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The Cause of "Atmospheric Rivers"

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Abstract

Extreme flooding due to "Atmospheric Rivers" has been observed for centuries, but they are considered to be natural events, with no known explanation for their occurrence.

However, it has been observed that they are always preceded by periods of higher temperatures caused by volcanic droughts (periods of 4-5 years without any VEI4 or higher volcanic eruptions), where there are no remaining volcanic Sulfur Dioxide (SO_2) aerosols circulating in Earth's atmosphere, or other instances where atmospheric SO_2 aerosol levels have been reduced, such as during American business recessions, (due to idled foundries, factories, etc.). With lower levels of SO_2 aerosol pollution in the atmosphere, temperatures rise, and heat waves, droughts, famines, and torrential downpours happen around the world.

Keywords: Atmospheric Rivers; Floods; Droughts; Volcanic Climatic effects; Climatic effect of decreased Atmospheric SO2 aerosols

1. Introduction

The Dec 26-Jan 10, 2023 California flooding has been attributed to an "Atmospheric River" and was strikingly similar to the Great California Flood of Dec 1861-Jan 1862 that flooded much of lower California, and other adjacent areas. That flood was also attributed to an "Atmospheric River", and was clearly a deadly natural event. However, as will be shown, the 2023 California flooding was largely man-made.

2. Discussion

VEI4 and larger volcanic eruptions inject sulfurous compounds into the stratosphere where they are quickly converted into the SO_2 aerosol, a mist of small Sulfuric Acid (H_2SO_4) droplets. These droplets are reflective, and cool the Earth's surface by reducing the amount of solar radiation reaching it. [1].

These aerosols eventually settle out of the atmosphere, and temperatures recover to pre-eruption levels, and usually, higher, due to the cleaner, more transparent air. The time for the settling-out process varies, but for VEI4 eruptions it typically takes 3-4 years (average: 41 months after an eruption) before the atmosphere is essentially free of circulating SO_2 aerosols, and temperatures rise enough to bring about drought conditions. [2].

The droughts occur because the near absence of SO_2 aerosols in the atmosphere results in the loss of SO_2 aerosol moisture nucleating sites, resulting in clear, cloudless skies, and an absence of precipitation.

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Because of the higher temperatures and cloudless skies, evaporation increases, and the atmosphere becomes saturated with moisture, forming ”Atmospheric Rivers” and releasing them around the world in random torrents of rain.

Up until the Industrial Revolution, (circa 1850) all “Atmospheric River” events would have been preceded by a drought caused by a volcanic “drought”, with essentially no volcanic SO2 aerosols in the atmosphere.

This was also partially true for the 1861-62 flooding, which followed a 48-month interval between volcanic eruptions, Fuego in Jan 1857 and Katia in May 1860. However, additional SO_2 decreases occurred due to concurrent business recessions and El Ninos. [3].

Figure 1 is a chart from Drought.gov which shows wet episodes following periods of drought within the United States, for the period 1850-1900. Similar episodes would have occurred around the world, due to the global distribution of SO_2 aerosol emissions.

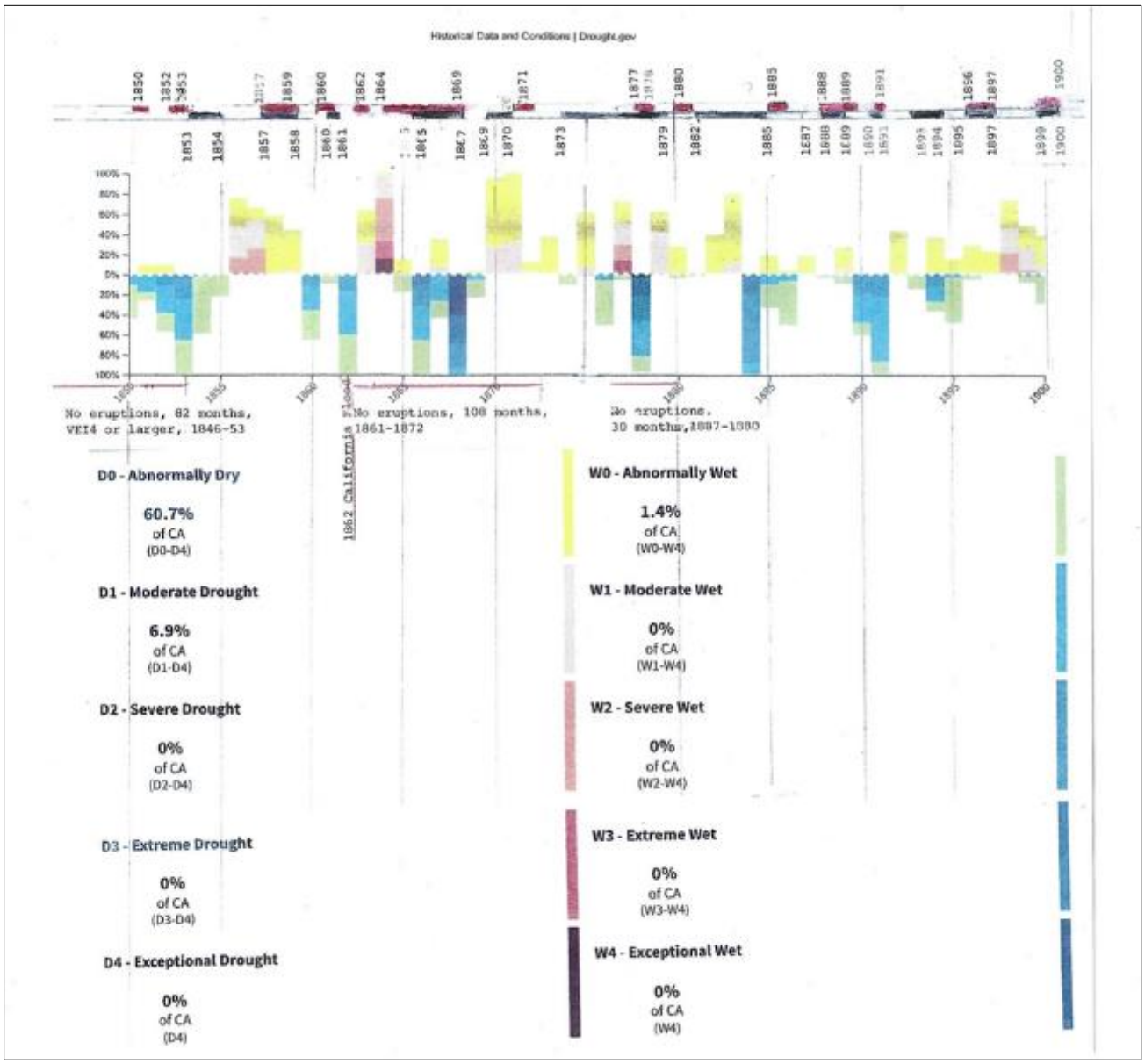

Figure 1 Incidences of Droughts and Floodings within the United States, 1850-1900

Black bars at top of the chart show periods of decreased SO_2 aerosol emissions due to business recessions, and the red bars show periods of El Ninos, also caused by decreased atmospheric SO_2 aerosol levels.

(It was initially thought that the downpours might have been caused by new SO_2 moisture nucleation sites from volcanic eruptions, but correlations were not always observed).

With respect to the 2003 California flood, it was preceded by a long drought (which began in 2000), meaning that atmospheric SO_2 aerosol levels were very low. Since the drought was not preceded by a volcanic drought, the decreased SO2 aerosol levels were the result of global Clean Air efforts to reduce Industrial SO_2 aerosol pollution, and to Net-Zero efforts to abandon the burning of fossil fuels, which also produces SO_2 aerosols.

Geoengineering by carefully re-introducing SO_2 aerosols, or some other dimming substance into our atmosphere, will be required to lower temperatures to earlier, more benign levels.

3. Conclusion

"Atmospheric River" Catastrophes naturally follow periods of drought caused by decreased levels of SO_2 aerosols in Earth's atmosphere.

The only way to avoid increasingly deadly weather events is to abandon all Net-Zero activities (which, if not abandoned, will inevitably also cause temperatures to rise to catastrophic levels), and to abandon continuing global "Clean Air" efforts to reduce SO_2 aerosol pollution.

References

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