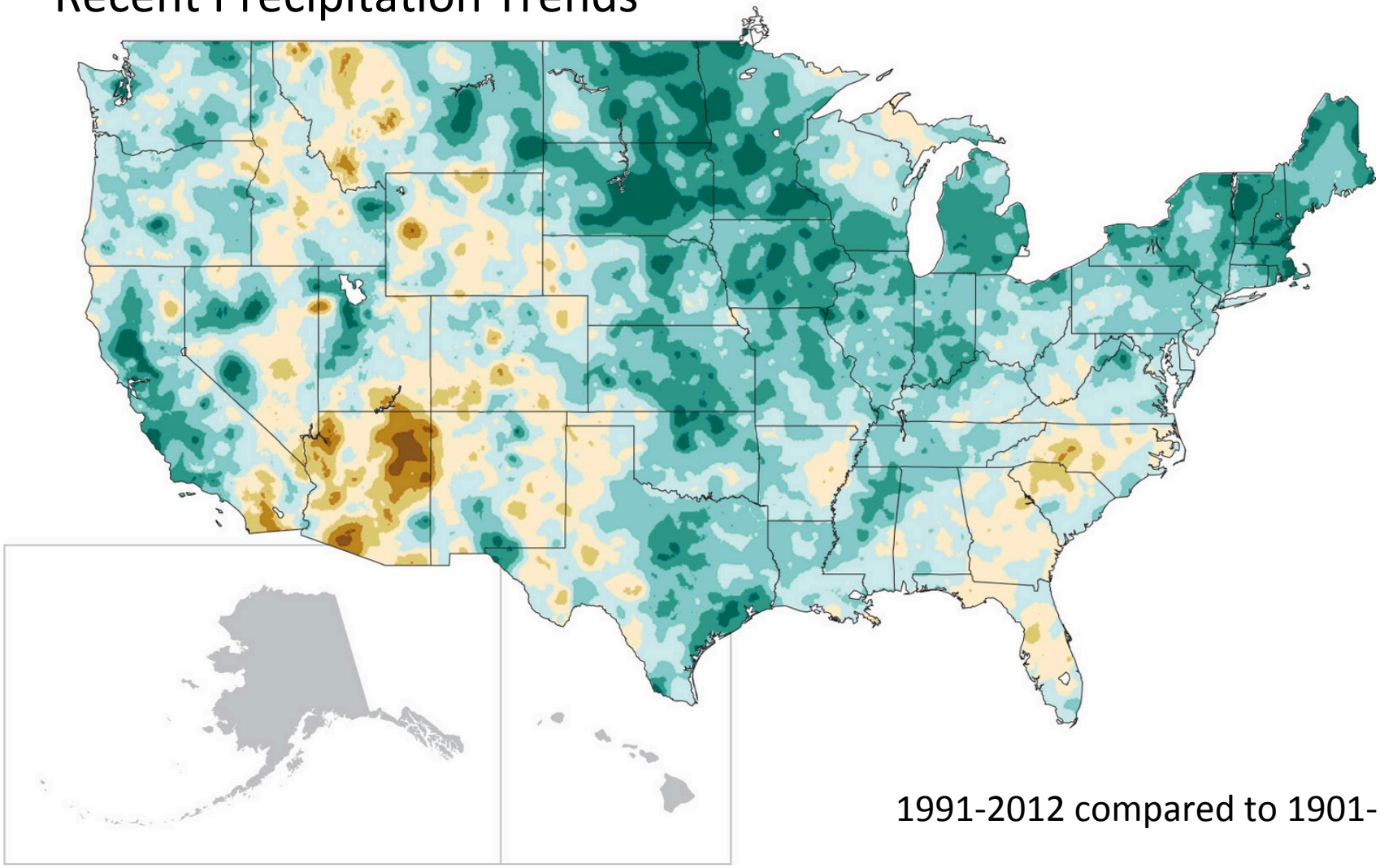
continued increases in emissions
(8 ˚F increase)



immediate & rapid reductions in emissions
(2.5 ˚F increase)

Climate Prediction

Recent Precipitation Trends



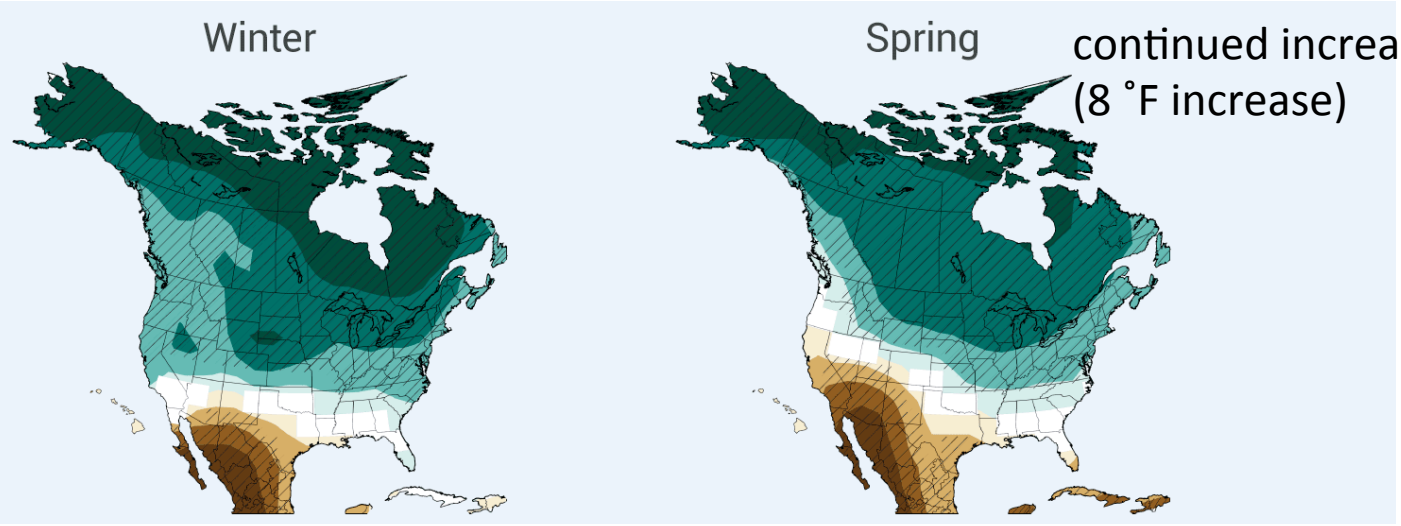
1991-2012 compared to 1901-1960

Precipitation Change (%)

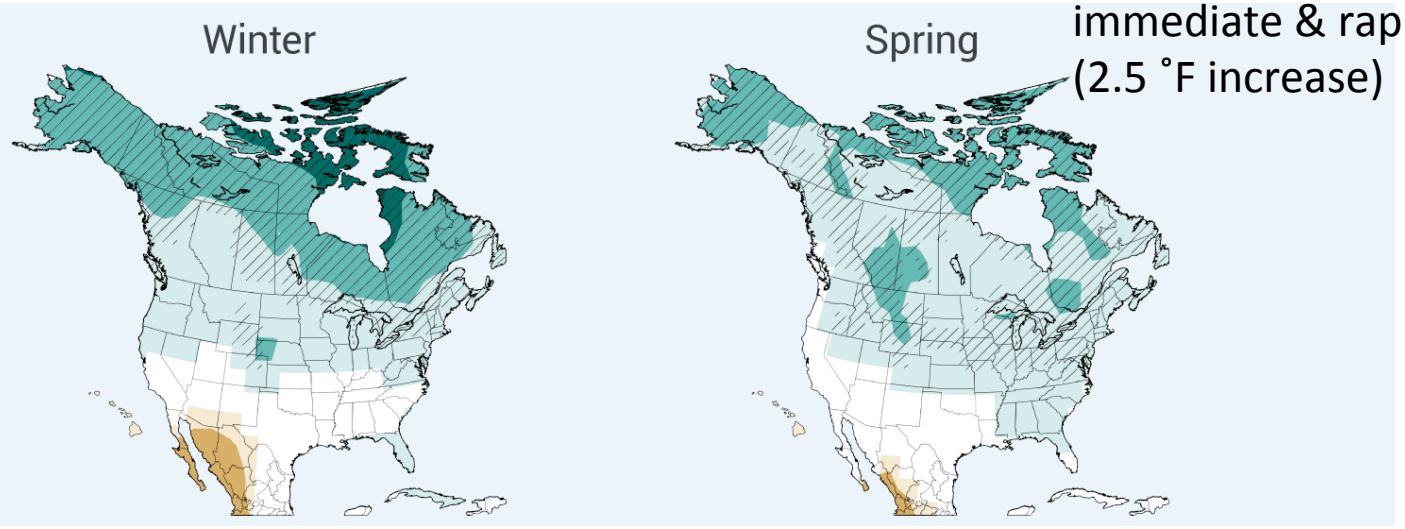
← -15 -10 -5 0 5 10 15 →

Climate Prediction

Model Predictions – Seasonal Precipitation



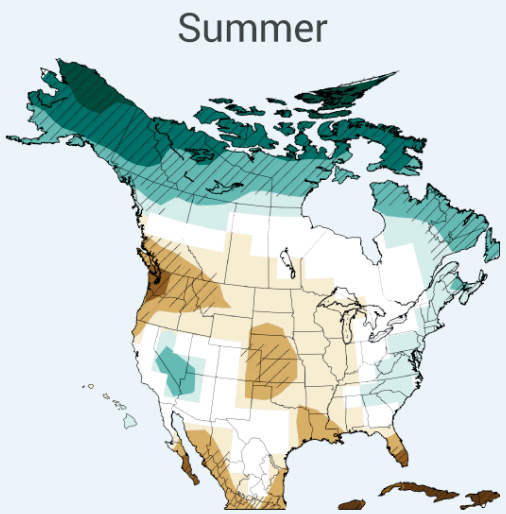
continued increases in emissions
(8 ˚F increase)

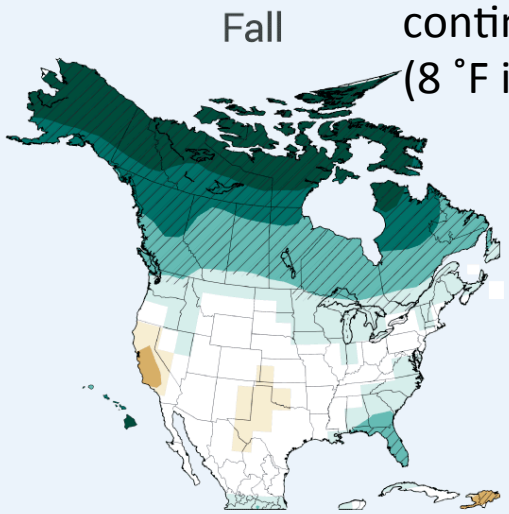


immediate & rapid reductions in emissions
(2.5 ˚F increase)

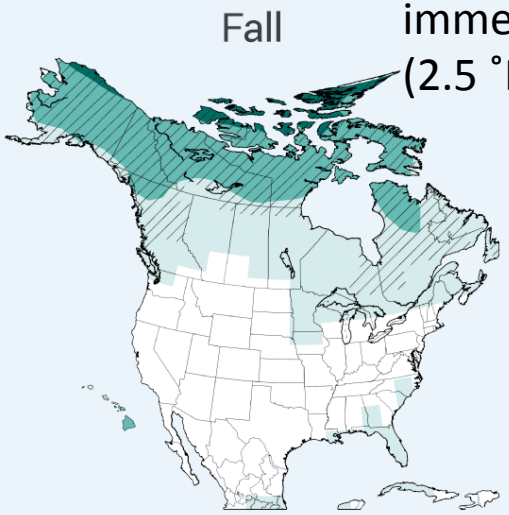
Climate Prediction

Model Predictions – Seasonal Precipitation





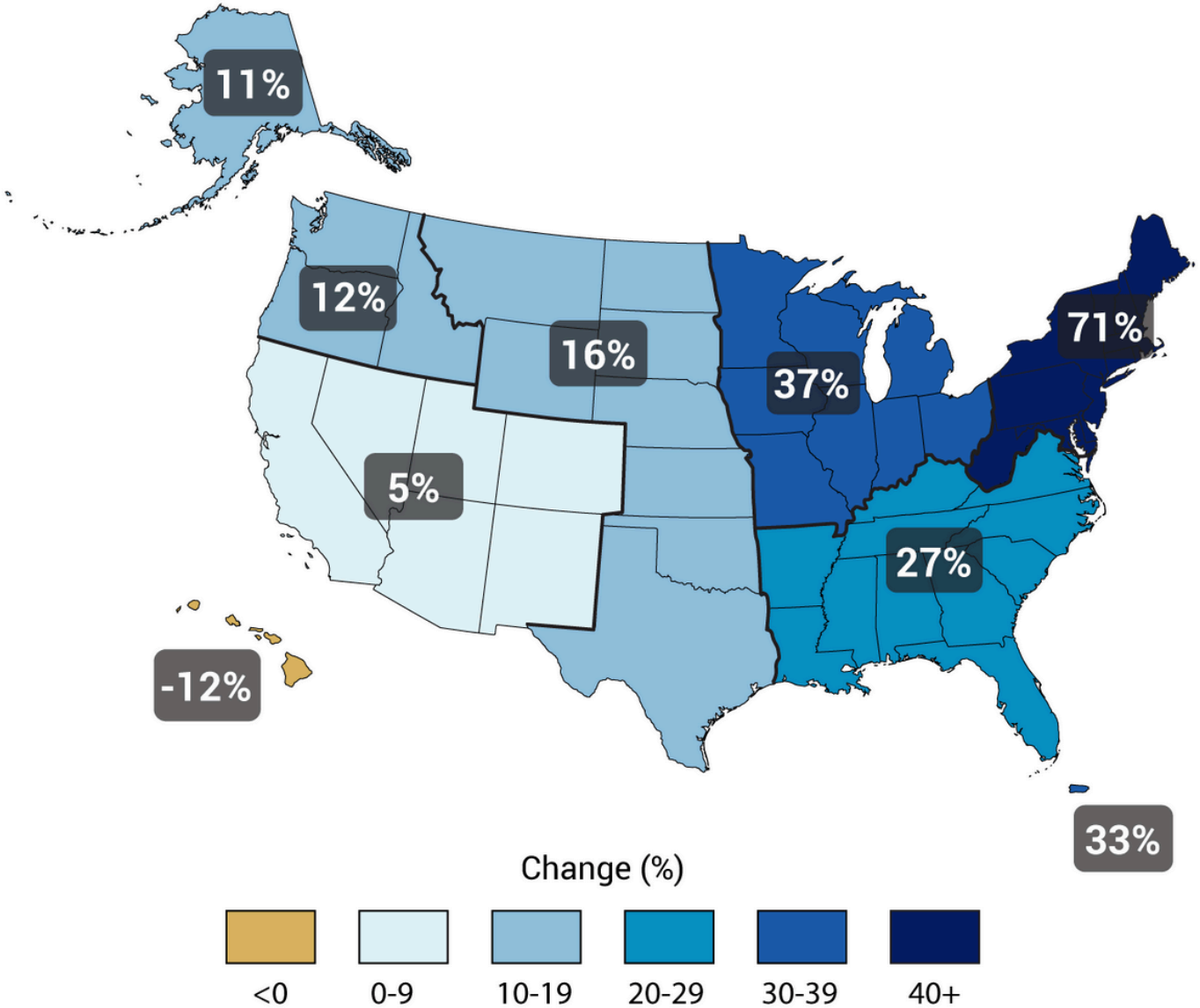
continued increases in emissions
(8 ˚F increase)



immediate & rapid reductions in emissions
(2.5 ˚F increase)

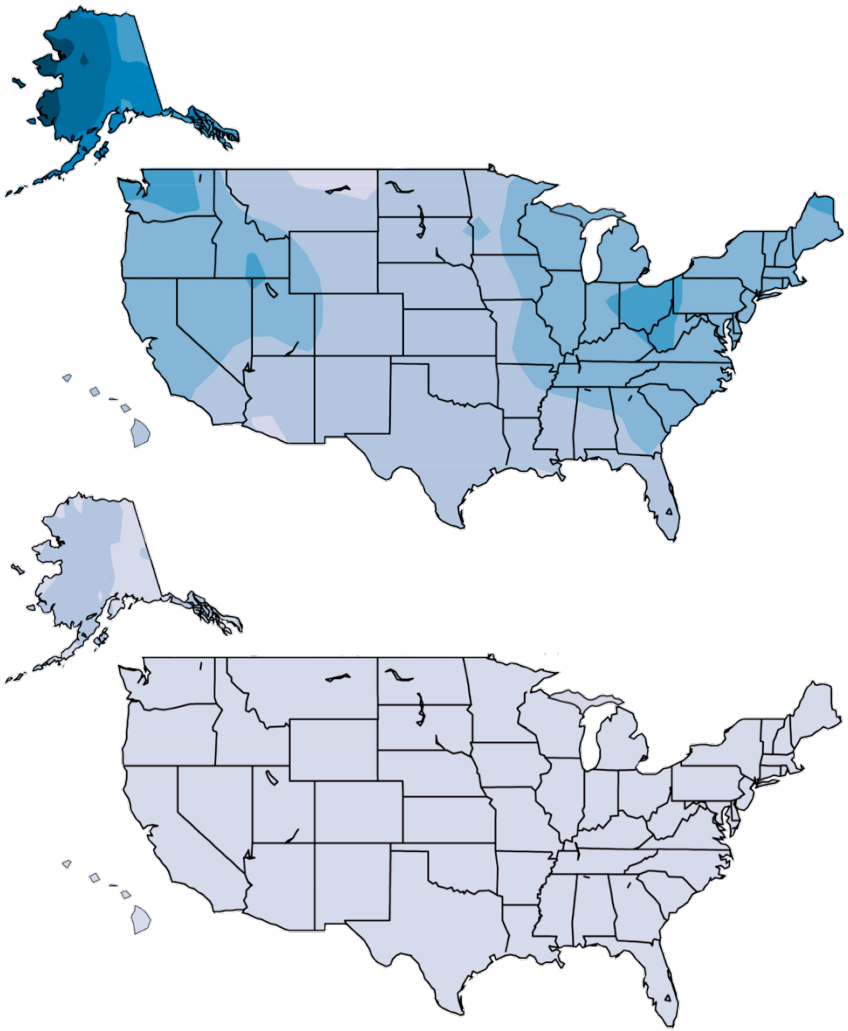
Climate Prediction

Extreme Precipitation Events (change from 1958 to 2012)



Climate Prediction

Extreme Precipitation Events



continued increases in emissions
(8 ˚F increase)

immediate & rapid reductions in emissions
(2.5 ˚F increase)

Climate Prediction

Climate Change Factors
- External (solar radiation, plate tectonics, human factors)
- Internal (atmosphere, ocean & land interactions)

Climate Simulations
- Simple, conceptual examples

Climate Models
- Simulate past & predict future climate
- Only as good as data and knowledge of system

Climate Predictions
- Temperature (overall warming, but greatest change at high latitudes)
- Precipitation (wetter high latitudes, drier low latitudes)