Comparing Composite Temperature Changes for Desert and Water Climates

The purpose of this project is to determine whether or not there is a significant difference between the composite change in temperature for a desert climate and a water climate. The reason why "desert" and "water" were selected is due to the marked contrast between the two: a desert climate is generally distinguished by its lack of precipitation while a watery climate is generally inundated with it. I predict there will be a significant temperature difference between the two, as a watery climate might fare better than the desert would in the face of rising atmospheric CO_2 concentrations since the oceans are a carbon sink and more vegetation in a watery climate could more effectively consume CO_2. The vegetation bins were used to distinguish between the two since desert vegetation and water vegetation would grow in, respectively, desert climates and watery climates. Using data from the National Oceanic and Atmospheric Administration's National Climatic Data Center to determine the average change in global mean temperature[1] for comparison, the findings are as follows:

	Data Composite 1950-2013	Data Composite 1880-2013
Water	0.18° C	0.1° C
Desert (Hot, Sand, Cold)	0.21° C	0.09° C
Global Mean Average	0.23° C	0.02° C

*See attached Excel file for the names of stations used

In order to maintain relative uniformity throughout the data, only meteorological stations in the water, hot desert, sand desert, and cold desert bins containing data from at least the 1950s to the mid-2000s were used. However, likely due to the general trend of peoples to congregate around areas near water, there was far more data from the water bin and thus 175 stations were used to determine the data composite for water while only 60 stations in the desert bins had an adequate amount of data to be worth calculating the composite for.

The implications of the data compiled above are probably very limited, given that many factors such as precipitation levels, geographic location, albedo, cloud cover, etc., were not accounted for. However, the data does display noteworthy differences and interesting similarities between the two "climates" selected and the global mean average. Curiously, there are no striking distinctions between the water data and desert data, as the numbers fall fairly closely to each other, thereby disproving the original hypothesis. From 1950, the desert has warmed 0.03° C more than water has, while over a greater span of time, this difference is restricted to only the last 60+ years as the composite data from 1880-2013 shows instead that the water is 0.01° C warmer. The most interesting numbers are on the composite data from 1880-2013, where temperature changes in the desert and water are significantly larger (0.08° C greater in water; 0.07° C greater in desert) than those in the global mean average. This could indicate that biomes housing desert or water vegetation were very susceptible to initial increases in CO_2 compared to other biomes

[1] http://www.ncdc.noaa.gov/cag/time-series/global

that might have been more adaptable to changes in the atmosphere's gas composition. This postulation is furthered by the marked differences noted in the composite data from 1880-2013 that do not exist in the data from just 1950-2013, where the difference between the desert/water climates and the global mean average is 0.02° C and 0.05° C, respectively. When isolating the data to the last 60 years, we find that the global mean average change is actually greater than that of either the desert or water. This possibly points to the doubling effect of climate sensitivity, where desert and water climates that have already responded to high levels CO_2 are now less responsive to recent additional increases in atmospheric CO_2 levels.