

Golden Gate Climate Update Transcript

Interview with Dr. James Johnstone
Post-doctoral Researcher, University of Washington
Interviewed on July 10, 2010
Will Elder interviewer
Part 1

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Will - Hi, I'm Ranger Will Elder, and welcome to Golden Gate Climate Update, your source for information on climate change and sustainability. Join us as we hear from people helping your National Parks understand and adapt to climate change.

Today we are talking with Dr. James Johnstone, post-doctoral researcher at the University of Washington's Joint Institute for the Study of Atmosphere and Ocean. So Jim, can you tell us a little about your research?

Jim – Right now I am working on looking at coastal wind variability in the summertime and its connection to fog along the coast and also to upwelling events in the coastal ocean.

Will - And according to your research in Berkeley focused on fog, it showed that summer fog is decreasing along the California coast in the recent years. Can you tell us briefly how you came to this conclusion and if you think climate change is playing a role in this decrease?

Jim – The results actually show that fog appears to be declining over a century time scale. So, comparing say the recent 60 years to the first few decades of the Twentieth Century, it looks as though that fog was quite a bit more frequent early on than it has been in the last several decades. Over the last 60 years there are actually really good airport measurements of cloud height. So using that data, I was able to draw some conclusions about how fog changes from year to year and how it changed over longer time periods. From decade to decade and in recent years, we see a lot of sort of up and down behavior, and if you look at century-long change, which is largely inferred from temperature patterns, it looks as though there has been a substantial decline.

Will - So do you feel that you can predict how the changing climate might affect the amount of fog and its distribution in the future then?

Jim – The future I think is sort of an open question at this point. There have been modeling studies done to try to address the future of fog in response to increases in greenhouse forcing. The models have tried to say that

because the land surface would heat at a greater rate than the coastal ocean, that the pressure gradient between those two areas should increase. Therefore the winds blowing along the coast should increase, which therefore increases upwelling and fog as well. What my data show is that there are things going on out over the ocean, pressure changes and changes in the wind, that are largely independent of what's going on over land, and that these changes over the ocean are actually of greater magnitude and are more important for driving the frequency of fog. So this does also kind of complicate the question of where things go in the future.

Will – Right, and so you know that kind of leads into my next question, which you may have somewhat answered already, but the fact that there is indication that upwelling is increasing, and so the cold water is cooling those moist airs, and producing theoretically more fog, how do you explain that discrepancy between your indication that fog may be decreasing somewhat?

Jim – The strongest positive trends in upwelling are seen sort of from central to southern California. But actually when you compare the fog record to the coastal winds, it actually shows that fog in northern California is most strongly connected to wind off the coast of Oregon, further north than northern California. I am still working on understanding why exactly this is. So the increases in upwelling that are being seen off the coast of California don't appear to be directly related to fog in the same area.

Will – Now, if we do have this sort of increased temperature cline from the ocean say to the inland, what might that do towards changing the fog belt?

Jim – When you look at the temperature data, you clearly see a warming trend over the whole West Coast of the United States. Superimposed on this a change in the contrast between the coast and the interior, so normally the coastline is rather cool, the interior warms up quite substantially on summer days. If you look at the long-term record, it looks as if that temperature contrast has decreased over time, which implies somewhat greater warming at the coastline than over the interior areas. It seems that the fate of that temperature contrast and the fog change hand in hand. And that stuff is generally controlled by pressure and wind patterns over the northeast Pacific, and so it is not fully clear how those things will change over time. But it is very clear that they are coupled with each other very strongly.

Will – Before we move on to our next question, it's time for the climate update challenge. Of the original 2 million acres of ancient redwood forest, what percent has been logged? 75 percent, 85 or 95 percent? Hear the answer, and the second half of this interview, in part two. This is Will Elder, thanks for listening.

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Male voice - Golden Gate Climate Update is produced by Will Elder and is a product of the Earth to Sky Program, an innovative partnership between the National Park Service, the U.S. Fish and Wildlife Service, and NASA.

Music from *A Walk in the Desert* by Electronic Symphonic.