California Wildfires: Role of Undisclosed Atmospheric Manipulation and Geoengineering

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Review Article

ABSTRACT

In this Review, we aim to reveal an unrecognised source of causality leading to increases in combustibility, intensity, and the extent of California, United States of America wildfires, and the concomitant harm to human and environmental health. We review literature, including scientific and medical, and evidence, including photographic, of near-daily, near-global jet-spraying particulates in the atmosphere as related to wildfires. We review the evidence that atmospheric manipulation utilising aerosolised coal fly ash is a primary factor in the extent and severity of forest fires in California and elsewhere; adverse effects include exacerbation of drought, tree and vegetation die-off and desiccation, and unnaturally heating the atmosphere and surface regions of Earth. Forest combustibility is increased by moisture-absorbing aerosolised particles that damage the waxy coatings of leaves and needles, reducing their tolerance to drought. The aerial climate manipulation using coal fly ash greatly increases the potential for forest fire ignition by lightening. Wildfires dramatically worsen baseline air pollution, emitting harmful gases and volatile organic compounds, and they both concentrate and re-emit toxic elements and radioactive nuclides over a wide area.

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The type of air pollution created by wildfires is associated with increased all-cause mortality, with the greatest impact on respiratory and cardiovascular disease. Studies have shown that aerosolised coal fly ash is an important risk factor for chronic lung disease, lung cancer and neurodegenerative disease. Failure to recognise multifold adverse consequences of jet-spraying particulates into the atmosphere, we submit, will continue the progression of ever-accelerating ecological disasters.

Keywords: wildfires, climate modification, atmosphere modification, forest fire health hazard, coal fly ash, geoengineering

1. INTRODUCTION

The California, USA wildfires (Fig. 1) are symptomatic of far more serious anthropogenic phenomena adversely affecting flora and fauna, including humans, worldwide [1]. The California (USA) wildfires are thus a microcosm of wildfires worldwide [2]. Climate change, specifically increased temperatures and increased water vapour pressure deficits [3-6], is considered a key factor driving California, regional and global wildfire increases. We agree with the assertion [7] that "human-caused climate change is now a key driver of forest fire activity in the Western United States," but the explanation proffered is grossly insufficient. Although wildfires are to some extent natural occurrences [8], the undisclosed, unnatural manipulations of our planet's atmosphere and hydrosphere that we describe in this review heat the atmosphere, exacerbate combustibility, and wreak anthropogenic environmental havoc of unprecedented magnitude.

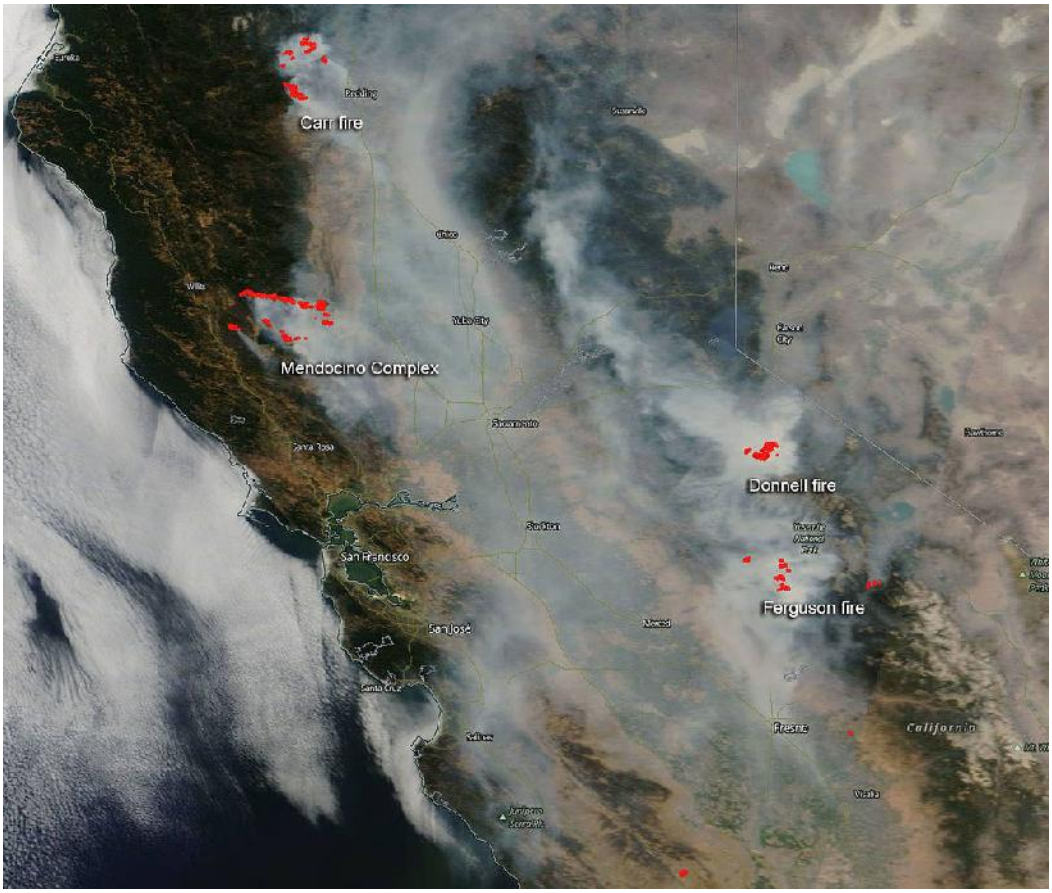

Fig. 1. August 7, 2018 NASA image [9] of the California wildfires, the largest in state history [9]

On December 12, 2017, the U. S. Forest Service reported that an additional 27 million trees, mostly conifers, died throughout California since November 2016, bringing the total number of trees that have died to a historic record of 129 million on 8.9 million acres [10]. Forest die-offs, with concomitant wildfires [11], are not confined to California, but are occurring globally [12]. The usual explanations given for the die-offs are combinations of global warming, drought, and bark beetles [13,14]. These explanations, however, are just consequences of a more fundamental human-caused attack on Earth's natural processes that has not been reported by academic scientists [15], but is the subject of this review.

The unprecedented numbers of tree deaths, while providing ready fuel for wildfires, is just one adverse consequence of the unnatural environmental manipulations that exacerbate the potential for major destructive wildfires whose occurrences are increasing in California and, indeed, globally [16,17]. Here we review the consequences of those unnatural and unreported climate manipulations with particular emphasis on their adverse implications to wildfires and to human health.

2. AEROSOL PARTICULATES SPRAYED WHERE CLOUDS FORM

Those who have lived in Southern California for many years, like author JMH, may remember when the skies were cerulean blue, often devoid of clouds, and when soon after sunset the air temperature would plummet [18]. Now California skies are filled with jet-laid particle trails, the state is experiencing its own form of 'global warming', and the air temperature very slowly lowers a bit after sunset. Night time temperatures are increasing more rapidly than day time temperatures [19]. These are the consequences of the deliberate jet-laid particulate pollution trails [20]. After exiting the jet as trails, they spread out, briefly resembling cirrus clouds, before becoming a whitish haze in the sky [21]. Heavy aerial spraying can make the sky artificially overcast, sometimes with a brownish hue. Fig. 2 shows examples of the consequences of such aerial particulate spraying in San Diego, California, USA on days devoid of natural clouds.

An article published December 6, 1958 in *The Bulletin* newspaper (Bend, Oregon, USA) reports one Congressman's complaint to the U. S. Air Force and describes jet trails in the sky over Palm Springs, California, USA as *"so thick that they are beginning to blot out the sun"* and are *"not disappearing but are breaking down into a haze and creating a cloud-like appearance in the sky"* [23]. Subsequently, observations with an ever increasing frequency of similar aerial jet-laid trails have been made by thousands of concerned citizens in California and around the world [21,24,25]. Around 2010 the aerial particulate spraying became a near-daily, near-global activity, presumably through a secret international agreement [1].

Initially the aerial particulate spraying was conducted in the United States by U. S. Air Force jets, like the one shown in Fig. 3 spraying over Palm Springs, California (USA). As the intensity, duration, and geographical area progressively increased undisclosed contractors became involved in the aerial pollution.

Fig. 4 is a time-sequence of photographs showing the particulate trail evolving from jet-spraying to natural spreading and thinning in the air on the way to becoming a white haze in the sky. All images were taken with the same magnification. The "t = 0 min." image was photographed in Coronado, California (USA) at 10:59 PDT on August 19, 2018 and shows one trail that was just emplaced; 13 minutes later the trail has somewhat spread out; at "t = 31 min." a second trail appears; and, at "t = 105 min. the two trails have considerably spread out on their way to contributing to the white haze in the sky.

This spreading is characteristic of particulate matter being sprayed and is wholly uncharacteristic of ice-crystal contrails, which potentially can form under certain very unusual conditions, i.e., if the aircraft exhaust contains appreciable moisture, the atmosphere is very cold and very humid, and the plane is flying at lower altitudes where air pressures are higher and ice-crystal evaporation time is reduced [26,27]. In usual circumstances, especially with modern jet aircraft, ice-crystal contrails, if they do form, quickly evaporate to become invisible water gas. Jet engine-exhaust ice-crystal contrails do not produce long trails across the sky and do not produce a white haze in the sky.

Jet-sprayed particulates absorb radiation and heat the atmosphere [20,28] as well as inhibiting rainfall until the clouds become overburdened and release their moisture in deluges and storms [29]. Upon settling to ground they absorb heat and change the albedo of ice and snow, further causing warming [30,31].

Fig. 2. Examples of deliberate jet-sprayed particulate pollution of San Diego, California (USA) skies on days devoid of natural clouds. Photos by author JMH from [22] with permission

Fig. 3. U. S. Air Force jet spraying particulate trails in the air above Palm Springs, California (USA). Photos courtesy of Dan Dapper

Fig. 4. Time sequence of photographs taken at the same magnification of particulate-trail spreading in the sky over Coronado, California (USA). Photos by author JMH

2.1 Systematic Misrepresentation of Aerial Particulate Spraying

A section of the 2005 U. S. Air Force Document AFD-0561013-001 written about the aerial spraying and entitled *The Chemtrail Hoax* states in part: *"There is no such thing as a 'Chemtrail'* [a term some use to describe the aerial spraying] … *Contrails* [ice crystals from aircraft exhaust moisture] *are safe and are a natural phenomenon. They pose no health hazard of any kind"* [32].

Retired U. S. Air Force Brig. General Charles Jones reportedly issued in part the following statement concerning observed trails in the sky [33]: *"When people look up into the blue and see white trails paralleling and crisscrossing high in the sky little do they know that they are not seeing aircraft engine contrails, but instead they are witnessing a manmade climate engineering crisis facing all air breathing humans and animals on planet Earth.... Toxic atmospheric aerosols [are] used to alter weather patterns, creating droughts in some regions, deluges and floods in other locations and even extreme cold under other conditions...."*

Concerned citizens have taken numerous photographs showing that the particulate trails observed are physically inconsistent with being ice-crystal contrails [25]. Fig. 5 consists of four photographs of a Qantas passenger jet taken over a period of less than two minutes. These four images conclusively demonstrate that the aerial particulate spray-activity undertaken by this commercial jetliner flying over Palm Springs, California is impossible to be confused with ice-crystal contrails.

Fig. 5. Photographs of a Qantas passenger airliner spraying erratic and interrupted particulate-trails wholly inconsistent with ice-crystal contrails without the aircraft having crashed from engine failure. Photos taken in Palm Springs, California (USA) by and courtesy of Dan Dapper

The upper-left, high-magnification photograph shows the Qantas passenger-jet engaged in aerial particulate spraying. The upper-right, low-magnification photograph shows the very long particulate trail, but note: The particulate density is not uniform along the trail length. Part of the particulate trail seems either to be missing or greatly reduced, indicating a malfunction. The lower-left photograph, like the upper-left, taken about one minute apart, shows the particulate spray mechanism to be still operational. But less than one minute later, the particulate spray mechanism ceases to operate, as shown by the lower-right photograph. Such a circumstance would be impossible for contrails. If those were ice-crystal contrails, their stoppage would have indicated engine failure and the airliner would have crashed.

Fig. 6. A FedEx cargo plane displaying one particulate trail not associated with engine exhaust and therefore not a contrail. Photos taken in Palm Springs, California (USA) by and courtesy of Dan Dapper

Fig. 6 shows two images of the same FedEx cargo aircraft spraying particulate trails in the sky over Palm Springs, California. Note that one of the trails is not associated with an engine. Spray outlets are typically located near engines so as to give the (false) illusion that the trails are coming from the engines. In the instance shown in Fig. 6, one trail is not associated with an engine at all, demonstrating that the aerial spray cannot be a contrail; genuine contrails, which are rare with modern jet engines, must have engine exhaust and can form only under very special cold and humid conditions, if they can form at all.

There has been no publically available information as to what substance(s) is being sprayed. Absent reliable information, citizens took post-spraying rainwater samples and had them analysed at commercial laboratories. In most cases, they requested only aluminium analysis, sometimes also barium, and sometimes strontium as well. The presence of these elements dissolved in rainwater was mistakenly assumed to mean that those three elements were being sprayed into the air as metals. What the data mean is that moisture in the air dissolves and extracts some elements from the main jet-sprayed substance.

To understand by an analogy of the chemical process involved, consider the hypothetical example of finely powdered tea leaves being sprayed into the region where clouds form. Atmospheric moisture would "brew" the tea, extract tannin and other chemicals, which would come down as rain, with chemical signatures of tea. The rain would indeed be tea, albeit very weak tea.

3. EVIDENCE CONSISTENT WITH TOXIC COAL FLY ASH AERIAL SPRAYING

As the aerial spraying became a near-daily activity in San Diego (USA), one of us (JMH) began a series of investigations aimed at ascertaining the composition of the aerosolised particles. Comparing Internet-posted 3-element rainwater analyses to corresponding experimental water-extract analyses of a likely aerosol provided the first scientific forensic evidence that coal combustion fly ash is consistent with the main particulate-pollutant substance being jet-sprayed into the atmosphere [34]. Later, comparison of 11 similarly-extracted elements validated that result [35]. Further consistency was demonstrated by comparing coal fly ash analyses to 14 elements measured in air-filter trapped outdoor aerosol particles [29] and to 23 elements measured in aerosol particles brought down during a snowfall and released upon melting [35,36].

During formation, coal traps various chemical elements that were present in the environment, many of which are harmful to human and environmental health [37]. When coal is burned by electricity-producing utilities, about 10% remains as ash. Burning coal thus concentrates the harmful elements in the ash. The heavy ash that is formed settles beneath the burner. The light ash, called coal fly ash (CFA), forms by condensing and accumulating, typically as tiny spheres (Fig. 7), in the hot gases above the burners [38,39]. This is an alien environment with no counterpart in nature, except in coal-deposit fires [40]. Consequently, many of the elements present in CFA, including aluminium, are readily extracted by exposure to moisture [41]. Coal fly ash, newly formed above the burner, would exit smokestacks, if not trapped and sequestered, as required by Western nations.

Being one of the world's largest industrial waste products, the annual global production of CFA in 2013 was estimated to be 600 million metric tons [42]. Coal fly ash is a cheap waste product that requires little additional processing for use as a jet-sprayed aerosol as its particles form in sizes ranging from 0.01 – 50 microns (μm) in diameter [43]. Moreover, CFA's ability to be partially extracted into atmospheric moisture, thus making moisture droplets more electrically conducting [41], is both unique and highly desirable for some purposes.

From time to time, other substances may be used for specific purposes or added to the CFA, for example, to minimise clumping caused by van der Waals forces. Nevertheless, the ubiquitous presence of CFA-extractable elements found in rainwater in California and around the world indicates that the main substance sprayed into the regions where clouds form is consistent with CFA. Coal fly ash – cheap, widely available, and with useful properties – is thus an ideal aerosol, if one has absolutely no concern for human and environmental health.

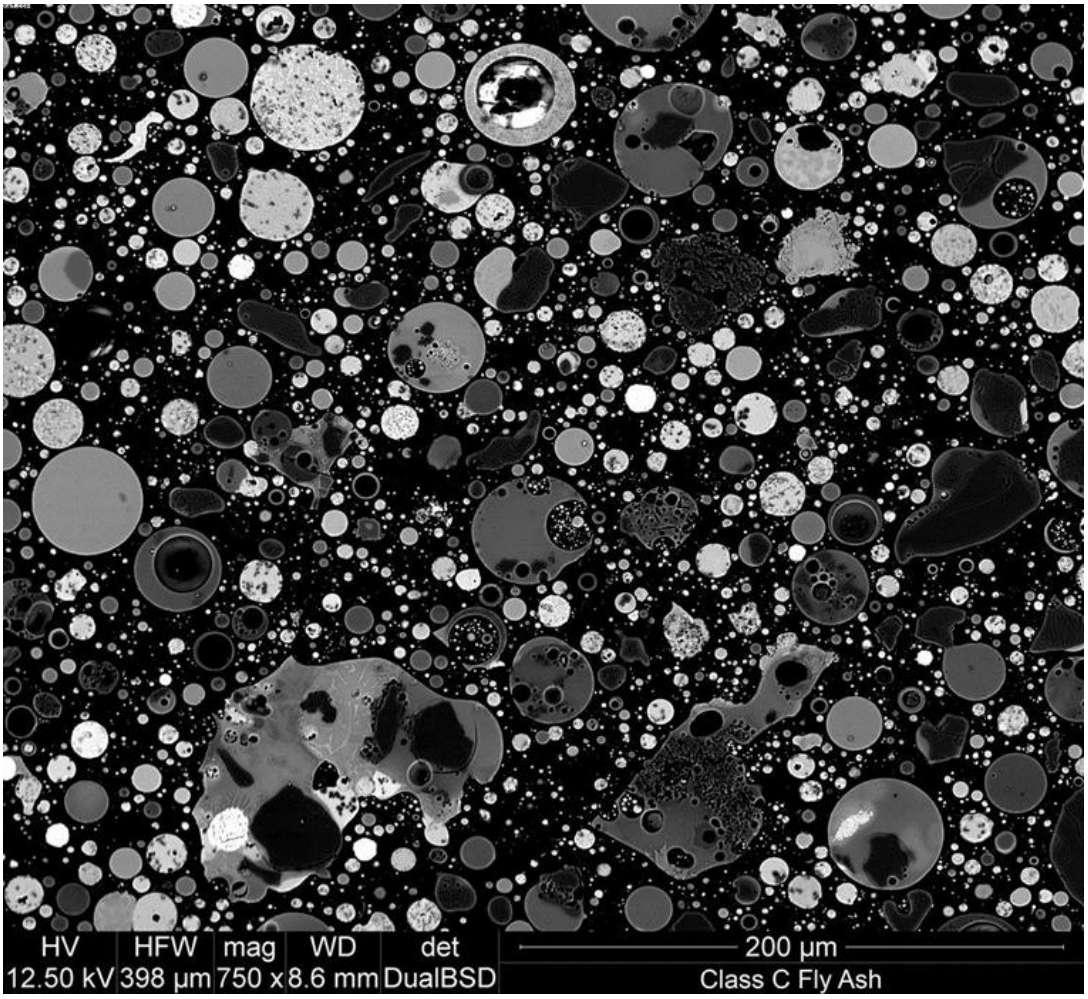

Fig. 7. Polished cross section of ASTM C 618 Class C coal fly ash embedded in epoxy. The image was obtained from back-scattered electrons which show differences in atomic density represented by variation in gray scale. Photo courtesy of Wabeggs: CC BY-SA 3.0

4. CONSEQUENCES OF AERIAL PARTICULATE SPRAYING

The purposes of the aerial spraying, like the composition of the aerosol particulates, are closely held secrets. The physical behaviour of the aerosol particles, however, is known or can be deduced. Thus, one may not know the intentions, but one can reveal the consequences of the aerial spraying.

4.1 Inhibiting Rainfall

The aerosol particles being jet-sprayed into the regions where clouds form are in fact pollution particles. In 2003 NASA [44] produced a webpage animation entitled “Particulates Effect on Rainfall” which contained the following explanation: “*Normal rainfall droplet creation involves water vapour condensing on particles in clouds. The droplets eventually coalesce together to form drops large enough to fall to Earth. However, as more and more pollution particles (aerosols) enter a rain cloud, the same amount of water becomes spread out. These smaller water droplets float with the air and are prevented from coalescing and growing large enough for a raindrop. Thus, the cloud yields less rainfall over the course of its lifetime compared to a clean (non-polluted) cloud of the same size."* NASA thus provided an easy to understand explanation of one of the principal consequences of the aerial spraying, preventing rainfall, although it is an incomplete explanation as it does not mention the downpours, deluges, and storms that may occur

when clouds become too overburdened with moisture.

Ultrafine particles in coal fly ash are effective precursors of cloud condensation nuclei (CCN). These particles modify cloud microphysics and precipitation intensity and distribution. Those changes in the precipitation budget may result in a shift from more frequent steady rain to very vigorous rain events and regional reduction of annual precipitation [45].

4.2 Heating the Atmosphere

Among other reasons, life on Earth is possible because its natural processes maintain a very delicate thermal balance. Our planet continuously receives a vast amount of energy from the sun, through a broad energy spectrum, as well as producing some heat energy internally. Essentially all of that energy must be continuously radiated into space as heat (infrared radiation). Pollution particles sprayed into the region where clouds may reflect some solar radiation, but they also absorb radiation, become heated, and then transfer that heat to the atmosphere by collisions with atmospheric molecules. Coal fly ash is known to be an efficient radiation absorber [28]. The consequence is that the surrounding atmosphere is heated, its pressure increases, and Earth fails to lose the requisite amount of heat thus leading to global warming.

Some in the scientific/academic community, while ignoring the ongoing aerial particulate spraying, promote the fallacious idea that at some time in the future it might be necessary to place particles into the atmosphere to block some sunlight, 'sunshades for the Earth,' to counteract supposed greenhouse gas global warming [15,46]. That proposition is misleading and incorrect, a circumstance not unlike dousing a fire with gasoline to cool it down. Instead of global cooling, the on-going aerial particulate spraying is causing global warming. Even the increased jet traffic exacerbates global warming [47].

4.3 Heating the Surface Regions

The aerosol particles, jet-sprayed into the atmosphere where clouds form, do not remain there, but are circulated by atmospheric convection currents, eventually settling to ground where they absorb solar radiation [30,31]. If they happen to land on ice or snow they change the reflective properties (albedo) causing less light to be reflected and more to be absorbed, thus adding to global warming [48].

4.4 Making Atmospheric Water More Electrically Conducting

Coal fly ash, which formed in the unnatural environment above coal-burners, when subjected to water results in many of its chemical elements to some extent being dissolved in the water. Laboratory studies have shown that as many as 38 such elements are dissolved to some degree and cause the water to become quite electrically conducting [41]. Making atmospheric moisture more electrically conducting may potentially be exploited to further heat the atmosphere with microwaves, like heating water in a microwave oven, or using electromagnetic energy to facility movement of weather masses.

4.5 California Drought Caused by Aerial Particulate Spraying

Our planet rotates and some of its rotational energy is transferred to the atmosphere; that is the primary mover of whether air masses. Additionally, weather masses move, driven by differences in pressure, from high pressure to low pressure regions. The near-daily, year-after-year aerial particulate spraying along the California coast and off-shore in the Eastern Pacific Ocean heats the atmosphere. The nearly continuously heated atmosphere results in nearly continuously elevated atmospheric pressures. That artificially-created high-pressure zone along California's coast acts like a wall to prevent the flow of Pacific Ocean moisture-laden weather masses from coming ashore (Fig. 8). The consequence is a persistent artificial drought for California. As one author (JMH) observed, sometimes after a weather forecast predicting rain in a few days, the spray-jets intensify their spraying thus often preventing the predicted rain.

4.6 Causing Tree Death

Aluminium is one of the major elements of Earth's crust, but it is locked up tightly with other elements, especially oxygen. Consequently, neither plants nor animals developed the ability to live well in an environment with aluminium in a 'chemically mobile form' in which it is dissolved in water [49]. One of the consequences of the aerial spraying of CFA is that atmospheric moisture extracts aluminium in a 'chemically mobile form' [41]. Trees, especially conifers, all along the

coast of California, are watered by fog that is contaminated with dissolved aluminium and other toxins. The fog-water condenses on the needles, where the toxins become concentrated by partial evaporation. Eventually, the toxin-bearing fog water drips to the ground and slowly poisons the trees thus weakening their defences to bark beetles and other pathogens [50]. Fig. 9 shows two dead Torrey Pines silhouetted against the toxin-sprayed sky that is a primary underlying cause of tree-death along the coast of California [50]. The aerial particulate spraying observed in Fig. 9 is a common occurrence along the California coast that presumably is being done to create an artificial high-pressure zone to keep the Eastern Pacific moisture-laden clouds from coming ashore (Fig. 8).

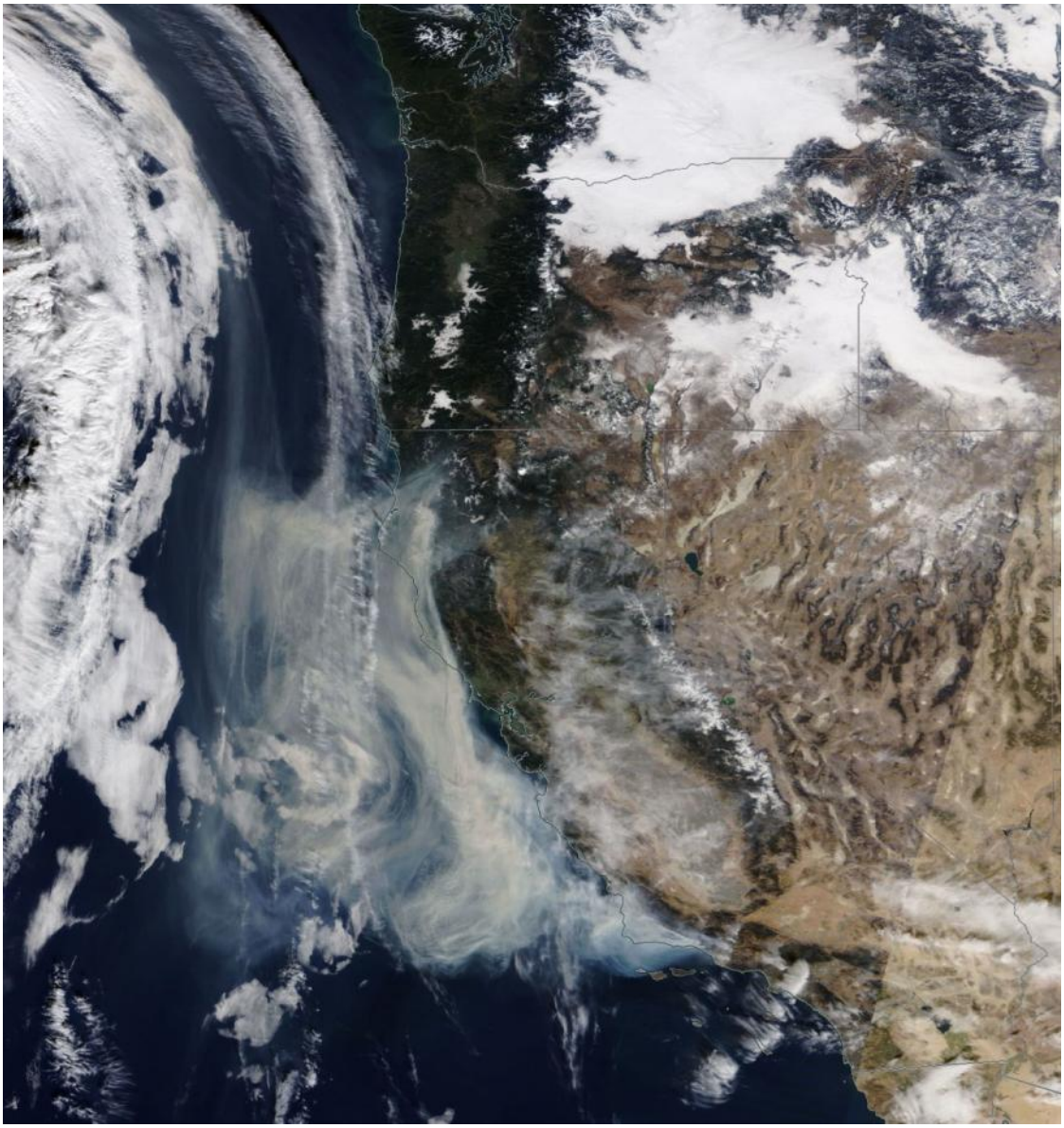

Fig. 8. NASA Worldview of the California coast on December 11, 2017. Weather masses in the Eastern Pacific ocean typically rotate counterclockwise due to Coriolis forces associated with Earth's spin as they move eastward. As the weather masses move eastward they bring moisture-laden clouds ashore, unless artificially prevented from doing so by aerial particulate spraying

Fig. 9. Dead endangered Torrey Pines in San Diego backlighted by sky perverted by toxic aerial spray. From [50] with permission

Coal fly ash, jet-sprayed into the atmosphere, contains substances, such as chlorine, that can damage Earth's atmospheric ozone which shields the surface from the sun's ultraviolet light. Exposure of trees to increased levels of ultraviolet radiation is capable of further weakening the trees' natural defenses [50-53].

In addition to facilitating wide-spread tree-death, CFA jet-sprayed into the atmosphere may be a primary cause of the global, dramatic decline of bee and insect populations and diversity [54]. Pollinator and tree die-offs have major adverse impacts on the agricultural and forest-products industries.

5. AERIAL PARTICULATE SPRAYING EXACERBATES WILDFIRES

The following circumstances contribute to the proclivity for wildfires in California. Coal fly ash persistent aerial spraying, near-daily, year-after-year, along the coast and in the Eastern Pacific Ocean offshore of California causes:

- The widespread and persistent aerial particulate spraying, especially along the coast of California, has created an long-term artificial drought by inhibiting rainfall and by blocking moisture-laden weather fronts from moving in from the Pacific Ocean with a coastal-wall of artificial high-pressure zones [55].
- In addition drought conditions caused by aerial spraying of particulate-pollutants, which damage trees and exacerbate wildfire risks, there is another adverse consequence. Coal fly ash, and perhaps potentially other aerosolised substances, is capable of absorbing moisture. Moisture-absorbing particles have been shown to damage the waxy coatings of tree leaves and needles which reduce their tolerance to drought [56]. The scale of present tree mortality is so large that greater potential for "mass fire" exists in the coming decades, driven by the amount and continuity of dry, combustible, large woody material that produces large, severe fires [57].
- The aerial particulate spraying has significantly increased California temperatures through particulate-caused atmospheric heating and reduction of

Earth's necessary and natural heat loss. Warm air with unnaturally high temperatures increases and exacerbates the risk for forest fires [16,17].

- Increased lightning strikes from unnaturally dry and aerial particulate electrostatic charges increase the number of wildfires [58].
- Although speculative, the possibility should be considered that perhaps the aerosolised particulate matter upon settling on trees and vegetation may under some circumstances become pyrophoric, capable of ignition [59-62].

6. ADVERSE HUMAN HEALTH CONSEQUENCES OF WILDFIRES

Wildfire smoke is an important and growing risk to public health [63]. Systemic review shows a positive association between exposure to wildfire smoke (including particulate matter $PM_{2.5}$) and all-cause mortality and especially respiratory disease, including pneumonia, asthma, and chronic obstructive pulmonary disease (COPD) [63]. Susceptible populations include people with respiratory and cardiovascular disease, older adults, children, and pregnant women [63]. Analysis of an extensive wildfire season in California (2015) showed elevated risks for both cardiovascular and cerebrovascular disease, especially in adults over 65 [64]. A multi-year study of exposure to wildland fire episodes in the U.S. (2008-2012) revealed major public health and economic burdens, with certain population subgroups disproportionately affected [65]. Besides adverse effects on respiratory and cardiovascular disease, general categories of health risks from forest fires include acute smoke inhalation, burns, heat-induced illness, ophthalmic (eye) disease, and psychiatric problems [66].

Wildfire smoke consists of particulate matter (PM) and gaseous products of combustion [66]. PM_{10} particles (which are able to pass the upper respiratory tract and deposit in airways), and the smaller $PM_{2.5}$ particles (which can go deeper into the lungs) are produced by burning vegetation [66]. Gaseous emissions, including carbon monoxide, nitrous oxide, and benzene, are produced, as are polycyclic aromatic hydrocarbons (often present on PM), aldehydes, and volatile organic compounds [66]. Several studies have documented the remobilisation of metals from fire events, and significant levels of toxic (e.g. lead/mercury) and non-toxic metals are emitted into the environment during fires [67]. Ash from California fires was found to contain toxic levels of heavy metals including arsenic, cadmium, and lead [68]. Wildfires concentrate alpha-emitting radionuclides found in CFA, especially polonium-210, reaching radiotoxic levels of 7,255 ± 285 Bq/kg [69].

Due to the sporadic and unpredictable nature of wildfires and the tendency for air pollution monitors to be situated in urban centers, there have been few studies of the toxicity of wildfire smoke particulate matter (PM) [70]. However, a study of toxicity of coarse and fine PM from the California wildfires of 2008 showed wildfire PM was more toxic to the lungs than equal doses of PM collected from ambient air from the same region during a comparable season [70]. The wildfire coarse PM is about four times more toxic to alveolar macrophages than the same sized PM from normal ambient air (no wildfires). The majority of the toxic effects (cytotoxicity) of wildfire PM in the lungs are a result of oxidative stress [71]. Active components of coarse PM from wildfire particulate matter include heat-labile organic compounds [71]. In California, there is heavy use of pesticides in agriculture including at the urban interface. When wildfires burn, these chemicals and their combustion products are volatilised and can be inhaled by humans. Toxic components of forest fire/wildfire smoke and ash are typically transported long distances from the source of the fire [72].

7. ADVERSE HEALTH CONSEQUENCES OF AERIAL SPRAYING

7.1 Health Issues Related to Air Pollution

Air pollution is already the leading environmental cause of disease and death worldwide, and it is increasing at an alarming rate [73]. Exposure to ambient fine particulate matter ($PM_{2.5}$) air pollution is a significant risk factor for premature death, including ischemic heart disease, chronic obstructive pulmonary disease, and respiratory infections [74]. Long-term, cumulative exposure to fine particulate matter in the United States is associated with all-cause mortality, cardiovascular disease, and lung cancer [75]. In recent years, emerging evidence from clinical, observational, epidemiological and experimental studies strongly suggest that Alzheimer's Dementia, Parkinson's, and thrombotic stroke are associated with ambient air pollution [76]. Children residing in highly polluted urban environments were found to have cognitive

deficits, and the majority of them showed brain abnormalities on MRI [77].

7.2 Health Issues Related to Aerosolised Coal Fly Ash

Climate manipulation utilising aerosolised coal fly (CFA) constitutes a deliberate, undisclosed and global form of air pollution. Coal fly ash is also an extremely dangerous form of air pollution, with far-reaching implications for human and environmental health. Coal fly ash contains $PM_{2.5}$, ultrafine (UFP) (0.1-1 um) and nanometer-sized (<100 nm) particles [78]. UFP's are among the most toxic particles based on their greater number, larger content of redox active compounds, greater surface-to-mass ratio, and ability to penetrate cell walls [79]. Characterisation of CFA particles by transmission electron microscopy reveals spherules often embedded in a silicon matrix containing metals including iron and aluminium [78]. Bioavailable iron, associated with reactive oxygen species and oxidative stress, is derived from the glassy alumino-silicate fraction of CFA particles [80]. Coal fly ash contains multiple toxic trace elements including arsenic, cadmium, chromium, lead, mercury, nickel, selenium, strontium, thallium, and titanium [81]. Coal fly ash also contains small amounts of radioactive nuclides and their daughter products [82] and polycyclic hydrocarbons like benzopyrene which is known to be carcinogenic [83].

We have shown that aerosolised coal fly ash utilised in atmospheric geoengineering operations is an important risk factor for chronic obstructive pulmonary disease (COPD) [84], lung cancer [85], and neurodegenerative disease [86]. Ultrafine and nanoparticles in CFA are inhaled into the lungs and produce numerous toxic effects, including decreased host defences, tissue inflammation, altered cellular redox balance in the direction of oxidation, and genotoxicity. Oxidative stress and inflammation contribute to both acute and chronic lung disease [84]. Coal fly ash contains a variety of carcinogenic substances including silica, arsenic, cadmium, hexavalent chromium, and alpha-emitting radionuclides. Radical generation catalysed by transition metals associated with PM in CFA result in cell signaling, transcription factor activation, mediator release, and chronic inflammation [85]. One such transition metal, iron, induces cancer stem cells and aggressive phenotypes in lung cancer [87]. The recent finding of spherical exogenous (pollution) magnetite (Fe_3O_4) nanoparticles in the brain tissue of persons with dementia [88] suggests an origin in air pollution produced by typically-spherical CFA particles. Primary components of CFA (Al, Fe, and Si) are all found in the abnormal proteins that characterise Alzheimer's Dementia, and the presence of these elements leads to oxidative stress and chronic inflammation. Energy absorbed by magnetite pollution particles from external electromagnetic fields may contribute to human neuropathology [86].

8. CONCLUSIONS

The California wildfires, as evidenced from our review, are exacerbated by undisclosed and largely unrecognised, large-scale jet-spraying of particulate matter in the region where clouds form which has become a near-daily, near-global activity. The California wildfires are thus a microcosm of similar global catastrophes.

The public has been misled by the government and military officials, by the United Nations, and by members of the scientific community who either turn a blind eye to the aerial spraying or falsely claim that the particulate matter jet-sprayed into the atmosphere is harmless jet-exhaust water-ice. Deliberately polluting the atmosphere with particulate matter is not only unconscionable, but disastrous to human health as air pollution is already the leading environmental cause of disease and death worldwide, and it is increasing at an alarming rate.

We review the evidence that atmosphere manipulation utilising aerosolised coal fly ash is an undisclosed and largely unrecognised primary factor in the extent and severity of forest fires in California, Western North America, and elsewhere. Adverse effects of this type of climate manipulation include exacerbation of drought, tree and vegetation die-off and desiccation, and unnaturally heating the atmosphere and surface regions of the Earth.

Combustibility of trees and vegetation at canopy and ground level is increased by moisture-absorbing aerosolised particles that damage the waxy coatings of leaves and needles, reducing their tolerance to drought. While humans start most wildfires, the aerial atmosphere manipulation using coal fly ash and possibly other substances greatly increases the potential for natural ignition of forest fires by lightening.

Forest fires dramatically worsen baseline air pollution, emitting harmful gases and volatile organic compounds, and they both concentrate and re-emit toxic elements and radioactive nuclides over a wide area. The type of air pollution created by forest fires is associated with increased all-cause mortality, with the greatest impact on respiratory and cardiovascular disease. In addition to forest fire pollution adverse health effects, studies have shown that aerosolised coal fly ash is an important risk factor for chronic lung disease, lung cancer and neurodegenerative disease.

Concerned citizens should recognise the multifold adverse consequences and take actions to halt jet-spraying particulates into the atmosphere. Otherwise, we submit, the ever-accelerating progression of ecological and human health disasters will continue.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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