

# GLOBAL TEMPERATURE PATTERNS

**Recent spike in temperatures**  
**Pp. 86-87**

## DURING THE VIDEO...

1. Describe the temperature patterns before 1850.
2. List the natural activities that could account for the temperature patterns before 1850.
3. Describe the temperature patterns after 1850.



# AFTER THE VIDEO...

1. Explain how natural activities (like volcanic eruptions or solar activity) could account for the temperature patterns before 1850.
  - a. Read: [How Volcanoes Influence Climate \(UCAR\)](#)
  - b. Read: [What Is the Sun's Role in Climate Change? \(NASA\)](#)
2. HYPOTHESIS: Develop a hypothesis that explains why the temperatures spiked after 1850.

# GREENHOUSE GASES LAB

## OBJECTIVE:

- WHAT: We will determine how greenhouse gases affect the temperatures
- HOW: By calculating the rate of change of a control sample versus one with Carbon Dioxide
- WHY: To determine if greenhouse gases could result in a global temperature increase and affect Greenland

TIME	CONTROL (AIR) TEMPERATURE	CARBON DIOXIDE TEMPERATURE
0		
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

# LAB DIRECTIONS

- You will use a straw to blow carbon dioxide into the labeled cup. Be sure to quickly seal the cup with the rubber band and plastic bag.
- The other cup will be a sample of air.
- When the teacher gives you permission, turn on your light. Record temperature every minute for 10 minutes.

# LAB REFLECTIONS

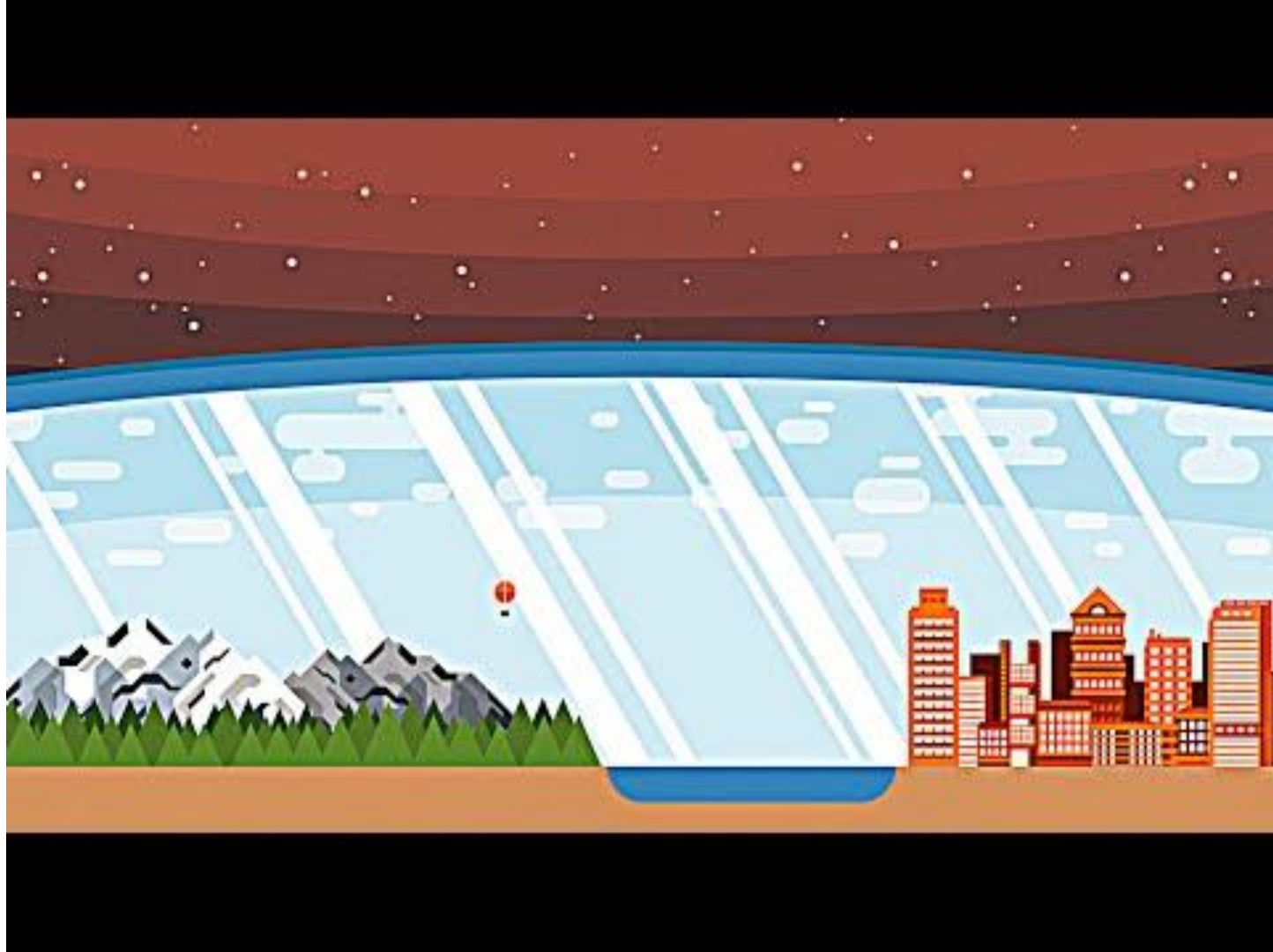
Using the Claim, Evidence, and Reasoning format, answer the following prompt:

**Use evidence to explain the correlation between greenhouse gases (like carbon dioxide) and temperatures.**



# DURING THE VIDEO:

1. Compare and contrast the Moon and Earth's temperatures, including the causes of the differences.
2. What is the role of Earth's atmosphere - during the day and night?
3. What does our atmosphere need in order to absorb infrared radiation?
4. Why do particles need to be "lopsided?"
5. Why are carbon dioxide and methane able to absorb energy?
6. Why doesn't 99% of the atmosphere absorb energy?
7. What percentage of outgoing heat do the greenhouse gases absorb?



WE SEE THAT GREENHOUSE GASES CAUSE INCREASING  
TEMPERATURES.

NEXT: DEVELOP A HYPOTHESIS THAT PREDICTS WHAT FACTORS  
ARE CAUSING A RISE IN GREENHOUSE GASES.

# DESCRIBE THE PATTERNS YOU OBSERVE IN THE GRAPHS.

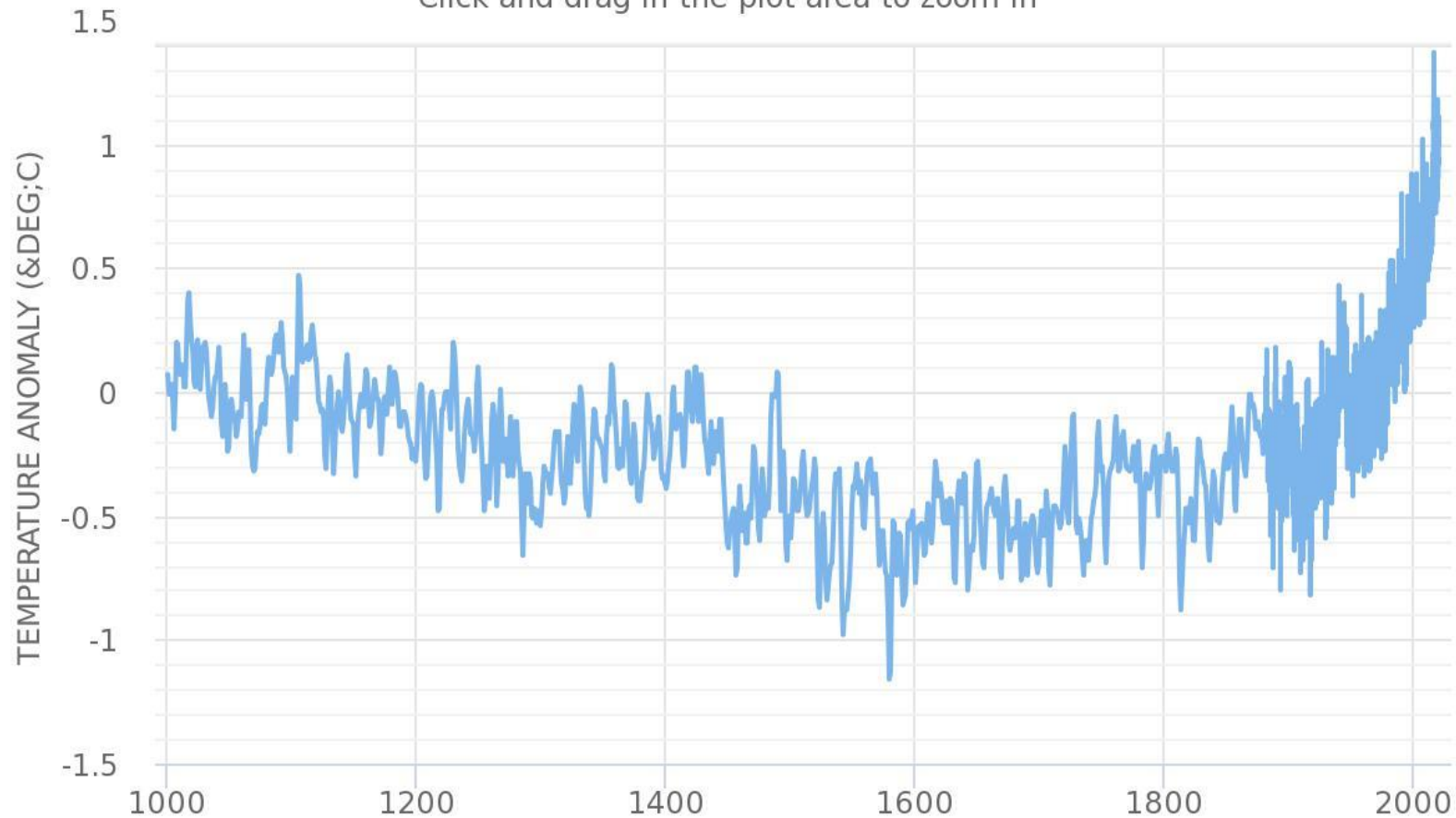
**Temperature Graph:** <https://www.temperaturerecord.org/>

**Greenhouse Gas Emissions:** <https://www.temperaturerecord.org/>  
(click 3 lines in upper left and change to carbon dioxide, methane, and nitrous oxide; click climate dashboard to see multiple)

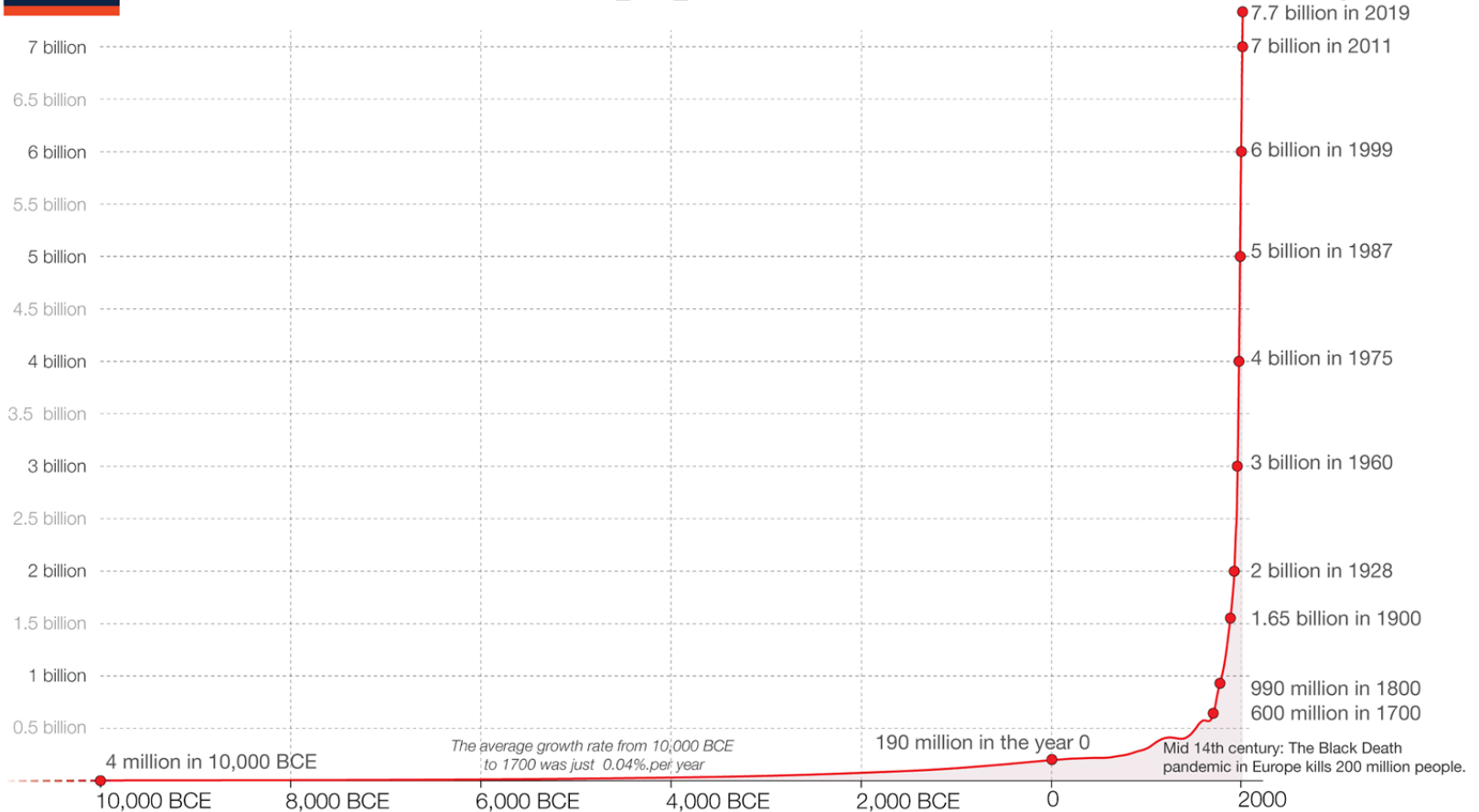
**Population Graph:**

<https://ourworldindata.org/uploads/2018/11/Annual-World-Population-since-10-thousand-BCE-for-OWID.png>

Click and drag in the plot area to zoom in



# The size of the world population over the last 12,000 years

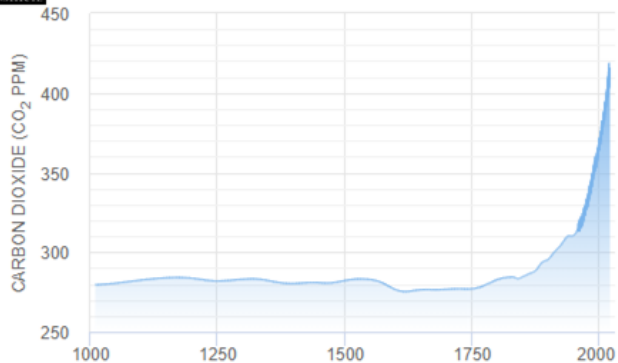


Based on estimates by the *History Database of the Global Environment* (HYDE) and the United Nations. On [OurWorldinData.org](https://OurWorldinData.org) you can download the annual data.

This is a visualization from [OurWorldinData.org](https://OurWorldinData.org), where you find data and research on how the world is changing.

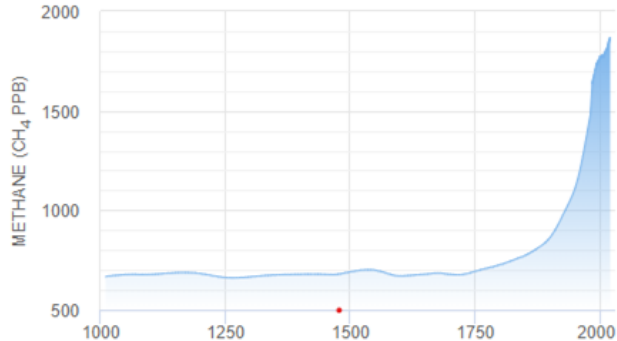
Licensed under [CC-BY-SA](https://creativecommons.org/licenses/by-sa/4.0/) by the author Max Roser.

### GLOBAL CO<sub>2</sub> LEVELS



### GLOBAL CH<sub>4</sub> LEVELS

Click and drag in the plot area to zoom in



### GLOBAL N<sub>2</sub>O LEVELS

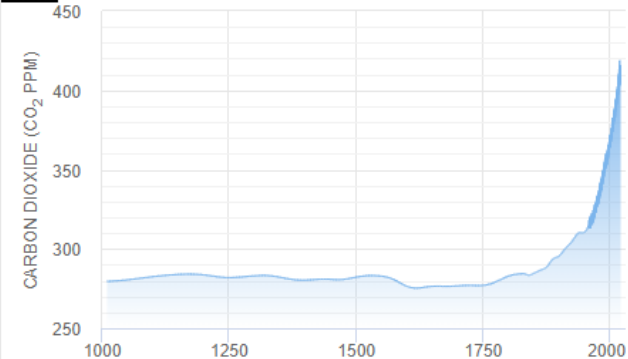


# EXPLAINING THE PHENOMENON

Use evidence to explain how human population, industrialization, and greenhouse gas emissions support the patterns of global temperature changes.



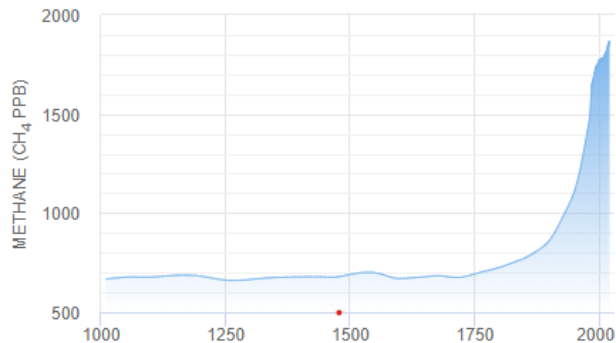
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### GLOBAL CH<sub>4</sub> LEVELS



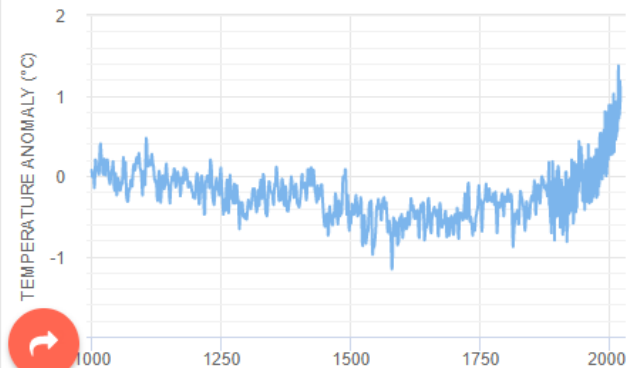
Click and drag in the plot area to zoom in



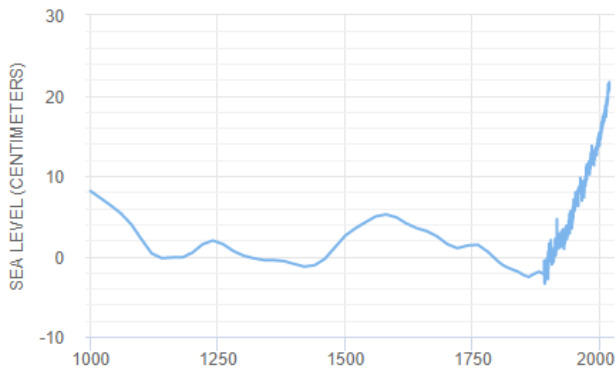
### GLOBAL N<sub>2</sub>O LEVELS



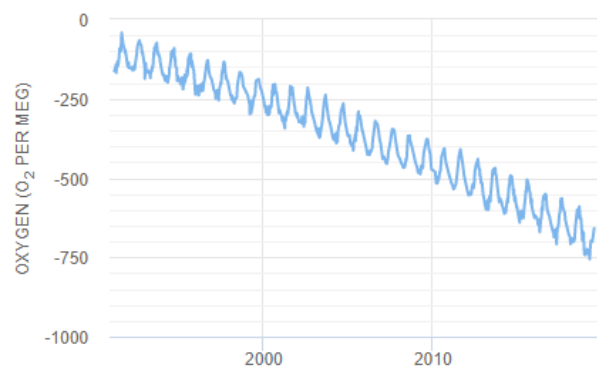
### GLOBAL TEMPERATURE RECORD



### GLOBAL MEAN SEA LEVEL



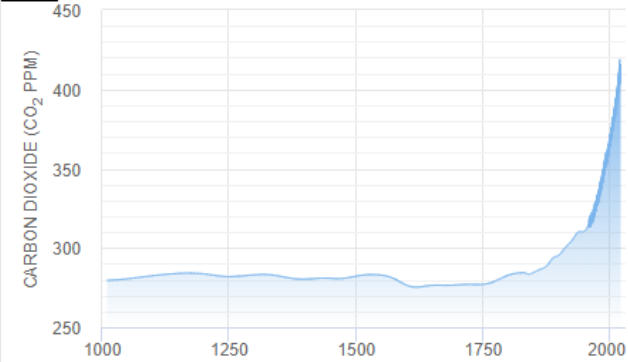
### GLOBAL O<sub>2</sub> LEVELS



# USE EVIDENCE TO EXPLAIN WHY GREENLAND'S ICE IS MELTING AND SEA LEVELS ARE RISING.

2

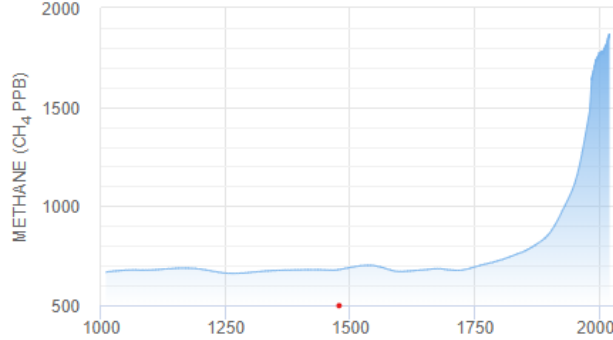
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## GLOBAL CH<sub>4</sub> LEVELS



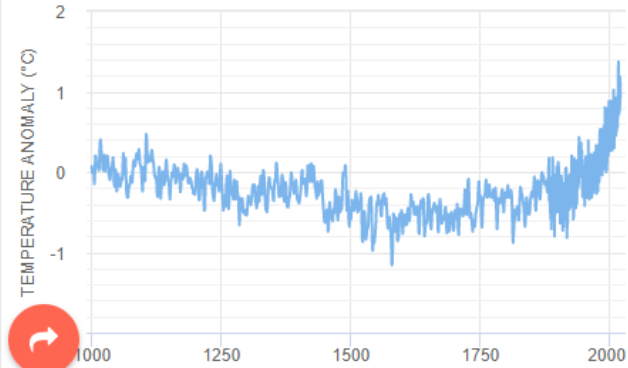
Click and drag in the plot area to zoom in



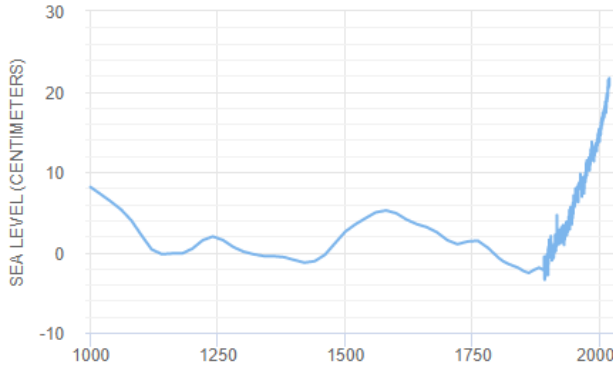
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## GLOBAL TEMPERATURE RECORD



## GLOBAL MEAN SEA LEVEL



## GLOBAL O<sub>2</sub> LEVELS

