

**What can past weather
data teach us?**

Data Collection

From the invention of the sealed mercury thermometer, we have been able to make reliably quantified comparisons of the weather from year to year. This has given us the ability to estimate the temperature of earth's global surface.

What can past weather data teach us?

The ocean cools and warms slowly so measuring temperature changes is challenging because the changes are very small, However:

In just the last few years, oceanographers have demonstrated that the surface oceans have warmed by 0.1°C to 0.2°C over the last fifty years or so ...The measurement of water temperature is exceedingly precise, so this warming signal is well known and significant, and it has been observed in every ocean basin. (Schmidt, Gavin and Wolfe 22)

What types of data do we have as evidence?

We use instruments such as:

Earth system models (ESMs) include the physics of the GCM [General Circulation Models that contain much of the physics of weather, ocean circulation, and sea ice] but also simulate the interactions between aerosols, atmospheric chemistry, vegetation, and ocean biolo-

gy. (Schmidt, Gavin and Wolfe 170)

Data collected by these instruments only date back 50—30 years, and thermometers have only been around for approximately 150 years. To gather information further back, scientists use proxy records that are reliable sources because of how tightly bound they are to events that leave behind evidence to piece together past weather and climate such as:

Rocks

Ancient landforms such as the Bungle Bungle Range provide millions of years worth of evidence of long-term climate change.

Trees

Taking data from trees that can live up to hundreds of years, we can look at their rings to track temperature and rainfall by their coloring; dark and dense rings for a lot of rainfall, and lighter rings for warm seasons.

Corals

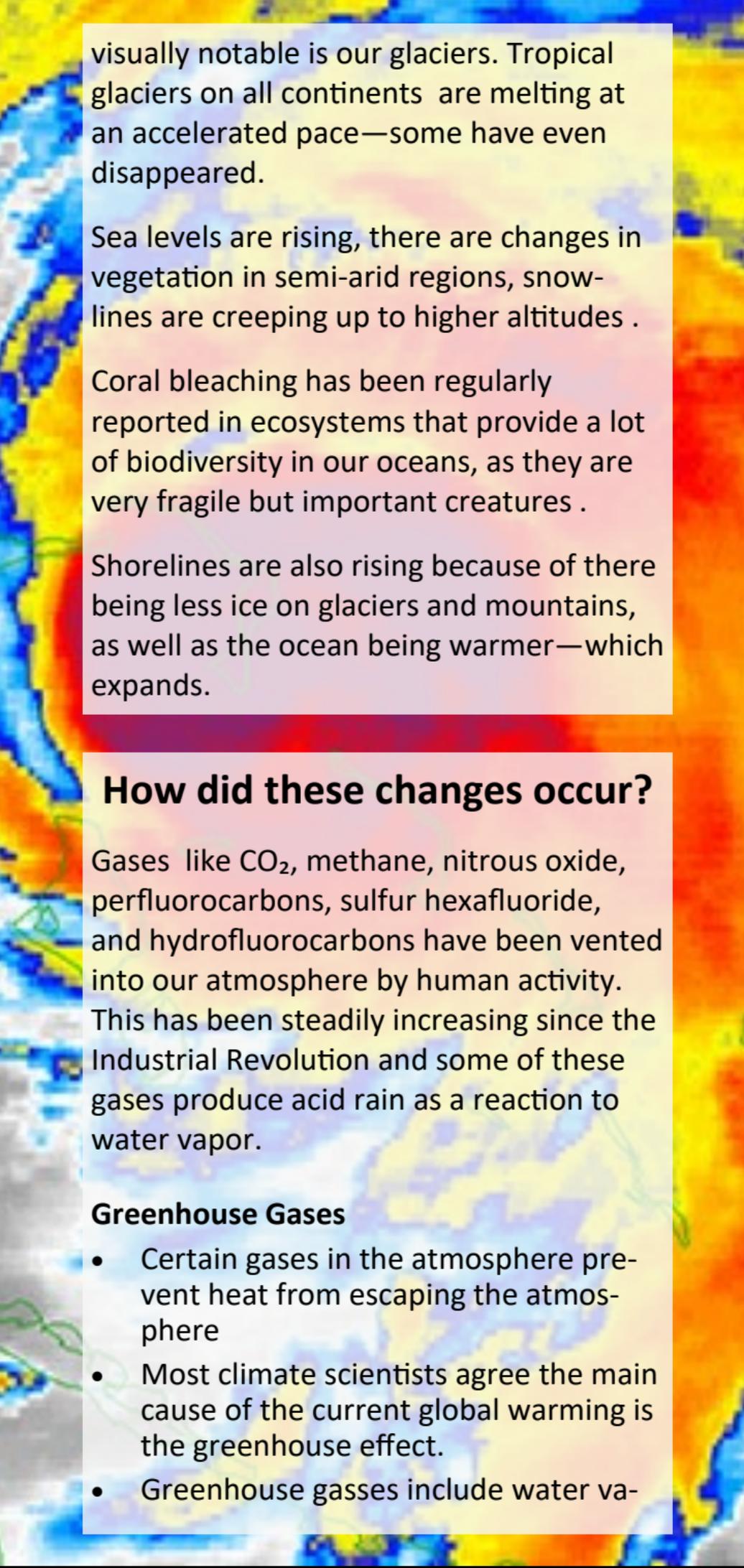
Skeletons made up of calcium carbonate contain bands similar to tree rings that can record annual information such as temperature, sediment and water chemistry that the corals grew in.

Glaciers

Sometimes hundreds of thousands years old, glaciers preserve air atmospheric composition and temperature historical evidence. Small bubbles trap contemporary air as the snow converts to ice. “The oxygen-isotope composition of the ice reflects the air temperature at the time the parent snow fell” (Montgomery and Dathe 332).

Present globe climate vs past climate conditions

Rising temperatures are changing our world,



visually notable is our glaciers. Tropical glaciers on all continents are melting at an accelerated pace—some have even disappeared.

Sea levels are rising, there are changes in vegetation in semi-arid regions, snow-lines are creeping up to higher altitudes .

Coral bleaching has been regularly reported in ecosystems that provide a lot of biodiversity in our oceans, as they are very fragile but important creatures .

Shorelines are also rising because of there being less ice on glaciers and mountains, as well as the ocean being warmer—which expands.

How did these changes occur?

Gases like CO₂, methane, nitrous oxide, perfluorocarbons, sulfur hexafluoride, and hydrofluorocarbons have been vented into our atmosphere by human activity. This has been steadily increasing since the Industrial Revolution and some of these gases produce acid rain as a reaction to water vapor.

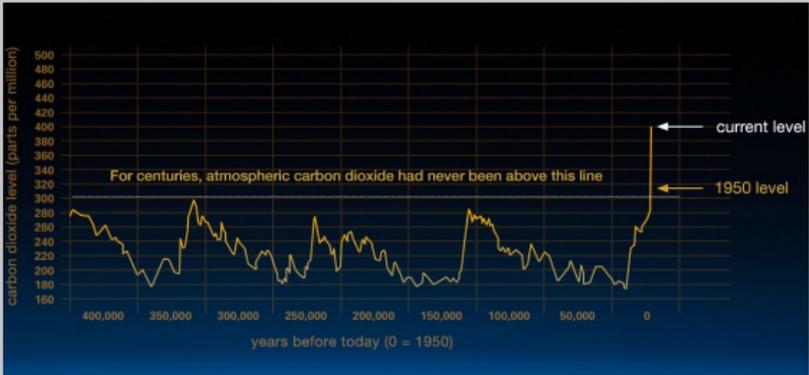
Greenhouse Gases

- Certain gases in the atmosphere prevent heat from escaping the atmosphere
- Most climate scientists agree the main cause of the current global warming is the greenhouse effect.
- Greenhouse gasses include water va-

por, carbon dioxide, methane, nitrous oxide, and chlorofluorocarbons.

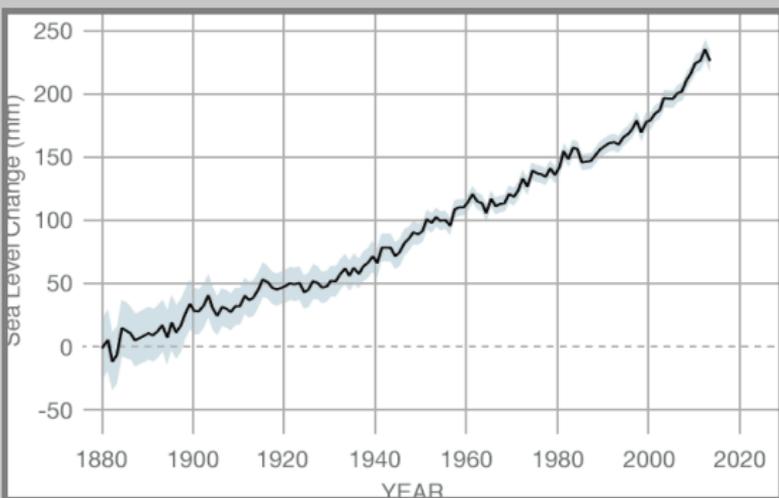
- Human activities, such as the burning of fossil fuels, are changing the natural gasses of the atmosphere

The Aftermath



Sea Level Rise

- Some regions can become significantly warmer
- It may lead to more precipitation in some areas and less in others.
- Ocean will become warmer and sea levels will rise
- Crops may have a difficult time adjusting to a new climate
- Sea level change is caused by added water from melting ice sheets and seawater expansion
- Rising sea levels will affect inhabited islands and coastal cities.
- Rising sea levels will displace many people from their homes





Works cited

“Carbon Dioxide Concentration | NASA Global Climate Change.” *NASA, NASA, 17 May 2017, climate.nasa.gov/vital-signs/carbon-dioxide/.*

Montgomery, Carla W., and David Dathe. *Earth, Then and Now*. 3rd ed., Wm. C. Brown, 1997.

Schmidt, Gavin, and Joshua Wolfe. *Climate Change: Picturing the Science*. W.W. Norton, 2009.

“Sea Level | NASA Global Climate Change.” *NASA, NASA, 24 Sept. 2018, cliimate.nasa.gov/vital-signs/sea-level/.*

References

Buckley, Bruce, et al. *Weather: a Visual Guide*. Firefly Books, 2008.

[Oceanconservancy.org](http://img.huffingtonpost.com/asset/scalefit_630_noupscale/55fb1bd21c00002d007574d3.jpeg)

http://img.huffingtonpost.com/asset/scalefit_630_noupscale/55fb1bd21c00002d007574d3.jpeg

<https://spacenews.com/trump-administration-planning-to-cut-noaa-weather-satellite-programs/>

https://pbs.twimg.com/media/CiflG_jXEAQhHV.jpg

<https://d.justpo.st/media/images/2015/05/ac85af172e37bcfa33584b836db59dbe.jpg>