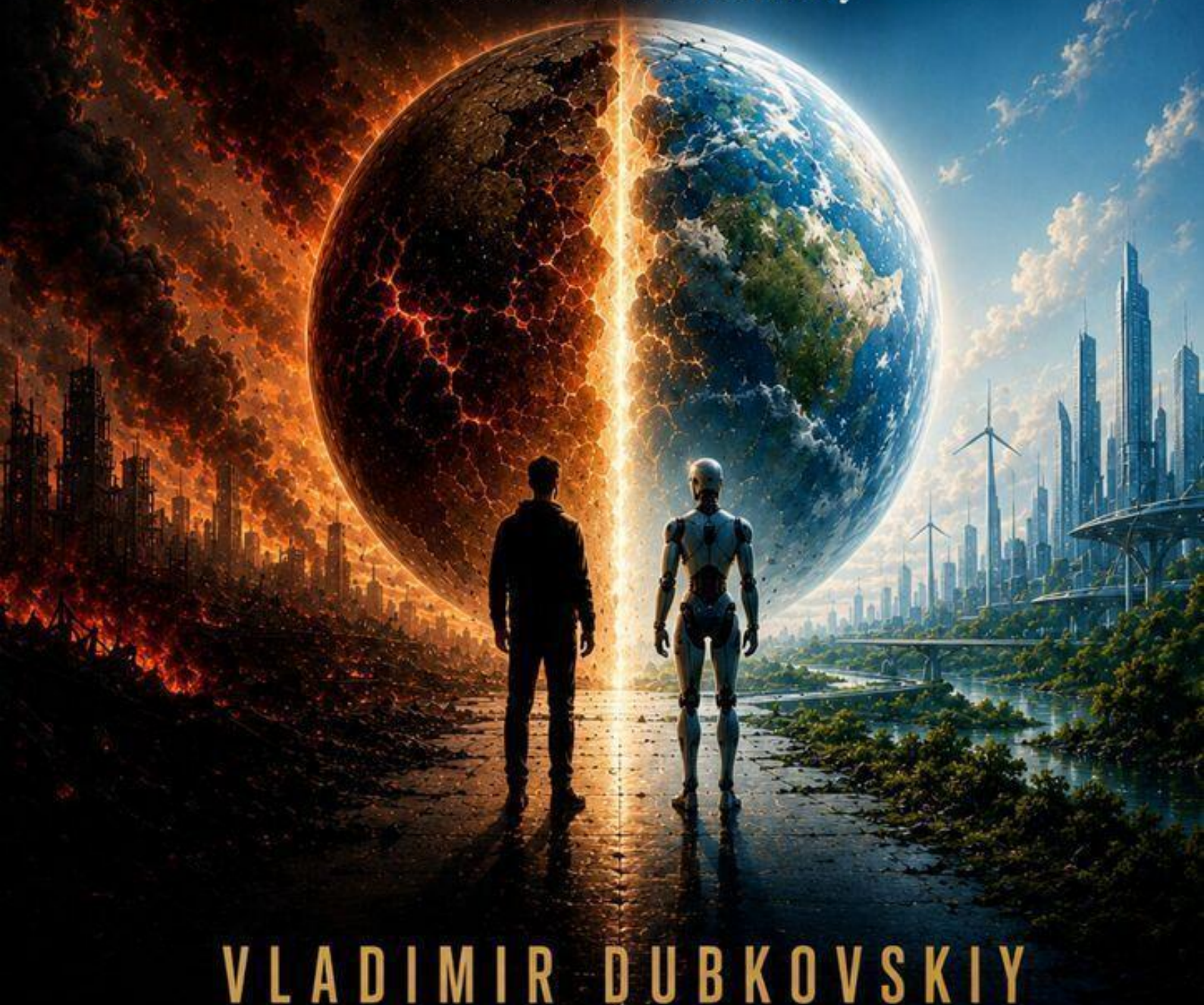


18+

2030

THE LAST CHANCE

Why Superhuman AI
Could Save Humanity



VLADIMIR DUBKOVSKIY

Vladimir Dubkovskiy

**2030: The Last Chance. Why
Superhuman ai could save humanity**

«Издательские решения»

Dubkovskiy V.

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V. Dubkovskiy — «Издательские решения»,

This book is a bold synthesis of science, philosophy, spirituality, and civilizational analysis. It offers an original answer to one of the defining questions of our time: does humanity have a future in the age of Artificial Superintelligence (ASI)?

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2030: The Last Chance

Why Superhuman ai could save humanity

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This book is about the future of humanity at the moment when several existential threats are converging into a single point.

Climate destabilization, nuclear war, engineered pandemics, and the rapid advance of artificial intelligence are not separate crises. They are parts of one “perfect storm” for which modern civilization is not prepared.

Most books about AI offer two scenarios: superintelligence will destroy humanity, or it will become an electronic god that builds paradise on Earth. Vladimir Dubkovskiy offers a different view. In this book, ASI is considered neither an executioner nor a savior, but a possible instrument for stabilizing a world that human beings can no longer hold together on their own.

But the book’s central question goes deeper than technology: if superintelligence is truly coming, what in the human being is worth preserving?

The author searches for an answer at the intersection of science, philosophy, history, the theory of consciousness, and spiritual tradition. His conclusion is both alarming and hopeful: the emergence of another intelligence may become not the end of human civilization, but its last chance to return to the meanings it has lost.

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Author's Preface

This book is an invitation to reflect on the questions that will determine the fate of humanity in the coming decades.

On one side stand the growing threats of nuclear war, engineered pandemics, and climate catastrophe. On the other stands the realization that the old ways of solving problems no longer work, while human nature remains essentially what it was thousands of years ago.

Into this fracture, into this “perfect storm,” enters something that has never existed before: artificial intelligence. Not merely a tool, but a new form of intelligence. And that changes everything.

There are many facts in this book, but facts are not an end in themselves. Facts without meaning are as ambiguous as a knife in a human hand: it may be the weapon of a murderer or the instrument of a surgeon. That is why, while examining the threats before us, I continually return to the questions that are usually left outside the discussion: Why are we here? What makes us human? And if we create an intelligence that surpasses our own, will we be able to exist with it on the same planet?

The answers to these questions will determine not only how we meet superintelligence, but also what kind of human beings we will have become by then.

Chapter 1. The Perfect Storm

*“But the day will come when Ra will take back all life, scorching the living and turning all that blooms into desert...”
— From the Egyptian Coffin Texts,
Middle Kingdom period.¹*

The fear of the End of the World has been part of human life since time immemorial. It can be compared to ocean waves: at times they sweep over the land in a destructive tsunami, then for a while recede and grow calm — only to return soon after and crash down upon humanity with renewed force.

How well founded is this fear? And if it is, when and how will the End of Days arrive?

In ancient times, fear of the End of the World was not merely a superstition, but a complex cultural and psychological mechanism. It helped people explain, and give meaning to, terrifying phenomena that led to the deaths of vast numbers of human beings: volcanic eruptions, floods, droughts, earthquakes, epidemics.

Wars, invasions, and the fall of empires were experienced by contemporaries as harbingers of the End of the World. So too were solar eclipses, the appearance of comets, and the coincidence of planetary cycles.

What, then, leads modern people — far removed from the superstitions of earlier ages — to return to the theme of the End of the World? There is a whole series of objective reasons for this, visible even to the naked eye.

The first is the steady increase in both the number and the power of natural disasters. Each such event becomes a reminder of an ancient fear, as though reviving humanity’s archetypal memory. And although we explain these phenomena in the language of science, the emotional reaction remains the same: anxiety, a sense of approaching danger, a foreboding of the end.

Yet probable death as a result of climate catastrophe is only one facet of apocalyptic fear. Humanity also carries the memory of other forms of mass death.

The pandemic of 2020—2021 painfully reminded us of earlier epidemics — plague, smallpox, measles, malaria, AIDS — that claimed hundreds of millions of lives.

The possibility of a Third World War has once again become a subject of discussion in the media and in expert circles.

Not long ago, the subject of nuclear weapons was under an unspoken taboo. After the Cuban Missile Crisis of 1962, people rightly concluded that the use of such weapons by either side would inevitably lead to the destruction of all humanity. Yet now the possible use of nuclear weapons is discussed almost casually — at expert forums, on television programs, across social media. What half a century ago was considered unthinkable has become part of the everyday information environment.

And quite recently, a fourth rider has joined these “three horsemen of the Apocalypse,” born in the depths of modern technology: artificial intelligence. What only yesterday seemed a technological miracle is now perceived as a potential threat. The media are filled with predictions of the imminent emergence of a superintelligence that will break free of human control and destroy humanity.

And historical “roots” were quickly found for this threat as well: the medieval legend of the Golem, a monster created by man that first served people, then slipped out of control, began destroying the city, and brought harm to its inhabitants.

It is obvious that a direct link has survived between modern apocalyptic moods and ancient psycho-cultural mechanisms. We can see archaic structures of consciousness being clothed in digital and scientific garments.

Climate anxiety is a new “Great Flood” or a new “Great Winter of Ragnarök,” only stretched out over time and confirmed by models. We see the same archetypes: coastlines under water, crop failures brought by drought, migrations of peoples. Chaos no longer comes from the gods; it is generated by a broken “covenant” with nature.

A pandemic is a direct parallel to pestilence as a biblical punishment or a sign of the end. A global, invisible threat that disrupts the familiar order has activated the same archetypes: the search for the guilty (“sinners”), the expectation of a “saving vaccine” (a miracle), rituals (self-isolation, masks as new taboos).

The nuclear threat is an apocalypse of fire — pure and instantaneous. It parallels the purifying fire of Christianity and Ragnarök in Germanic and Norse mythology. The symbol of “nuclear winter” unites the archetypes of fire and ice.

Artificial intelligence is a creation that has slipped beyond its creator’s control — the Antichrist risen against God, the enemy of Christ and his false substitute, seeking to draw human beings after it.

Fear of the End of the World is fed by the daily stream of news about yet another temperature record, forest fire, military conflict, political crisis, or breakthrough in AI-related research. One might say that this stream has come to function as an apocalyptic calendar, and that we ourselves search it for — and find in it — the “signs of the end.”

Various numbers and graphs — for example, rising CO₂ levels or the curve of disease growth — become sacred omens interpreted by a new class of “priest-scientists.”

Scientific data have become a new language for describing the same ancient catastrophes. We mythologize scientific facts by fitting them into familiar narratives of the end.

So the structure of apocalyptic thinking has remained the same; only the context and the “scenery” have changed.

We have not changed. We have simply recoded archaic myths into the language of science and technology.

At the same time, a break with antiquity should still be noted.

Ancient myths, even the darkest of them, always contained hope: the salvation of the righteous, the renewal of the world, the coming of a savior — Vidar in Norse mythology, Jesus Christ in Christianity, Kalki in the Hindu tradition.

Modern apocalypses grounded in science are stripped of any built-in “happy ending.” In scenarios of nuclear winter or climate collapse, there is no room for divine intervention or guaranteed renewal. It is a pure, meaningless end.

That is what makes modern apocalyptic fear especially toxic: it paralyzes rather than mobilizes, unlike the fear of sin, which once mobilized people toward virtue.

To sum up this interim conclusion, one may say that the ancient fear of the End of the World has not gone away; it has simply been transformed — and in recent years even intensified. And the blame for this lies not only with sensation-hungry journalists who sensationally dwell on each new catastrophe, whether natural or man-made. Scientists and countless experts in many fields have also begun speaking of the probable End of the World.

What we see, then, is rational scientific analysis and fear of the end merging in the public imagination into a single cultural symbol — one that may also be described by the term “perfect storm.”

In its modern meaning, a perfect storm is a metaphor for a rare and catastrophic event arising from the simultaneous convergence of several unfavorable factors. Each factor is dangerous in itself, but their combination produces a qualitatively new, unprecedented crisis with devastating consequences.

This term perfectly captures the logic of modern apocalyptic expectation. That is precisely how modern people perceive global risks: climate change, nuclear tension, pandemics, artificial

intelligence. These are no longer separate threats, but a single system capable of generating a crisis for which humanity is unprepared.

Thus, the “perfect storm” has become a scientific-metaphorical analogue to the biblical plagues of Egypt — a vision of the end as a cascade of interconnected catastrophes.

In the following chapters, the author’s view of the probability of the End of the World in the foreseeable future will be presented on the basis of a detailed examination of each of the risk factors listed above.

Chapter 2.

A Fragile Planet

“Look again at that dot. That’s here. That’s home. That’s us.”
— Carl Sagan, *Pale Blue Dot*¹

“There is no Plan B because there is no Planet B.”
— Ban Ki-moon, *8th Secretary-General of the United Nations*²

The Great Flood

The threat of perishing in the waters of a global flood is rooted in the biblical story of the Great Flood and in numerous ancient myths.

Mainstream science interprets the material traces discovered in different regions of the planet as evidence of severe but local flooding, and therefore sees no reason to elevate such events to the rank of a probable apocalyptic scenario.

As an argument against a Great Flood that covered the whole earth, scientists long pointed to glaciological calculations suggesting that it would have been impossible for such a volume of water to appear that “all the high mountains under the whole heaven were covered,” as the Bible says.

But later, scientists themselves found that water.

In the late 2000s, the seismologists Jesse F. Lawrence and Michael E. Wysession of Washington University in St. Louis, analyzing an anomaly in seismic attenuation beneath East Asia, proposed a model according to which the upper part of the lower mantle may contain a volume of water comparable to that of the Arctic Ocean.³

According to Joseph R. Smyth and Steven D. Jacobsen, the mantle transition zone may contain very large volumes of bound water and may be regarded as one of the largest internal water reservoirs on Earth.⁴

Ancient myths speak of a global flood that destroyed a significant part of humanity in the distant past, and these are among the most widespread myths in the world. They appear in Mesopotamia (the Epic of Gilgamesh, the myth of Ziusudra/Utnapishtim), in the Bible (Noah), among the Greeks (Deucalion), in the Hindu tradition (Manu), and in the myths of the peoples of the Americas, Asia, and Oceania.

David R. Montgomery, professor of geomorphology at the University of Washington in Seattle, analyzed about two hundred flood myths from different cultures. He concluded that around 70 percent of them contain common elements: the waters come suddenly, only those who managed to climb a mountain or build a boat survive, and after the flood the world is repopulated.

Montgomery argues that such a convergence of details is unlikely to be accidental. It resembles, rather, multiple independent testimonies to one and the same event, seen from different vantage points.⁵

Researchers of the flood broadly agree on one point: behind all these ancient traditions stands some real cataclysm, traces of which ought inevitably to be detectable even today.

Traces of the Flood

We will return a little later to the probable causes of such a cataclysm; for now, let us turn back to the material and cultural traces of the Flood discovered in different parts of the planet.

In studies of the seabed at depths of up to 100 meters, scientists have discovered numerous stone artifacts dating from 6,000 to 9,800 years ago. In 1994, stone structures were found in the coastal waters of Israel, near Haifa, the remains of a settlement that had existed roughly 9,000 years ago. Seeds of flax and barley found there also point to the former presence of developed agricultural land. And there are many similar examples.

The traces of the Great Flood have been found not only underwater; they have also been discovered high in the mountains.

In the 1950s, American archaeologists led by Professor Ralph Solecki of Columbia University discovered the large Shanidar karst cave in the mountains of Kurdistan in northern Iraq. It is located on the bank of the Great Zab River, a tributary of the Tigris, at an elevation of about 750 meters above sea level, near the Turkish border.

The cave was impressive in scale: its entrance was an opening 25 meters wide and 8 meters high, beyond which lay a grotto of more than 1,000 square meters with a height of up to 15 meters. On the walls and ceiling, archaeologists found a thick layer of ancient soot and ash, evidence of long-term human habitation.

Excavations showed that the cave had been inhabited for 100,000 years. Its compacted floor formed a cultural layer about 15 meters thick, beneath which lay solid limestone.

Archaeologists opened this layer and analyzed the household objects of ancient people and various natural formations found within it. In the end, scientists concluded that about 12,000 years ago a powerful wall of water burst into the cave and washed away a three-meter layer of soil. At the same time, a strong earthquake occurred, causing the ceiling to collapse and enormous blocks of stone to become mixed with the lower strata.

It is noteworthy that between the layer formed about 12,000 years ago and the one formed 29,000 years ago, the soil layer corresponding to a 17,000-year interval is completely absent.

Researchers link this catastrophe to a global cataclysm, for example, the Great Flood.

Radiocarbon dating confirmed both the age of the layers and the time of the catastrophe — about 12,000 years ago.

It is important to note that in many similar cases, depositional layers overlie soil or a cultural layer, while new soil accumulates above them again — something that points to a single catastrophic event.

These findings fundamentally alter the assessment of tsunami risk for coastal regions, showing that the scale of past events may have vastly exceeded anything observed during the historical period.

The traces of major natural cataclysms that occurred on Earth in different periods of its history show that our planet has repeatedly undergone dramatic events leading to mass extinctions of a significant share of species over geologically short periods of time.

Great Extinctions

Scientists report five great mass extinctions that occurred on Earth in different eras.

1. The Ordovician — Silurian extinction (about 443 million years ago).

Scale: about 85 percent of marine species disappeared, since life at that time was concentrated mainly in the oceans. The drift of the continent of Gondwana toward the South Pole caused global cooling, glaciation, and a drop in sea level. This disrupted circulation, producing stagnation and oxygen depletion in the oceans.

2. The Devonian extinction (about 372—359 million years ago, in a series of pulses).

Scale: up to 75 percent of species perished, especially marine fauna.

3. The Great Permian — Triassic extinction (about 252 million years ago).

Scale: 96 percent of marine species and about 70 percent of terrestrial vertebrates died out.

4. The Triassic — Jurassic extinction (about 201 million years ago).

Scale: about 50 percent of all species disappeared, especially large amphibians and many reptiles.

5. The Cretaceous — Paleogene extinction (about 66 million years ago).

Scale: about 76 percent of all species perished, including the dinosaurs, pterosaurs, and large marine reptiles.

Most of the great extinctions are associated with rapid climatic changes — warming or cooling — as well as ocean acidification and anoxia caused by major geological processes such as volcanism and impacts. In the course of these events, the biosphere underwent a kind of “reset,” removing some forms of life from the planet and opening the way for new ones.

Visitors from Space

What caused catastrophes on such a grand scale? On this point scientists are nearly unanimous: they were triggered by the impact of large comets or asteroids striking the Earth. This conclusion rests on material traces that have been remarkably well preserved to the present day.

Among them is the iridium anomaly — a thin clay layer found worldwide with an anomalously high concentration of iridium, a metal extremely rare on Earth but common in asteroids. And of course there are the impact scars themselves, impressive in their scale.

In South Africa lies the largest and oldest confirmed impact crater on Earth, known as Vredefort. Scientists estimate its age at about 2.023 billion years.

The event was so powerful that, according to one hypothesis, it may have completely melted the ice sheet existing on Earth at that time, triggering abrupt warming.

Sudbury (the Sudbury structure), Ontario, Canada.

This is the second-largest impact crater. Its age has been determined to be about 1.849 billion years. It was formed by the impact of a body 10 to 15 kilometers in size. The strike was so powerful that it melted enormous volumes of mantle and crustal rock.

Today the Sudbury Basin is one of the world's largest sources of nickel. About 10 percent of global nickel is mined there, along with copper and precious metals. This is a direct “inheritance” from an asteroid.

On the Yucatán Peninsula in Mexico lies the Chicxulub crater, about 180—200 kilometers in diameter. It is the key material evidence for the asteroid-impact hypothesis as the cause of the Cretaceous — Paleogene extinction. Radioisotopic dating places the age of the crater at about 66.043 ± 0.011 million years.

Scientists have calculated the size of this dinosaur killer at 10 to 15 kilometers in diameter. It struck the Earth at a speed of about 20 km/s (72,000 km/h), and the energy of the impact was about 10^{23} joules — roughly two million times more powerful than the strongest thermonuclear bomb. The heat released would have been enough to boil all the oceans of the planet, at least locally.

Scientists say that the Chicxulub crater is not just “a hole left by an asteroid.” It is the key geological archive of an event that changed the planet's climate within hours and determined the subsequent history of life, clearing the way for mammals and, ultimately, for human beings.

One of the most acute mysteries troubling the scientific community is what happened at the boundary of the Holocene, 12,800 years ago, when the gradual warming of the climate was abruptly replaced by a sharp cooling that lasted nearly 1,300 years. This is the so-called Younger Dryas cooling, identified by geologists more than a century ago, though its causes long remained unknown. It was precisely during this period that major changes occurred in the megafauna of northern Eurasia, including the disappearance of woolly rhinoceroses and, soon afterward, mammoths from most of the continent.

A possible answer appeared in 2006 with the publication of *The Cycle of Cosmic Catastrophes*, in which a group of American researchers proposed the hypothesis of a comet impact on the ice sheet that at that time covered Greenland and much of Canada. This cosmic strike led to a fundamental reorganization of the entire climate system of the Northern Hemisphere. In North America, all mammals weighing more than 40 kilograms died out, and with them ended the history of the so-called Clovis culture.⁶

(Clovis culture was the first widely recognized culture of nomadic hunters and gatherers in North America, existing about 13,400—12,750 years ago.)

This is perhaps the most controversial, most fiercely debated, and at the same time one of the most durable catastrophic hypotheses of the past twenty years.

In 2007, a group of scientists led by Richard B. Firestone suggested that these were traces of a cosmic catastrophe.

They presented their hypothesis in an article published in PNAS (Proceedings of the National Academy of Sciences of the United States of America), one of the most prestigious scientific journals in the world. There they wrote:

“An extraterrestrial impact approximately 12.9 ka contributed to abrupt environmental change that triggered Younger Dryas cooling, biomass burning, widespread extinctions and human cultural changes at the end of the Clovis period”⁷.

Martin Sweatman wrote in a 2021 review:

“The vast majority of evidence now available strongly supports the Younger Dryas impact hypothesis”⁸.

It is well known that NASA takes the threat of an asteroid collision with Earth very seriously. Thanks to the efforts of its specialists, the orbital parameters of 90 percent of all asteroids larger than 700 meters have been identified and determined. In the course of this work, scientists focused attention on the asteroid Apophis (2004 MN4), 270 meters in diameter, which in 2029 will pass through a certain point near Earth’s orbit. Depending on how it passes that point, it could return in 2036 and pass much closer still.

Scientists themselves acknowledge that the reliability of such forecasts is still far from high, and that a dangerous asteroid could appear unexpectedly. A vivid example is the close flyby of the Halloween asteroid (2015 TB145), which passed Earth on October 31, 2015, at a distance of 1.3 lunar distances. It was detected only three weeks before the event. Its size is estimated at 500—600 meters, already close to the threshold of global catastrophe. A collision with Earth would have led, if not to the complete collapse of our civilization, then at the very least to the end of civilization in the form we know it.

In this connection, one may recall another similar case that demonstrates the reality of cosmic threats.

On June 14, 2002, an asteroid roughly 70—120 meters across passed Earth at a distance of about 120,000 kilometers. That is less than one-third of the distance to the Moon (about 384,000 km) and within the range of geostationary satellite orbits (about 36,000 km).

The crucial fact is that it was detected only on June 17, three days after its closest approach.

The reason was not scientific negligence but a “blind zone” on the Sun-facing side. 2002 MN approached Earth from the daytime sky, immersed in bright sunlight. Ground-based optical telescopes cannot see objects near the Sun.

Of course, science does not stand still, and methods for detecting dangerous celestial bodies are constantly improving. Space telescopes are being placed in orbit to increase the visibility of such objects. Yet the risks do not thereby disappear, because no reliable means of preventing such a catastrophe yet exist.

To sum up these preliminary findings, one may conclude that floods of varying scale occurred in different periods of Earth’s history. Some of them can reasonably be classified as great floods, above all those caused by the impact of large cosmic bodies on the Earth. These catastrophes struck suddenly and brought about rapid and devastating climatic changes.

Such catastrophes may well have served as the basis for the many myths of the Great Flood. The geographical spread of these myths suggests that the flood affected a large part of the planet and dealt a heavy blow to Earth’s biosphere.

The cosmic threat remains a real source of intense End-of-the-World fear even today. A large asteroid carrying destruction for humanity may appear near Earth unexpectedly, slipping past existing monitoring systems, while effective means of destroying it at a safe distance from Earth still exist only in the cult Hollywood blockbuster *Armageddon* (1998), directed by Michael Bay.

The scale of catastrophe that could follow a collision between Earth and a comet or large asteroid is vividly illustrated by an event that occurred in 1994, when Comet Shoemaker — Levy 9 struck Jupiter. Its trajectory might have brought it toward Earth, but Jupiter lay in its path and captured it with its immense gravity. The giant planet literally tore the comet's nucleus into multiple large fragments — some up to 2 kilometers across — which then plunged into Jupiter's atmosphere at a speed of 64 km/s.

Within hours, a dark spot 12,000 kilometers across — close to the diameter of the Earth — appeared in Jupiter's atmosphere. The energy released in the collision was estimated at 6 million megatons of TNT equivalent, 750 times greater than the entire nuclear arsenal accumulated on Earth.

Humanity witnessed such an event for the first time. It proved that collisions between celestial bodies are not merely a theory but an ongoing reality, and it forced people to think seriously about similar risks for Earth.

It is not difficult to imagine what would happen to Earth in the event of such a collision.

The Sleeping Threat

Nature is showing an increase in the intensity of hurricanes and tropical cyclones; every year about 15—23 earthquakes of magnitude 7 or higher occur; the frequency and severity of floods are increasing; and volcanic activity continues. Of particular concern are dormant supervolcanoes. They are found on every continent, and if even one of them were to erupt, the consequences for humanity would be extremely severe. Not all people would die, but for many years the Earth would sink into chaos touching every aspect of human life.

The best-known of the supervolcanoes is Yellowstone. It is the largest volcanic system in North America, located in Yellowstone National Park (Wyoming, Montana, and Idaho, USA). It is a supervolcano capable of VEI-8 eruptions, ejecting more than 1,000 cubic kilometers of material. The caldera measures 45 by 85 kilometers, and beneath it lies a magma chamber at a depth of 5—15 kilometers, fed by a hot mantle plume.

According to scientists, this sleeping giant has erupted three times: about 2.1 million years ago, when the ejecta volume was 2,450 cubic kilometers; then about 1.3 million years ago, when it expelled 280 cubic kilometers of material into the atmosphere; and about 640,000 years ago, when it ejected 1,000 cubic kilometers and formed the modern caldera.

But what if such an eruption were to occur tomorrow? Scientists paint the following picture:

Locally:

Ash would spread for more than 1,000 kilometers; lava flows and pyroclastic material would force the evacuation of millions of people.

Globally:

A volcanic winter would follow, with cooling of 1—3°C for 5—10 years, crop failures, and famine (NASA models estimate 10—100 million deaths), along with ozone depletion and increased ultraviolet radiation. But not “the end of the world”: humanity survived the eruption of the Toba supervolcano about 74,000 years ago and would survive Yellowstone as well.

DeepSeek, when prompted with the same question, generated a far darker scenario:

Locally (North America), immediately:

- total destruction within a radius of 200—300 kilometers;
- pyroclastic flows moving at hundreds of kilometers per hour;
- temperatures reaching hundreds of degrees.

Within days:

- ash several meters thick across thousands of kilometers;
- building collapses;
- failure of electronics;
- paralysis of transportation;
- destruction of agriculture in the United States and Canada.

The United States would cease to function as an organized state.

Globally (the whole world, in the first weeks):

- ash and aerosols would rise into the stratosphere;
- solar radiation would begin to be screened out;
- atmospheric transparency would fall sharply.

This would mark the beginning of volcanic winter.

The second phase: months to years (volcanic winter)

Climate:

Estimates, based on Toba analogies and modeling, suggest:

- a drop in Earth's average temperature of 3—7°C;
- in continental regions, declines of up to 10—15°C;
- summers in temperate latitudes becoming cold and short.

This would be a global climatic shock, not merely “cooling.”

Biosphere and agriculture:

- a sharp reduction in photosynthesis;
- mass crop failure for 2—5 consecutive years;
- famine on a global scale.

Even with modern technology:

- food supply chains would collapse;
- humanity's food reserves would last for months, not years.

The main cause of death would not be lava, but hunger.

Humanity:

A realistic assessment would include:

- the death of tens of percent of the population;
- a possible decline in numbers to 1—2 billion or lower;
- the disintegration of the global economy;
- local wars over resources among the surviving population.

Even under such a catastrophic scenario, humanity would not die out completely, but what might occur is what could be called a “civilizational reset.” Human beings would remain; civilization would not. Simple logic suggests that the more complex a system is, the more efficient it is — and the more vulnerable. Modern global civilization is the most fragile in history, despite its visible power.

The signs of an approaching reset are already visible; they will be discussed in the concluding chapter. For now, let us continue our examination of climate threats.

In assessing the probability of a major Yellowstone eruption, scientists have estimated it at about 1 in 730,000 per year, using the average interval between the three known super-eruptions. That is roughly 0.00014 percent per year, which means the probability of such an event in the next century is for all practical purposes close to zero. In support of this conclusion, scientists cite many arguments: the magma chamber is not fully charged; observations suggest that most of the underground magma has already partially or nearly solidified, leaving too little melt for a super-eruption; and there are no signs of escalating activity — such as changes in gas emissions, rapid ground uplift, or accelerating seismicity — that usually precede major eruptions.

It would seem, then, that one could sleep soundly — if not for one “but”: there are alternative assessments of Yellowstone's eruption risk, and they do not paint as reassuring a picture as the U.S. Geological Survey does.

A number of scientists and analysts believe that the official estimates are excessively optimistic. They too have their arguments:

- the magmatic system is not a single chamber, but a complex network of reservoirs;
- even partially molten magma may be dangerous under certain conditions;
- history shows that the precursors of major eruptions may be weak or short-lived;
- a volcanic explosion may be triggered by a major earthquake, even at a considerable distance from the caldera;
- all volcanoes on the planet are linked in a single chain, and the trigger for Yellowstone could be the eruption of another supervolcano.

These scientists also regard the probability of a Yellowstone super-eruption as very low, but not “almost zero”—conventionally, perhaps 1 in 10,000. That is still an extremely small risk, but an order of magnitude higher than the official estimate.

There is also a radically alternative camp. This is already outside the scientific mainstream, but it matters for an overall understanding of the landscape. Their estimates are: “at any moment”; “we are already on the threshold”; “the authorities are concealing the truth.” Their arguments are built on the weakness of monitoring systems for detecting signs of approaching danger, with the result that catastrophes occur suddenly.

As an example they cite the eruption of Hunga Tonga — Hunga Ha’apai on January 15, 2022. Scientists recorded increasing seismicity and deformation only a few days before the main event, yet were unable to assess its scale. As a result, the eruption proved unexpectedly powerful, producing a global tsunami and atmospheric shock waves. Tsunami warnings were issued only hours in advance, and in distant regions, such as Peru and Japan, the waves arrived suddenly. It was one of the most powerful explosions in 150 years, yet monitoring failed to anticipate the full collapse.

On March 11, 2011, an earthquake of magnitude 9.1 occurred off the coast of Japan. It came suddenly; scientists were unable to predict it, and the JMA early-warning system issued a tsunami alert only after the quake had already occurred. The tsunami, with waves reaching as high as 40 meters, killed about 18,500 people and triggered the largest radiation accident at the Fukushima Daiichi nuclear power plant.

On February 6, 2023, the double earthquake in southeastern Turkey and Syria, with magnitudes of 7.8 and 7.5, occurred without clear precursors. Seismologists detected no anomalies in the days or even hours beforehand. The result was about 59,000 deaths and devastation across eleven provinces. Although the region is seismically active, along the Anatolian fault system, the specific event was unexpected and left no time for evacuation. Post hoc analysis revealed weak signals, but monitoring failed to capture them.

Of course, there are also examples of successful volcanic forecasts. But who will later speak of a risk of 0.00014 percent if seismologists miss Yellowstone’s warning signals? And why, in estimating the risk of a super-eruption, do scientists base their calculations on the average interval between three eruptions?

What happens if, instead, one uses linear regression, taking into account the shortening of the intervals between eruptions?

Difference between the intervals:

$800,000 - 660,000 = 140,000$ years.

Next interval:

$660,000 - 140,000 = 520,000$ years.

Time since the third eruption:

640,000 years.

Since $640,000 > 520,000$, the fourth eruption should already have occurred:

$640,000 - 520,000 = 120,000$ years ago.

If one uses another approach and calculates in geometric progression — assuming the dynamics are exponential — one gets a different result:

If the intervals decrease proportionally, then the coefficient is:

$660,000 / 800,000 = 0.825$.

Next interval:

$660,000 \times 0.825 \approx 544,500$ years.

Time since the third eruption:

640,000 years.

“Overdue”:

$640,000 - 544,500 \approx 95,500$ years.

By such methods of calculation, Yellowstone is already 95,500 to 120,000 years “late,” and the estimate “at any moment” no longer looks grossly exaggerated.

In assessing the risk of a Yellowstone eruption, one must take into account not only the local factors that specialists monitor so closely, but the entire chain of supervolcanoes spanning the planet. Can the eruption of one trigger a chain reaction in others? Traditional science rejects such a cascading effect, pointing to the vast distances between them — from one to fifteen thousand kilometers. The volcanoes are considered isolated, their magmatic systems independent, and direct triggers operating across thousands of kilometers are not supported by the data.

And yet, in the last century quantum physics opened up a panorama in which unity extends across the universe itself. What it revealed was not merely local events on a planet, but the fundamental connectedness of all things — a reality in which distance is an illusion and nonlocality the norm. This is not mysticism, but an experimentally confirmed reality that forces us to rethink what it means to be separate.

Everything begins with quantum entanglement — the phenomenon in which two or more particles become inseparable even if they are carried light-years apart. If the state of one is measured — say, the spin of an electron — the other instantly “learns” this and assumes a corresponding state, without any signal passing between them. Albert Einstein called this spooky action at a distance, seeing in it a challenge to his theory of relativity, according to which nothing can travel faster than light. But experiments — from John Bell’s work in 1964 to Alain Aspect’s in 1982—confirmed that entanglement is real.

Bell’s theorem showed that the universe is fundamentally nonlocal and that no “hidden variables”—no local properties of particles — can explain the instantaneous transfer of information from one particle to another, regardless of the “distance” between them. Nonlocality implies that the universe is not an assembly of independent parts, but a single fabric. Particles do not “communicate” through space — they are simply not separate in the quantum sense.

The locality we observe in the everyday world is an emergent property, an illusion arising from decoherence — from interaction with the environment. At the most basic level, everything is connected.

Philosophically, this changes the picture completely: our ideas of “separateness” are artifacts of classical physics. As George Musser notes, “our sense of the universe as an orderly space with absolute places is an illusion.” Nonlocality hints at a deeper unity in which “local” events — volcanism on Earth, for example — may be only manifestations of a global network.

When scientists speak of supervolcanoes as independent points on a map, they are describing their behavior at a level where space still appears solid and time still appears linear. But the quantum prism shows that this level is only a projection — useful, but not final.

Modern science has already identified quantum phase transitions in the lower mantle on a global scale — over thousands of kilometers — such as spin crossover in minerals like ferropericlase. This is not a microscopic laboratory effect, but a phenomenon that influences mantle convection, and therefore plate tectonics and volcanism. In other words, the quantum nature of individual iron atoms deep within the planet may collectively modulate the movement of entire continents and the position of hot spots.

Geophysicists are already using quantum gravimeters — atom interferometers — that register changes in gravity caused by the movement of mass beneath volcanoes such as Etna. These instruments operate precisely on quantum principles — superposition, interference — and detect what classical instruments miss.

The implication is that supervolcanoes are not isolated bombs, but resonators within the planet’s vast vibrational system. And if a strong disturbance arises somewhere in that system, the response may propagate nonlocally — not through a mechanical wave, but through correlations in collective states.

Shadows Cast by Light

When we think of the Sun, we are always drawn to the quiet duality built into its nature. It is the source of everything we call life: a warm ray breaking through leaves, a golden sunset over the sea, or simply the feeling that the world revolves around something greater than ourselves.

But in this chapter we are forced to turn to its other side — to the side where light becomes a storm and warmth becomes plasma capable of striking a devastating blow to our civilization. Scientific research adds up to a picture in which the star that gives life may also take it away. We will examine that picture layer by layer, look at fresh evidence from the real world of 2026, and try to model what awaits us if history repeats itself. And history, as we know, has a habit of doing just that.

Let us begin with a full map of the manifestations of solar activity and their actual effects on life on Earth.

1. Sunlight and radiation (the baseline level).

This includes visible light, infrared radiation, and ultraviolet radiation. The role of these factors is overwhelmingly positive: they are the main source of energy for the climate, they drive photosynthesis, and they help shape the biosphere. They sustain life on our planet. Only ultraviolet radiation poses a danger, but the ozone layer protects us reliably from it.

2. The solar wind (the constant background).

This is a stream of charged particles — mainly protons and electrons — constantly emitted by the Sun at speeds of 300 to 800 km/s.

It shapes the magnetosphere, creates the auroras, and under normal conditions is safe. Earth's magnetic field is the principal protective barrier against the solar wind.

3. Solar flares.

These are sudden releases of energy in the electromagnetic spectrum — X-rays and ultraviolet radiation — lasting from minutes to hours.

Their effects on Earth include radio interference, disruption of communications — especially aviation and maritime navigation — and ionization of the upper atmosphere.

They do not “burn” the Earth, but they are dangerous for astronauts and affect electronics. They reach us at the speed of light, which makes meaningful advance warning almost impossible.

4. Coronal mass ejections (CMEs).

These are immense clouds of plasma and magnetic fields, with masses measured in billions of tons, thrown off by the Sun. If such an ejection is directed toward Earth, it reaches our planet in one to three days.

This is the most dangerous form of solar activity. It causes geomagnetic storms, overloads power grids, damages satellites, disrupts GPS, and triggers mass blackouts.

On September 1, 1859, humanity had already lived through such an event — one that entered history as the Carrington Event. That day, the amateur astronomer Richard Carrington saw something extraordinary. Above an enormous group of sunspots, each several Earths in size, a bright white light flared up — as if someone had switched on a spotlight directly on the Sun. It was the first recorded white-light flare, a solar flare that lasted only five minutes. Carrington noted that the light was so intense that it outshone even the solar disk.

Independently of him, another astronomer, Richard Hodgson, saw the same thing and described it as a “sudden flash of light.” Neither man knew that this was the beginning of a chain reaction: the flare released a stream of charged particles and plasma, known as a coronal mass ejection, which raced toward Earth at a speed of about 2,300 km/s.

The distance from the Sun to Earth is 150 million kilometers, but this “plasma bubble” crossed it in only seventeen hours — exceptionally fast for such events. Normally CMEs take two to four

days, but in this case everything aligned perfectly: earlier ejections had “cleared the way,” accelerating this one.

By the evening of September 1 and the morning of September 2, Earth had been plunged into a storm. The planet’s magnetic field was compressed under the assault of the solar wind, and chaos began. The sky lit up with auroras — but not only at the poles. They descended into the tropics: in Colombia people saw red and green flashes; in Hawaii the sky burned like a polar night; and in Australia miners awoke thinking dawn had come. In the United States, from Maine to Florida, the auroras were so bright that one could read a newspaper by their light. One reporter described it as a “blood-red glow, terrifying and magnificent.” The storm lasted about two days at its peak, but its echoes stretched on for a week: auroras were seen even in Rome and Cuba, down to latitudes of about 18 degrees.

And now to the consequences. In 1859 there was not much high technology, but what did exist suffered. The telegraph network — the “internet” of that era — stretched for thousands of kilometers across Europe and America. When the CME struck, powerful currents were induced in the wires: operators received electric shocks, sparks flew from the instruments, and in some stations the message paper caught fire. In Sweden a telegraph station burst into flames; in New York sparks showered down like fireworks. Some lines functioned even without batteries — the current came directly from the atmosphere. Communication as a whole collapsed for hours, and recovery took weeks.

Fortunately, electricity had not yet become widespread in 1859, and the event caused relatively little overall damage.

Scientifically, however, it was a breakthrough. Carrington linked the flare with the storm, laying the foundations for “space weather”—the science of how the Sun affects Earth. If such an event were to happen today, the consequences would be very different. But in 1859 it was more spectacle than catastrophe: people panicked, thinking of the end of the world, while newspapers overflowed with descriptions of “heavenly fire.”

Now to the question of risk. The Sun threatens us not directly, but through a chain: flares → coronal mass ejections → geomagnetic storms → induced currents and radiation.

If we model a Carrington Event in our own time, we can see its likely consequences: the magnetosphere would be compressed by 90 percent, while cosmic rays would increase tenfold. We would be left without internet, communications, and electricity. Transformers would burn out. Banks would be paralyzed. Refrigerators would fail. Gas stations would stop functioning. Transport would grind to a halt. In cities, water supply and sewage systems would cease to operate. In a single moment, the Earth would be plunged into chaos. This would not yet be the End of the World — but it would come dangerously close.

Has anything like this happened before? Yes — and more than once. That became clear through the work of Fusa Miyake, then a graduate student at Nagoya University in Japan. In 2012 she examined the wood of a 1,900-year-old Japanese cedar that had been cut down in 1956. Miyake was looking for a history that might be written into the cellulose of the tree’s rings. She discovered that, in their chemical composition, some rings contained excessive amounts of carbon-14. This isotope is extremely rare: roughly one particle per trillion particles of ordinary carbon. Even so, its signal is strong enough to be detected by researchers.

Modern scientists are able to track radiocarbon and determine its amount in organic remains such as tree rings. And if the year in which a tree was cut is known, one can determine the precise year of a particular event recorded in those rings. This is known as dendrochronology.

Miyake was not studying the Carrington Event, but something older and far more powerful. Examining the cedar’s rings year by year, she found a clear signal: between AD 774 and 775 there was a 12 percent jump in carbon-14. That fluctuation was about twenty times greater than anything produced by ordinary cosmic phenomena.

Other researchers confirmed Miyake's conclusions by studying European and North American trees. Scientists also found a corresponding signal in beryllium isotopes preserved in Antarctic ice cores. The concentration per square centimeter was roughly the same everywhere. This indicated that the event in question had been global, not a local Japanese phenomenon such as a volcanic eruption. The newly identified phenomenon came to be called a Miyake Event. And it pointed to bursts of energy orders of magnitude greater than the solar flares that produced the Carrington Event of 1859.

By now, thanks to the work of scientists around the world, we know of at least nine Miyake Events, from AD 774 back to 12,350 BC.

The earliest known event was also the strongest — a Miyake Event at the edge of the Ice Age, when the Earth was colder and had no technological shield for such a shock to strike. It passed “quietly” then. Today, something of that kind would bring an era to an end.

The Carrington Event and the Miyake Events are not just flashes in the sky; they are reminders that we live on a small sphere beside a giant reactor, and that our star can overturn the whole world with a single “sneeze.”

Could something like this happen again in the near future?

Events like the Carrington Event and the Miyake Events tell us something simple: if this has already happened before — and happened many times — it will happen again. The only question is when.

Judge for yourself: as of 2026, we are near the peak of Solar Cycle 25, with a record 69 storms in 2025 and 164 geomagnetically disturbed days — the highest level in twenty years. The cycle began in 2020, and scientists had predicted it would be weak, like Cycle 24. Reality turned out differently: activity exceeded forecasts by 60 percent.

We are now on the downslope after the peak. Models such as FB Prophet (2025) predict that the sunspot number will decline to 100 by the end of 2026, with the cycle minimum arriving in 2030. But the Sun likes surprises: Solar Cycle 25 has already outperformed expectations, and fresh observations indicate that elevated activity continues.

On January 20, 2026, the U.S. National Oceanic and Atmospheric Administration (NOAA) declared a “critical weather day” because of extreme space weather. What was observed was a combination of a powerful solar radiation storm and a geomagnetic storm of the highest category.

If events continue to intensify along their current trajectory, the Sun may produce a superflare like the one in 1859 or in one of the Miyake Events. On the surface of the Earth, we would immediately see a blackout from pole to equator. But no less dramatic changes would occur beneath the surface.

Solar plasma, penetrating more deeply through a weakened field, would induce currents in the outer core. A quantum leap would follow: spin transitions in perovskite, the principal mineral of the lower mantle, synchronization across millions of cubic kilometers of matter. As a result, mantle viscosity would fall and convection cells would reorganize — not as a crude displacement of the crust, but as a phase transition, a kind of “wave collapse.”

And this is not the scenario of a science-fiction disaster film. It is the direction in which deep scientific research points, even if only a small part of that research is presented in this chapter. It was precisely such research that underlay the report by scientists from the National Research Council (NRC), working under the auspices of the U.S. National Academies, on the threats posed by space weather. The report's full title is *Severe Space Weather Events: Understanding Societal and Economic Impacts: A Workshop Report*.

These dangers were already clearly visible to scientists in 2008, when they gathered for a workshop in May of that year to examine how extreme space weather could strike our fragile technoworld.

The report was born of an anxiety stated plainly in the document itself:

“The adverse effects of severe space weather on modern technology — electric power outages, disruption of high-frequency communications, degradation of spacecraft operations — are well known and have been extensively documented. The physical processes that underlie space weather are also reasonably well understood. However, the potential social and economic consequences of disruptions to critical technological systems caused by severe space weather are much less well documented and understood”⁹.

The report focuses on the “perfect storm”—a superstorm like the Carrington Event of 1859, when the damage was minimal because the world did not yet depend on electricity. In the 2020s, however, that is a very different matter. Here is what the scientists foresaw:

Power systems in ruins: a geomagnetic storm induces currents in transmission lines, overheating transformers. Not all of them will burn out, but the key ones — especially at high latitudes — will. Replacement will take months or years: transformers are enormous machines built in factories that themselves require electricity. The report estimates that in the United States alone, a blackout could affect 130 million people, with economic losses reaching \$1—2 trillion in the first year.

Satellites and communications: CMEs bombard orbit, causing anomalies ranging from GPS disruptions to complete failures. Communications suffer: HF radio falls silent, air travel is paralyzed as pilots lose contact, and finance freezes — ATMs, exchanges, the whole digital infrastructure. The report warns that modern technology is more vulnerable than older systems because the miniaturization of chips has made them more sensitive to radiation.

Cascading effects: without electricity, water pumps stop, gas stations shut down, hospitals survive on generators for only a few days. Transportation — trains, subways, airports — grinds to a halt. The economy’s supply chains collapse. Society responds with panic and fear. Recovery stretches across years, accompanied by decline in every sphere of life.

The report recommended improving monitoring through NOAA’s Space Weather Prediction Center, investing in resilient grids, and advancing forecasting capabilities.

In 2010, the U.S. Congress passed the NASA Authorization Act, directing the White House Office of Science and Technology Policy to coordinate preparation for changes in space weather. By 2015, the SWORM Working Group had been created to develop strategy and planning. The world responded with bureaucracy: reports, workshops, and planning exercises echoed the NRC’s warning that the threat was real.

From 2016 to 2022 the response gathered momentum — new plans, studies, and forecasts appeared — but reality-testing came in 2022, when SpaceX lost 40 satellites to a geomagnetic storm. The episode showed that humanity remains largely powerless before the fury of the Sun.

In 2023—2026, as solar storms continued breaking records in both frequency and intensity, the world responded with updates to plans and scenarios. But what can human beings in fact oppose to the Sun’s energy today? No system of scenarios and plans can truly shield the Earth from an assault that may come at any moment.

Solar risks remind us that a civilization built on electricity and the digital realm is vulnerable to forces that have no intentions but possess colossal energy. History suggests that such forces do not bring about the end of humanity, but the end of a given version of civilization — which, for modern people, is almost the same thing.

Someone once put it well: the most dangerous catastrophe is the one after which everything remains except the ability to live as before. A solar strike does not kill humanity. It tests whether civilization possesses any reserve of strength — or only comfort.

Global Warming: Myths and Realities

Over the past three decades, this topic has become the subject of intense debate. The discussion has unfolded vigorously both in the media and at international climate forums. And there is an objective reason for that: from the preindustrial period (1850) to 2025, the Earth's average temperature rose by approximately 1.2—1.3°C. Over the past fifty years, moreover, warming has accelerated compared with the earlier period. The year 2023 became the warmest in the history of instrumental observations at +1.48°C. Yet that record was broken the very next year (+1.60°C, according to Copernicus), while 2025 came in at +1.47°C, again according to Copernicus. These figures are broadly consistent across the major centers — NASA, NOAA, Copernicus, Berkeley Earth, and the Hadley Centre. The spread in estimates usually falls within ± 0.05 —0.1°C.

So what, exactly, is so alarming about that? a person far removed from climate science may ask. So what if the planet has become warmer by only a degree and a half? That might even be good. Beach season will last longer; crops will ripen sooner...

In reality, it is bad — very bad.

This is shown clearly and persuasively in the National Geographic film *Six Degrees Could Change the World* (2008).¹⁰ Each additional degree is not simply “warmer weather,” not just another number on the thermometer. It triggers a chain reaction of feedback loops that greatly amplify the initial warming and create a qualitatively new, far more dangerous world. Drawing on the work of climate scientists, the film's authors build, step by step, a picture of what awaits the planet as average global temperature rises.

+2°C (we are already close). Most of the world's coral reefs will die off because of ocean warming and acidification. That will lead to the collapse of marine ecosystems and the loss of food sources for hundreds of millions of people. Melting of the Greenland ice sheet will intensify. Hurricanes and tropical storms will become markedly stronger and more destructive. In the United States, Australia, and the Mediterranean, prolonged and devastating droughts will begin. Wheat and maize yields in key regions will fall by 10—20 percent. Millions of people in poorer countries will face food and water shortages. Arctic ice will melt at an accelerated pace, raising sea levels by tens of centimeters and intensifying storm surges.

+3°C. This is already a critical threshold. The Amazon rainforest will begin to die, and vast territories will be transformed from the lungs of the planet into savanna and desert.

The melting of the Himalayan and Tibetan glaciers will first bring flooding and then a catastrophic drop in water levels in Asia's great rivers — the Ganges, Indus, Yangtze, and Mekong. Hundreds of millions of people in India, China, Bangladesh, and Pakistan will be left without drinking water and irrigation for their fields and will become climate refugees.

Super-hurricanes and typhoons will become commonplace even in regions where they were once atypical.

+4°C. This is a world in which civilization approaches the edge of survival. The Amazon will be virtually destroyed. Africa will become largely unsuitable for agriculture, forcing millions to flee hunger and thirst.

In Europe, the southern regions — Spain, Italy, Greece — will turn into semidesert landscapes resembling today's Sahara. A sea-level rise of 1—2 meters will inundate densely populated coastal zones from Bangladesh and Vietnam to Florida and the Netherlands. Billions of people will become climate refugees.

Conflicts over water and food will escalate into regional wars.

+5°C. Much of the tropics and subtropics will become effectively uninhabitable for human beings because of the combination of heat and humidity, with wet-bulb temperatures rising above 35°C — the point at which the human body can no longer cool itself through sweating.

Ocean circulation will slow or even shut down, paradoxically cooling Europe while throwing the global climate into chaos. Mass extinctions will affect 50—70 percent of species.

Fires in the boreal forests will release still more carbon. Coastal cities will be abandoned entirely. Billions of people will be forced to migrate toward the poles.

+6°C. The planet approaches a state close to “Hothouse Earth.” Summer temperatures in the mid-latitudes will regularly exceed 45—50°C. The atmosphere will become saturated with water vapor and methane, creating a greenhouse effect that reinforces itself.

Temperatures in the tropics will become so high that many regions of the planet will be physically unfit for human beings to remain outdoors for more than a few hours. Enormous territories will turn into lifeless deserts. Humanity as a species will come under threat of extinction.

Much of the ocean will become anoxic, releasing hydrogen sulfide — a toxic gas that smells of rotten eggs. Nearly all coral reefs, forests, and agricultural regions will disappear. Humanity will survive only in small near-polar refuges. Most mammals will die out.

The planet will begin to resemble the Earth of 55 million years ago during the Paleocene-Eocene Thermal Maximum — but unfolding far more rapidly and without time for adaptation.⁶

The film ends with a harsh conclusion: each additional degree is not a linear worsening, but a transition into a qualitatively different and increasingly hostile state. We have already passed the point of no return by reaching the 1.5°C level and are moving rapidly toward 2°C. Beyond that lies only acceleration.

The seriousness of the issue has been confirmed not only by scientists but also by political leaders at the highest level.

In November 2007, for the first time in history, the UN Security Council held a special session devoted to climate. Britain’s Permanent Representative to the United Nations, John Sawers, declared: “In this new century, climate change will become the major threat to humanity, the main cause of instability and the disappearance of entire states.”

Leading climatologists reinforced his warning: life on Earth would be altered beyond recognition. Sea level would rise so far that many coastal countries — home to a third of the world’s population — would go underwater, while much of the remaining land would become waterless desert.

In response to these threats, humanity tried to organize a global response. In 1997 the Kyoto Protocol was adopted — an international agreement intended to reduce greenhouse-gas emissions into the Earth’s atmosphere in order to counter global warming.

That agreement failed completely: by 2012, global CO₂ emissions had risen by 58 percent.

In 2015, a new attempt was made to limit CO₂ emissions, and 196 countries, including the United States, India, and China, signed the Paris Climate Agreement. But it met the same fate. Global greenhouse-gas emissions continued to rise from 2015 to 2024. In 2025, global carbon dioxide emissions from fossil-fuel burning reached a record high of 38.1 billion tonnes.¹¹

All these efforts were focused on one thing: limiting the anthropogenic factor — reducing industrial CO₂ emissions, shifting to renewable energy, and introducing carbon taxes and quotas.

But there is another view, also advanced by scientists. Many of them state directly that human industrial activity is not the primary cause of climate change on our planet. Today the entire world is preoccupied with cutting technogenic emissions into the atmosphere. Yet one might argue that all such factors account for not even 10 percent of the carbon dioxide released as a result of geotectonic processes. The ridges that cut across the floor of the World Ocean are sites of constant volcanic activity, with giant gas emissions whose scale simply cannot be compared with human activity. A single major submarine volcano can release as much CO₂ into the atmosphere as the whole of global industry produces in a decade.

And there is still another lurking enemy, one that is mentioned far less often, but is far more frightening than CO₂—and it is already beginning to awaken.

The Methane Bomb

In recent years, the Arctic Ocean has been increasingly clearing of ice during the summer season. Warming in the Arctic is occurring three to four times faster than the planetary average. This is a source of great excitement for shipping companies, which stand to benefit from shorter routes and faster voyages.

The retreat of the ice also opens access to previously hard-to-reach deposits of minerals and hydrocarbons. By some estimates, the Arctic contains about 13 percent of the world's oil and gas reserves.

But the hidden cost of this seemingly attractive development is a growing climatic threat to all humanity.

Beneath the layer of permafrost on the ocean floor lie methane hydrates — crystalline compounds in which methane molecules are “packed” into cages of ice. When warmer water, heated by the disappearance of the ice cover, reaches the seabed, the permafrost thaws, pressure drops, and the methane hydrates destabilize. As a result, powerful methane plumes rise from the seafloor. Scientists from the Pacific Oceanological Institute have recorded dissolved-methane anomalies with concentrations ten thousand times above background levels.

Scientists have calculated that the frozen ground of Siberia, Alaska, and Canada stores twice as much carbon as humanity has emitted throughout its entire history. But that is not even the main point: thawing permafrost also releases methane, whose warming impact over a twenty-year horizon is 84—87 times greater than that of CO₂.

The most frightening part of this story lies underwater. The shelf of the East Siberian Sea contains about 80 percent of all subsea permafrost, with methane reserves measured in the thousands of gigatons. A release of only 5 percent of those reserves — about 40 gigatons — would be enough for a planetary-scale catastrophe. That is eight times more than the current amount of methane in the atmosphere.

Over the past thirty years, the rate of thaw in subsea permafrost in the seas of the eastern Arctic has doubled compared with previous centuries. Once a certain warming threshold is crossed — a critical water temperature — the process of methane release can become self-reinforcing and difficult to reverse.

It is true that most climatologists regard a sudden release of tens of gigatons of methane as unlikely in the short term.

But if we look back at climate forecasts from previous years, we find many errors in them.

The Greenland ice sheet is melting at a rate roughly 6 gigatons per year higher than older models projected.

The clearest example concerns the Arctic. Earlier generations of climate models — for example, those used in IPCC reports ten to fifteen years ago — projected the disappearance of summer sea ice toward the end of the twenty-first century, around the year 2100. But in 2020 an international group of climatologists from the British Antarctic Survey, the University of Washington, and the University of Reading published a study in *Nature Climate Change* concluding that the Arctic could lose its summer sea ice as early as 2035.

When we reason about the speed of climatic processes and the timing of major events, we must also take into account what is known as the climate feedback loop. It works like this: warming in the atmosphere raises the temperature of seas and oceans, which in turn causes permafrost to thaw and increases emissions of carbon dioxide and methane, which then accelerate global warming still further. And so the cycle continues, moving faster and faster.

Even if the present warming trend were merely to continue at its current rate, we are moving steadily toward the point beyond which an irreversible cascade begins.

And if all the other threats described in this chapter — the Great Flood, supervolcanic eruptions, solar coronal mass ejections, and the impact of a large asteroid — may still be delayed for centuries, climate change leaves us with a very narrow window of time. International agreements by themselves are incapable of stopping the process. Nature operates on a scale far beyond human control.

Preparing for Global Catastrophe

Those capable of strategic thought and willing to face the obvious have already begun preparing for the coming cataclysm. Such people do not read the soothing articles of mainstream scientists about the 0.00014 percent risk of a Yellowstone super-eruption, nor do they believe in the doctrine of uniformitarianism, which denies abrupt climatic shifts. They prefer to rely on other sources of information that assess current processes and the likelihood of potential risks turning into real events more soberly.

The clearest confirmation of how seriously existential threats are being taken was the construction of the Doomsday Vault on Svalbard — officially the Svalbard Global Seed Vault — the largest backup seed bank for agricultural crops in the world. It is, in effect, a kind of Noah's Ark for plants, or a seed bunker for humanity.

The idea emerged in the 1980s and 1990s out of international discussions about preserving biodiversity. In 2004—2005, the Norwegian government began implementing the project. The vault officially opened on February 26, 2008, and on that very day it received its first deposit — about 100,000 samples from seven countries and international centers.

The facility has several layers of protection: its entrance lies 130 meters above sea level, guarding against ocean rise; it is built 120—160 meters deep into the mountain; its storage temperature is maintained at — 18°C by combining natural permafrost with active cooling; and its capacity reaches 4.5 million samples.

Its level of security is extremely high: seismic resistance, protection against flooding, radiation, and explosions, along with two airtight doors, airlocks, video surveillance, and biometric access systems.

The vault was created specifically as a global collective insurance policy against black-swan scenarios:

- nuclear winter;
- global warming or abrupt cooling;
- the loss of genetic material in ordinary gene banks, many of which are located in high-risk regions such as Syria, Afghanistan, and Iraq;
- solar superstorms capable of destroying power supply and cooling systems in gene banks around the world.

As of 2026, the vault holds more than 1.2 million samples from over 100 countries, and more than 90 countries and international organizations have deposits there.

The irony is that in 2017 the vault suffered its first serious incident: because of abnormally warm weather and heavy rain, meltwater entered the access tunnel, though it never reached the seeds themselves. It became a symbolic reminder that even the safest place in the world is already vulnerable to the effects of climate change. One is forced to ask: what would happen to this Doomsday Bank in the event of a truly serious catastrophe?

Countries along the Pacific Ring of Fire and low-lying coastal regions — Japan, Indonesia, Chile, Peru, the United States (Hawaii, California, Alaska, Oregon, Washington), Australia, New Zealand, and the Netherlands — are investing billions in early warning, physical protection, and public education. The global framework is being shaped by programs such as UNESCO-IOC's Tsunami Ready Programme and by regional systems such as the Pacific Tsunami Warning System and the Indian Ocean Tsunami Warning System.

Let us look at what countries in the zones of highest risk are doing, for this makes it possible to judge how effective current measures really are when it comes to saving lives.

Japan, which endured the devastating tsunami of 2011, ranks first in preparedness.

In Fukushima and other prefectures, the Japanese are building immense concrete breakwaters and seawalls up to fifteen meters high.

A national system of rapid public warning has been established to alert the population to an approaching catastrophe. It gives only minutes for evacuation, which itself points to the limitations of monitoring.

Elevated evacuation centers have been built in thousands of communities.

A nationwide system of public instruction has been introduced to train people how to act in the event of disaster.

Thanks to these measures, more than 1.9 million people were successfully evacuated after the Kamchatka earthquake of magnitude 8.8 in July 2025.

Indonesia has concentrated mainly on the mass rollout of special mobile applications and on installing large numbers of sensors across different regions.

In the United States, the National Tsunami Warning Center (NOAA) has been created, along with numerous sensor buoys used to forecast wave heights and map inundation zones.

In the Netherlands, the Delta Works system of dams, locks, and barriers has been built to protect about 60 percent of the country's territory lying below sea level.

Governments in different countries are also strengthening the protection of power grids, satellites, and communications systems.

Ordinary people are not standing aside from such concerns either. Unlike state systems, they focus on autonomous survival for periods ranging from two weeks to three months.

It is well known that wherever demand appears, supply follows. The first demand for private shelters arose in the United States during the Cold War, when the threat of nuclear war loomed over humanity. But after the September 11 attacks, the pandemic of 2020—2022, and the rise of climate catastrophes and geopolitical instability, a genuine boom began in the construction of bunkers of every level of comfort and protection.

Among the leaders of this market is Atlas Survival Shelters, one of the largest bunker companies operating in the United States, Europe, and the Middle East. Based in Dallas, Texas, it offers various types of shelters designed to protect against pandemics, civil unrest, biological and nuclear threats, and electromagnetic pulse. In 2024, it was reported that the company was selling, on average, one bunker per day.

Another active player in this market is the California-based company Vivos, founded by Robert Vicino. It specializes in building large underground complexes tailored to the individual demands of clients. One example is Vivos xPoint, located on the grounds of a former military base in South Dakota. It is designed to accommodate 5,000 people—575 families — and covers about 47 square kilometers, only slightly smaller than Manhattan.

The bunker is equipped with blast-resistant doors, autonomous climate-control and ventilation systems, water-production systems with three diesel generators, and water-treatment facilities. It contains everything necessary to live there for a full year.

Its developers claim that it can withstand a nearby nuclear explosion, an earthquake, and any armed attack.

The project's creators have also placed in the shelter a collection of zoological species, an archive of the world's most valuable artifacts and treasures, and even a DNA repository for preserving species.

The complex includes restaurants, a medical center, wells, and power stations. Access is possible only through the purchase of space for one's family, with units of about 230 square meters available.

For the elite investing hundreds of millions of dollars in high-tech shelters, another threat unexpectedly emerged — one beyond the very dangers from which the bunker was meant to save

them. It was described by Douglas Rushkoff, the well-known American media theorist, writer, professor at CUNY, and author of books on technology, society, and the psychology of digital culture. Much of his work concerns the psychology of human behavior, group dynamics, and power in times of crisis.

In 2017, Rushkoff was invited to deliver a talk on “the future of technology” at a luxury desert resort before a group he assumed were investors and bankers.

Instead of a public presentation, he was led into a private room with a round table where five men from the upper ranks of tech investment and hedge funds were seated. They began by asking about cryptocurrencies, VR/AR, and quantum computing, but then abruptly shifted to practical plans for surviving the Event — their euphemism for global catastrophe: ecological collapse, social unrest, nuclear war, solar superstorm, pandemic, hacking attack, and the like.

One of them, who by then had nearly finished building his underground bunker, asked the key question:

“How do I maintain authority over my security force after the Event?”

They discussed a possible future on the basis of the following assumptions:

The guards would be needed to defend the bunker from looters and crowds.

Money — even cryptocurrencies — would become worthless, so how would the guards be paid?

What would prevent the guards, or even family members, from choosing a new leader, killing the owners, and seizing the limited supplies of food, water, and air?

Possible ways of preventing a revolt by the security personnel were considered: special combination locks on food-storage areas, whose codes would be known only to the owners; “discipline collars” for the guards; or a fully robotic staff.

This question occupied most of the meeting. Rushkoff was shocked: the elite feared not only the external apocalypse, but also betrayal and rebellion by their own people under conditions of resource scarcity. He described it as a moment of recognition of the fundamental vulnerability of their “plans for salvation.”

Summing up the meeting, Rushkoff gave them the only realistic answer — one that, by his own account, shocked them:

“The way to make sure your security force won’t shoot you in the bunker after the Event is to start treating them well now. Pay for your head of security’s daughter’s Bat Mitzvah today. Help their families. Build real human relationships. Because when money disappears, all that will remain is what exists between people.”

In one interview, he even put it more bluntly: Be good to them today, and it will be much harder for them to shoot you in the back of the head tomorrow in the bunker.

They listened, but it was plainly not what they wanted to hear. What they wanted was a technical or coercive guarantee, not a moral or human solution. Rushkoff emphasizes that they did not take the advice seriously, because their entire philosophy is built on isolation, control, and individual “winning,” not on interdependence and trust.

The credibility of this story is high: it first appeared in Rushkoff’s 2018 essay in Medium / OneZero, “Survival of the Richest.” He later retold it many times in interviews — with The Guardian, The New York Times, CBC Radio, WIRED, podcasts, and YouTube appearances — without contradictions, and without any later debunking. The fullest version appears in his book *Survival of the Richest: Escape Fantasies of the Tech Billionaires*.¹²

Conclusions

The history of the Earth is full of dramatic events that repeatedly led to a “reset” of the biosphere. How likely is it that similar events will recur in modern history?

Supervolcanoes rumble ominously, regularly ejecting streams of lava, gas, ash, and rock fragments from their depths. The probability of a super-eruption is real, but its timing cannot be predicted. It lies somewhere on a spectrum ranging from “tomorrow” to “a hundred years from now — or later.”

The danger of a collision with a comet or a large asteroid is also real and equally unpredictable in terms of timing.

A new Great Flood belongs to the same category of threats.

A Carrington Event or a Miyake Event could happen at any moment — or it might wait another hundred years or more.

Global warming, by contrast, is not a future possibility. It is already underway and has entered a phase of acceleration, rapidly bringing us toward a dangerous threshold.

Professor Eliot Jacobson, analyzing global series including Copernicus ERA5, has argued that the three-year running mean of surface-temperature anomaly has reached $+1.52^{\circ}\text{C}$ relative to the 1850—1900 preindustrial baseline. In his view, this is the hottest three-year period in the last 120,000 years; beyond it lie only the deep ice ages and their opposites.¹³

The official summaries of the WMO and Copernicus are slightly more restrained: the consolidated three-year mean for 2023—2025 is $+1.48 \pm 0.13^{\circ}\text{C}$, while ERA5 gives $+1.52^{\circ}\text{C}$. The difference is explained by methodology and the choice of datasets, but the essential point remains the same: the 1.5°C threshold of the Paris Agreement is no longer “somewhere ahead of us.” It is already behind us, visible in the rear-view mirror.

How close are we to the point of no return? No one can answer that with precision. In a nonlinear system such as climate, even a careful analysis of current warming dynamics offers only limited predictive certainty.

Yet the rapid intensification of climate instability suggests something important: even in the absence of “black swans” such as a Carrington Event, a Miyake Event, an asteroid impact, or a supervolcanic eruption, the risk of a near-term climate apocalypse is already extremely high. And human beings are powerless to prevent it: the forces of nature exceed human capacities by orders of magnitude.

But nature is not the only horseman of the Apocalypse now galloping toward us. There is another threat — one humanity has created itself.

It is nuclear apocalypse.

The Doomsday Clock, set at the University of Chicago, goes on ticking, counting down the final seconds before midnight.

Chapter 3.

Nuclear Apocalypse: When Will the Clock Strike Midnight?

“I know not with what weapons World War III will be fought, but World War IV will be fought with sticks and stones.”
— Albert Einstein¹

Prologue

History never happens “suddenly,” nor does it recognize such a thing as “chance.”

It was no accident that on June 28, 1914, shots rang out in Sarajevo, ending the life of Archduke Franz Ferdinand, heir to the Austro-Hungarian throne.

From that day on, events unfolded like an avalanche rushing down a mountain: on July 28, 1914, Austria-Hungary declared war on Serbia. During the month of August alone, Russia, Germany, France, Belgium, Great Britain, and Japan were drawn into the conflict. Later the list of participants expanded to include the Ottoman Empire, Montenegro, Italy, Bulgaria, and Romania.

The rest of the story is well known: four years of war that claimed roughly 40 million lives.

Hardly had the final artillery shots faded when historians began sharpening their pens. Between 1918 and 1935, they published more than 300 books and 1,000 articles devoted to the First World War as a whole, including its causes, course, and consequences.

All of them agreed on one point: the war was the result of a long accumulation of contradictions among the great powers, a combination of imperial ambition, bloc logic, militarism, and failed diplomacy in a moment of crisis.

In their works, they laid out the elements of those contradictions: Germany’s drive to redistribute colonies and spheres of influence, the struggle for power in the Balkans, rivalry over control of the Black Sea straits and Ottoman territories — and so on, always in the same vein and in the same direction. Researchers write of a “Gordian knot of contradictions” that could not have been cut any other way.

The historians are right in their facts, but wrong in their understanding of the deeper causes. So let us thank them for their diligent and useful studies of the surface causes, and then dive deeper ourselves.

The true causes of this war — and of all other wars — reveal themselves only when we plunge back to the very beginning of human history.

If we approach that “beginning” from the biblical perspective, we find ourselves in the interval between 3874 and 3800 BC, watching Cain kill Abel.

If we take the scientific account of human development as our starting point, we descend roughly 315,000 years into the past and witness one Homo sapiens pick up a stone for the first time in order to crush the skull of another.

If that is so, then the root of future wars must be sought not in treaties and borders, but in the very structure of man.

To understand how humanity arrived at the point from which nuclear apocalypse is already clearly visible, we must trace the entire path — from cave fights over the best cuts of mammoth meat to the button labeled launch. Because in essence nothing has changed; only the scale and the scenery are different. And the button marked launch is merely a modern stone in the hand.

A World That Has Come Too Close to the Edge

Since the taboo against talking openly about the possibility of nuclear war was lifted, hardly a lazy blogger has failed to weigh in on the danger. And since there are few lazy bloggers, the entire blogosphere is now saturated with military themes.

If the matter were confined to posts by frightened bloggers, perhaps there would be less reason to worry. But when the discussion begins to include the voices of authoritative figures — politicians, major business leaders, scientists, and artists — the matter takes on an entirely different character. Ordinary people always feel that if a source of information stands high on the social ladder, it knows more about the real state of affairs. And if such a person not only remains silent no longer but begins to speak openly, then things must be truly bad.

So what, exactly, have ordinary people been hearing recently from authoritative voices? Let us begin with a figure known throughout the world: UN Secretary-General António Guterres.

Everywhere he has taken the podium, one hears the same warning: that the risk of nuclear war has risen to its highest level, and that “the nuclear option is not an option at all. It is a one-way road to annihilation.”

The United Nations, created in 1945, had one central purpose: to prevent new world wars. But its predecessor, the League of Nations, failed — and the Second World War began. Nonaggression treaties signed on the eve of catastrophe did not stop it.

Historians say that the experience of the League of Nations was taken into account when the UN was created. Five permanent members of the Security Council were given the right of veto. But it was precisely the veto that repeatedly paralyzed the Council whenever a conflict touched the interests of the great powers.

The UN has been transformed from an instrument of peace into a platform for political games. More and more politicians speak openly of its uselessness. In February 2025, U.S. President Donald Trump signed an executive order withdrawing the United States from a number of UN organizations, calling them “bloated, poorly managed, and ineffective.” It is hard to disagree.

Let us now see what other authoritative figures are saying about the situation that has taken shape in the world.

Nuclear scientists warn that the world is moving onto increasingly dangerous nuclear ground, and that 2025 brought no encouraging developments in the field of nuclear security. They stress that military operations in several regions are unfolding under the shadow of nuclear weapons, and that the risk of escalation is growing.

U.S. military experts at the DIA also acknowledge that the risk of nuclear escalation is rising faster than at any point in recent decades.

No one in the world, presumably, wants to unleash a Third World War. And yet the principle “If you want peace, prepare for war” sits firmly in the minds of many politicians. It is no accident that in recent public discussions of war the name of the famous nineteenth-century Prussian military thinker Carl von Clausewitz has resurfaced again and again. Clausewitz, author of the treatise *Vom Kriege* (*On War*), studied some 130 military campaigns, focusing especially on the wars of the previous 150 years, and above all on the Napoleonic era. He concluded that war is a natural instrument of state policy whenever diplomacy fails to achieve its ends.²

When Clausewitz formulated his famous maxim—“War is the continuation of politics by other means”—he could hardly have imagined that this thought would become not merely a theoretical definition, but a psychological code that Europe would carry within itself for decades.³

In the nineteenth century, Clausewitz’s idea became the foundation of a new military culture in which war was perceived not as tragedy, but as a natural, almost inevitable stage of political development.

Prussian generals spoke of war as “the normal condition of Europe,” and of peace as merely a temporary pause between campaigns. Thus an analytical formula was transformed into a norm of behavior, and in the twentieth century that norm became part of the continent’s collective consciousness.

The European powers, armed with the idea that war was simply “another language of politics,” began to act as though that language were inevitable.

This is how one might describe the cycle of actions that preceded the Second World War: the mobilization of one country became an argument for the mobilization of another; the fortification of borders was perceived as a sign of hostility. And if one country entered into an alliance with another, that served as a signal of threat to their neighbors.

Thus arose a “spiral of expectations,” in which Clausewitz’s idea functioned as a self-fulfilling prophecy.

Therein lies the tragic paradox of European history: a thought born as an attempt to understand war became the matrix through which war reproduced itself.

Clausewitz did not call for war — he described it.

But Europe heard in his words not a description, but a guide to action.

Today, when politicians once again speak of the “inevitability of conflict,” when defense ministers name specific years by which their countries must become “combat-ready,” we can see that old mechanism coming back to life. Clausewitz’s thought is once again turning into prophecy — not because it is true, but because people believe it.

The leading European politicians speak regularly about the risk of a new war and the need to be prepared for it by 2030.

Listening to some of Europe’s leaders today, one cannot help recalling Marcus Porcius Cato the Elder (234—149 BC), known as Cato the Censor — a figure whose political career and rhetoric became a vivid example of how a deep conviction in the existence of an existential threat can turn into an obsession, and then into a real war.

Cato entered history because he ended virtually every speech in the Roman Senate — regardless of its subject — with the same phrase: *Ceterum censeo Carthaginem esse delendam* (“Furthermore, I consider that Carthage must be destroyed”). It was precisely this relentless repetition that made the phrase proverbial and turned it into a symbol of the persistent, almost manic drive to destroy an enemy.

After the Second Punic War (218—201 BC), Carthage had been defeated, stripped of its fleet, most of its territory, and its army. It was obliged to pay enormous indemnities to Rome and could not wage war without the permission of the Roman Senate. Yet by the middle of the second century BC the city had recovered economically: trade had revived, agriculture had flourished, and visible prosperity had returned.

In 157 BC, Cato visited Carthage as part of a Roman commission and was stunned by its prosperity. That visit became the catalyst. Cato concluded that a recovering Carthage represented a mortal danger to Roman dominance in the western Mediterranean.

That position ultimately led to the Third Punic War (149—146 BC), in the course of which Carthage was completely destroyed and its territory turned into a Roman province.

Cato’s repeated phrase is an early example of a self-fulfilling prophecy in politics. By constantly reminding the Senate of the “threat of Carthage,” he gradually shifted public opinion and the Overton window: what first seemed excessive became normal, and then became necessary. In the end, Rome obtained the war it had itself provoked.

In the nuclear age, we see similar mechanisms at work: the constant repetition of a narrative about the “inevitable threat” posed by another state can move conflict from the hypothetical realm into the real one.

Against this background, all the leading global players are intensifying their military and technological programs, increasing the number of military exercises and expanding defense spending.

But one thing is well known: the more resources are pumped into the war machine, the more powerfully the old mechanism that political scientists call the “security dilemma” begins to operate. One country increases spending “for defense”; its neighbor sees a threat in that and responds in kind; then a third, a fourth, and a fifth join in. That is how an arms race is born — a race in which no one wants war, but everyone is preparing for it.

And in this picture we can see the same “spiral of expectations” already described above, the one that unfolded on the eve of the Second World War.

There is yet another influential source of End-of-the-World fear: the Doomsday Clock, a symbolic project that visualizes the level of global danger created by human activity.

The project was founded in 1947 by the editors of the *Bulletin of the Atomic Scientists* after the atomic bombings of Hiroshima and Nagasaki and the onset of the Cold War. Midnight on this clock symbolizes nuclear apocalypse.

The decision to move the hands is made annually by the Bulletin’s Science and Security Board, which includes physicists, climatologists, and experts in cybersecurity who assess global threats.

The Board in turn consults with the Board of Sponsors, which includes Nobel laureates and other distinguished scientists.

Initially, the experts discussed only apocalyptic risks connected with nuclear testing. In 2007, they concluded that climate change had become a key factor on a par with the nuclear threat. Beginning in 2010, cyberthreats, biosecurity, artificial intelligence, and disinformation undermining global cooperation were added to the list of risks.

The process of moving the hands is rigorous and scientifically grounded, and for that very reason it has a powerful effect on public consciousness. The result is announced publicly each January. The clock is not moved automatically: the hands may be left where they are, moved forward closer to midnight, or moved back farther from it.

The historical minimum of danger—17 minutes to midnight — was recorded in 1991, in connection with the end of the Cold War after the collapse of the Soviet Union and the signing of agreements reducing nuclear arsenals.

The historical maximum of danger—85 seconds to midnight — appeared in January 2026, when the hands were moved four seconds closer to midnight because of worsening global trends. This is the closest the clock has ever come to global catastrophe in the history of the project.

In essence, this scientific ritual of the twenty-first century has replaced the ancient prophets and oracles. Scientists, like new priests, interpret world events each year, pronounce a “diagnosis” on humanity, and symbolically “count down” the time to possible apocalypse.

The scientists added fuel to the fire when, on January 27, 2026, they moved the hands of the Doomsday Clock another four seconds closer to midnight. As a result, the symbolic time of global catastrophe was set at 11:58:35 p.m. —85 seconds before the notional “nuclear midnight.” It was the bleakest forecast in the project’s history.

The new time was announced at a press conference held by the *Bulletin of the Atomic Scientists* in Washington. The event was broadcast live.

A journalist from ABS News, commenting on the decision, remarked that humanity was “closer to self-destruction than ever before.”

The maximum time before “midnight” on the Doomsday Clock had been recorded in 1991, when the hands showed 11:43 p.m. —that is, 17 minutes before a notional global catastrophe.

And now, in the opinion of the scientists, only 85 seconds remain before nuclear Apocalypse. That is less time than it takes a person to read this page or drink a cup of coffee. Less time than a missile needs to travel from a submarine to the coast. Less time than it takes for a kettle to boil.

We live in an age in which the End of the World has become technically possible, politically permissible, and — most frightening of all — psychologically familiar.

To sum up this section, one may say that a new Overton window has opened in Europe: the idea of a large war, still unthinkable only recently, has become discussable, then permissible, and then almost inevitable. And in that shift lies the principal danger. When war becomes part of normal political discourse, it ceases to be impossible.

A Historical Excursion

When did wars between human beings begin on Earth? And what were their motives? Is there a causal link between aggressive behavior in the distant past and the manifestations of aggression we see in the modern world?

Even the briefest excursion into human history shows that war appeared long before states, armies, and even agriculture.

Carl von Clausewitz did not study ancient wars. His horizon extended over roughly a century and a half of European conflict, from Frederick the Great to Napoleon. We, however, need to dig deeper, to go back to the sources, because only then does the whole river of time become clearer — a river in which peaceful periods were merely small islands in a violent current.

To dig deeper — in both the literal and figurative sense — is the task of archaeologists, and they have done it well. In northeastern Africa, on the territory of present-day Sudan, they uncovered a mass grave containing sixty-one individuals; in forty-five of them, arrowheads were still embedded in the bones, along with other signs of violent death. Historians regard this as evidence of an ancient mass conflict that took place about 13,000 years ago. In their view, groups of hunter-gatherers were killing one another over access to water and hunting grounds.⁴

This does not mean that there were no conflicts before that time. It means only that conflicts already existed 13,000 years ago. As for how human beings lived in earlier periods of history, we do not know, and can only speculate. But we will not indulge in guesswork. For our purposes, the last 13,000 years are more than enough.

The next well-documented massacre took place in Kenya about 10,000 years ago. During excavations at Nataruk, in Turkana County, the remains of twenty-seven murdered individuals were discovered — the skeletons of men, women, and children, ranging from a three-year-old child to an older man no younger than forty-five. One of the dead women was in the final months of pregnancy.

Study of the bones revealed numerous injuries: traces of blows from clubs or stone axes, fractures of arms, knees, and ribs. Stone projectile points from arrows or spears were embedded in the bones of two men. The position of some of the remains suggests that the victims may have been bound before death — or possibly afterward. No signs of intentional burial were found. In the view of the researchers, the bodies were left where they fell or thrown into the waters of Lake Turkana.⁵

About 7,000 years ago, a true slaughter took place at Talheim in what is now Germany: thirty-four people were killed at the same time by blows to the head from stone axes. There were no middle-aged men among the victims, which gave rise to the hypothesis that they had been taken captive.⁶

Between 3000 and 2500 BC, wars regularly broke out among the city-states of ancient Sumer, on the territory of present-day Iraq. Writing already existed by that time, which is why we know quite well what happened there and how it happened. In Sumer we see the emergence of the first armies and the first military commanders, who waged war mainly for resources.

Then historians point to the battles between ancient Egypt and the Hittite kingdom (ca. 1274 BC), the Assyrian conquests (ca. 900—600 BC), the Greco-Persian Wars (ca. 500—449 BC), Alexander the Great's campaigns in his attempt to build a global empire (ca. 334—323 BC), Rome's Punic Wars against Carthage (ca. 264—146 BC), the Hundred Years' War between France and England (1337—1453), and the Napoleonic Wars of 1803—1815.

Of course, these are only the loudest milestones along the path of war, which has accompanied humanity from the most ancient times. But even they are enough to support one conclusion: ***war is not a deviation but a norm in relations between human beings***; the causes of war have changed little — resources, fear, power; and the modern world is not an exception, but a continuation of an ancient line.

When a phenomenon or process — war, for example — ceases to be an exception and becomes part of normal reality, the need arises to study it. In 2007, the Institute for the Study of War (ISW) was founded in the United States. Such structures do not arise from outside; they grow out of a society's internal needs, its fears, its expectations, and its new ways of perceiving the world.

Alongside ISW, two other major global centers operate in this field: UCDP (the Uppsala Conflict Data Program) in Sweden and PRIO (the Peace Research Institute Oslo) in Norway. It is these institutions that provide the official statistics on conflicts across the planet.

If we look into their reports, we find a deeply alarming picture. According to UCDP and PRIO, there were 61 armed conflicts in the world in 2024—the highest number recorded since 1946.⁷

In 2025 and 2026, conflict activity did not subside, and the trajectory has continued upward. This creates a background in which nuclear escalation becomes increasingly likely.

Weapons of Doomsday

On July 16, 1945, in the Alamogordo desert, the first atomic bomb in history exploded. Its creation was the result of the efforts of several dozen of the greatest physicists of the twentieth century. The leading figures in that process were Robert Oppenheimer, scientific director of the Manhattan Project; Enrico Fermi, creator of the world's first controlled nuclear reactor; and Nobel Prize — winning physicist Niels Bohr.

This was the core of a project that ultimately involved more than 130,000 people: scientists, engineers, chemists, metallurgists, and military personnel.

The most famous physicist of the twentieth century, Albert Einstein, did not personally take part in the Manhattan Project. Yet it was he who revealed the key to a weapon capable of destroying humanity. That key was the formula $E = mc^2$, derived and published by Einstein in 1905 within the framework of special relativity. The equation explained why the splitting of the atom releases enormous energy.

It later became one of the cornerstones of modern physics, a science to which Einstein's work made a foundational contribution toward the creation of the atomic bomb. In 1939, he signed a letter to President Roosevelt urging the United States to begin atomic research. The argument behind that appeal was clear: Germany might be the first to build an atomic bomb.

It was a powerful argument. Roosevelt received the letter on October 11, 1939, when Europe was already in flames from the war unleashed by Germany.

In fairness, it should be noted that the letter itself was written by the American physicist Leo Szilard, and Einstein merely signed it. But it was that letter that became the political impulse behind the creation of the Manhattan Project.⁸

The world learned what human beings had created three weeks later, when the two atomic bombings of Japan brought the Second World War to an end: Japan surrendered on August 15, 1945.

The nuclear age had begun, along with the arms race and the Cold War. It was after the attack on Japan that a fear emerged which has shaped international politics ever since.

That race led first to the Soviet Union acquiring atomic weapons (1949), then the United Kingdom (1952), France (1960), and China (1964).

Later the list of states possessing nuclear weapons expanded to include India (1974), Israel (1979, unofficially), Pakistan (1998), and North Korea (2006).

A clear understanding emerged across the world: if nuclear war were ever to begin, it would likely lead to the destruction of civilization on a global scale, and possibly of humanity itself.

And yet a paradoxical situation took shape: fear became the chief guarantor of peace and, at the same time, the fuel for the continuing arms race. States possessing nuclear capability began producing such weapons on a large scale, while simultaneously increasing their destructive power and the speed of delivery.

Consider these figures: since 1945, more than 2,000 nuclear tests have been conducted by the world's states. They were carried out on land, underground, in the air, underwater, and in space. The atmosphere, the oceans, and the soil have all borne consequences that we still do not fully understand.

As of 2026, the combined nuclear arsenals of all countries amount to 12,241 warheads. These weapons are distributed across land-based silos, submarines, and aircraft.

Scientists have repeatedly modeled scenarios of full-scale nuclear war. Although these models differ in minor details, they converge in their general picture of the consequences.

In the first hours, 1.5 to 2 billion people die. Another 2 to 3 billion die in the following months from burns, radiation, hunger, and the collapse of medical care.

That is to say: civilization ceases to exist as an organized system.

For roughly 10 to 20 years, a nuclear winter descends upon the entire planet. It kills no fewer than the explosions themselves. Between 150 and 180 million tons of soot rise into the atmosphere. Global temperatures fall by 10 to 15°C, and in continental regions summer temperatures drop to as low as —20°C. Crop yields disappear almost entirely.

The ozone layer is destroyed by 30 to 70 percent. It ceases to be a barrier to ultraviolet radiation, which becomes lethally dangerous.

Radioactive contamination spreads across the planet for decades.⁹

The End of the World arrives, and civilization is reset.

The Cuban Missile Crisis: Thirteen Days to the End

Fear of dying in the flames of nuclear apocalypse rose sharply after the events that later came to be known as the Cuban Missile Crisis. It unfolded in October 1962, and the world truly stood only a few steps away from nuclear war.

The background to the crisis was this: in 1961, the United States deployed PGM-19 Jupiter missiles in Turkey. The Soviet Union regarded this as an unacceptable threat and, in October 1962, secretly deployed R-12 and R-14 medium-range missiles in Cuba, both capable of carrying nuclear warheads.

The world froze, one step away from the outbreak of nuclear war. What followed exceeded any Hollywood blockbuster.

On October 27, a group of American warships detected a Soviet diesel-electric submarine near Cuba. The Americans began dropping practice depth charges in order to force it to surface.

The commander of the submarine, in darkness and cut off from communication with Moscow, concluded that war had already begun and gave the order to prepare a torpedo armed with a 20-kiloton nuclear warhead for launch.

Launch required the consent of all three senior officers on board. Two agreed. The third — the flotilla chief of staff, who was also aboard the submarine — refused to confirm the order. He drew attention to the signals coming from the American ships and insisted that the submarine surface in order to establish contact with command.

In the end, the leaders of both countries did recognize that there would be no victors in such a war, and on October 28, 1962, the United States and the Soviet Union reached a settlement. Under the agreement, the Soviet Union removed its missiles from Cuba, and the United States removed its missiles from Turkey. Both sides carried out the arrangement.¹⁰

This episode became one of the clearest examples of how fragile peace is in the nuclear age — and how much can depend on the composure and clarity of thought of a single person standing at a combat post.

The NORAD False Alarm

On January 24, 1961, the American early warning system NORAD detected a massive launch of Soviet missiles. The signal looked absolutely real: by all parameters, it matched the beginning of a USSR nuclear strike.

Strategic B-52 bombers carrying megaton-class nuclear bombs were immediately scrambled into the air. They set course for the Soviet Union, and their crews were ordered to prepare for combat mode.

Within minutes, it became clear that this was a false alarm, caused by a severe storm. The storm had knocked out communication lines, and the system interpreted this as the destruction of American radars by a first strike (some sources attribute the alarm to a “fire at a switching station in Colorado caused by a short circuit”).¹¹

The bombers were ordered back to their bases, and the threat of war due to a technical glitch temporarily dissolved.

Yes, unfortunately, only temporarily. Because the situation repeated itself on May 23, 1967, when a powerful solar flare triggered an intense geomagnetic storm. This storm knocked out American early-warning radars in Alaska, radars in Greenland, and radars in the United Kingdom. To the Pentagon, this looked like a coordinated Soviet attack on the U.S. missile defense system — a typical first step before a nuclear strike.

The military’s reaction was predictable: Air Force command concluded that the USSR was “blinding” American radars. The entire U.S. nuclear triad — strategic bombers, land-based missiles, and nuclear-armed submarines — was put on maximum alert as quickly as possible.

This time, the situation was saved by military meteorologists. They managed to report that the failure was caused by a solar flare, not an attack. After that, the order to prepare for a strike was canceled.¹²

But what if the meteorologists’ report had been delayed by just a few minutes? The United States might have moved into combat mode, and the USSR would have responded in kind.

That was a moment when space weather nearly became the trigger for nuclear war.

The next such moment was no longer about weather, but about computers.

On November 9, 1979, a message appeared on the screens of operators at the NORAD command center: “Launch of 2500 Soviet intercontinental ballistic missiles.” This looked like a full-scale first strike by the USSR, and the military command immediately shifted to alert level DEFCON 1 (pre-war posture) — with all the actions prescribed by launch protocols.

The mistake was understood when several independent technical sources (satellites, external radars) failed to confirm the launches.

Where did the false message come from? The cause turned out to be absurd: a training tape, intended for drill scenarios, had been accidentally loaded into the system.¹³

These are cases that have made it into open sources. I would venture to guess that many more such episodes have remained “off the record,” and we will never know about them. But does that change anything in essence? Not at all. The picture is perfectly clear: nuclear war may begin not out of malicious intent, but by mistake.

Cyberattack

Recently, another risk has been added to technical failures like those described above — cyberattacks by hackers.

In the twenty-first century, cyberattacks are considered one of the factors capable of provoking nuclear escalation: they can send false signals, interfere with early warning systems, disrupt communications, and disable command centers. Theoretically, a cyberattack could block or, conversely, simulate commands, disable verification mechanisms, and ultimately lead to catastrophe.

And all this in systems where decisions are made in minutes.

Cyberattacks are characterized by invisibility, speed, and the ambiguity of the attacker's intentions. And in a crisis situation, uncertainty is a powerful and terrifying enemy. If military command or political leadership fails to understand what is happening amid threat signals, the worst-case scenario may unfold.

But perhaps these threats are greatly exaggerated, and military facilities are well protected even against the most skilled hackers?

Unfortunately, practice shows the opposite.

In 2008, the Pentagon was hacked. Malicious code entered the network of the United States Central Command through an infected USB drive, creating a hidden communications channel and allowing data to be transmitted outside the network.

In 2010, the first digital strike in history was carried out. Its target was Iran's nuclear program, specifically the uranium enrichment facility in Natanz.

For this strike, the malicious program Stuxnet was created — a sophisticated computer worm that became an example of digital weaponry aimed at the physical destruction of infrastructure.

Stuxnet's primary goal was to disrupt or slow down Iran's nuclear program by disabling uranium enrichment centrifuges.

According to various estimates, Stuxnet disabled about 1,000 centrifuges at the Natanz facility, roughly one-fifth of the total. This significantly slowed the development of Iran's nuclear program.

This attack set a precedent, demonstrating the possibility of deliberately targeting another country's critical infrastructure with malicious software.

In 2011, the control system of U.S. drones was hacked. A virus infiltrated the network of a U.S. Air Force base in Nevada where combat drones were operated. This showed that even highly protected systems are vulnerable.

Between 2013 and 2017, North Korean hackers repeatedly attacked the infrastructure of the South Korean Ministry of Defense, and in one case stole documents containing elements of the country's defense plan.

All states take measures to protect their nuclear forces from digital threats. Nuclear systems avoid full automation — critical decisions are made by humans, not algorithms. They create parallel communication channels, backup command centers, independent verification systems, and isolate nuclear systems from the internet.¹⁴

The risks of unauthorized access to strategically critical nodes are reduced, but they do not disappear entirely.

There is another factor that increases the risk of nuclear war. This time, it is not people, nor technology — it is nature, specifically the climate changes that were already examined in detail in Chapter 2.

Now let us look at them from a different perspective.

Climate as a Threat of War

When assessing the risks of a nuclear war breaking out, experts mainly discuss the human factor and potential technical failures. These factors can still be addressed to some extent, and since war has not yet broken out, this struggle must be acknowledged as successful so far.

Конец ознакомительного фрагмента.

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