

The effects of the Great Depression and war on the rise in global average temperatures

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Abstract

This paper analyzes the effects of the Great Depression, which began in 1929 and ended in 1939, and the impact of the two world wars on global average temperature rise. The paper concludes that the war has accelerated the rise in global average temperatures. The more serious problem of war is that it makes it impossible for mankind to think calmly about the path of green and peaceful development, so mankind should strive to eliminate war.

1 Introduction

Now it seems that the rise in global average temperatures is a very certain thing (LINDSEY & DAHLMAN. 2024). The rise in global average temperatures is mainly caused by human activities. Economic development and wars are very common human activities, and their impact on the climate is very large. This article analyzes data from NASA (SMD Content Editors. 2024), and summarizes the impact of the Great Depression (GD) and the war on the rise of global average temperature.

2 The lag of global average temperature rise

Judging from the existing facts, there is a lag in the impact of human activities on global climate

change. For example, in terms of the relationship between the rate of global sea level rise and the rate of global average temperature rise after the end of the last glacial maximum (Denton, Anderson & Putnam. 2010), the impact of global average temperature rise caused by human activities should be 10 times higher than that time after the Industrial Revolution (Cheng & Luo. 2024). This means that sea levels have risen by about 1 meter every decade since the Industrial Revolution. However, current observational data suggest that the current sea level rise is nearly 3 cm in 10 years (Frederikse, Landerer & Wu. 2020). This proves that there will be a lag in the impact of human activities on sea level rise, etc. Of course, the same is true for the rise in global average temperature. After the invention of the steam engine, the global average temperature did not rise immediately. It is only after the carbon dioxide emitted by these industrial plants that it accumulates to a certain extent that it begins to cause a rapid rise in global average temperatures.

The principle behind it can be understood in this way, in the process of industrial production, a large amount of carbon dioxide will be produced, and the emission of these carbon dioxide in a short period of time is relatively small, but after a year, or even more time of accumulation, these carbon dioxide can produce observable effects in the atmosphere. After carbon dioxide accumulates to a certain extent, it faces the problem of heat accumulation in the earth's atmosphere. This heat comes mainly from the radiation of sunlight, but also from human-made heat engines and the burning of fossil fuels. In the case of sunlight, its radiation hits the ground and seawater, causing the ground and seawater to rise in temperature, which is then transferred to the atmosphere by convective heat dissipation. This process takes some time. So, to put it all together, the whole process goes like this: first, carbon dioxide is continuously emitted into the atmosphere, then it leads to the accumulation of heat, and eventually the temperature of the atmosphere rises. This process

still takes a long time, which is the reflection of the lag in the relationship between global warming and human activities.

3 Comparison of the GD and War with the Global average temperature Rise Curve

After taking into account the lag of the global average temperature rise curve, we can compare events such as the Great Depression GD and World War I (WW I) and World War II (WW II) with the global average temperature rise curve. The exact time nodes are marked with red boxes in Fig.

1. The temperature change data curve is from <https://climate.nasa.gov/vital-signs/global-temperature/?intent=121>.

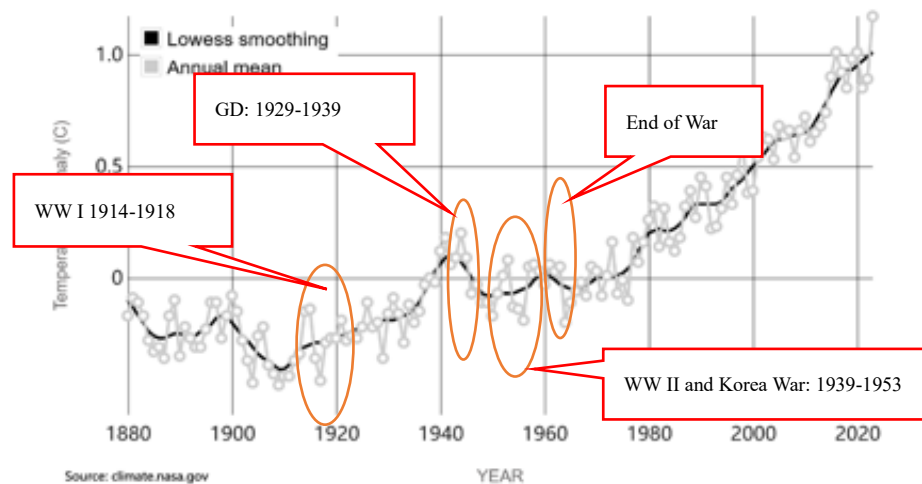


Fig. 1. The effects of the GD and war on global average temperatures

As can be seen in Fig. 1, the WW I lasted for a relatively short period of time from 1914 to 1918, and the resulting lag effect of global average temperature rise was also relatively short. Judging from the change in annual mean temperature in the figure, there was a relatively large

fluctuation in the global annual mean temperature during WW I. A year or two after the outbreak of the WW I, there was a rapid increase in the annual mean temperature, which is probably the cumulative effect of the rapid industrial development before the WW I. Two years after the outbreak of WW I, there was a rapid decline in annual mean temperatures. This may reflect the fact that the large amount of dust produced by the war enters the atmosphere and obscures the sun's rays, resulting in an immediate cooling effect during the war, resulting in a drop in the annual mean temperature. However, from the perspective of the change of the Lowess smoothing curve, the entire global average temperature rise process was relatively steady from the end of WW I to the emergence of the GD in 1929. This may indicate that overall industrial production was not severely affected during the WW I and that greenhouse gas emissions were sustained. Of course, the overall industrial scale during this period was not very large, and the carbon dioxide emissions produced at the same time were relatively small.

Between 1929 and 1939, the GD occurred. Global industrial production is in a state of extreme slump. Without the greenhouse gases and heat generated by large-scale industry, the Lowess smoothing global average temperature will drop rapidly. Of course, this reduction in global Lowess smoothing temperature will be delayed for some time. As we can see from the figure, there was a rapid rise in the Lowess smoothing curve of global average temperature during the GD, which reflects a very large growth in the global industrial scale before the GD, that is, before 1929. Rapid industrial growth led to the release of large amounts of carbon dioxide gas into the atmosphere, which had a cumulative effect during the GD, leading to a rapid rise in global average temperatures. This rapid rise in global average temperatures lasted for a decade.

Around 1939, the shrinking industrial scale caused by the GD caused a rapid decline in the

global average temperature. We can see that the rapid decline in the global average temperature from 1941 to 1944 in the chart probably reflects the contraction of industrial production caused by the GD.

This was followed by a steady increase in global average temperature from 1944 to 1960, which lasted about 16 years. This process of rising temperatures is believed to be related to WW II and the Korean War from 1937 to 1953. Due to the emergence of large-scale global modern warfare, the military industry has developed rapidly. This, in turn, leads to more greenhouse gases being emitted into the atmosphere. At the same time, the use of heavy machinery such as tanks and planes in WW II, the explosion of explosives, and other factors also produced more greenhouse gases. So many greenhouse gases were emitted into the atmosphere, which eventually triggered a resurgence in global average temperatures in 1944. This warming process ended in 1960. Then there was the decline in the global average temperature from 1960 to 1965. This process reflects the lag effect of the rapid reduction of greenhouse gas emissions from the operation of tanks and fighter jets and the explosion of explosives after the end of the Korean War, when a large number of military enterprises stopped production and production. Of course, during this period, industrial production for the production of civilian products gradually recovered. For example, in Japan, after the post-war economic collapse, the Japan economy grew by a maximum of 14% in the 15-year period from 1956 to 1970 (Kusago. 2007). Rapid industrial growth led to more greenhouse gas emissions into the atmosphere, which began in 1965 to lead to a steady increase in global average temperature.

Although in the 70s, 80s, 2000, and 2008 of the last century, there were oil crises, financial crises, etc. But after learning from the experience of the GD of the twenties, these economic and financial crises did not significantly slow industrial production, which meant that greenhouse gas

emissions rose steadily after the end of the Korean War. This results in a steadily rising global average temperature curve in Fig. 1.

4 Conclusions

From the analysis of this paper, we can see that firstly, there is a lag in the impact of human activities on climate change. This lag is related to the length of time of human activities, and if the greenhouse gases and other factors produced by human activities take a long time, then the global average temperature will also take a long time. Second, we can find that the strength of human economic activity has a direct impact on the change in global average temperature. In the GD of the late 20s of the 20th century, due to the global industrial production was at a standstill, which led to a serious decline in carbon dioxide emissions in the past 10 years, which directly led to a rapid decline in the global average temperature for a relatively long period of time after the 40s of the 20th century. Third, there is the impact of the war on the change in global average temperature. According to the results of this analysis, at the time of war, a large amount of dust was emitted into the atmosphere due to the explosion of countless explosives. These dusts are able to effectively shade the sun, resulting in a real-time drop in the global average temperature. This means that at the beginning of the war, the temperature will drop immediately. Fourth, the amount of dust that actually flew into the atmosphere during the outbreak of modern wars such as WW II was not very large. Modern warfare is mainly about the use of a lot of machinery. For example, tanks, planes, and so on. The main thing that these heavy machines emit is carbon dioxide. This carbon dioxide has a relatively good light transmission effect on visible light. But it is a greenhouse gas, so it is able to prevent heat from the Earth from radiating into outer space, causing the temperature of the

atmosphere to rise. But the greenhouse effect of carbon dioxide has a lag. In other words, a large amount of carbon dioxide is emitted into the atmosphere at the beginning, but it does not immediately increase the temperature of the atmosphere, but accumulates over several years, causing the global average temperature to rise. According to the results of this analysis, the global average temperature is still in the process of declining due to the reduction in greenhouse gas emissions caused by the GD in the early years of WW II. But at the beginning of the war, large quantities of greenhouse gases were emitted into the atmosphere, and over a period of several years, this cumulative effect occurred, and the global average temperature ushered in a rapid rise. Considering that even though WW II ended in 1945, there were some relatively large-scale wars in the following period, such as the Korean War and so on. As a result, the massive greenhouse gas emissions caused by the entire world war actually lasted for about a decade, that is, in 1953, when it officially ended. Fifthly, it is worth noting that there is a clear difference between industrial production in times of war and human peace. During the war, the main production was a variety of modern weapons, as well as aircraft, artillery and tanks suitable for war, and much more. Once the war stops, the production of these weapons stops, and the number of tanks and fighters and the time they operate decreases, leading to a noticeable drop in the greenhouse gases emitted into the atmosphere by these heavy machineries. This, of course, will cause a decrease in the global average temperature for some time to come. However, after the end of the war, human peacetime industrial production began to gradually recover, which eventually led to more carbon dioxide greenhouse gases being emitted into the atmosphere. This is the reason why global average temperatures have risen steadily since the 60s of the last century.

According to the results of this paper, both war and normal human industrial production will

lead to the emission of a large amount of greenhouse gases into the atmosphere, which is the basic cause of global average temperature. But the way and equipment that emit greenhouse gases are different from the normal industrial production and the war. So there will be a brief drop in global average temperature at the beginning of the war and at the end of the war. However, the outbreak of a huge global war will inevitably cause panic among mankind, which will lead to a faster population growth and greater demand for industrial products after the war. This increased demand means that more greenhouse gases such as carbon dioxide will be emitted into the atmosphere, triggering a severe increase in global average temperatures. Therefore, there is no problem in saying that the war accelerates global warming. What we want is to eliminate the danger of war altogether, so that humanity can concentrate on finding a green path. In such a green development path, it can not only meet the requirements of human beings to pursue a higher quality of life, but also will not have a large amount of greenhouse gas emissions that cause global warming. Of course, to achieve this goal, it takes a lot of sober human ingenuity. And to attain this sober human intelligence, it must be achieved without the threat of war.

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