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Similarity of climate change data for Antarctica and Nevada

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Abstract

The correlation between temperature and carbon dioxide concentration in the past one hundred years is studied. Separate graphs containing data from Vostok, Antarctica and the Mojave desert/mountain west (Nevada region) are presented. Using data obtained from these graphs, an attempt is made to explain the results and investigate the similarity of these results for Antarctica and Nevada. The importance of this study lies in the fact that if data show the same trend in the two regions, many findings for climate change in Antarctica may readily be validated and employed for Nevada.

Introduction

Carbon dioxide (CO₂) is the most important greenhouse gas produced by human behavior, primarily through the incineration of fossil fuels. Not all carbon dioxide (figure 1) are produced by human activities, carbon dioxide also naturally occurs through cycles. Among these naturally occurring gases are water vapor (H₂O), methane (CH₄) and nitrous oxide (N₂O). It is originally perceived that samples of these chemicals can only be collected in the atmosphere. However, through ice-drilling in East Antarctica, detailed climate records can be accessed and analyzed. Climate records from these ice-cores can be traced back over 400,000 years. This unprecedented length of time can only be obtained the further down the ice is acquired. In January 1998, the Vostok project yielded the deepest ice core ever recovered, reaching a depth of 3,623 m. Although Nevada does not incorporate ice core data, carbon dioxide levels and temperature levels still exist and are available.

![Figure 1](Ice core drilling)

It is calculated that carbon dioxide levels will continue to elevate for at least the rest of the century, reaching 550 ppm (part per million) by 2050 and 700 ppm; approximately doubling today’s concentration levels. Carbon dioxide is one of the raw substances of photosynthesis because it increases distribution rise of CO₂ into the leaf. Elevated sustained rates of photosynthesis should associate higher growth and plant production.

![Figure 2](Temperature in Antarctica vs. Carbon Dioxide Concentration)

Discussion

The consequences of climate change are important. Although more research is imperative before any conclusions can be made, much can still be said about the effects of climate change in the Nevada region. Changes in the temperature can dramatically affect vegetation in the Mojave Desert, causing native species to become obsolete and making way for new nonnative vegetation to appear more often on the land. Thus, essentially changing ecosystem processes. Global climate models predict the doubling of carbon dioxide concentration in the atmosphere will considerably amplify both winter and summer rainfall, or possibly just summer rainfall, in the southwestern desert region.

Table 1: Potential ecological effects of climate change in the Mojave Desert

<table>
<thead>
<tr>
<th>External variable</th>
<th>Functional response</th>
<th>Potential new regime</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elevated CO₂</td>
<td>Greater plant production</td>
<td>More productive desert</td>
</tr>
<tr>
<td>Higher Temperature</td>
<td>Species range shift</td>
<td>Community disequilibrium</td>
</tr>
<tr>
<td>Water deficit</td>
<td>Greater production of xerophytes</td>
<td>Increased fire frequency</td>
</tr>
<tr>
<td>Increased Nitrogen deposition</td>
<td>Reduced Nitrogen fixation</td>
<td>Loss of Nitrogen fixing species</td>
</tr>
</tbody>
</table>

References


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For further information

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