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Climate Change and Drought in California

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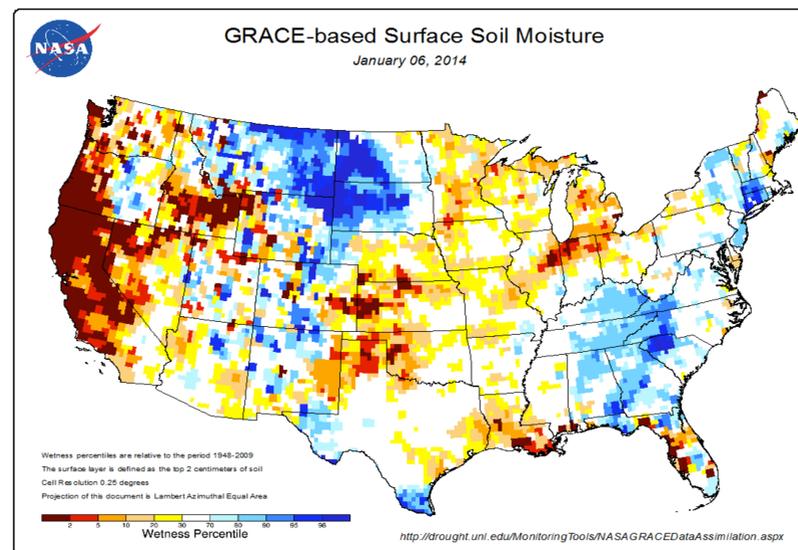


Climate Change and Drought In California

Jake Szarzynski, Wei Zhang, Brennan Tatem

Abstract

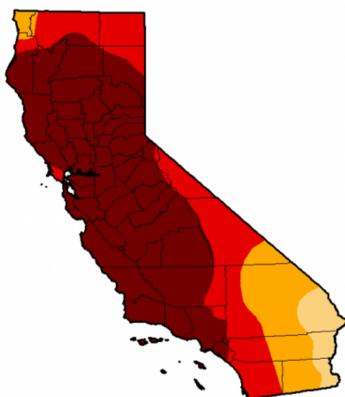
We believe that there is a correlation between the increasing frequency and duration of droughts in California and climate change. The first step to solving any problem, such as a drought, is to identify the cause of the problem. As a result of the research conducted, we can determine that it is possible that climate change is a leading cause to droughts. We hope that by providing evidence that climate change is causing droughts, people will become aware that climate change does have negative results that we experience on a daily basis. We used several different scholarly sources when conducting our research, including peer-reviewed scientific publications as well as scientific journals, all written by experts in their field. Extremely high atmospheric pressure is preventing storms from reaching California, and we found that the atmospheric pressure would not be as high if it wasn't for the influence of human caused Greenhouse Gasses. With this we were able to conclude that it is very likely that human caused climate change ultimately causes the dramatic droughts we experience today.



Materials & methods

Our hypothesis and the data that needed to be collected to prove it posed a problem for our research. While ideally we desired to physically conduct an experiment ourselves, our time restriction to compose our report would have rendered any data collected useless; our hypothesis requires decades of collecting data so we can show the correlation between climate change and droughts. We extensively searched through databases, University libraries and countless publications about both drought and climate change. These sources proved very useful, and included computer models and simulations of storms and atmospheric pressure.

U.S. Drought Monitor California



September 9, 2014
(Released Thursday, Sep. 11, 2014)
Valid 9 a.m. EDT

	Drought Conditions (Percent Area)					
	None	D0-D1	D1-D2	D2-D3	D3-D4	D4
Current	0.00	100.00	100.00	95.42	91.92	58.41
Last Week	0.00	100.00	100.00	95.42	91.92	58.41
3 Months Ago	0.00	100.00	100.00	100.00	78.68	24.77
Start of Calendar Year	2.81	97.39	94.25	97.53	27.58	0.00
Start of Water Year	2.83	97.37	95.95	94.12	11.36	0.00
One Year Ago	0.00	100.00	97.08	92.94	11.36	0.00

Intensity

- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

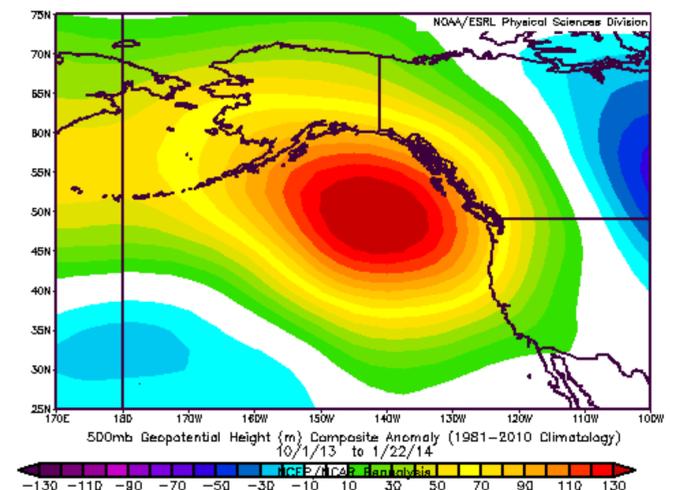
Author: Brian Fuchs
National Drought Mitigation Center

USDA logo and other logos at the bottom.

<http://droughtmonitor.unl.edu/>

Results

Figure 1 demonstrates the amount of rainfall in California over the past century. As the trend has been typically decreasing, the amount of Carbon Dioxide in the atmosphere has been steadily increasing as shown in figure 2. We believe that this is not a coincidence, and that there is a strong correlation between the two. Extremely high atmospheric pressure has a direct link with precipitation. More specifically, the high atmospheric pressure over the Pacific Ocean, known as the "Ridiculously Resilient Ridge", is diverting storms from reaching California, furthering the effects of the drought (N.D. 2014). This duration and scale of this ridge are greater than any other previous occurrence of the past 50 years. With computer simulations conducted by Stanford's climate expert Noah Diffenbaugh, it is believed that the high atmospheric pressure is much more likely to occur due to the presence of human caused greenhouse gasses.



Introduction

Droughts in California lead to countless problems that are not limited to the death of plant life. In 2014 alone, it is estimated that at least two billion dollars worth of agricultural income and around 17,000 seasonal jobs will be lost as a result of this drought (N.D. 2014), further damaging an already weak economy. Drought also contributes further to global warming and the amount of Greenhouse gasses in the atmosphere. Due to dryer conditions, wildfire frequency and intensity has also increased significantly in past years. This results in increasing temperatures in the atmosphere, as well as loss of earth's only natural CO2 reducer: Plants. All of this leads to our original question: does climate change influence and cause droughts? While there is no absolute answer, we believe that climate change does have a direct relationship with droughts. Droughts have always been around, especially in a Mediterranean climate, but as our research will show the increase in climate and CO2 in our atmosphere is a close match to the increasing amount and length of droughts. We discovered our results through extensive research conducted in libraries, databases and scientific journals.

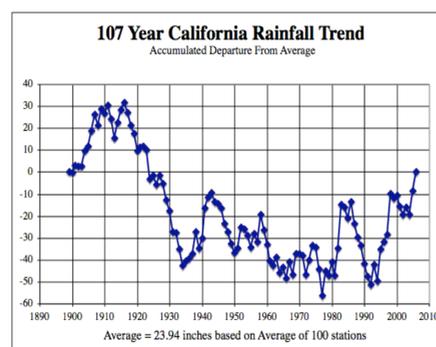


Figure 1

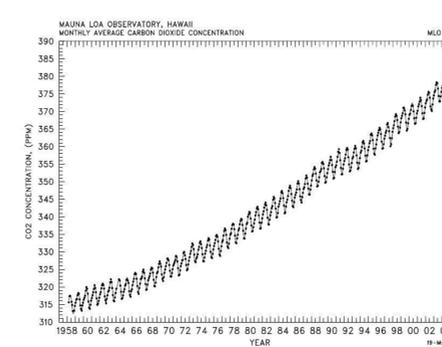


Figure 2

Discussion

The results of our research show that droughts in California, both in longevity and intensity, are furthered by climate change. Computer simulations have shown that because of greenhouse gasses produced by humans, atmospheric pressure over the Pacific Ocean is at an extreme high, diverting storms that California desperately needs. Because these storms fail to reach California, the drought will continue indefinitely until atmospheric pressure allows a storm to reach the coast.

Conclusion

Climate change affects our lives in countless ways, some that we experience directly and others indirectly. As humanity's emissions of Greenhouse Gasses continue to not only occur but increase, we will begin to see more of an impact that our past actions will have on our lives. Since the industrial revolution, humans have damaged Earth to an extremely large extent, however, since the results of our damage haven't always been immediate, we've continued on with our ways. Now that there is evidence that human caused climate change is affecting us directly in more dramatic ways, such as this drought, we can only hope that more people will be conscientious of how their own actions affect this beautiful gift we've all been given: Earth.

Acknowledgements

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Works Cited

- Noah Diffenbaugh, N.D., 2014. Atmospheric Conditions Associated with the 2013-14 California Drought Are 'Very Likely' Linked to Human-caused Climate Change. Stanford Woods Institute for the Environment
- Noah Diffenbaugh, N.D., 2013. Explaining Extreme Events of from a Climate Perspective. Bulletin of the American Meteorological Society, Vol.94, No. 9,