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To cite this article: Job Flores-Fernández & Francisco José Martínez-López (2025) Synergies, concordances and resonances around the cyclical concept of time, Cogent Arts & Humanities, 12:1, 2598013, DOI: [10.1080/23311983.2025.2598013](https://doi.org/10.1080/23311983.2025.2598013)

To link to this article: <https://doi.org/10.1080/23311983.2025.2598013>



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Published online: 05 Dec 2025.



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Synergies, concordances and resonances around the cyclical concept of time

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ABSTRACT

Theories modelling history through cycles are still little known, despite their innovative nature and the impact they may have on our immediate future. To check if there are concordances and synergies between them, we have made an analysis using the comparative method. Initially, we collected data from well-known authors on cycles of about 120 years of a historical nature. Then, we have compared them in turn with other 120-year climatic cycles. The results showed a remarkable concordance between the different cyclical theories, and they showed that the synergies (or at least the synchronies) between climatic and historical springs are not impossible. The conclusion is that we may have to expand our concept of the T (time) factor, considering its multidimensionality.

ARTICLE HISTORY

Received 2 May 2024
Revised 21 May 2025
Accepted 30 October 2025

KEYWORDS

Historical and warlike cycles; climatic cycles; prospective; comparative history; time factor

SUBJECTS

Anthropology - Soc Sci; History; Cultural Studies

Introduction

We all know the linear and irreversible nature of time, but it is also true that many events and circumstances, very similar to each other, appear again and again throughout history. In many cases, these repetitions of similar events generate patterns that we call “cycles.”

Although the study of these cycles has been a constant in the history of humanity, since the 19th century their study has intensified. That is why today, we can find studies on climate, war, political and economic cycles, among many others.

The study of these repetitive patterns has a notable interest and multiple applications. They are especially known in foresight (future studies), where they form one of the four currents of this discipline (Bas, 1999, pp. 68-71).

The idea that underpins this interest is that if events follow a stable pattern or a constant trend, this could help us consider what scenarios are likely to occur in the immediate future. These possible scenarios help us not to predict the future, but rather to think about it, with the purpose of avoiding it, taking advantage of it, or even modifying it to the extent of our possibilities. That is because extrapolation of

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Full Professor of the University of Huelva for 37 years. He gives teaching in the areas of Information Technologies, Futures Studies and Theory of Historical Cycles. Graduate and Ph. Doctor in Economic and Management Sciences (with extraordinary prize). He has given conferences in diverse institutions, courses and masters, as well as more than 50 courses of doctorate in Universities so much Spanish as Europeans, Asians and Americans. Director and principal researcher in numerous scientific, both national and international projects, author and co-author of more than 200 scientific works. He has been Rector of the University of Huelva and President of the Economic and Social Council of Huelva, President of Council of Foundation Certiuni, President of Council of Federation Alumni Spain, and Vice President of United Academic Journals.

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cyclical, seasonal, or trending models of data is one of the forecasting methods that uses past data to think about the future values (Bas, 1999, pp. 84-86; Montgomery et al., 2016).

But although it is generally accepted that these repetitive patterns occur and have certain regularity in different fields related to human activities such economy or in demography (and that means, in our history) (De Miguel, 1987), the problem arises when trying to determine the causes that trigger them. Are they caused by the human being himself (endogenous causes)? Do some cycles influence others? Are they simply the product of a study method? Are they a result of generational alternation? On the other hand, we can also think about exogenous causes, and ask ourselves: are they the product of other natural cycles? Maybe climatic related?

Searching for a climatic origin

In this regard, the famous historian Braudel (1992, pp. 82-83) wrote about the long-term conjunctures that, while “economists and historians have observed and described these movements and noted how they are superimposed just as the tide”, and they are “always surprised at their extent and their eternal regularity”, they “are never try to explain why they happen”.

Then, he points out that “the only initiative in this direction concerns Juglar cycles, which some people have tried to connect with sunspots! No one seriously believes in such a close connection”. However, he explains that “the most important impact is that caused by external, exogenous causes”, and points out to the *ancient régime* economy, “dominated by the calendar”: the harvest, the winter... seasonal and climatic causes.

By this mention about sunspots, he may possibly refer to the studies of Dewey & Mandino (1971, p. 166), published some years before. They drew this parallel between the Juglar economic cycle (of about 10years), and a sunspot cycle of about 11years known as the Schwabe cycle (Kern et al., 2012). As we can see in their work, Dewey & Mandino (1971) knew the similar theory formulated by Jevons in the 19th century.

In relation with these connections between historical or economic cycles and these relate to the climate, the Spanish sociologist De Miguel (1987, p. 39) indicated that “the notion of the cycle” can be applied to demographic and economic data, but that

A strict mechanical causality should not be sought, nor less astronomical regularities. The relative harmonies of meteorological phenomena cannot even be achieved. In human affairs, the accumulation of variables is such that inharmonious oscillations, full of breaks, must be expected. What we should search in the oscillations of the conjuncture and the population cycles is not an exact match, but variations more or less related, an echo or resonance of one in another curve.

However, the author tries to connect the climatic cycles of Boyson and Padoch (1980) with the Braudel ones, and concludes that “without extreme fantasy, what can be recorded more modestly is a persistent “resonance” between the great Braudel cycles and certain oscillations in the climate of the Northern Hemisphere.” And after showing “the surprising correspondence between the two rhythms,” he concludes: “it cannot be by chance that the eras of plenitude coincide with cold “episodes” in European climatic history,” although he interprets that the trend seems to break in the warm but creative period, which began around 1915 (De Miguel, 1987, pp. 47-49). With these words, the author refers to the coincidence between the historic-economic cycles and the climatic ones in about 1200-1400 and 1600-1720 AD, as we can check in Figure 1.

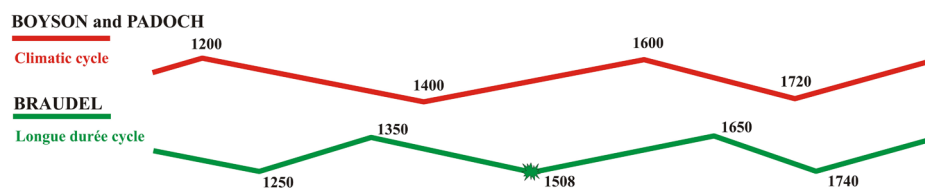


Figure 1. Comparison between climatic and economic cycles. Own elaboration, according to De Miguel (1987).

Since the 70s and 80s, scientific knowledge about climatic has increased notably. And also, the ancient cyclical theories of history and economics have continued to develop until today (Rothenberg, 2010). That is because in this article, we are going to update these comparisons. We will compare climatic, generational, warlike, and economic cycles that present a priori some sort of affinity. This will help us see if there are indeed these aforementioned “resonances” and how harmonic or inharmonic they are.

Materials and methods

To solve this question, we will carry out a double study. First, we will analyse the general concordances between the various cyclical concepts of time, from the beginning of humanity to our immediate present.

Furthermore, we will study the particular synergies through a specific case study. Our subject of study will be the cycles that different researchers have found in the great European historical events from the fifteenth century to the present day. They are mainly warlike, hegemonic, and cultural cycles, to which we will add cycles related to climate. They also have duration of around 120 years.

General concordances: the cyclical concept of time

Sources and data collection

Our sources of information will be all those authors who have proposed cyclical theories to explain history or found cycles in natural phenomena or human activities. We will also include myths, beliefs, philosophies, or works of art, where ideas related to a cyclical evolution are expressed.

For this, we will directly consult the authors’ works (Toynbee, Spengler, Ligeti, and others) and commonly accepted reference works and articles. In order to facilitate its analysis, this information will be organized according to the following thematic and chronological blocks: beliefs, history, science, and finally, the search for natural causes.

Data analysis

These data will be analyzed using the comparative method. In the frame of macrohistory (“the study of the histories of social systems (...) in search of patterns” according to Galtung, 1997), we find also mixed methods which combines quantitative and qualitative approaches. They are very employed in prospective (future studies), and one of them is the historical analogy or the compared history, a qualitative based method that can be completed with a quantitative approach (Bloch, 1999; Caballero, 2015; Goldstone, 1986).

According to Olábarri (1992, pp. 56-64), this is a magnificent historical research tool that can help us ask different questions and look at the same phenomenon from different angles; while serving as an instrument of synthesis, capable of finding that “middle ground” that “can synthesize the essence of history.”

The method consists of establishing a “*tertium comparationis*” (the two elements to be compared and the question or points to be analyzed), studying each case separately, and their similarities and differences (Caballero, 2015).

In our case, the *tertium* will be composed by the different theories around three central questions: 1) the theoretical shape of the time (lineal, cyclical, or spiral), 2) the quantitative measure of the cycles, and 3) which are the possible causes of these cycles.

Particular synergies: ~120 year cycles

Sources and data collection

Our sources, in this case, will be all the authors of the precedent study, that explain cycles of about 120 years in their field of study. In this case, they are Ibn Jaldún, Ligeti, Toynbee, Wright, Wallerstein,

Goldstein, Arrighi, Barzun, Modelski, and Flores & Martínez for the historical cycles, and Scafetta, and Velasco, Mendoza & Velasco for the climatic cycles.

Data analysis

We will use a mixed methodology to analyze these data, which combines the qualitative with the quantitative, typical of the prospective (Pole, 2009). One of the main currents of this discipline bases its modelling on long-duration cycles (Bas, 1999).

In this case, we will carry out a type of causal exploratory analysis comparing a warlike sequence with a climatic sequence (one of the possible causes or hypothetical conditions). The main objective is to try to elucidate the possibility of an echo or resonance between the climatic oscillations and European historical and social evolution. The results will be displayed in the form of a graph.

Results: general concordances, particular synergies

In this section, we will present the development of the research divided into two parts. In the first, we collect all the general data related to the various theories, and in the second, we carry out a particular case study.

General concordances

Cycles: an ancient belief

In the field of beliefs, we can cite numerous myths (e.g. Osiris or Sisyphus) that are based on the cyclical processes of nature or that try to counteract the irreversibility of time (Davies, 2005, p. 28). Furthermore, cycles and the idea of a return are present to a greater or lesser extent in almost all religions (reincarnation, chakras, kalpas, etc.). At the same time, the linear and irreversible concept of history appears in some faiths, like these of the Hebrew people (Eliade, 2001, pp. 64-65). Even so, in this religion and related ones (Christianity, Islam, Zoroastrianism, etc.), the concept of natural cycles is present in the sacred books themselves (Ecclesiastes) and in the Messianic hope, which carries with it a universal resurrection and restoration/renewal (Hartog, 2021).

In the beliefs of various ancient cultures, there were already cycles of 50 years (Jewish jubilee), 52 years (pre-Columbian), or 60 years (as in Sumerian or China). The use of the latter would go back at least to the fourteenth century BC (Flores Fernández & Martínez López 2020, p. 115; Scafetta, 2010, pp. 952-953).

And in the arts the concept appears in the form of symbols (triskel, uroboros, Aion), musical works, and in literature (León Felipe, Gabriel García Márquez, Jorge Luis Borges, Michael Ende, or Isaac Asimov).

Classical antiquity: defining the cyclical concept of time

On the other hand, in philosophy, we have the old, mainly Stoic idea of palingenesis: the eternal return of all things and of history itself, after each conflagration of the universe, which occurs at the end of each Great Year, an idea that already was present in Plato (Rivera de Ventosa 1965, p. 277). Similar concepts appear in Seneca, Marcus Aurelius, Schopenhauer, Nietzsche (the myth of the eternal return), and Deleuze (concepts of intracycle, cycle, and their version of the eternal return).

Finally, in the social sciences and specifically among historians, we already find in Thucydides (c. 460-396 BC) "the idea of the repetition or parallelism of historical processes, the cyclical conception of history that explains Thucydides' aspiration that his History be a useful teaching for the future, an acquisition for all time" (Torres Esbarranch, 1990, p. 156).

As well as in Polybius (c. 200-118 BC) and his anacyclosis (cycle of government forms): "since Polybius discerned a "circular movement" by which the history of states came back, over and over again, to the same point, the theory of historical cycles has been a commonplace of European thought" (Collingwood, 1927, p. 311).

Middle ages: cycles under a lineal concept of time

After the irruption of Christianity and Islam and their general concept of irreversible time (inheritance of the Hebrew faith), the cycles will generally appear in a relative way, subject to this way of understanding time. During the High Middle Ages, Joaquín de Fiore presents history as a line of constant progress made up of three parallel cycles divided into phases, consisting of 42 generations of 30 years.

Shortly before the end of this period, Ibn Khaldun, in tune with Thucydides, composed a colossal work in which there appear cycles relating to empires and dynasties. He was convinced that whoever can “properly know the history of the ages that have preceded you; he will even be able to foresee what might arise in the future” (as quoted in Trabulse, 1977, p. 20).

Modern era: recovering the classic shape of time

In the same way, during the Early Modern Age, Nicholas Machiavelli rescues the ideas of Thucydides and Polybius in his theory of politics. In it we find the concept of a *riduzione ai principi* (return to the beginning) once complex societies enter their degradation phase (Rossi, 2014).

Along this line, Giambattista Vico composes the *Principles of a New Science Concerning Nations' Shared Nature* (or *Scienza Nuova*). Vico believes that society progresses in a spiral, through *corsi e ricorsi* (advances and setbacks), distributed in different periods (Elío-Calvo Orozco 2012, p. 56).

And Voltaire draws analogies between parallel historical periods in his work *The Age of Louis XIV*, where he compares four golden stages of history separated from each other by less favored moments.

Contemporary age: cycles as science

Finally, since the nineteenth century, multiple theories have been developed based on this concept of spiral time, which advances irreversibly while relatively repeating itself. These are studies supported at times in the pendular history of art itself.

In this sense, we have the Egyptologist W. M. F. Petrie and his work *The Revolutions of Civilizations* (1911), O. Spengler with his study entitled *The Decline of the West*; P. Ligeti, author of the book *Der Weg aus dem Chaos* (1931), A. J. Toynbee and his monumental *A Study of History*, and A. Deulofeu, who writes *La paz mundial por la matemática de la historia*. This line has continued with authors such as J. Barzun and his work *From Dawn to Decadence*, A. de Riencourt in *The Coming Caesars*, and J. M. Otero Novas with *El retorno de los césares* (2007).

Another line of research that starts from the nineteenth century corresponds to quantitative data. It begins with researchers who discover cycles in the economy and technological development: C. Juglar, J. Kitchin, N. D. Kondratieff, and J. A. Schumpeter, Austrian Finance Minister and Harvard University professor. Also R. N. Elliott, E. R. Dewey, R. H. Wheeler, S. Kuznets, J.W. Forrester, E. Mandel, G. Mensch, and M. Armstrong. Warlike or political cycles also appear in K. Marx, H. Adams, P. Q. Wright, A. M. Schlesinger, Sr., A. M. Schlesinger, Jr., and W. D. Burnham.

Some even articulated history based on economic cycles, such as F. Simiand, E. Labrousse, or F. Braudel, who conceives “a history of constant repetition, ever-recurring cycles (...) with slow but perceptible rhythms” (Braudel, 1995, p. 20). Describing processes of long (*longe durée*), medium (*conjoncturelle*), and short duration (*événementielle*). This line of thought is followed by P. Kennedy and A. de Miguel.

Current cycle schools

Finally, between the twentieth century and the present, a whole series of schools of thought related to the scientific and academic study of cycles have developed. We will mention these grouped in various categories to facilitate their assimilation:

1. Hegemonic¹ cyclical theories and pluralistic waves (Boswell & Sweat, 1991; Kohout, 2003). The first section, in the systemic school, corresponds to the World-System of the sociologist I. Wallerstein, together with professors A. G. Frank, B. K. Gills, J. S. Goldstein, and G. Arrighi. In this first section, another theory is that of the Long Cycle, developed by Professor G. Modelski, together with W. R. Thompson and T. Devezas. In the second section (of waves, pluralistic), we quote the Power Cycle Theory by Professor C. F. Doran.

2. Cliodynamics, by Professor P. Turchin & S. Nefedov, cycles of varying magnitude are described in their work *Secular Cycles*.
3. Generational theory of W. Strauss & N. Howe, authors of the widely known work *The Fourth Turning*, where generational cycles are structured in periods called *saeculum* (centuries) and divided into turnings (turns).
4. Theory of cultural development. With a comprehensive approach, Flores & Martínez present a synthesis that brings together the cycles and basic concepts of previous theories from the comparative history of art.

Cycles in nature

Cycles appear so profusely in nature that some authors have even postulated theories about an oscillating universe, such as Friedmann, Tolman, and Penrose, creator of the “conformal cyclic cosmology” (Penrose, 2011).

The numerous cycles in solar activity and other stars are well known, and their possible influence on climatic cycles is being studied. Some authors who have explored these cycles and their synergies are Scafetta (2010, 2021) and Velasco, Mendoza & Velasco (2015), among others. Furthermore, the influence of climatic events on human history is often commented on by historians (Cohen, 2012; Pattenden, 2022). In the form of cycles, they have been studied by authors such as De Miguel (1987), or Dewey & Mandino (1971).

Another cycle that decisively affects human activity is that of generational change itself, which is often cited by scholars such as Ferrari, Dilthey, Ortega y Gasset, Strauss and Howe, Turchin and others.

Particular synergies

In the previous section, we presented an overview of the main theories that use cycles to study history. But in this part, we will study exclusively those that present 120-year cycles. To make this presentation clearer, we have decided to include them in this separate section.

In this case study, we will begin by displaying and enumerating the data provided by our sources, and then we will proceed to a comparative study. Results will be expressed in the form of a graph, and authors who speak of cycles of about 120 years will be included. In the first place, there will be an analysis of those referring to historical, military, economic, hegemonic, and cultural issues, and secondly, those that describe related natural cycles.

Ibn Khaldun

Ibn Khaldun tells us about a 120-year cycle that determines the duration of empires and dynasties. He mentions the generational spring as its cause, saying that these 120 years comprise three generations of 40 years, or four of 30 years, since “for every 100 years, three generations are counted” (Ibn Khaldun 1977, pp. 348–350).

Ligeti

In the *History of Art*, Ligeti discovers cycles of about 130 years and endows them with a generational aspect, since he reasons that four generations for 30 years are 120 years, or that four generations of 35 years would add up to 140 years, leaving the average in about 130 years (Ligeti 1931, pp. 154, 156, 78, 85). When we examine his graphs, the most recent date sequence is 1370/1430, 1530, 1650, 1780, and 1910/1930. And for the Roman period: 30 B. C. (Augustus), 100 A. D. (Trajan), and 200 A. D. (Septimius Severus).

Toynbee

On the other hand, Toynbee, in his “War-and-Peace Cycle,” establishes an overture (1494-1568) and several regular cycles: first (1568-1672), second (1672-1792), third (1792-1914) and fourth

(1914-present). The duration of each would be 104, 120, and 122 years respectively, as in [Figure 2](#) (Toynbee, 1987, p. 272).

Quincy Wright

Quincy Wright also established four similar war periods based in statistics of casualties: 1) 1450-1648 (firearms/religious wars), 2) 1648-1789 (professional armies/dynastic wars), 3) 1789-1914 (industrialization/nationalists wars), 4) 1914-present (airplane/totalitarian wars). They are periods of 198, 141, and 125 years (Goldstein, 1988, p. 286; Klimberg, 1970, pp. 505-511; Wright, 1951, p. 228)².

Wallerstein

Wallerstein (1984, pp. 41-42) recognizes a correspondence between K waves (from Kondratieff, 50-60years), hegemonic cycles, and great wars. These are the Thirty Years' War (1618-1648), the Napoleonic Wars (1792-1815), and the World Wars (1914-1945). Similarly, his hegemonic cycles arise from the union of two K waves. These are I. Habsburg (1450-1575), II. Netherlands (1575-1672), II a. Unnamed (1672-1798), III. British (1798-1897), and IV. United States (1897-present) (Hopkins & Wallerstein, 1982, p. 18).

Goldstein

Goldstein (1988, pp. 67, 283-342) describes a cycle with a first war era (mercenary wars, 1350? –1648) culminating in the Thirty Years' War (1618-1648); the second (professional wars, 1648-1815) in the French wars of 1793-1815; and the third (1815-1945) in the national wars of 1914-1945. According to his study, these were empirically the most severe wars. The fourth era, which we are in, began in 1945. Furthermore, these great wars would always occur at the peak of cycles of about 60years described by Braudel, Frank, Kondratieff, and Mandel ([Figure 2](#)).

Arrighi

Along the same line, Arrighi locates its systemic cycles of accumulation as follows: 1. Genoa c. 1450-1640 (190years); 2. Holland c. 1640-1790 (150years); 3. British c. 1790-1925 (135years); and 4. United States c. 1925-present (Valiani, 2009, p. 195).

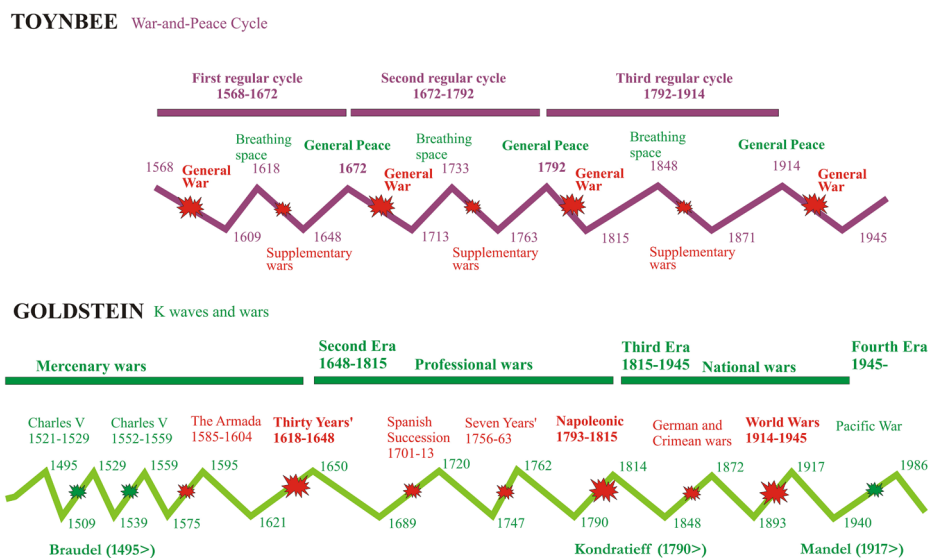


Figure 2. Comparison between the Toynbee and Goldstein warlike cycles (those of the latter, also following the economic cycle⁵).

Own elaboration. Sources are the references that appear in the text.

Barzun

Barzun (2002, pp. 23-24) also structures modern Western history in periods of 125 years, in which different questions have been answered: what to believe in religion (1500-1660), the form of government (1661-1789), and social equality (1790-1920).

Modelski

Modelski (2001, p. 79; Devezas & Modelski, 2003, p. 843) has described numerous time cycles that fit together like matryoshka dolls. At the base are generational cycles (25-30 years), which, united in pairs, form a K-wave (50-60 years). These, joint two by two, generate the long cycles of global politics (~ 120 years), and these, in turn, the democratization processes (~ 240 years), immersed in cycles greater than 480 years (opinion-making), 960 years (world economy), 1.920 years (active zone), and others even longer³.

For Modelski (1978, pp. 217, 225; Modelski & Thompson, 1996, p. 54), the 120-year cycles followed one another in periods marked by conflict: the Italian Wars (1494-1517), the Dutch War of Independence (1579-1609), the wars of Louis XIV (1688-1713), the French wars of 1792-1815, and the World Wars (1914-1945). The authors even include the dates on which a possible future conflict would occur: 2030-2050 (Modelski & Thompson, 1996, pp. 8, 54, 154.). These long 120-year cycles are linked to hegemonic succession and are formed with pairs of K cycles (50-60 years) (Modelski & Thompson, 1996, pp. 8, 67-69, 137, 154).

Flores & Martínez

Finally, Flores Fernández and Martínez López (2020, pp. 109-110, 114, 117), comparing the pace of modern warfare with those that occurred in the Roman Imperial Period (the *Pax Augusta* and the *Pax Romana* with the *Pax Britannica* and the *Pax Americana*), set the cycle average at about 123 years, marking this general sequence: the wars of Louis XIV, the French wars of 1792-1815, and the World Wars (1914-1945). If this cycle were continued only quantitatively back a few centuries, it would point to the initial wars of the Renaissance⁴, and the wars of Charles V and Philip II.

They indicate that if the sequence were to continue in a hypothetical future, the next date would be between the second quarter and the middle of the twenty-first century. In ancient Rome, similar cycles would go from Julius Caesar to the end of the Julius-Claudians, and from the beginning of the Flavians to the end of the Antonines. The authors explain cycles based on the generational modules, which are approximately periods of 30, 61, 922, and 1.845 years.

Velasco, Mendoza & Velasco

On the other hand, in the climatic field, Velasco, Mendoza & Velasco (2015, p. 221), found “a great minimum for the XXI century, beginning in ~ 2004 (or 2002) and ending in ~ 2075 (or 2063)”, as well as periodicities of 120 and 240 years.

In the 120-year cycle, the last temperature drops occurred in the fifteenth century (Late Medieval Period, 1410-1470), in the middle of the sixteenth (Spörer, 1530-1590), at the end of the seventeenth (Maunder, 1650-1710), at the beginning of the nineteenth (Dalton, 1770-1830) and at the beginning of the twentieth (Modern, 1890-1950)⁶. The one corresponding to the twenty-first century would be 2010-2070. In addition, the 240-year cycle would have its minimum at the end of the fifteenth century, at the end of the seventeenth, and the end of the nineteenth century. These are just a few of the many related cycles found, including others of 60, 480, 1.000, and 2.100 years, for example (Velasco, Mendoza & Velasco, 2015, pp. 221, 227-230, 232).

Scafetta

Similarly, Scafetta (2010, pp. 951, 953, 963-964, 967) speaks of a 60-year cycle of oscillation in temperatures, possibly modulated by the action of stars such as Jupiter and Saturn on the Sun. According to this

cycle, divided into two 30-year phases, the warm period of 1970-2000 would be followed by a possible cooling or stabilization of temperatures between 2000-2030/2040, and a new maximum again towards 2060, with the inflection between 2020 and 2022. Scafetta (2021, p. 17) also mentions those 100-130-year rhythms that occur between cold periods, such as between the Maunder Minimum (1645-1715) and the Dalton Minimum (1790-1830).

Discussion

In this section, we will present the results of the general comparison and the specific case study, always pointing to the originality and novelty of their contributions, and the lines of research that they leave open for future works.

General concordances

In this block, we will comment on the results of our analysis. We will do it in three sections corresponding to the three questions analysed in the comparison between different theories: theoretical shape of time, the average of the cycles, and the possible causes.

About the theoretical shape of time

Regarding general concordances, it is evident that the concept of an absolutely cyclical history is not currently shared by most of the scientific community, with the idea of an irreversible history being the one commonly accepted.

At the same time, a large group of authors with notable figures and important precedents advocate a concept of time that admits and contemplates the relative and particular repetition of events within a general vision of a time that never returns in any way absolute.

The consensus model would perhaps be that of a spiral story (like Petrie or Vico), which progresses while repeating itself and could be expressed most simply with the example of Toynbee: that of a chariot that moves forward thanks to the rotating and repetitive movement of the wheels of vicissitudes (Toynbee, 1972, p. 350).

Even so, we must be careful in our conclusions regarding this historiography, given that we are presenting the results of a very specific selection of authors with common ideas, where often the theses are just the development of other preceding studies.

About the average of the cycles

Not all measures of the cycles agree between the different authors. It is true that in all complex theories, they present a system of cycles combinable with each other. Moreover, despite the quantitative differences, the similarity is such that it is possible to establish categories such as those of Braudel's "*conjoncture*" cycles (generational, about 50-60 years and their derivatives 20-30 or up to 90 years, like the "*saeculum*" of Strauss & Howe); and the "*longue durée*" ones, which span several centuries (such as the secular cycles of Turchin). The similarity between millenary cycles would also give rise to a third major category (as in Toynbee, Spengler and others) (Flores Fernández, 2022, p. 141).

Furthermore, it is interesting that even in the twenty-first century, the cycles discovered by current authors such as Modelski and others have practically the same duration as those recorded by Ibn Khaldun in the fourteenth century: ~ 20/30, ~ 60, ~ 120, ~ 240, and ~ 960 years.

It is evident that not all the ancient cycles had an astronomical basis. It is also clear that the cycles of the cited researchers (Ibn Khaldun himself disapproved of astrology) are based on observation, calculation, and statistics and do not have an astronomical or astrological origin. As we have just seen, their authors usually attribute to them a rational explanation based on generational succession, climate, and other known factors.

In our opinion, the only thing that would demonstrate the similarity between the cycles of the forecasters of the Ibn Khaldun's era and Modelski's current cycles, and between some theories and others, is

that human beings can interpret the same natural phenomenon (the cycles) from a rational, logical, and scientific point of view, and also from a religious, philosophical, astrological or even superstitious position. The paradox arises that the calculations of those ancient forecasters fit with the observations of some modern authors, but they do not fully coincide with the exact data that current astronomy gives us about conjunctions and their cycles⁷.

About the causes of the cycles

In that case, what would be the scientific reason why the average of the cycles is so constant? In addition to the possible climatic influence, from Ibn Khaldun to the present, the generational spring is cited as the natural and rational cause of the cycle.

The generational argument has already been masterfully explained by authors such as Ortega y Gasset⁸. We also believe that the logical reason why this phenomenon would be so stable is provided by De Miguel when he speaks of two constant temporal values in human life, which do not vary much as life expectancy increases: the hope of being parents (that is, the average age at which the first child is born, between 25-29 years); and the duration of active life, which is maintained at about 50 years (De Miguel, 1987, p. 50).

Of course, the endogenous causes among which are climatic factors, are commonly cited by historians, both when we talk about a linear concept of time, and when the temporal model used admits the presence of patterns or cycles.

Particular synergies

Regarding the specific case study, in the upper area of [Figure 3](#), we observe a simplified representation of the data and figures from Velasco, Mendoza & Velasco (2015), referring to the TSI (total solar irradiance). In it, cold periods separated by about 120 years⁹ can be clearly observed, marked with an inverted triangle. These authors also point to periods greater than about 240 years in their figures. We have marked them in the graph with a point, so that these would go approximately, from the Late Medieval to the Maunder Minimum and from there to the Modern. The 240-year cycle of Devezas & Modelski (2003, p. 843) would go instead from 1840 to the year 2000.

On the other hand, in the lower part of [Figure 3](#), we observe the comparison of nine different data sources that have collected the presence of these cycles in various fields of study: warlike cycles (e.g. Toynbee), hegemonic (e.g. Wallerstein), and cultural (e.g. Ligeti). As we can see, there is a notable concordance of the ~ 120 years of the warlike/hegemonic/cultural cycle between authors.

Differences and similarities in the war cycles

We can see that the acceptance of the period between the French and Napoleonic Revolutionary Wars, and the World Wars, is absolute (see also other concordances in [Figure 2](#)). The next point in the sequence oscillates between the wars of Louis XIV and the Thirty Years' War, with which the deviation is minimal. But when it comes to the Renaissance, there are several disputed dates, although there seems to be agreement on setting a turning point in the fifteenth century and another in the sixteenth.

Close climatic correspondences

On the other hand, the coincidence of these events with the coldest periods of the climatic oscillation is certainly very remarkable. Now we can see a more detailed version of the comparison made by De Miguel, where the three descents in the Braudel's cycles (1350-1507/1510; 1650-1733/43 and 1817-1896) match with three cold events: Late Medieval (1410-1470), Maunder (1650-1710), and Dalton (1770-1830).

As Pei et al. state, "climate change has been proven to be the ultimate cause of social crisis in pre-industrial Europe at a large scale" (Pei et al. 2014, p. 1), but detailed analyses between climate and economic cycles remain lacking. However, in their work these authors used Granger Casualty Analysis and compare graphics about temperature, precipitation, grain yield, grain price, consumer price index,

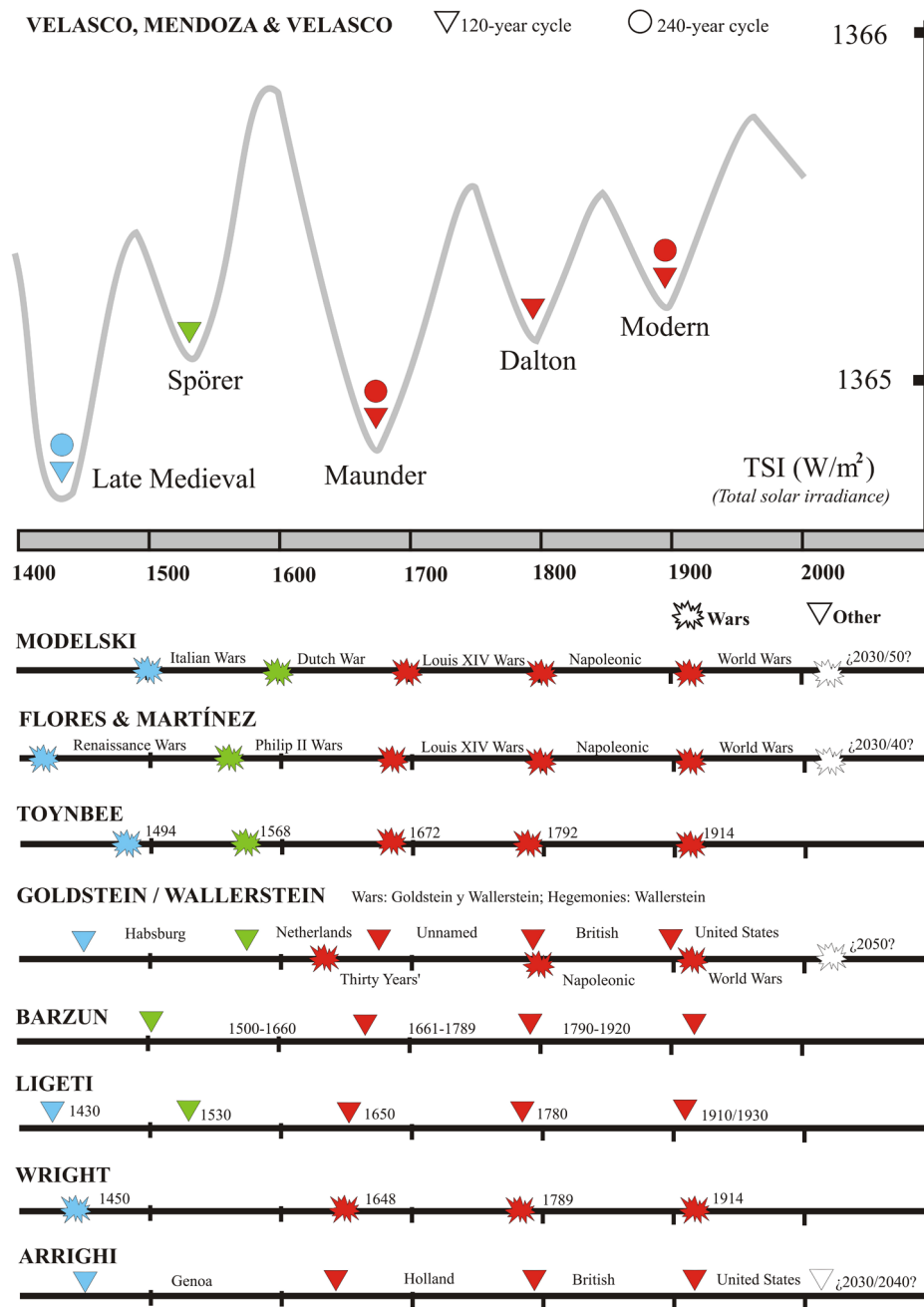


Figure 3. Hegemonic, cultural, warlike, and climatic cycles.

Own elaboration. Comparison between the cold periods that appear in a reconstruction of the TSI (total solar irradiance) of Velasco, Mendoza and Velasco (2015), and the warlike, hegemonic, and cultural cycles of the authors cited in the text.

real wage and population size. As a result, we can appreciate in their studies the general interactions between climate and economic cycles in Europe during AD 1500 to 1800.

But we must remember that mere coincidence does not necessarily imply that there is a causal relationship. So, we think that this is an issue that requires more research. Still, we leave open the possibility that the resonance exists since it is common to point to climatic events as determining factors or even causing certain historical events to a greater or lesser degree¹⁰.

In this sense, some important questions appear. De Miguel (1987, p. 48) asks himself: What would happen if all other natural cycles were truncated, from the seasons to the tides? And we add: Are these events always in synchrony? If not, how can we explain the lack of synchronicity? If the climate rhythm is changing, may this affect to the 120-year series of cycles in the human activities?

Cycle-based potential futures

We also find it very interesting that, both in climatic and social aspects, we take into account the possibility that a new repetition of these cycles will yield a certain statistical forecast about our immediate future.

As we have seen in the case of climate, Velasco, Mendoza and Velasco (2015, p. 221) follow the sequence of their 120-year cycle and speak of a new period of minimum temperatures around 2002/2004-2063/2075.

And Scafetta (2010, pp. 951, 954, 964)¹¹, specifying even more so with its sixty-year cycle, projects in the future a period of stabilization or even cooling of temperatures between 2000-2030/2040, and a new rise between 2030/2040-2060.

In the case of social events, Modelski & Thompson (1996, pp. 8, 54), and Flores Fernández & Martínez López (2020, p. 117; 2023) among others (see Modelski & Denemark, 2009, p. 64), also throw into the uncertain future the possibility that some military or revolutionary act could happen in the hypothetical case that the cycle repeats itself, locating it according to the averages, equally towards 2030-2050¹².

In short, if we really trust in the responsibility and freedom that human beings have to forge their own future, it is precisely the knowledge of these historical cycles and their resonances that can prevent events as undesirable as a great war from repeating themselves.

We therefore believe that this type of general and comprehensive study of the cyclical concept of time can have important implications for the future¹³. We think that the circular concept of time comes to complete our linear vision, and to enrich it. The facts and dates are the same, but the way of looking is different, and the conclusions that this new perspective of time can reveal about our past, our future and about our relation with our environment are still unknown. We think that more case studies and forecasts should be made based on the patterns set out in this study to assess their potential impact.

For this reason, we must evolve towards a “unified theory” of history in which the time factor “T” must be incorporated, as has already been done with the space factor “E.” After all, as Santayana (as quoted in Streza, 2011, p. 35) said, only those who cannot learn from history are doomed to repeat it. In this regard, Ortega y Gasset (1957, p. 96) concludes:

But the past is of its essence a *revenant*. If put out, it comes back, inevitably. Hence, the only way to separate from it is not to put it out, but to accept its existence, and so to behave in regard to it as to dodge it, to avoid it. In a word: to live “at the height of our time.”

The “T” factor as a catalyst in the analysis of historical events

The use of historical cycles leads us to think about the very conception of time, in the “T” factor, or as Smith (1984) calls it: “Time as Historical Construct”. The “T” Factor as a representation of time is one of the components we must consider in the historical analysis. It determines how the ephemerides occur, drawing the passage of time from the past to the present and the future.

In general, there is still no definitive current that indicates that historical time cycles can be part of the evaluation and study of the historical course. However, there are numerous indications, as has been made explicit in this article, that allow us to glimpse synergies, concordances, and resonances in which the time factor “T” surpasses its traditional conceptualization of magnitude. This simply serves to locate the facts and fully enter the equation constructed to give methodological support to history as a science. Being able to clear this equation from both an objective and a subjective perspective depends on how we position ourselves as an observer.

Already in the world of physical sciences, especially since the theory of relativity was formulated, it has been shown that certain phenomena cannot be correctly analyzed if the time factor is not introduced into the measurement system itself (Craig, 2001). As Harrington (2008) indicates, history is also a science of time, so we can and should include the “T” factor in the study of historical becoming, as has already been done in other sciences.

And already the “philosophical cosmology,” which analyzes the theoretical aspects of space and time, includes the time factor in the analysis of historical evolution, especially from logical positivism and advances in the scientific method.

The “T” factor: new possibilities

For decades, research has been carried out on time cycles, analyzing the time variable factor “T,” as another element of the space-time image. And taking time as an element that can be seen in motion both backwards and forwards, moving through the corresponding cycle.

This allows us to measure positive or negative accelerations and the derivative of the curves that form the different cycles. This way of seeing the angles of time evolution will enable us to contextualize the theory of time cycles in history with enough accuracy. It also allows us to build future models to apply prospective methodologies in which the curvature of time through the cycle’s historical data will enable us to make better use of chronological time.

This allows us to put some light when not everything that happened is known in its details. It can be inferred from the situation and temporal location in cycles that can give us clues in certain events that allow us to know the past better. Thanks to the historical cycle theory, we can add to the facts other possible and feasible events and cause-effect relationships not contemplated when we do not take into account the curved evolution of the events through the cycles in which they are included. This offers us more detailed information that historians can contrast.

It is about creating an Information System that helps the researcher, not about presenting axioms or immutable truths. On the contrary, the historian must be provided with a tool that can give him possible clues of what happened to corroborate these potential alternatives in his good understanding and apply the classical scientific methodologies (Aróstegui, 1998; Huguet Santos, 2001; Martínez-López, 1995; Sarno, 2017).

Overcoming the one-dimensional character of time

We must bear in mind that the “T” factor has a series of characteristics that perhaps allow us to understand better that, even though the facts are indissoluble and irreversible, they can also be recurrent at other times. When studying these new facts, it is possible to obtain cause-effect relationships that are traditionally not discovered. In this way, the events can be considered relative since they depend, as in other scientific fields, on the researcher’s position and how he conceptualizes the fact analyzed (Lockwood, 2005).

The same event is usually perceived from the prism of a specific moment, running the risk of not seeing the forest for the trees. On the other hand, the relativity of the “T” factor allows us to observe what happened from different positions, even located in other historical periods, but which can help us understand what is only partial without an overall vision. Temporal relationships allow us to associate and infer possible causes and effects over time for specific events, past, present, and even future.

Obviously, the circumstances can be different, and it must be understood that an event is only simultaneous to others if it happens in the same timeline. Still, it can also happen in another cycle, in another curve, in a different time phase. This is where traditional historiography has stopped, and the “T” factor theory helps us deepen. This enables connections that temporal simultaneity in a simple timeline does not allow, which at same time permits us to glimpse other possible explanations of certain events that can later be corroborated by other means or with different historiographic methodologies.

Traditionally, time has been considered an essential element for history as a science; now we see it can be even more relevant. It is not just a matter of seeing the evolution of events in a space-time line, but of being able to infer other causes that are not shown to us if we do not take into account the “T” factor, as has already been done in other sciences (Reichenbach, 1958, 1991).

All of this offers us new ways of studying and understanding specific facts, especially their effects, in variables not made explicit in the traditional analysis. Furthermore, locating the events in several super-imposed cycles, from the very long term to smaller cycles, which relativity tells us can give light to certain historical consequences not explained in a compilative way.

Synchronies in the “historical memory”

On the other hand, as in human evolution theories, cultural elements accumulate traditions that overlap and can re-determine specific facts in history. It would happen the same as in the conformation of our

brain, in which the deepest part would be inherited from a remote past, and others would have been incorporated to make us in a certain way that indicates our behavior. This type of evolution would also occur in history, almost from “historical memory,” which can be observed much better in curved cycles than in the traditional timeline (Rufer, 2020). Historical changes and disruptions are like changes in DNA, although there is a certain determinism that allows us to anticipate, based on cycles, some of the forms of these transformations.

Synchrony occurs not only when two events are repeated in different places simultaneously but also in different temporal spaces, as it is explained in other works by Flores Fernández and Martínez López (2020). Historiography considers that diachrony can only be understood in a timeline, but it can also be relative depending on the observer and the cycle in which both events are repeated. Therefore, the succession of events can be analyzed from a broader perspective, considering the “T” factor as the work methodology.

In this sense, Koselleck (1993, 2013; Koselleck & Gadamer, 1997) proposes to take into account the temporal forms of experience, in such a way that to understand historical processes, diachronic and synchronic elements must be joint, in what he calls the “strata of time,” which allow reading in the past what can be the embryo of the present and the future. Even Braudel (2002) considers that history must be conceived from different temporalities that it is mandatory to analyze in order to understand historical processes. In the same line, Wolosky (2014) considers that irreversibility and simultaneity can be combined when analyzing different facts in an anachronistic way.

The concept of time: between idealist and realists

There is a significant confrontation regarding the concept of time between idealists and realists. Among the first, Kant, in his *Critique of Pure Reason*, places facts, time, and space in people’s minds, speaks of “forms of sensitivity,” without substance in themselves, even McTaggart (1908) speaks of illusion and the unreality of time. On the other hand, for realists, such as Leibniz, time and space have an existence apart from people, coining the term “monads,” with which he grants time an existence independent of the historian himself.

Einstein, for his part, understands time in a relative way, contrary to the strict Newtonian sense, so that all vision about time is not about it in an absolute way, but must take into account simultaneous events and must combine temporal and spatial magnitudes, without explicitly distinguishing between space and time, something similar to what happens with the indistinguishable of mass and energy. This vision has had a strong impact in many sciences, and it is perhaps in the historical field where it could be applied in a more disruptive way, but we still need to take that step as we advocate in this article.

Thanks to this new way of conceiving time and space, other sciences have been working on a concept barely considered in historiography (Herrero, 2020). It is about the contest between invariance and covariance, which has been extensively developed by Freedman (1982, 1983). Invariance occurs when something does not change as it is subjected to a set of transformations. It is said to be symmetric compared to the covariance that analyzes the changes that occur by issuing laws that explain said modifications. If we do not consider the factor “T,” invariance and covariance can be equal. Still, by introducing relative elements and time as a key element in the equation of historical evolution, covariance can explain the facts much better, as occurs in fields such as physics.

Today, we can already analyze history with more advanced procedures, including mathematical methods, so that the term “historical structure” (Guerra Manzo, 2005) has been created based on the application of invariances and covariances applied to historical models of space and time. Even more recent theories, such as string physics, can be applied in historical science, which no longer considers elements like particles occupying a single point in space. Rather than that, it speaks of strings that are only defined by their length occupying a line of space at each instant of time, so that its history in space-time is a two-dimensional surface called a “universe sheet” as opposed to the universe line described by classical theories.

In historical science, events can also be understood, more than as particles, as strings in space-time; perhaps with this vision, we can appreciate many facts that sometimes we are unable to discern in their proper measure. All of this leads us to conceive those cycles allow us to observe events that can have

numerous similarities with a qualitative vision of time. Perhaps considering factor “C” as the “Catalyst” that can accelerate or retard the historical evolution between one historical cycle and another in which the fact under analysis is framed.

In the “Einsteinian” model, it is understood that time is not in itself absolute but based on simultaneous events, not only spatial but also temporal. The relativity of space has already been assumed by historiography, but the relativity of time has yet to be applied. This new vision can allow us to resolve numerous uncertainties. We are advancing towards a “unified theory” of history in which the “T” factor must be incorporated, as was the space factor “E” in its day.

It is not a question of changing the entire methodology of the historical sciences but of finding a complement that helps to discern many of the variables that we have not yet been able to clarify or decipher, by incorporating synergies, concordances, and resonances in the analysis around the cyclical concept of time.

Notes

1. Hegemonic theories explain the rise and fall of hegemonic powers with phases of expansion and contraction in the world economy (Kohout, 2003).
2. According to Klimberg (1970, pp. 508-509), Wright is also related to other cycles that fit together. They are the periods of introversion and extroversion (of about 50 years), and others of about 140 years formed with three cycles of the previous ones.
3. These same cycles already appear in Ibn Khaldun. This wise man, who presents astrology as a “vain” art, “founded on inconsistent principles”, and even “dangerous” (1977, pp. 968-974), nevertheless mentions how the forecasters of his time based their predictions of dynasties and nations on the conjunctions of Jupiter and Saturn. This author, who denies the mysterious influence of the stars, does highlight the time lapses in which they occur, as was believed in his time: the small conjunction takes place every 20 years, and returns every 60 years (“the revolution, or the return of the conjunction”). This “heralds the rise of rebels, sect founders and the devastation of cities or their progress.” The median conjunction (240 years), announces “the appearance of conquerors and aspirants to sovereignty”, and the great conjunction (960 years) “the change of empires or dynasties, and the transfer of sovereignty from one people to another” (1977, pp. 592-593).
4. Such as the Hussite wars (1419-1436), the Milanese wars (1423-1454), or the end of the Hundred Years War and the fall of Constantinople in 1453 (Tucker, 2010, pp. 327, 330, 341, 387).
5. Kondratieff, according to De Miguel (1987, p. 42), would have said that “wars and revolutions are not causes of cyclical movements, but one of their symptoms, as a consequence of the “acceleration of the rhythm and tension of economic life””.
6. In the frame of the ETCW, it exists also oscillations, Brönnimann et al. (2024, p. 757), “Global surface air temperature increased by ca. 0.5°C from the 1900s to the mid-1940s, also known as Early 20th Century Warming (ETCW). However, the ETCW started from a particularly cold phase, peaking in 1908–1911. The cold phase was global but more pronounced in the Southern Hemisphere than in the Northern Hemisphere and most pronounced in the Southern Ocean”. What is more, according to Wen & Huang (2010, p. 3850) concludes in their studies that “the current grand solar maximum, which began in 1920, will soon end. (...) It is estimated that the intensity of solar activity will reduce to the level of that during the early 20th century in the immediate future”.
7. Today we know that the astronomical periods cited by those astrologers/astronomers are not entirely exact, and therefore do not accurately reflect the time periods in which the conjunctions of these planets occur. For example, according to Etz (2000, pp. 175-177), the 20 years is really 19, 86, the 60 years would be about 59 ½, the 240 becomes about 238, and the 960 years can be estimated at 913 at most. That old theory about conjunctions could have been forged in the Sassanid Iran, between the third and seventh centuries A. D., although the first evidences are in Baghdad during the eighth century A. D.
8. Ortega y Gasset (1957, p. 93), says that a generation acts for a period of thirty years, and that one generation is the opposite of the previous one. This would generate cycles of about 30 and 60 years. Kondratieff himself said that grandchildren behave in a similar way to their grandparents. It is the so-called generational gap or parent-child opposition, cited by De Miguel (1987, p. 50), Turchin and other authors.
9. It may not be regional events. A study on the climate changes in China for the past 2.000 years, also showed “that temperature variation in China has exhibited significant 50–70-yr, 100–120-yr, and 200–250-yr cycles” (Ge et al., 2017, p. 941). And in the same article, Ge et al. state that “when the Wolf (AD 1280 to AD 1350), Spörer (AD 1460 to AD 1550), Maunder (AD 1645 to AD 1715), and Dalton Minimum (AD 1795 to AD 1823) occurred, temperatures in China were lower than during other periods” (2017, p. 946).
10. About the climate oscillation and the fall of the Roman Empire, please see Los volcanes (2015), and Gargantilla (2017).

11. About this, please see Nieves (2015) and Llegará (2020). In this last article it is said that “there will be a «Great Solar Minimum», but it will not affect the Earth, already overheated by the effect of climate change”.
12. Please see Lukin (2014), La incertidumbre (2020), Alves (2014) and Catlin (2021).
13. About the new perspectives regarding the possible cooling of the Earth’s climate as a result of solar changes, Wen & Huang (2010) concludes that “(1) solar activity is weakening to its very low level, which is comparable with the level in the early 20th century; (2) the current grand solar maximum has already lasted for eight 11-year solar cycles and might end in the coming one/two 11-year cycles; (3) a grand solar minimum might prevail in the next 100–200 years (...)”.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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