Lay Perceptions of How Long Air Pollution and Carbon Dioxide Remain in the Atmosphere

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ABSTRACT

The atmospheric residence time of carbon dioxide is hundreds of years, many orders of magnitude longer than that of common air pollution, which is typically hours to a few days. However, randomly selected respondents in a mail survey in Allegheny County, PA (N = 119) and in a national survey conducted with MTurk (N = 1,013) judged the two to be identical (in decades), considerably overestimating the residence time of air pollution and drastically underestimating that of carbon dioxide. Moreover, while many respondents believe that action is needed today to avoid climate change (regardless of cause), roughly a quarter hold the view that if climate change is real and serious, we will be able to stop it in the future when it happens, just as we did with common air pollution. In addition to assessing respondents’ understanding of how long carbon dioxide and common air pollution stay in the atmosphere, we also explore the extent to which people correctly identify causes of climate change and how their beliefs affect support for action. With climate change at the forefront of politics and mainstream media, informing discussions of policy is increasingly important. Confusion about the causes and consequences of climate change, and especially about carbon dioxide’s long atmospheric residence time, could have profound implications for sustained support of policies to achieve reductions in carbon dioxide emissions and other greenhouse gases.

INTRODUCTION

Experts in the geophysics community have understood the role of greenhouse gases in shaping the earth’s climate for over a century. Despite scientific consensus on the need to dramatically reduce greenhouse gas emissions now, political discourse and media coverage have grown ever more confusing and contentious.

We report research designed to explore the extent to which Americans understand the fundamental difference in atmospheric residence times between common air pollutants and carbon dioxide. We also explore the possible consequences of this understanding by examining beliefs about causes of climate change and how these views influence willingness to take action against climate change. We ask:

1. To what extent do people understand the difference in atmospheric residence times between common air pollution and carbon dioxide, as well as the sources of each?
2. To what extent do people correctly identify causes of climate change?
3. To what extent do these beliefs affect people’s support to take action against future serious changes in the climate?

METHOD

PA Mail Survey
- 400 addresses randomly sampled from zip codes across Greater Pittsburgh Area
- $2.00 incentive
- 119 returned (30%)．

Online Survey
- National sample with Mechanical Turk (MTurk)
- $1.25 incentive
- 1,013 responses
- 2 common questions with PA mail survey

RESULTS

Table 1. Summary statistics for Pennsylvania and MTurk study sample, Allegheny County and the United States.

<table>
<thead>
<tr>
<th></th>
<th>PA Mail Sample</th>
<th>Allegheny County</th>
<th>MTurk Sample</th>
<th>U.S.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>55%</td>
<td>52%</td>
<td>49%</td>
<td>51%</td>
</tr>
<tr>
<td>Mean age</td>
<td>56*</td>
<td>41</td>
<td>36.6</td>
<td>36.8</td>
</tr>
<tr>
<td>Education</td>
<td>96% finished high school</td>
<td>88% finished high school</td>
<td>59% completed college</td>
<td>53% completed college</td>
</tr>
<tr>
<td></td>
<td>44% completed college</td>
<td>21% completed graduate training</td>
<td>33% completed college</td>
<td>62% completed graduate training</td>
</tr>
<tr>
<td>Political affiliation</td>
<td>28% D</td>
<td>60% D</td>
<td>46% D</td>
<td>47% D</td>
</tr>
</tbody>
</table>

* sample mean age is statically higher than Allegheny County’s mean age

To what extent do people understand the difference in atmospheric residence times between common air pollution and carbon dioxide, as well as the sources of each?

ACKNOWLEDGMENTS

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