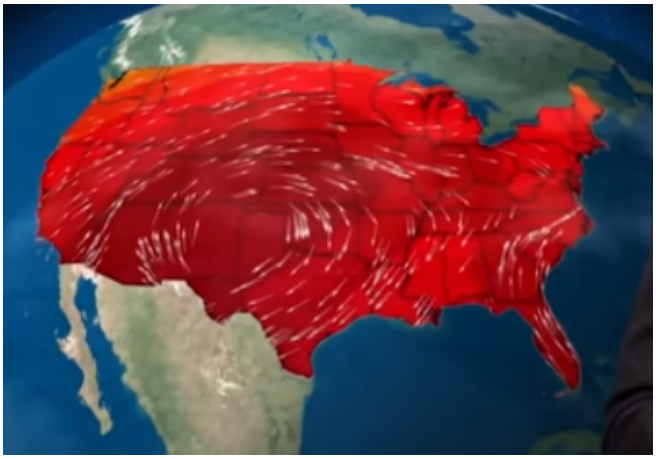
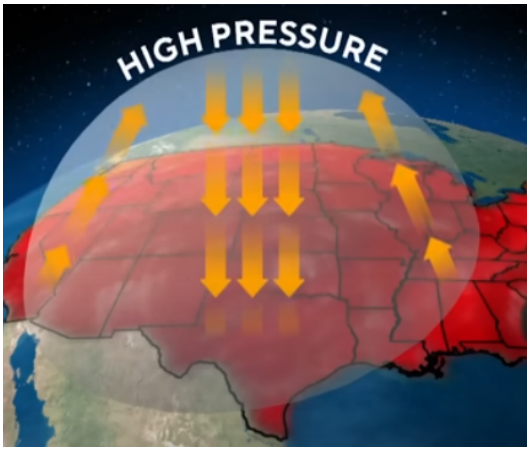
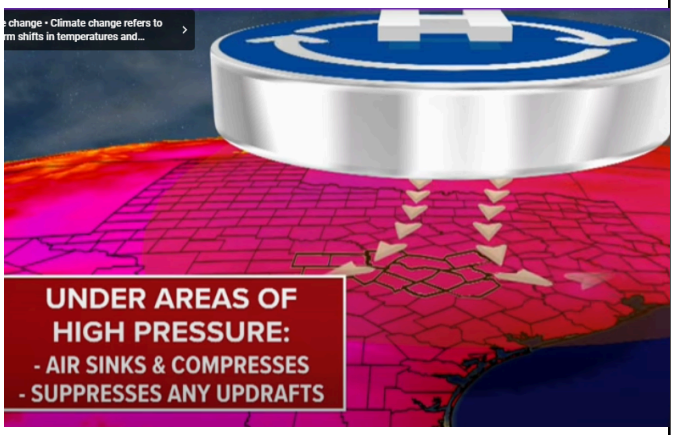
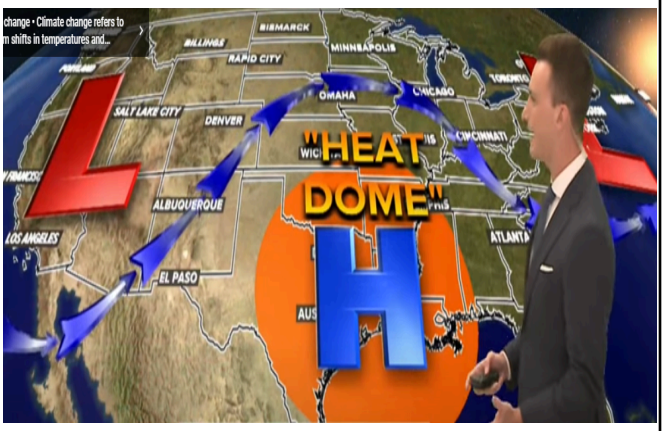
What are Heat Domes?

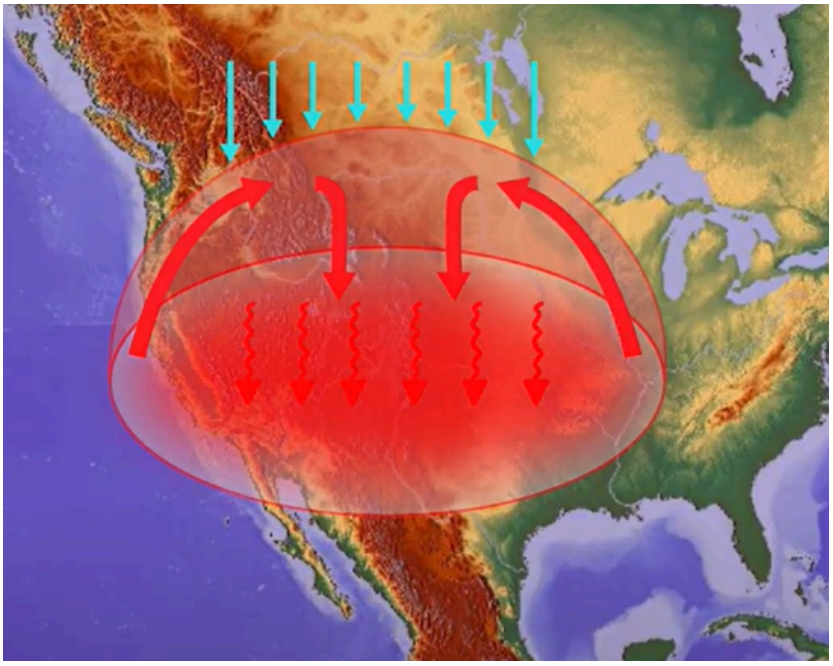
I had to laugh as I prepared this study on “Heat Domes”. It took probably 20 videos and articles, most (the ones from the weather programs in the news) claiming to give the scientific info on Heat Domes, before I found one (from India!) on the U.S. heat dome situation. What we see in the weather program analyses turn out to be stunningly incomplete.

Here’s what we get on the news programs:

<table>
<tr><td>  </td><td> 
</td></tr>
<tr><td>Shows a circulation at surface - no comment</td><td>Shows a high pressure lid over the dome - where did that come from? I thought hot air rises? And what are those up-arrows?</td></tr>
<tr><td> 
</td><td> 
</td></tr>
<tr><td>A spinning paperweight on top?</td><td>Just name it - don’t draw it.</td></tr>
</table>

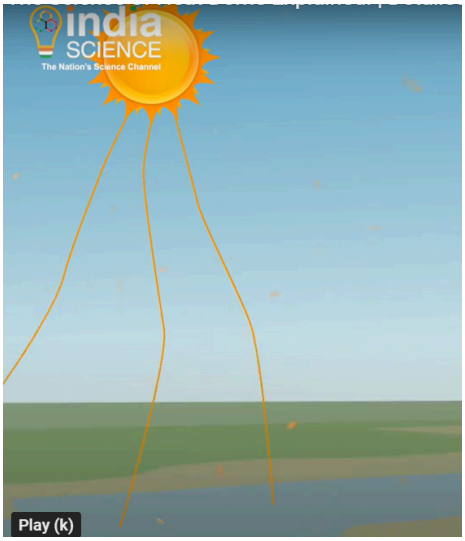
maclankford@gmail.com

This image below seems a little better, and it turns out it comes from the Indian program I mentioned, which will provide many of the graphics below… The link is provided and is well worth watching.



https://www.youtube.com/watch?v=9ceAny9E8LY

I suspected they were going to explain what is really going on. They started with the SUN!!!

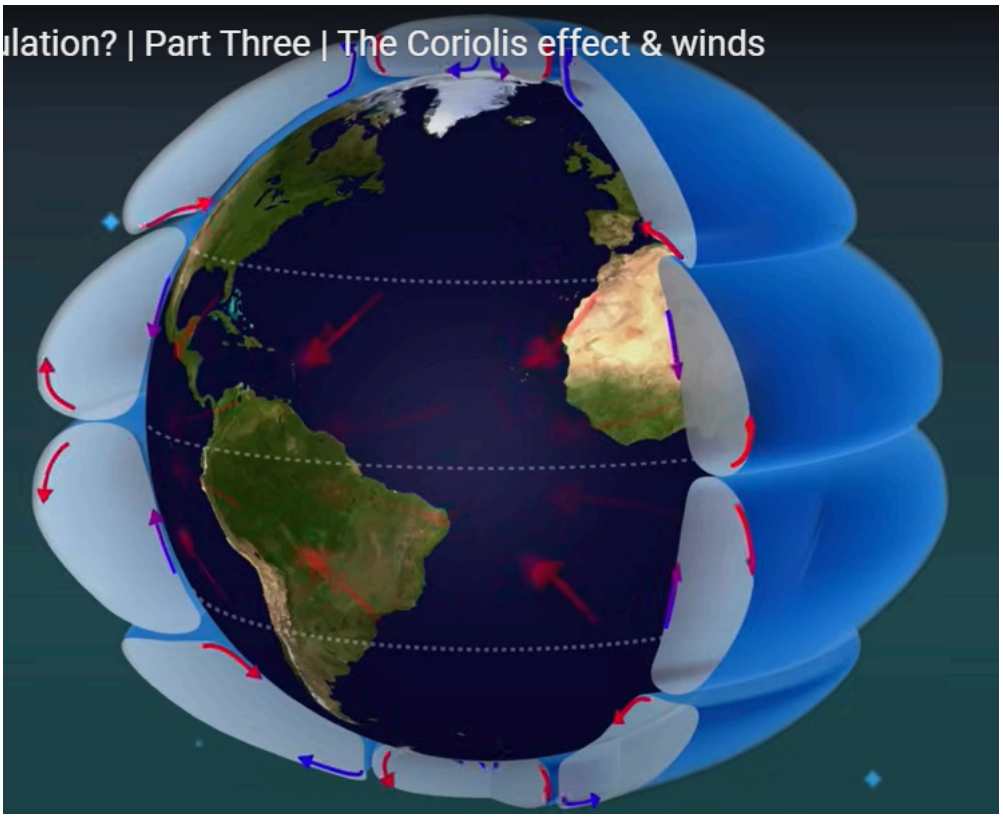


It shines down and heats the land, the air, and the water…

What are Heat Domes?

Before we go into their explanation, we need to review things we addressed in CSSG-2.14:

Global atmospheric cells are created because the equator air is expanded more than the poles, so the high air at the equator wants to flow downhill to the poles. In the process, because the earth is spinning, the flow to the poles is not just a single flow. It breaks down into these cells.

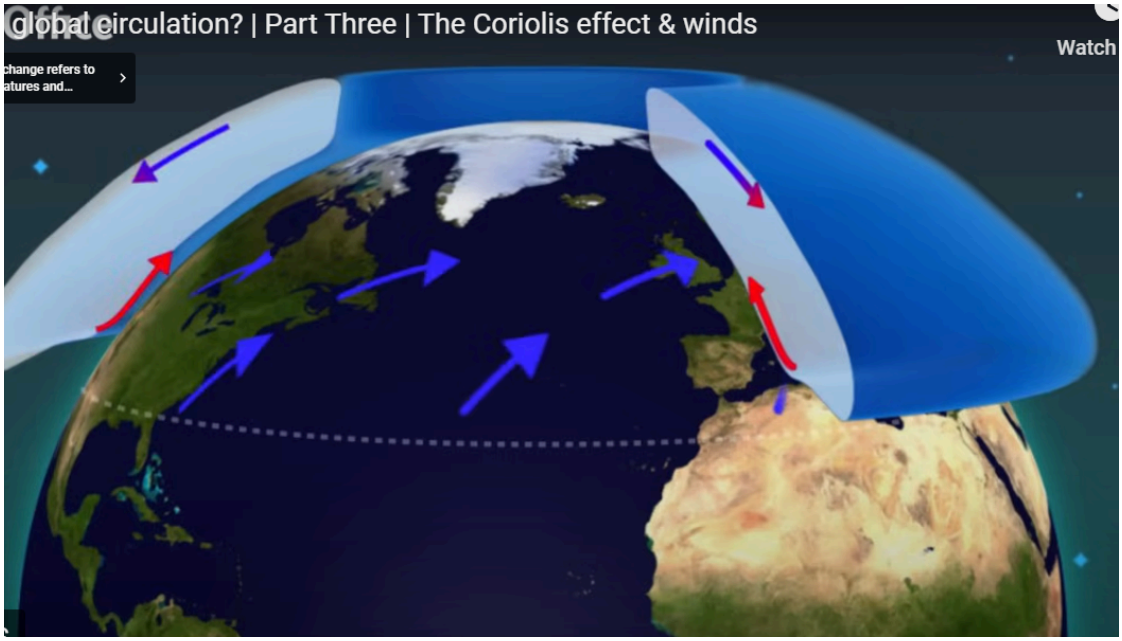


https://www.metoffice.gov.uk/weather/learn-about/weather/atmosphere/global-circulation-patterns

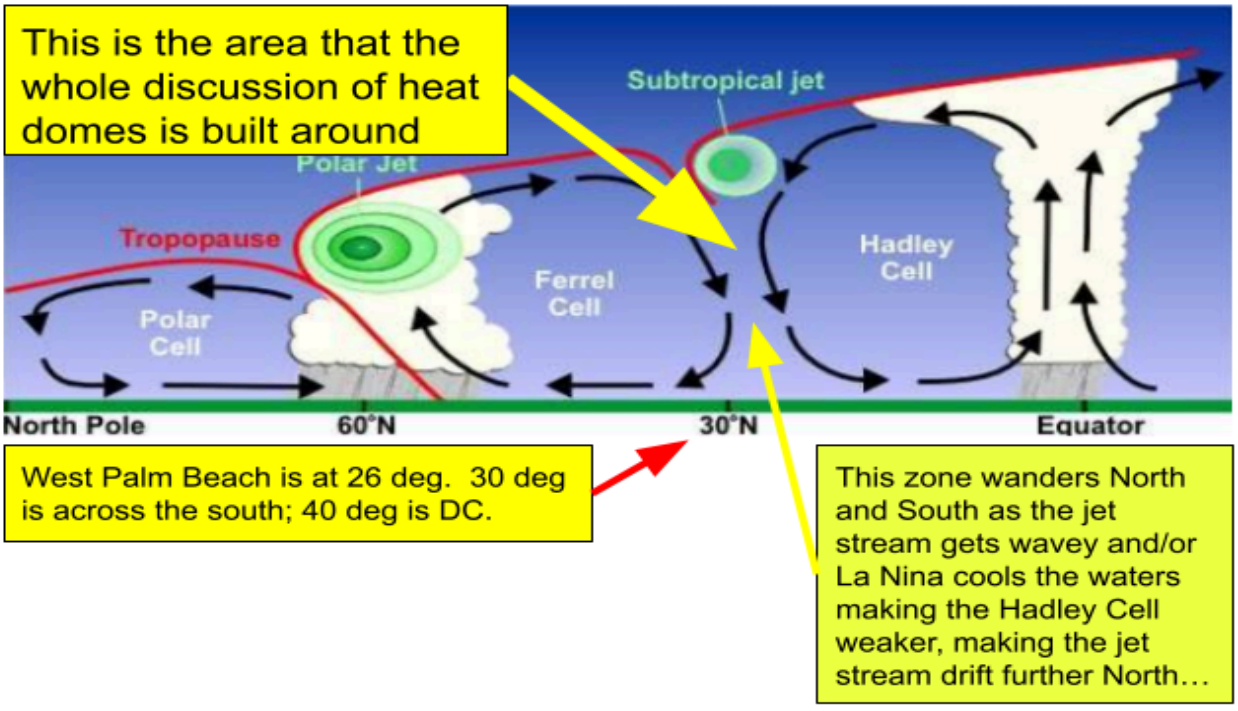
BTW, this will happen on any spinning, sun-heated planet with an atmosphere. Here's Jupiter:

What are Heat Domes?

In the full-sphere image above, you can see the trade winds moving near the equator towards the West. Below is shown the next cell North, which covers most of the U.S and brings winds across the country from the West.

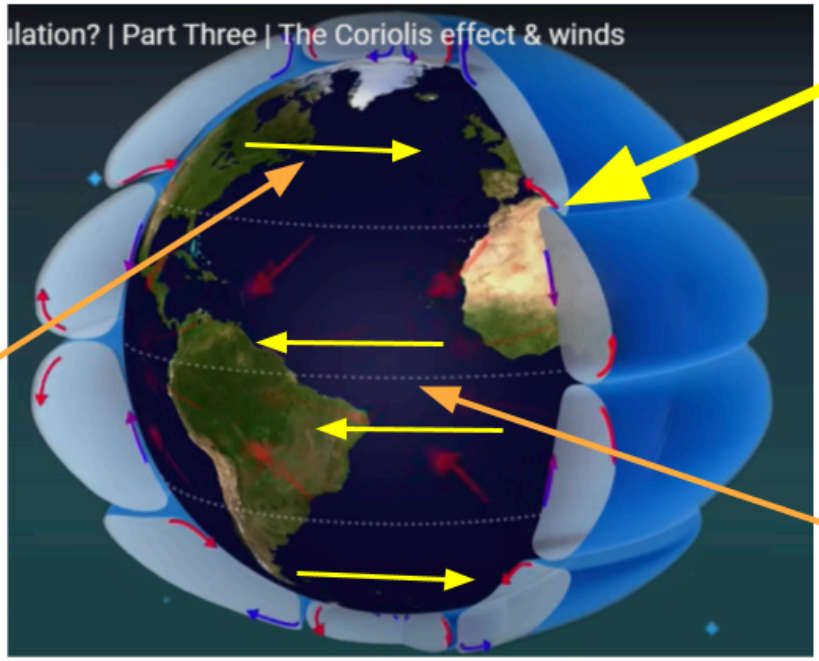


The “Dome Zone” below has that downward flow of air. THAT’S HIGH PRESSURE !



What are Heat Domes?

Note the direction of the surface winds



This crease is where the action is for heat domes

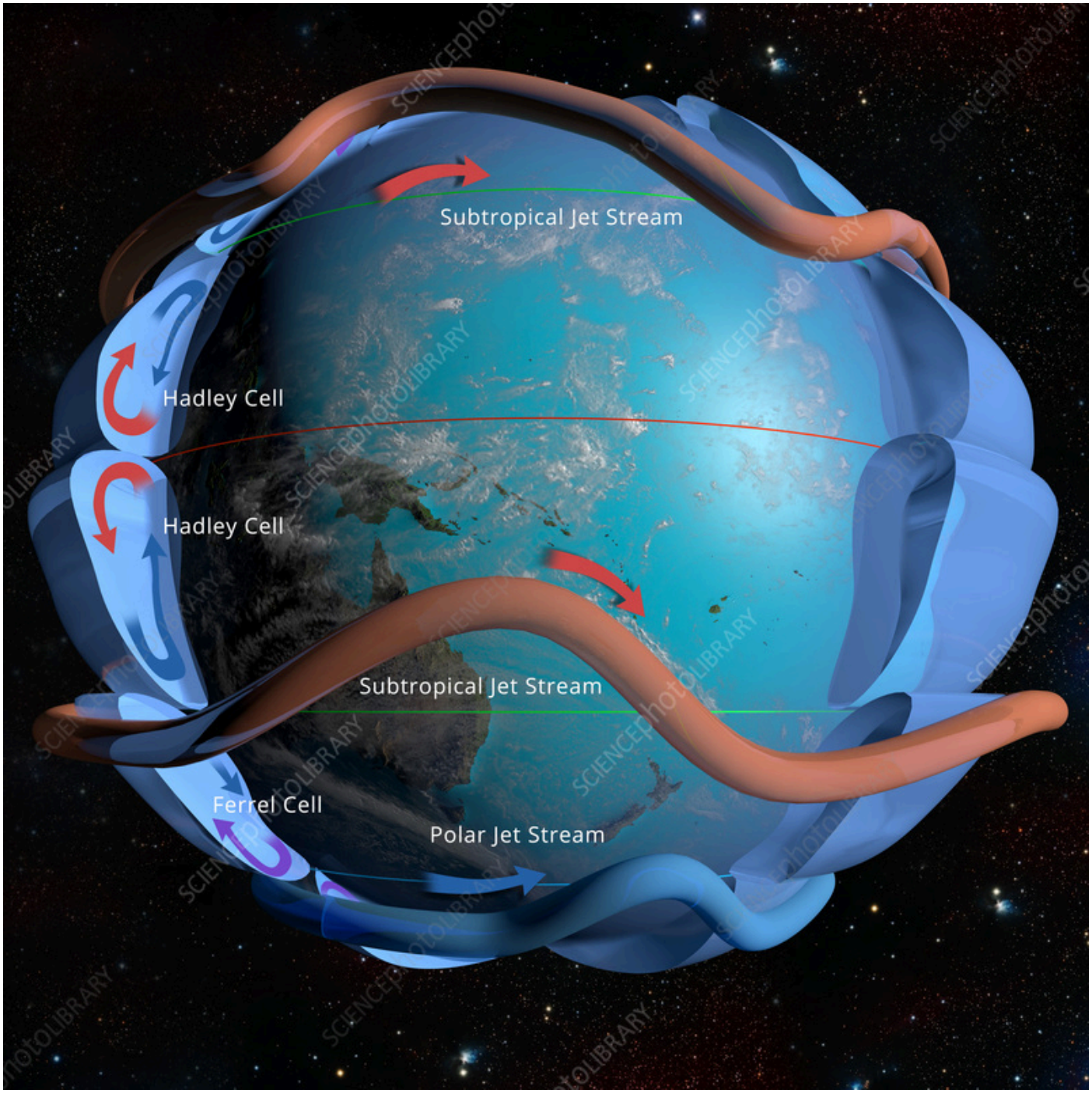
These Westerlies (i.e., from the West) move the weather across the U.S.

These trade winds push the hot waters to the western pacific, allowing the cool waters to come to the surface off of Peru

One more background point: the North edge of the Hadley cell is nominally at 30 deg North. That's where it would be if the whole planet were covered with water. (Notice that Jupiter is pretty regular). But we have land, mountains, cold patches in the oceans, etc. to disrupt things.

So the Jet streams at the edges of these huge cells can be moved around by such things as a region of cooler water (as in La Nina) and global warming (which makes the downhill slope from the equator less, so the jet is weakened and gets more wavy).

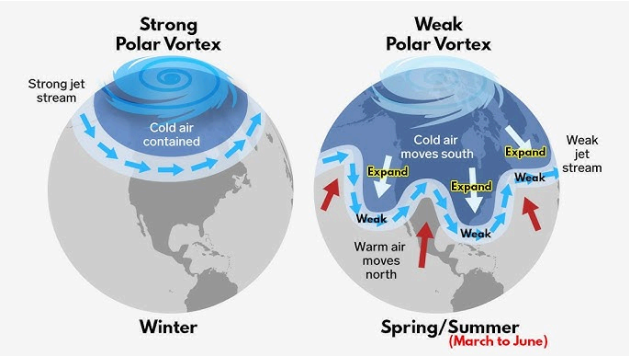
I just had to include this image - it's beautiful!

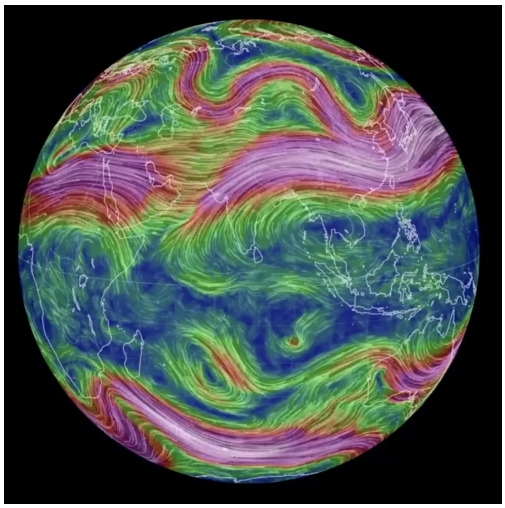


Cree

What are Heat Domes?

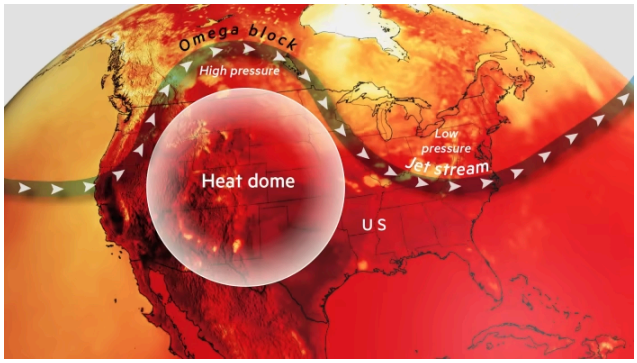
We get jet streams which are not simple:

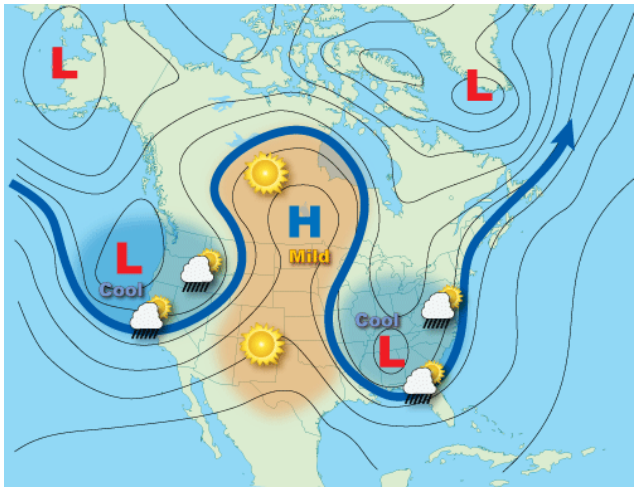




Global warming reduces the downhill flow of air to the poles, weakening the jet streams and allowing them to get more wavy

In general jet streams are not perfect anyway, because of features on the surface.

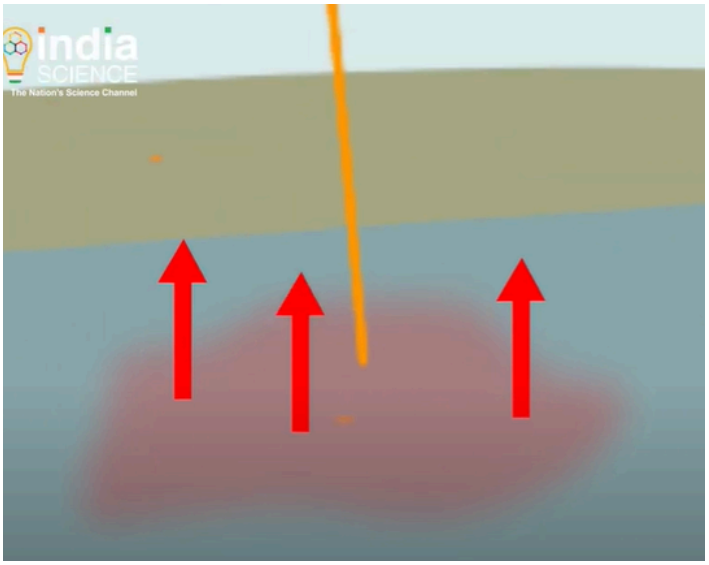




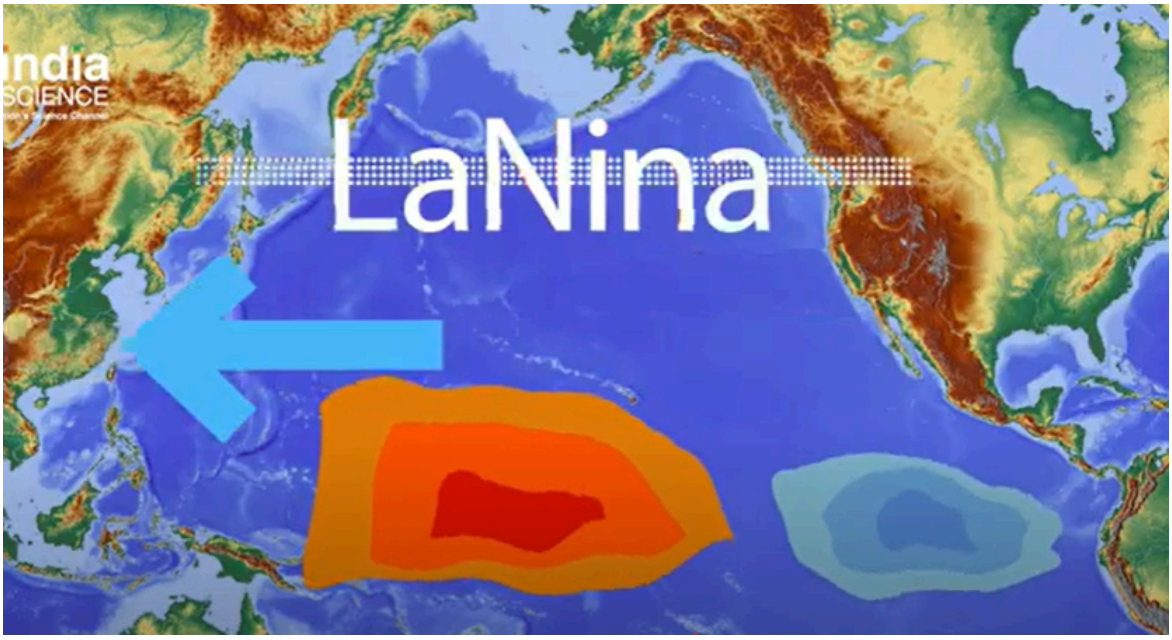
The wavy jet stream sets up the condition for heat to get stuck instead of simply proceeding across the continent as weather often does.

The downward draft at the interface of the Hadley and Ferrel Cells forces the air down on the southern side of the jet stream, creating a HIGH PRESSURE area.

NOW, we can get to the explanation I thought made some sense.



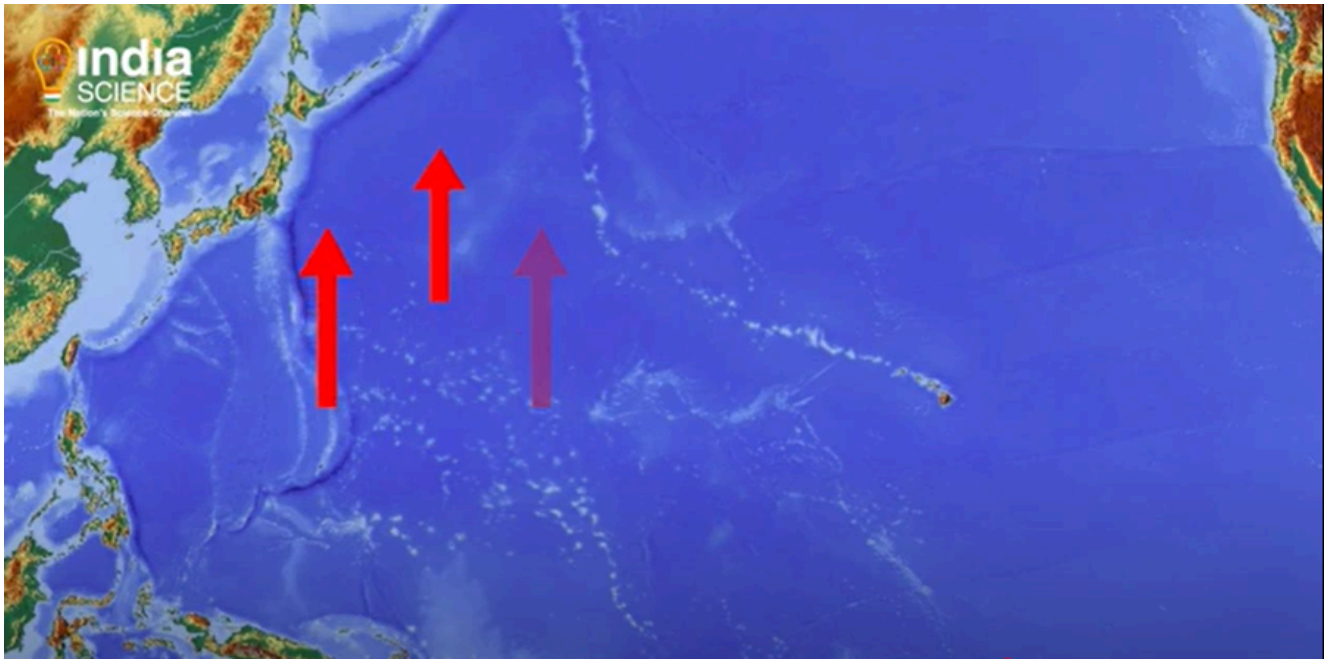
In the Pacific, the SUN shines down and heats the water… and the heated surface heats the air, which rises…



The prevailing winds at our Florida latitude and around the equator (the Trade Winds) are blowing to the West and driving the hot surface water to the Western side of the Pacific…This is like the La Nina conditions.

What are Heat Domes?

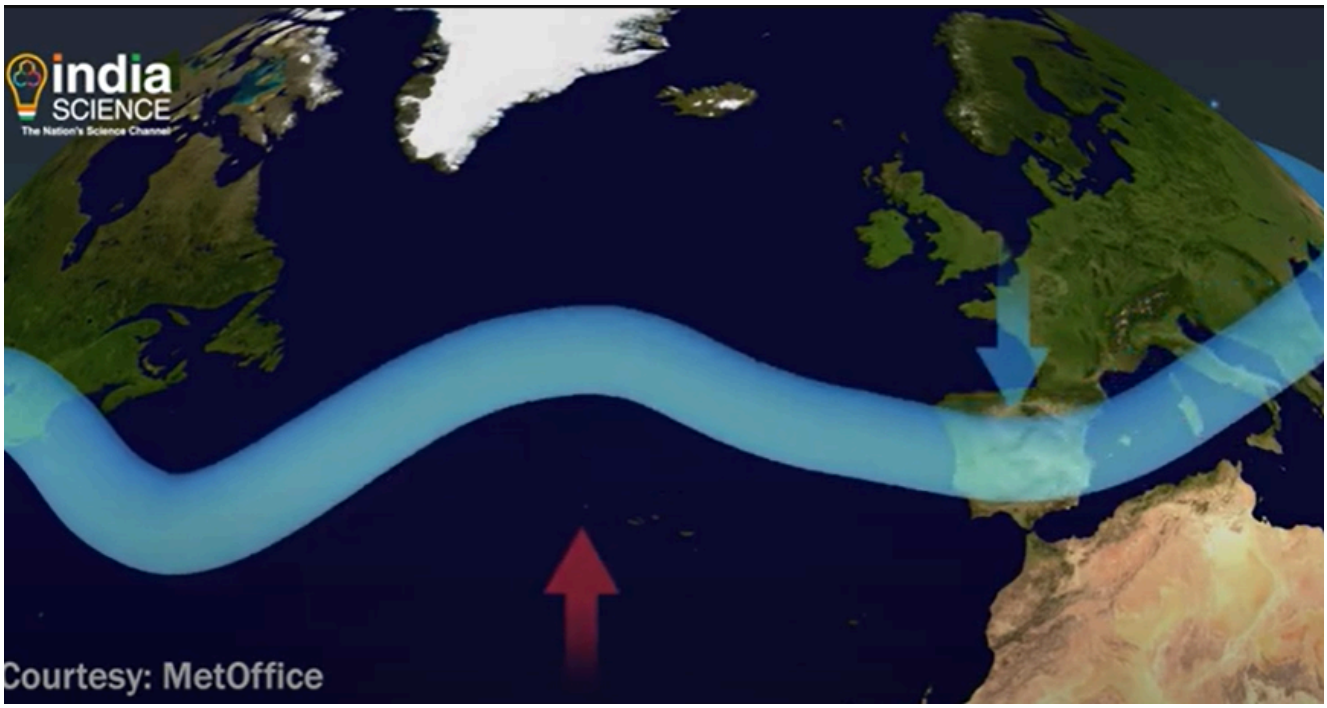
Hot air builds up and rises in the Western Pacific, not only from the La Nina buildup but also from reduction in shipping aerosols pollution in the Northern Pacific which add to heating.



The prevailing wind is from West to East at this latitude and it brings the hot air to the U.S.

”

Meanwhile, the cooler temperatures in the Pacific off of Peru have allowed the jet stream to move further north, and become even more wavey.



What are Heat Domes?

And, as previewed above, the clear air typical in a high pressure area (where the air is coming down between the Cells) is now trapped in a wave. The sun shines down and superheats the surface.

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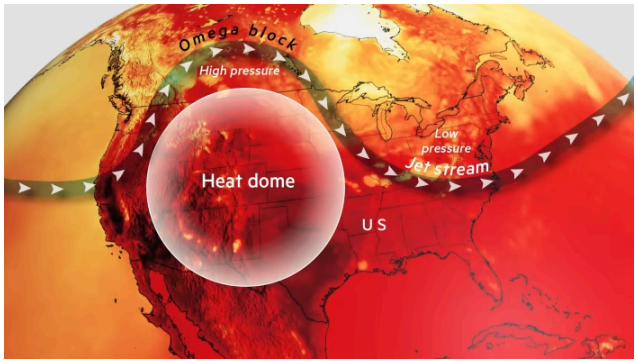
<td> 
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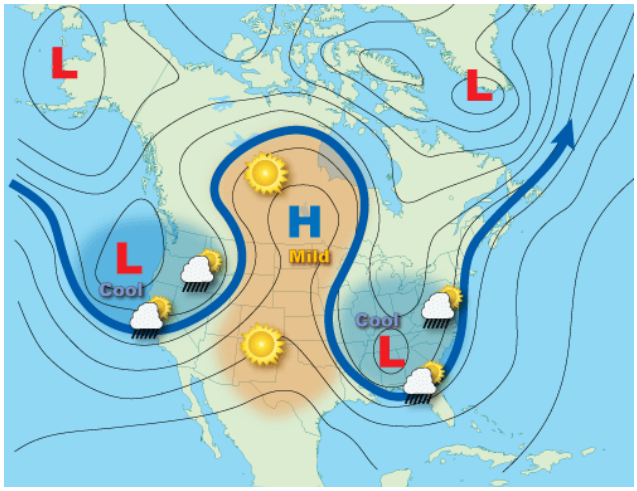
<td> 
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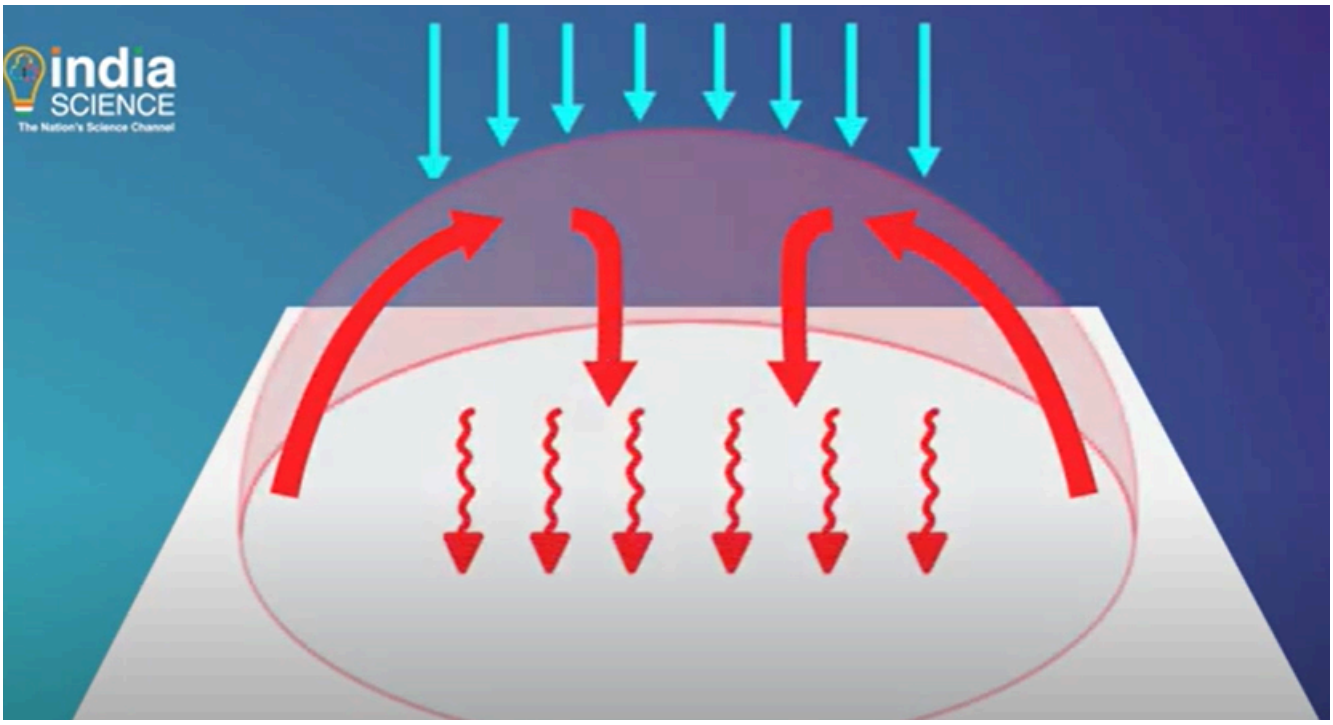
The hot air builds up at the surface and tries to rise up. But it can't get out because of the cold air trying to get down between the cells. In fact, it gets compressed, making it even hotter!

What are Heat Domes?



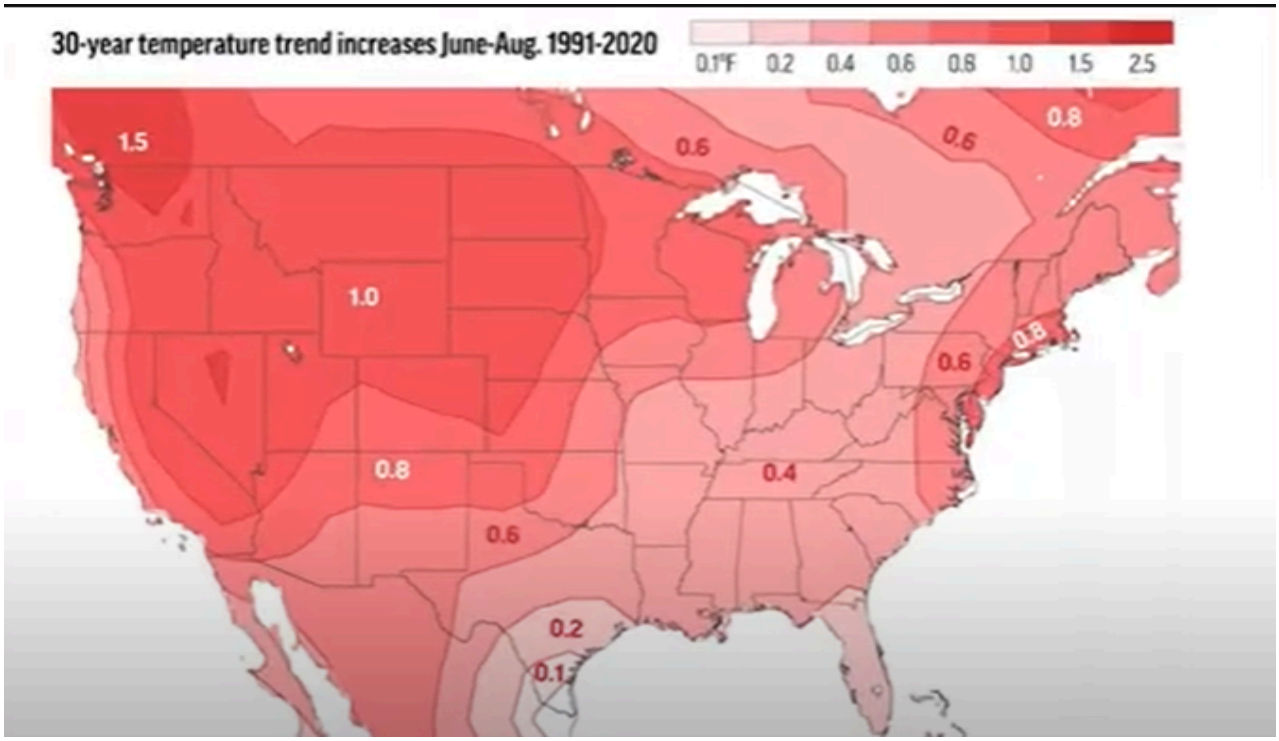
What are Heat Domes?

Good to Remember:

Compressed air gets hotter

What are Heat Domes?

Climate change does have several impacts here. The wavier jet streams make the events more frequent and longer-lasting than before. And the increased global temperatures drive up the impacts.



GOOD NEWS CORNER

https://apple.news/AxnOy6iYVSKyXIctRXhn1nA

Here are 12 vetted environmental organizations worthy of your support

The Cool Down

News

Some more on our **Ocean Ecosystems:**

Mama turtle tracks in, the nest hole, and mama tracks out.

And Baby tracks out

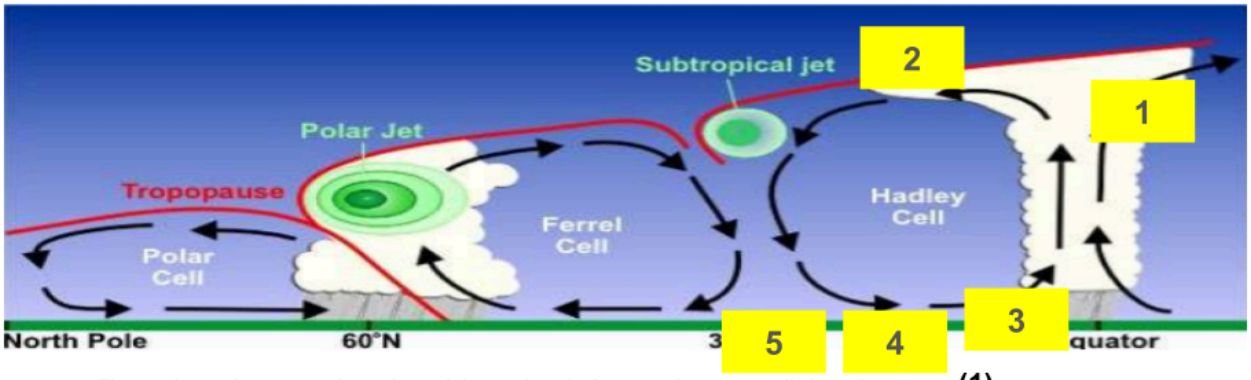
What are Heat Domes?

What are Heat Domes?

Approximate "Cheat Sheet":

1 meter → 3 feet **1 degree Celsius (^{0}C)** → 2 degree Fahrenheit (^{0}F)
ppm = parts per million **CO_2** = Carbon Dioxide
1 tonne = 1000 kilograms = 2205 pounds **1 gigatonne (1 Gt)** = 1 billion tonnes
1 trillion tonnes (1Tt) = 1000 gigatons

Supplemental Material



- The sun heats the equator the moist and the wet hot air rises causing storms all along the equator (1)
- That air gets to the top, having lost its moisture and it's cold up there..(2)
- Meanwhile, the air rising at (1) causes a "vacuum" at (3). **This is a very LOW PRESSURE AREA BECAUSE THE AIR IS RISING AWAY FROM THE SURFACE**, causing air to flow back on the surface from the North at (4).
- This forms another "vacuum" at (5), which the cold (so more dense), dry air up at (2) is more than happy to fill…
- This circulation has now formed what is called the Hadley Cell.
- Similar dynamics form other cells globally, with the jet streams being formed at their intersections (see CSSG-2.14)
- Here's the critical Point: **(5) IS A VERY HIGH PRESSURE AREA, BECAUSE THE AIR IS BACK DOWN TO THE SURFACE.PUSHING**