The Deep Past and Possible Future Climate – Part 2

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1. Introduction

I had completed Part 1 of this 2-part series, and didn't even know there would be a part 2 when I started reading my next book on climate change (and my last book on this subject for a while – I'm switching to one my other subjects for a while). The (for now) last book on climate change is referenced below.

However, first, I need to cover some climate-change ground to clarify one of the differences between part 1 and part 2 of this series.

Earth's climate is very dynamic. Thus, radical climate change has been going on many millions (and probably billions) of years before the first member of our species (Homo sapiens) evolved. Part 1 of this series explored an event (the Paleocene–Eocene Thermal Maximum or PETM) that occurred roughly 56 million years ago, and how anthropomorphic (human-caused) climate change could trigger a much worse "PETM-like" event in the near future.

This paper will explore humans' (specifically Homo sapiens') history for events that were caused or substantially affected by both anthropomorphic and natural climate change. By looking at how ancient cultures responded to these events, we might find some role-models defining how we should respond to current and future climate change.

There are (at least) two approaches for dealing with climate change: mitigation and adaptation. Mitigation is mostly about reducing the amount of greenhouse gasses (GHG) we are emitting and/or otherwise reducing the GHG in the atmosphere. The primary reference and thus this paper are about adaptation.[1]

The price of the Reference 1 Book ranges from a bit over $15 for a new hardcover, to a bit over $10 for a used book. This is absurdly inexpensive for a book this good.

2. Challenges of Climate Change

2.1. A Frozen World, (c. 30,000 to c. 15,000 Years Ago)

Central Europe, autumn, 24,000 years ago. Two weather-beaten hunters sit on a streamside boulder with their backs to the wind; their faces turned toward the horizon. They ignore the reindeer feeding on the other bank, pawing through the dead leaves of autumn. Gray clouds scud close to the ground, massing heavily to the north. Neither of them says anything as they watch the cold, arid landscape in the growing darkness. Then they look at one another and nod, gathering their parkas close around their shoulders.

[1] Brian Fagan (Author) and Nadia Durrani (Author), Climate Chaos: Lessons on Survival from Our Ancestors, September 21, 2021, https://www.amazon.com/Climate-Chaos-Lessons-Survival-Ancestors/dp/154175087X/ref=pd_lpo_d_sccl_3/140-8574840-2664452?pd_rd_w=IS2f9&content-id=amzn1.sym.4c8c52db-06f8-4e42-8e56-912796f2ea6c&pf_rd_p=4c8c52db-06f8-4e42-8e56-912796f2ea6c&pf_rd_r=Z79ZHQ887XSN3V665Y90&pd_rd_wg=54ou5&pd_rd_r=48cf4280-f4e1-49fc-a3c1-21e0a7c74ca6&pd_rd_i=154175087X&psc=1

Their summer dwelling hugs the ground, a low dome of sod and hides. The hunters stoop into the smoky interior, where everyone clusters around a blazing hearth as fat-lamps flicker in the gloom. As darkness falls and the churning storm strengthens outside, the people huddle under furs and hides. One of the hunters, believed to have supernatural powers, tells a familiar tale of mythic beings, of the first people of long ago. The band has heard the story many times, a tale of constant movement following the reindeer and wild horses in spring and autumn. As the story unfolds, the elders listen to the opinion of everyone, young and old, male and female. It is time to move to winter quarters.

We are Homo sapiens, the self-named "wise people." Our species emerged in the warmth of Africa at least 300,000 years ago – the date is still controversial.[2] Nimble, intelligent creatures, we moved over wide hunting territories and adapted to climatic shifts like long drought cycles by anchoring ourselves to reliable water sources. We were consummate opportunists, relying on careful observation, an intimate knowledge of the surrounding landscape, and cooperation-both within the narrow boundaries of family and band and also with extended kin-for survival. We lived with the vicissitudes of local climates using simple, portable tools and weapons. For almost all of our existence, we led this nomadic life-moving with the animals and with the seasons. Before writing, which emerged in western Asia a mere 5,000 years ago, we passed on all knowledge-real or imagined-by word of mouth and sometimes via art as well.

Our survival in ancient times depended on intimate knowledge of, and respect for, the living world of which we are part. Though no present-day group is a portal to the remote past, it is helpful to consider what life is like among today's few remaining nomadic hunter-gatherer societies. Among the Inuit of the Arctic or the San of Southern Africa, we find a strong deference for prey and a deep understanding of the living environment-of the seasons, of plant foods, and of the migration of game animals. This knowledge spells the difference between life and death, as it always has.

Back in our African homeland, violent storms, intense drought cycles, and the ash-laden aftermaths of major volcanic eruptions were always climatic realities. But the challenges to our survival intensified dramatically when some of Homo sapiens moved into the much colder, sparsely inhabited European and Asian world around 45,000 years ago. We found ourselves battling some of the harshest climatic environments our species has ever lived through. But there was more: we were not alone. During the six-million-plus years of human evolution, several distinct hominin species always coexisted at any given time.

For example, in Eurasia, there were Neanderthals between about 400,000 and 30,000 years ago, though the dates are disputed. These were hominins with whom we were reasonably closely related in evolutionary terms. We shared a common ancestor back in Africa, up to if not before, 700,000 years ago.

[2] The first word in the species name Homo sapiens is "Homo," which refers to the genus of humans. The second word "sapiens" is a species modifier that indicates the specific species designation within the genus Homo. The earliest members of the genus Homo emerged approximately 2.8 to 2.75 million years ago. The oldest known remains of Homo sapiens date back to about 315,000 years ago.

On an island in Southeast Asia until about 50,000 years ago, there existed an isolated population of another diminutive human, Homo floresiensis, the so-called hobbit folk, known for their short stature. A third, still largely unknown hominin species-the Denisovans-lived in Siberia and further east and south. There were other hominin species, too, of which we know almost nothing. And despite some minimal interbreeding between some of the various species (notably Homo sapiens, Neanderthals, and Denisovans), all, bar us, were destined for extinction. By 30,000 years ago, we Homo sapiens were the only hominin species to remain standing.

Author's comment: There are two facts about these authors (Brian Fagan and Nadia Durrani) I wish you to take from the above text. (1) They go out of their way to present the full scientific facts regarding their narrative, and (2) they interleave the facts with short narrative sections (stories) to sustain interest. Also, they are very skilled writers.

I will take advantage of the authors' skills by knitting together my brief paper with their words wherever I can.

After The Ice *(Before 15,000 Years ago to c.6,000 BCE):*

Hunters and foragers had flourished in the relatively well-warmed lands between the Mediterranean coast and the Syro-Arabian Desert for millennia… The previous icy climate of the late Ice Age had warmed slowly after 20,000 years ago…

A Perfect Storm:

The vegetation became more diverse and included wild cereals that provided rich harvests of edible seeds. Game abounded, so did edible nuts like pistachios and acorns. Especially along the lowest reaches of the Tigris and Euphrates Rivers, generations of hunters and gatherers lived so well, they decided to stay put…

First Towns: Drugs, Drought, Disease *(C. 7500 BCE):*

As forests retreated in the face of drought, wild grass harvests plummeted. Hungry communities survived off gazelle hunting and more intensive processing of grains and legumes. In areas like southeast Turkey and northern Syria, some communities started planting wild grasses to expand their range, a familiar strategy of experimenting.

At a village mound named Abu Hureyra close to the Euphrates River in northern Syria, the original inhabitants of about 13,000 years ago lived in simple pit dwellings in a well-wooded environment, where animals and wild cereals were plentiful. They also harvested hundreds of Persian gazelles, which migrated from the south each spring.

By sifting the ashy occupation levels through fine screens, excavator Andrew Moore recovered large samples of plant foods. His colleague Gordon Hillman found that they came from half a dozen staple wild plants. But hundreds of others were also used for all kinds of purposes, including as hallucinogens and dyes. The tiny village was abandoned as the drought intensified, perhaps in part because of a shortage of firewood.

The Little Ice Age *(C. 1321 to the late nineteenth century CE)*

The Little Ice Age was a "snap" of significant cooling. Back in 1939 the Little Ice Age was no more than an idea. Today, researchers have accumulated proxies and historical records for the Little Ice Age from all over the world.

Author's comment: two questions readers might have are:

1. How significant were the effects of the Little Ice Age?
2. Could we have another "Little Ice Age"?

   I will answer the second question first. No. We now in a period substantial human-caused (anthropomorphic) warming (see the text below).

Although many climate deniers like to tout the risk of another potential Ice Age as being justification for the human-made global warming, we have rolled way past that. Cooling (like in the Little Ice Age), or warming (like we are experiencing today via anthropomorphic climate change leading to global warming) each have major downsides. Furthermore, with the amount of greenhouse gasses in the air today, it will take centuries to return to Earth's "normal" climate (although reading Reference 1 would convince you that there is no such thing as a "normal" climate on our planet or any place therein). However, I will add a large excerpt from Reference 1 in the process of answering question 1 above to complete this paper, and describe the Little Ice Age.

In 1711, English natural scientist William Derham remarked on the low level of sunspot activity between 1660 and 1684. This led him to remark, "Spots can hardly escape the sight of so many Observers of the Sun, as were then perpetually peeping upon him with their Telescopes." Everyone assumed until 1774 that sunspots were clouds that covered the sun, so there were few new observations until the nineteenth century. Today, we know that sunspots are places where the sun's magnetic field rises from below its surface. Sunspot activity waxes and wanes about every eleven years but does not affect us directly. Days, even weeks, can pass without any sunspot activity. Over the past two centuries, only the year 1810 saw no sunspot activity whatsoever. By any standards, the low level of sunspot activity during the Little Ice Age was unusual. Whether or not these lulls caused lower temperatures during that period is unknown, but they coincide in considerable part with its coldest years.[1]

There were three minima. The first longer cold phase of the Little Ice Age came between 1450 and 1530. This coincided with a low level of sunspot activity known as the Sporer Minimum, named for a German astronomer. The Sporer years were cold, but those of the second minimum, dubbed the Grindelwald Fluctuation for a town in the Alps, lasted from the early 1560s to 1620 and were significantly colder. During the coldest Grindelwald years, the growing season in northern Europe became as much as six weeks shorter. Many farmers switched from wheat to more cold-resistant barley, oats, and rye. Nevertheless, crop failures still occurred, especially on marginal lands. The Maunder Minimum (1645-1715) was a period of very low sunspot activity that coincided with a period of lower-than-average temperatures in Europe and North America. The Thames in London and Dutch canals froze over. During the Maunder, the sun emitted weaker ultraviolet light, leading to less ozone in the stratosphere. The decrease caused planetary waves, which kicked the North Atlantic Oscillation into a negative mode. Winter storms tended to be colder under such conditions, and temperatures were lower, as confirmed by limited historical records.

Sunspot activity did not cause the Little Ice Age. Most likely volcanic activity was a major player, for the cold increased with intensified volcanic activity. Mount Huaynaputina in southern Peru burst apart on February 19, 1600, the largest eruption of the past 2,500 years, dwarfing both Pompeii and even Mount Tambora and Krakatoa during the nineteenth century.[3] The Huaynaputina explosion threw thirty cubic kilometers of ash and rock thirty-five kilometers into the atmosphere. Ash fell like rain over hundreds of square kilometers. Volcanic ash mantled the volcano-surrounded town of Ariquipa. A local scholar, Felipe Guaman Poma de Ayala, remarked that one could see neither sun nor moon nor stars for a month. The summer of 1601 was the coldest since 1400 throughout the Northern Hemisphere. Summer sunlight in Iceland was so dim that there were no shadows. Both the sun and moon were little more than "faint, reddish" apparitions. At least four other volcanic episodes during the seventeenth century produced significant cold spikes, but none of them as severe as that caused by Huaynaputina.

Chamonix, now a fashionable ski resort, was then a poverty-stricken village where ice constantly threatened growing crops. The community lost a third of its land between 1628 and 1630 in the face of an assault of avalanches, floods, and advancing ice. Only one harvest in three reached maturity in fields that were under snow for most of the year…

Final author's comment: So, you have the answer to Question 1 on the prior page: Normal cycles in solar activity to some degree, but mostly volcanic eruptions (which also may be cyclic).[4]

The authors of Reference 1 take you through to modern times. The goal of this book is to teach the lessons modern man can learn from many generations of ancestors. Although, the authors spell these out in later sections, I will not. This book is very inexpensive (<$20), so, if you are interested in climate change adaptation, buy it and read it.

[3] See the primary image and caption for this post.
[4] See: https://arstechnica.com/science/2012/12/earths-orbital-cycles-may-trigger-peaks-of-volcanic-eruptions/