Tales of catastrophe: the authenticity of Mediterranean palaeo-disasters in films

Récits de catastrophes : l'authenticité des paléodésastres méditerranéens dans les films

Olivier PLANCHON[1], Matthew J. JACOBSON[2], Cécile ALLINNE[3], Pierre POUZET[4], Nick MARRINER[5]

[1] Biogéosciences - UMR 6282 CNRS, Université Bourgogne Europe, 6 Boulevard Gabriel, 21000 Dijon, France, olivier.planchon@u-bourgogne.fr
[2] Division of Agrarian History, Department of Urban and Rural Development, Swedish University of Agricultural Sciences (SLU), Ulls väg 27, 756 51, Uppsala, Sweden, matthew.jacobson@slu.se
[3] Université de Caen Normandie, CRAHAM - UMR 6273 CNRS, Esplanade de la Paix, 14000 Caen, France, cecile.allinne@unicaen.fr
[4] Université d'Angers, Nantes Université, Le Mans Université, CNRS, Laboratoire de Planétologie et Géosciences, LPG UMR 6112, 49000 Angers, France, pierre.pouzet@univ-angers.fr
[5] ThéMA - UMR 6049 CNRS, Université de Franche-Comté, 32 rue Mégevand, 25030 Besançon, France, nick.marriner@univ-fcomte.fr

ABSTRACT. This article explores the enduring allure of ruins from ancient civilizations and the depiction of catastrophic events in cinema, focusing on the portrayal of natural disasters in antiquity and prehistoric times. A reflection from an archaeological and environmental point of view is based on literary and scientific sources of natural events that inspire the film synopses. Using films from the Peplum genre's "Golden Age" in the mid-20th century, we analyze how cinema reimagines historical calamities, ranging from the destruction of the Colossus of Rhodes to the demise of Pompeii. While some palaeo-disasters in these films are scientifically plausible, such as the Vesuvius eruption in Pompeii, others, like the Black Sea deluge hypothesis in Noah and The Ten Commandments' multi-disaster scenario, persist as enduring myths. The article also addresses debated hypotheses, including the meteoritic impact in Sodom and Gomorrah and the speculative cataclysm in 10,000 BC, emphasizing their reliance on myths and pseudo-archaeological theories. This exploration contributes to understanding the complex interplay between cinematic imagination, historical events, natural disasters and enduring cultural myths.

RÉSUMÉ. Cet article explore l'attrait durable des ruines des anciennes civilisations et la représentation d'événements catastrophiques au cinéma, en se concentrant sur la représentation des aléas naturels dans l'Antiquité et la préhistoire. Une réflexion d'un point de vue archéologique et environnemental est basée sur les sources littéraires et scientifiques des événements naturels qui inspirent les synopsis des films. À partir de films de l'"âge d'or" du genre péplum, au milieu du XX^{e} siècle, nous analysons la manière dont le cinéma réimagine les désastres historiques, de la destruction du colosse de Rhodes à la disparition de Pompéi. Si certaines paléo-catastrophes montrés dans ces films sont scientifiquement plausibles, comme l'éruption du Vésuve à Pompéi, d'autres, comme l'hypothèse du déluge de la mer Noire dans Noé et le scénario multi-catastrophes des Dix Commandements, persistent comme des mythes durables. L'article aborde également des hypothèses débattues, notamment l'impact météoritique à Sodome et Gomorrhe et le cataclysme spéculatif de 10 000 ans avant J.-C., en soulignant leur dépendance à l'égard des mythes et des théories pseudo-archéologiques. Cette exploration contribue à la compréhension de l'interaction complexe entre l'imagination cinématographique, les événements historiques, les catastrophes naturelles et les mythes culturels durables.

MOTS-CLÉS. Films "péplum", Catastrophes naturelles, Archéologie, Géologie, Paléoclimatologie.
KEYWORDS. Peplum movies, Natural disasters, Archaeology, Geology, Palaeoclimatology.

Introduction

The allure of ruins and remnants from ancient civilizations has captivated human imagination for centuries (Habib, 2011; Schnapp, 2020). The portrayal of these ruins, in addition to the depiction of untamed nature, gained prominence during the Romantic era and Renaissance, evoking a sense of aesthetic fascination (***fig. 1a***). Similarly, the romantic fascination with natural disasters, catastrophes and cataclysms, inspired by Greco-Roman mythology and biblical narratives, has fueled artistic depictions of once-thriving cities reduced to ruins by calamities (***fig. 1b***). While ruins may not always result from disasters, human imagination and art, whether in painting, literature or theatre, have often interwoven the two concepts.

Figure 1. *Representations of monumental remains in ruins through an example of the painting of the Romantic era.* ***A.*** *Louis-François Cassas, 1801: Vue d'une partie des ruines du temple de Junon à Agrigente. Sources: Fereng, 2020 et Utpictura18*[1]*;* ***B.*** *John Martin, 1831: The fall of Babylon. Source: Wellcome Images, Library reference: ICV No 34964, Photo number: V0034440*[2]

Since the 1930s, cinema has looked to harness the universal fascination with disasters and cataclysms (*e.g. Deluge*, directed by Felix E. Feist, Admiral Productions, USA, 1933), captivating audiences through peplum films and post-apocalyptic storylines (Musset, 2019; Yeates, 2021; Planchon *et al.*, 2022). The "Sword-and-sandal" or "Peplum" genre, set in ancient times including Greco-Roman antiquity, ancient Egypt and biblical settings, constitute clear manifestations of both historical narratives and mythical catastrophes (Hennebelle, 1998; Aziza, 2008; Lochman *et al.*, 2008; Aknin, 2009; Baron, 2016; Bessières, 2016; Clavel-Lévêque, 2017). The origin of this cinematographic genre is confused with that of cinema, at the end of the 19th century, with a French animated silent photographic view entitled *Néron essayant des poisons sur des esclaves*, produced by the Lumière brothers and directed by Georges Hatot, and released in 1897 (Seguin, 1999). The term "*peplum*" (Latin word *peplum*, derived from the ancient Greek word πέπλος/*péplos*, meaning "cloth used to drape itself for making a "toge") appears during the 1950s and 1960s, which marked a "Golden Age" of this cinematographic genre (Fourcart, 2012; Champclaux & Tahir-Meriau, 2016; Atkinson, 2018), with these films often featuring real or mythical disasters. Notable examples include the Colossus of Rhodes' destruction by an earthquake in 227 BCE (*The Colossus of Rhodes*, 1961) and Pompeii's demise following the eruption of Vesuvius in 79 CE (*The Last Days of Pompeii*, 1959).

[1] https://utpictura18.univ-amu.fr/notice/15600-ruines-temple-junon-lacinia-a-agrigente-l-f-cassas
[2] https://wellcomeimages.org/indexplus/obf_images/fc/fc/32d4c8b927dea8bfbf69f55cbd10.jpg

A palaeo-disaster generally refers to a natural disaster or catastrophic event that occurred in the distant past, typically during historical, ancient or geological epochs. These events are often studied to better understand Earth's history and the processes that have shaped the planet over millions of years, but they also offer crucial information about the evolution of ancient societies during (pre)history. Some examples of palaeo-disasters include meteorological events (significant heatwaves, storms, wildfires or droughts: Woodhouse & Overpeck, 1998); sea-level related events (coastal flooding: Morton *et al.*, 2007); geological events such as earthquakes and volcanic eruptions (Leterrier *et al.*, 1982); or impact events (the impact of large asteroids or comets on Earth that can also result in widespread fires, tsunamis, and dramatic climate changes: Vellekoop *et al.*, 2014). Various methods are employed in reconstructing (pre)historical events and exploring their socio-economic repercussions. These approaches can include fields like palaeoclimatology, glaciology, sedimentology, ancient history and geoarchaeology. They encompass a variety of sources, including fossil or archaeological remains, geological evidence and computer modelling (Liritzis *et al.*, 2019).

This article aims to probe cinematic portrayals of past disasters in antiquity and prehistoric times. The disasters depicted, described or evoked in these films encompass a wide spectrum, from climate change and severe weather events to earthquakes, tsunamis, volcanic eruptions and meteorite impacts. By analyzing these films, we look to evaluate the ways in which cinema reimagines historical calamities and their impacts on ancient civilizations, shedding light on the enduring allure of palaeo-disasters and their role in shaping artistic narratives. The locations of the sites described in the studied films, as well as other sites referenced in this article, are shown in ***figure 2***.

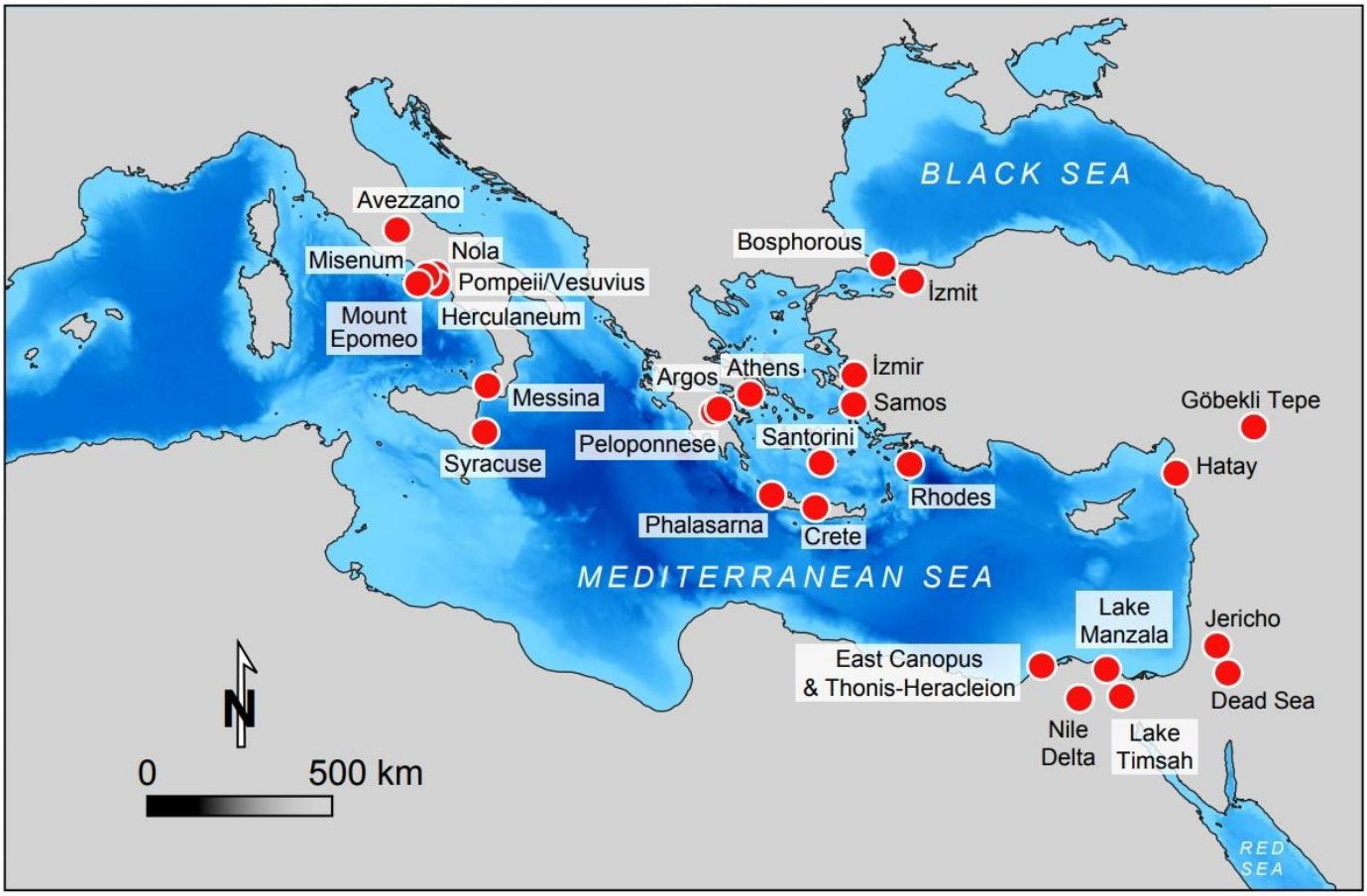

Figure 2. *Location of the sites described in the studied films, and other sites referenced in the comments and analyses.*

The list of films proposed here is not exhaustive, but the question developed in this work led us to search for examples of films representative of all types of possible scenarios studied in the article. We have selected some famous "blockbusters" from the late 1950s to the present day, to draw examples of natural disaster scenarios from various periods in the history of cinema (mainly American cinema). In this article, the cinematographic language will not be studied as an aesthetic object, with its language and its regime of truth, and the authors propose here a reflection of a specific cinematographic genre from an archaeological and environmental point of view, based on literary and scientific sources of natural events that inspire the film synopses.

1. Disasters documented in historical sources

1.1. *The Disappearance of the Colossus of Rhodes: seismic hazard, historical event and film interpretation*

The film entitled *The Colossus of Rhodes* (Italian: *Il colosso di Rodi*; directed by Sergio Leone, CTI, Cineproduzioni Associati, CFF, and Procusa, France, Italy and Spain, 1961) ends with the destruction of the *colossus* and the city of Rhodes by an earthquake (***fig. 3***).

Figure 3. *The earthquake that would have caused the destruction of the Colossus of Rhodes around 227 BCE: images from the film The Colossus of Rhodes (Italian: Il colosso di Rodi), directed by Sergio Leone, CTI, Cineproduzioni Associati, CFF, and Procusa, France, Italy and Spain, 1961. A. Destruction of Rhodes by the earthquake of circa 227 BCE; B. Earthquake: collapse of a temple (interior view).*

The Colossus of Rhodes (Ancient Greek: ὁ Κολοσσὸς Ῥόδιος/*ho Kolossòs Rhódios)* was an over 30 m tall bronze statue of the Greek sun god Helios, erected in the city of Rhodes. It was designed by Chares of Lindos and was constructed around 292 BCE to celebrate the Rhodian's successful defence against Demetrios I of Macedon during the siege of Rhodes (305–304 BCE). It has been considered, since antiquity, as one of the Seven Wonders of the Ancient World. An earthquake caused its destruction in the 3rd century BCE. Although classic antique writers, like Polybius (202–120 BCE; V, 88–90) and Pausanias (2nd century CE; VIII 2.7.1 and 43.3; see translation by W. H. S. Jones and H. A. Ormerod [Pausanias, 1918]), already reported that a strong earthquake destroyed the city of Rhodes, the date of the event is uncertain, *e.g.*, between 234 and 218 BCE according to Emanuela Guidoboni *et al.* (1994). However, when following historical sources, other authors agree on a date of 227 BCE (Kontogianni *et al.*, 2002; Papadopoulos *et al.*, 2007; Stiros & Blackman, 2014).

The Eastern Mediterranean is subject to very high seismicity, with the Hellenic Arc and Trench system (including the area of the island of Rhodes) being one of region's most active seismic structures (Ambraseys & Jackson, 1998; Papadopoulos *et al.*, 2007). On the Hellenic arc, the triple point of contact between the Hellenic microplate, and the Anatolian and African plates, makes this Europe's most seismically active region (Ambraseys, 2009). Throughout history, the Eastern

Mediterranean region has been the theatre for a multitude of seismic events, many of which are clearly documented since antiquity (Nur & Burgess, 2008). The Rhodes earthquake of c. 227 BCE is considered "one of the most famous in Hellenistic times" (Laronde, 2006). However, radiocarbon dating of earthquake contexts has not identified this event (Pirazzoli *et al.*, 1996). The only records of an earthquake during this period are at 2360 (410 BCE) ± 70 BP in Poros, 2190 (240 BCE) ± 60 BP in Rahi, 2111 (161 BCE) ± 100 BP in the Hatay region in the extreme south of present-day Türkiye. More recent work by Stathis Stiros and David Blackman (2014) and Andy Howell *et al.* (2015) estimates a one-meter seismic subsidence around 220 BCE, recorded by ship sheds built around 250–225 BCE; the links between the natural hazard and the event leading to the destruction of the Colossus are proposed by these authors. Nevertheless, the geological factors contributing to this significant subsidence remain challenging to decipher even today. These events sharpen focus on the recent and active history of this hazard in the Mediterranean. The recent earthquakes of 2023 in Türkiye and Syria had magnitudes between 7.5 and 8 on the Richter scale. They resembled that of 1999 in Türkiye along the Anatolian fault at İzmit (Magnitude between 7 and 7.5). In Italy, two major earthquakes of magnitude 7 occurred in 1908 (Messina) and 1915 (Avezzano). Given the active history of this hazard in the Mediterranean, it should be remembered that many of them, including the particularly powerful 365 CE earthquake in southern Crete, have also caused destructive tsunamis (see section 2.1.).

1.2. *The eruption of Vesuvius in 79 CE and the demise of the Roman cities on the Bay of Naples*

The films *The Last Days of Pompeii* (*Gli ultimi giorni di Pompei*, Mario Bonnard and Sergio Leone, ABC Filmverleih, Transocean-Film Vasgen Badal & Co, Cineproduzioni Associate, Domiciana, and Procusa, West Germany, Spain, Italy, and Monaco, 1959) and *Pompeii* (directed by Paul W. S. Anderson, Constantin Film and Impact Pictures, USA, Germany and Canada, 2014; ***fig. 4***) narrate two versions of the same event: the eruption of Vesuvius in 79 CE and the destruction of the Roman city of Pompeii in southern Italy.

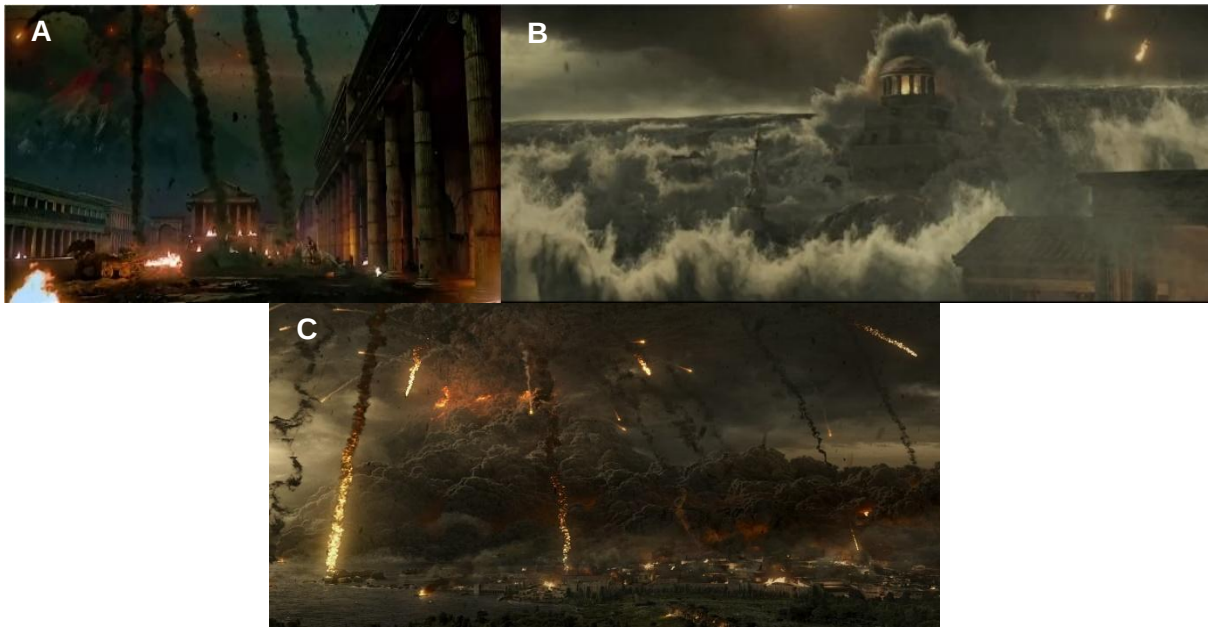

Figure 4. *The eruption of Vesuvius and the destruction of Pompeii in 79 CE: images from the film* Pompeii *(Paul W. S. Anderson, Constantin Film and Impact Pictures, USA, Germany and Canada, 2014).* ***A.*** *Eruption of Vesuvius and volcanic bombs rushing down on Pompeii;* ***B.*** *Tsunami flooding the port;* ***C.*** *Pyroclastic flow rushing on Pompeii.*

The only account of the event by an eyewitness consists of two letters addressed to the historian Tacitus by Pliny the Younger (Pliny the Younger, 2001 & 2016: Letters, LXV, To Tacitus), who was 18 years old at the time of the eruption. After observing the early stages of the volcanic activity from the port of Misenum, on the other side of the bay of Naples (~35 km from the volcano), his uncle, Pliny the Elder, launched a rescue fleet. At the same time, he also decided to closely study the phenomenon, venturing to the shore where he tragically succumbed to asphyxiation due to the toxic gases. In the other letter, Pliny the Younger shares his observations following his uncle's departure with Tacitus. The eruption of Mount Vesuvius caused the death of > 3,000 people in the Pompeii and Herculaneum region, killed by the pyroclastic flow (temperature: 300–500°C), fragments of rocks ejected by the volcano, or collapsed roofs weakened by the earthquake and the weight of the ash (Sigurdsson & Carey, 2002; Giacomelli *et al.*, 2003). The accounts provided by both Pliny the Elder and Pliny the Younger have bestowed their name upon a distinct category of volcanic eruptions known as "Plinian". They are characterized by their immense explosive force and continuous emission of a plume of hot gas, ash and pumice. The plume rises to tens of kilometers in height and its solid components then fall over a large area, forming a thick deposit of coarse ejecta (Walker, 1981; Doronzo *et al.*, 2022). The region of Naples is particularly susceptible to volcanic activity. Vesuvius itself is still active and erupted several times until 1944 (Scandone & Giacomelli, 2008). The Phlegraean Fields located in direct proximity to the city of Naples form with Mount Epomeo, Vesuvius, and all the underwater dormant volcanoes in the surroundings, the Campanian volcanic arc (Carlino, 2019). Numerous large eruptions have occurred in this region over the past 40,000 years (Scandone *et al.*, 2006). For example, a Bronze Age village on the site of present-day Nola (La Croce del Papa, 20 km north of Pompeii), met a comparable fate around 1700 BCE due to an eruption from Mount Vesuvius and was fossilized under ash in the same way as Pompeii (Livadie, 2011).

The long time lag between these two films highlights the technical differences in special effects, which make the well-known successive phases of the eruption of Vesuvius (Doronzo *et al.*, 2022) all the more spectacular in the 2014 version, but not necessarily more realistic (*e.g.* the tsunami episode is greatly exaggerated: ***fig. 4b***; see Scarth & Tanguy, 2001). The 1959 version is interesting because it includes archival images of the eruption of Vesuvius in March 1944 (Lambert, 2023).

2. Fictional and mythical catastrophes: bridging reality and imagination?

Other films draw their inspiration from fictional or mythical events, often using narratives of divine wrath and retribution on a city, a continent, or even a planetary cataclysm. A myth is "an ancient story or set of stories, especially explaining the early history of a group of people or about natural events and facts" (Cambridge Dictionary, 2024). Ancient Greece is the origin of the name and concept of mythology. Ancient Greek thought opposed the *logos* (ancient Greek λόγος/*lógos*) and the *mythos* (ancient Greek μῦθος/*muthos*), *i.e.* the "reasoning" and the "myth". The first is everything that can be rationally accounted for (objective truth). The second is all that is addressed to the imagination (Grimal, 2008). According to Paul Veyne (1983), a myth is a narrative that cannot be reduced to a religious meaning or function, but also fulfils a social function. The listener's attention is less focused on the narrative content of the myth, on a story whose degree of fiction or truth should be assessed, than on the presence, in the background, of certain symbolic values. According to Maurice Merleau-Ponty (1945), mythical space is defined on the one hand as nature, as it is seen from a scientific point of view; on the other hand, it is combined with *numina* (divine powers), monsters, and living beings. It is therefore a much more complex space than the one whose scientists are studying natural phenomena (Dan *et al.*, 2020). This is a complex issue that cannot be reduced to a simple opposition between imaginary construction (fiction) and scientific truth, since there are many debates and controversies about certain scientific issues. Some of these debates and controversies will be detailed

in this article, in a nuanced manner according to the probable degree of veracity of the fictional or mythical events described.

2.1. *Fictional tsunami on Argos and the destruction of ancient coastal cities in the Eastern Mediterranean*

The film *Clash of the Titans* (Desmond Davis, Charles H. Schneer Productions, Metro-Goldwyn-Mayer, Titan Productions, and Peerford Ltd., USA and United Kingdom, 1981) defies the conventional approach of peplum films by immediately unveiling a catastrophe. A remake of this film was released in 2010, with the same title (Louis Leterrier, Legendary Pictures, The Zanuck Company, Thunder Road Pictures, USA, United Kingdom, Australia), but the natural disaster described in the 1981 version is not described again in the 2010 version. A seldom-seen occurrence in the genre, the film opens with the tumultuous wrath of Poseidon, the sea god, unleashing a tsunami that engulfs the coastal city of Argos (***fig. 5***) situated on the Peloponnese of Greece. The event is fleeting but spectacular: is it plausible in this geographic context?

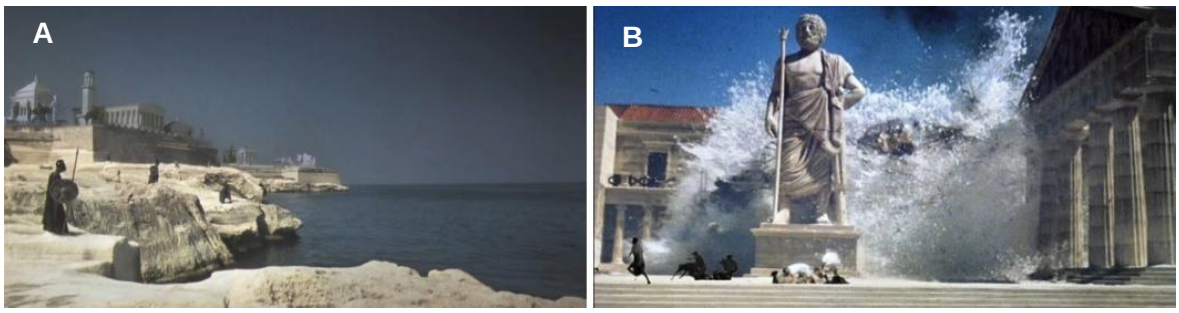

Figure 5. *Destruction of Argos by a tsunami: images from the film* Clash of the Titans *(Desmond Davis, Charles H. Schneer Productions, Metro-Goldwyn-Mayer, Titan Productions, and Peerford Ltd., USA and United Kingdom, 1981).* ***A.*** *Argos before the tsunami;* ***B.*** *The tsunami submerges the city of Argos.*

According to Edward Bryant (2005), 10.1% of tsunamis recorded since 47 CE have occurred in the Mediterranean Sea. As a collision zone between the African and Eurasian plates, and also located near the contact with the Arabian plate, the Eastern Mediterranean Basin is considered as a highly seismic area (see section 1.1.), and consequently at risk of tsunamis (***fig. 6***) (Bryant, 2005).

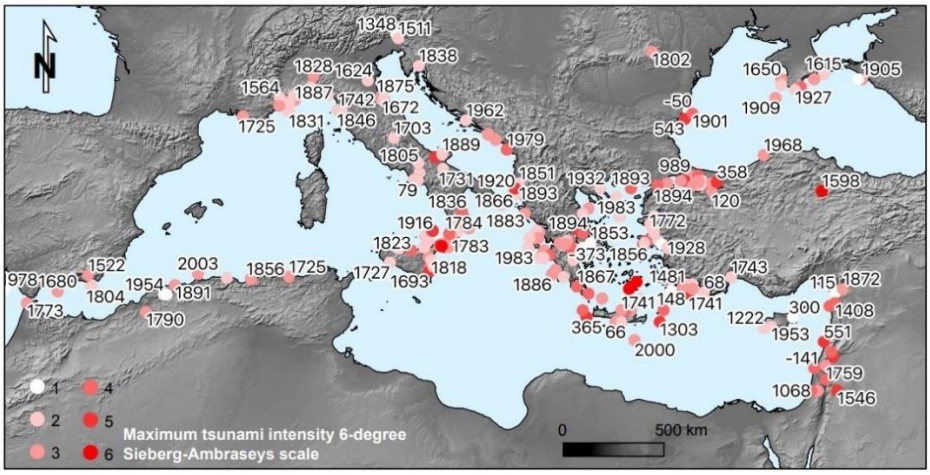

Figure 6. *Distribution of tsunamis in the Mediterranean and Black Sea regions, focusing on event epicenters from 6150 BCE, as documented in the Euro-Mediterranean Tsunami Catalogue (Maramai et al., 2014). In particular, this map underscores the elevated seismic hazard levels prevalent in the Central and*

Eastern Mediterranean. Maximum tsunami intensities are based on the 6-degree Sieberg-Ambraseys scale (Ambraseys, 1962).

Many earthquakes in Eastern Mediterranean marine and coastal contexts generate strong tsunamis, some of them being propagated long distances across the basin (Galanopoulos, 1960; Ambraseys, 1962; Antonopoulos, 1980; Papadopoulos & Chalkis, 1984; Soloviev, 1990; Papazachos & Papazachou, 1997; Soloviev *et al.*, 2000; Papadopoulos, 2001). Much like the dramatic events that played out at the beginning of the film *Clash of the Titans*, the coasts of the Peloponnese have historically been vulnerable to the impact of tsunamis resulting from earthquakes originating at considerable distances, for instance in 365 and 1303 CE (Altinok *et al.*, 2011; Guidoboni *et al.*, 1994). Furthermore, earthquakes are considered as the most common type of short-term cataclysmic events (Mordechai & Pickett, 2018). However, earthquakes are not the sole potential triggers for tsunamis in this region, volcanic activity (intimately related to tectonics) can also be the cause. A "mega-tsunami" was reportedly triggered around 1600 BCE by the eruption of the Thera volcano in the current Santorini Archipelago (the "Minoan" eruption), the oldest evidence of the effects of a tsunami in the region (Şahoğlu *et al.*, 2021). The tsunamis caused by the eruption of the Santorini volcano and the collapse of the caldera following this eruption strongly affected Crete and impacted the Minoan civilization (Lespez *et al.*, 2021), and could also have affected the Peloponnese and sites further afield such as the Levant (Goodman-Tchernov *et al.*, 2009).

Another particularly powerful seismic event occurred in 479 BCE in the Aegean Sea, as described by Herodotus (Herodotus, The Histories, Book VIII: Urania), with a significant impact during the Greco-Persian Wars (Stefanakis, 2006; Mathes-Schmidt *et al.*, 2019). In 365 CE, a "cataclysm" was also noted in the literature, following a powerful earthquake with its epicenter south of Crete, causing a tsunami attested in 29 different historical sources (Jacques & Bousquet, 1984) and various geological archives (Polonia *et al.*, 2013; Boulton & Whitworth, 2018). Although less significant, the events of 373 BCE (Gulf of Corinth) and 66 CE (off Phalasarna) also left important archaeological traces (Stefanakis, 2006). The ancient polis of Helike (Ἑλίκη) on the north coast of the Peloponnese was destroyed and submerged by the earthquake and tsunami of 373 BCE (Lafond, 1998; Engel *et al.*, 2016). According to Dora Katsonopoulou and Ioannis K. Koukouvelas (2022), this catastrophic event and the ruins of Helike were already well known to several ancient scholars and writers of the ancient Greco-Roman world, and were originally recorded by contemporary authors such as Aristotle (Met. 1.6.343, Met. 2.8.368, and Mu. 396a) and Herakleides of Pontos (preserved in Strabo 8.7.2). Therefore, considering the posterity of this disaster, Adalberto Giovannini (1985) speculated that the submersion of Helike could have inspired Plato to describe the destruction of Atlantis.

In the absence of archaeological or geomorphological evidence, it is challenging to make definitive claims regarding the destruction of Argos. By contrast, there is well-documented evidence confirming that Helike was indeed devastated by an earthquake and/or tsunami (Lafond, 1998; Engel *et al.*, 2016; Katsonopoulou & Koukouvelas, 2022). On the basis of the examples described above, the disasters depicted in the film *Clash of the Titans* are geologically plausible in the Eastern Mediterranean. The circumstances surrounding the destruction of the ancient ports of East-Canopus and Thonis-Heracleion (ancient Greek: Κάνωπος and Θῶνις - Ἡράκλειον) on the coast of the Nile delta could be similar to those attributed to the destruction of Helike at the end of the 2nd century BCE (Robinson & Goddio, 2015). However, it has also been suggested that the lowering of the Canopic lobe of the Nile delta led to the submersion of the two ancient estuarine-harbor cities, whose remains lie 4–7 m below present mean sea level (Flaux *et al.*, 2017). In recent history, the Mediterranean Sea has the highest number of documented historical tsunamis since 1840, accounting for 10.5% of such events worldwide (for approximately 90 dated records: Léone & Péroche, 2021). The most recent example

is the low-intensity tsunami observed in October 2020 on the coasts of Samos, İzmir, and Vathy, following an earthquake of magnitude 6.5–7 in the Aegean Sea near the island of Samos (Triantafyllou *et al.*, 2021).

2.2. *Sodom and Gomorrah: from an earthquake to the hypothesis of a meteoritic impact*

In the film *Sodom and Gomorrah* (dir. Robert Aldrich, Titanus, Pathé Consortium Cinéma, and Société générale de Cinématographie, Italy, France and USA, 1962), the city of Sodom is destroyed by an earthquake (***fig. 7a***), followed by a massive explosion (***fig. 7b***).

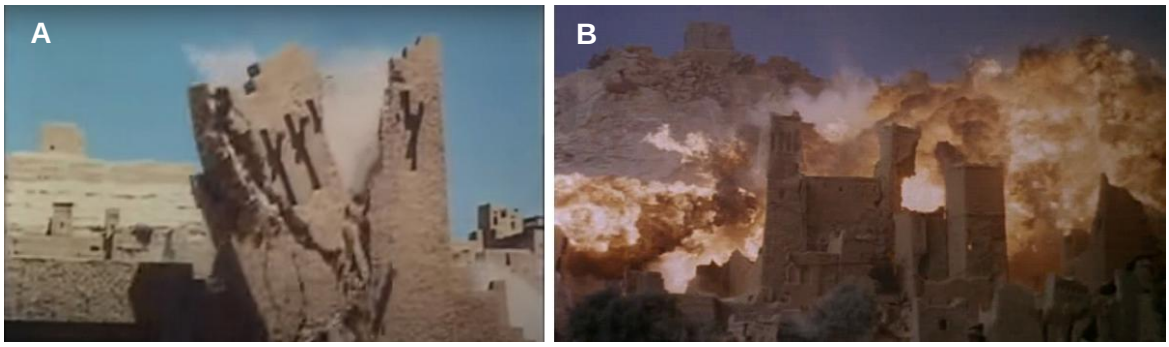

Figure 7. *Destruction of Sodom: images from the film Sodom and Gomorrah (dir. Robert Aldrich, prod. Titanus, Pathé Consortium Cinéma, and Société générale de Cinématographie, Italy, France and USA, 1962).* ***A.*** *Destruction of Sodom by the earthquake;* ***B.*** *Final destruction of Sodom by fire.*

Sodom and Gomorrah (Hebrew: סְדוֹם וְעֲמֹרָה / Səḏōm w ʿĂmōrāh) were ancient cities mentioned in the Book of Genesis, i.e. the first book of the Hebrew Bible/Old Testament (Genesis/from Greek: Γένεσις/Génesis, "origin"; Hebrew: בְּרֵאשִׁית/Bərēšīṯ, "In the beginning"; see *e.g.* Freedman *et al.*, 2000), in which God destroyed them for their wickedness (Greene, 2004). Biblical tradition places them south of the Dead Sea, in present-day Jordan, but their exact location remains uncertain. According to the biblical narrative, they were destroyed by "brimstone and fire" unleashed by divine wrath, along with most other cities around the Dead Sea (Genesis 19. 24–29).

The Dead Sea and Jordan Rift, part of the immense Afro-Arabian fault system, is a highly seismic region whose impacts have been documented by historical sources dating back to antiquity (Klinger *et al.*, 2000; Al-Zoubi *et al.*, 2006; Hamiel *et al.*, 2009). Indeed, this valley-oasis is one of the oldest inhabited regions in the world, where agriculture, and village communities and urban conglomerates occurred among the earliest known occurrences (approximately 12,000 years BP: Zeder, 2011; Grosman *et al.*, 2016). Some of these prehistoric settlements are still inhabited today, including for example Jericho (Arabic: أريحا/Rīḥa or Arīḥā). Located in the Jordan Valley, Jericho is often considered to be one of the oldest cities in the world, with archaeological excavations dating the oldest remains of the Jordan Valley to the 10th millennium BCE (Murphy-O'Connor, 1998; Freedman *et al.*, 2000; Gates, 2011). At every stage of its long history, the city of Jericho has suffered violent earthquakes (Reches & Hoexter, 1981). Since the site has been inhabited for > 11,000 years, there is a wealth of archaeological traces of past earthquakes (archaeoseismics) dating back to the Neolithic period (Alfonsi *et al.*, 2012). These discoveries have prompted seismic interpretations of the biblical narratives regarding the destruction of Sodom and Gomorrah, as well as the collapse of the wall of Jericho (Reches & Hoexter, 1981; Harris & Beardowin, 1995; Nur & Burgess, 2008).

The explosive demise of Sodom shown in the film *Sodom and Gomorrah* (***fig. 7b***) is inspired by the description of the biblical cataclysm, which itself has been the focal point of a contentious theory

suggesting that this calamity resulted from a meteorite impact of even greater magnitude than the Tunguska event in 1908 (Bunch *et al.* 2021). This hypothesis was soon questioned by Mark Boslough (2022) who alleged that the pro-meteoritic impact argument had relied on manipulated images. Mark Boslough (2022) argued that some images published by Ted E. Bunch *et al.* (2021) from the Tall el-Hammam excavation had been photoshopped and rotated to match the hypothetical compass direction of the supposed blast. In his opinion, four of the seven images had the north arrows used by archaeologists to orient images digitally edited out. With no north arrows, photos can be reoriented, as was done for *e.g.* the figure 44c of the paper of T. E. Bunch *et al.* (2021), which has shadows indicating the sun would be shining from an impossible direction at that latitude in January. Still according to Mark Boslough (2022), colored arrows are annotations added by Ted E. Bunch *et al.* (2021) to point out features in the photograph.

2.3. *Ancient catastrophes: investigating multiple disaster scenarios in the Exodus narrative*

The film *The Ten Commandments* (dir. Cecil B. DeMille, prod. Paramount Pictures and Motion Picture Associates, USA, 1956) proposes a "multi-disaster" scenario, with the description of some of the *Plagues of Egypt* and the cataclysmic events surrounding the Crossing of the Red Sea (***fig. 8***).

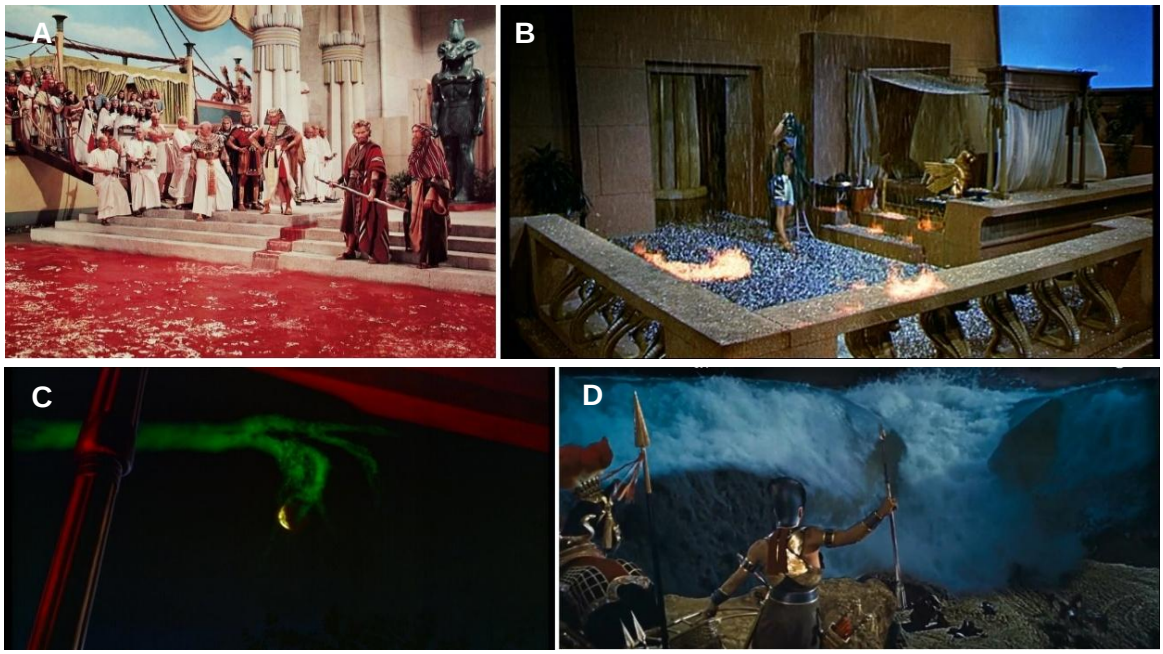

Figure 8. *Some examples of the Plagues of Egypt and submersion of the army of Pharaoh Ramses II by the Red Sea: images from the film The Ten Commandments (dir. Cecil B. DeMille, prod. Paramount Pictures and Motion Picture Associates, USA, 1956).* ***A.*** *Turning water to blood;* ***B.*** *Hailstorm;* ***C.*** *Pestilence is spreading before the killing of the firstborn (the 5th, 6th and 10th plagues were combined in the film);* ***D.*** *After the Crossing of the Red Sea by the Hebrews, the Red Sea closes to the Egyptian army.*

The *Ten Plagues of Egypt* (Hebrew: עשר מכות מצרים) and the "*Crossing of the Red Sea*" (Hebrew: קריעת ים סוף) are two consecutive chapters of the *Book of the Exodus* (from Ancient Greek: Ἔξοδος, *Éxodos*; Hebrew: שְׁמוֹת/*Šəmōṯ,* "Names"), the second book of the Hebrew Bible/Old Testament (Freedman & Myers, 2000). According to the biblical narrative, the Plagues of Egypt were ten disasters inflicted by the God of Israel on Egypt in order to compel the Pharaoh to emancipate the enslaved Israelites (Freedman & Myers, 2000).

Is there any historical and/or archaeological evidence of these events?

Siro I. Trevisanato (2005 & 2006) believed that the eruption of the Santorini volcano around 1600 BCE could have been the source of the Plagues of Egypt: his theories are summarized in ***table 1***.

	Plague	Hebrew	Theory
1	Blood	דָּם/*dām*	Winds would have carried the volcanic ash to Egypt, including mineral cinnabar which could have been capable of turning a river a blood-like red color.
2	Frogs	צְפַרְדֵּעִים/*tsefar dae'im*	The accumulated toxic acids (e.g. sulphuric acid) in the water would have caused frogs to leap out and search for clean water.
3	Lice	כִּנִּים/*kinnim*	Insects would have burrowed eggs in the bodies of dead animals and human survivors, which generated larvae and then adult insects.
4	Flies	עָרֹב/*'ārov*	Same as above.
5	Pestilence	דֶּבֶר/*dever*	The grass would have been contaminated, poisoning the animals that ate it.
6	Boils	שְׁחִין אֲבַעְבֻּעֹת פֹּרֵחַ / *shahin avatsebu'ot porēaḥ*	Volcanic ash projected into the atmosphere through acid rain would have caused skin diseases (boils) in the population.
7	Hail	בָּרָד/*bārād*	High concentrations of airborne particles would have caused climatic and meteorological disturbances (volcanic winter), e.g. hailstorms.
8	Locusts	אַרְבֶּה/*arbêh*	High humidity from unusual rainstorms would have created optimal conditions for locusts to thrive.
9	Darkness	חֹשֶׁךְ/*hoshekh*	The last explosion of the volcanic eruption, the most violent and which projected the greatest amount of particles into the atmosphere, could also explain the several days of darkness.
10	Killing of the Firstborn	מֵת כָּל־בְּכוֹר/*mēt kōl-bekhōr*	S. I. Trevisanato (2005 & 2006) argues that according to an ancient Egyptian text (Papyrus Leiden I 344 recto/*The Dialogue of Ipuwer and the Lord of All*: 4.3-4, 5.6, 6.12), the firstborn of aristocrats could have been sacrificed in the hope that such a significant sacrifice would lead their gods to stop punishing them. Unless, according to John Marr, epidemiologist at the New York Public Health Department, the culprits may be toxic molds that developed in the upper layers of Egyptian attics? If the firstborn had been served first, absorbing the mycotoxin-contaminated food decimated them all (Humbert, 2015).

Table 1. *Theories of the Ten Plagues of Egypt, summarised from Siro I. Trevisanato (2005 & 2006).*

None of these controversial theories have been validated by archaeological evidence. For example, the catastrophic events described in *The Dialogue of Ipuwer and the Lord of All* are all the more difficult to interpret because they are not dated (Enmarch, 2009); they could describe earlier events, such as the collapse of the Old Kingdom and the First Intermediate Period (22nd-21st centuries BCE). Therefore, they may have no connection with either the biblical texts, or with the Minoan eruption: perhaps they described the 4.2 ka (Weiss *et al.*, 1993; Stanley, 2003; Kaniewski *et al.*, 2018; Bini *et al.*, 2019) or 3.2 ka aridification events (Kaniewski *et al.*, 2019), or could they describe something we have no evidence for? The historical and archaeological veracity of the Plagues of Egypt is still under discussion, but are these debates relevant to the content of the texts taken into account?

Following the portrayal of the Plagues of Egypt, the film *The Ten Commandments* shows the epic "Crossing of the Red Sea" by the Hebrews in a spectacular manner. According to the biblical narrative in chapter 14 of the *Book of Exodus*, the Hebrews moved towards a body of water called the Sea of

Reeds (Hebrew: יַם־סוּף / Yam-Suf), whose waves opened before Moses and his people and then closed to the Egyptian army (***fig. 8d***; Freedman & Myers, 2000). The location of this Sea of Reeds is controversial, as there are several lakes or lagoons between the Mediterranean Sea and the Red Sea (Gulf of Suez), *e.g.* Lake Manzala, Lake Timsah and the Bitter lakes. Using mesoscale models reproducing the southern (Gulf of Suez) and northern (Lake Manzala) extremities of the region concerned, Doron Nof and Nathan Paldor (1992; northern end of the Gulf of Suez) and Carl Drews and Weiqing Han (2010; Lake Manzala) showed that moderate winds (wind setdown) may have made some of these shallow water bodies temporarily and partially accessible on foot. Such a geographical configuration would imply that Moses knew exactly where to pass, that the ford was very narrow, and that the pharaoh's army missed the ford and plunged into shallows or mudflats. However, it would be very surprising if the pharaoh, and his scouts, did not know the geography of their own kingdom.

The film *The Ten Commandments* places the Plagues of Egypt and the "Crossing of the Red Sea" under the reign of Ramses II (1279–1213 BCE), so these dates do not correspond to the estimated dating of the Santorini volcano eruption (around 1600 BCE). In addition, much of the narratives of the Hebrew Bible/Old Testament may have been assembled in the 5th century BCE (Berquist, 2007; Römer, 2007; Evans, 2008), so eleven centuries after the Minoan eruption, and well after the Crossing of the Red Sea. D. Humbert (2015) reported that Jean-Louis Schlegel, sociologist of religions, recalls that some sacred texts could perhaps be based on real events. But these texts are interpreted as being of divine origin and sometimes understood as "punishments" of God, so they are told in narratives that emphasize the marvellous and the miraculous: religious myths are not scientific books of palaeontology, archaeology or history (Humbert, 2015). The same reasoning can be applied to the myth of Atlantis.

2.4. The collapse and sinking of Atlantis: from Plato's narrative to a science fiction scenario

The film *Atlantis the Lost Continent* (dir. George Pal, prod. Metro Goldwyn Mayer, USA, 1961) applies the scenario of a *plinian* volcanic eruption as it occurred in Pompeii, to the disappearance of the mythical city of Atlantis (***fig. 9a***). The film also offers an opportunity to blend a philosophical narrative with elements of peplum and science fiction (***fig. 9b***).

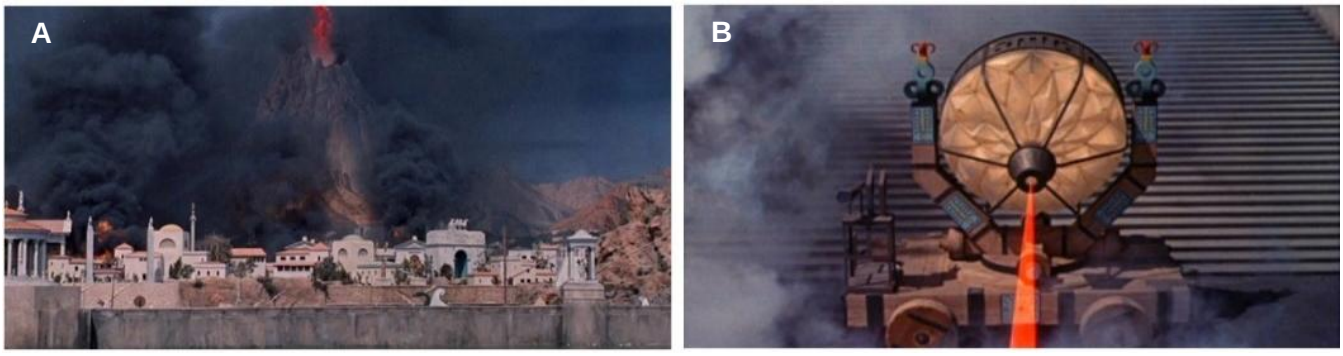

Figure 9. *Images from the film* Atlantis the Lost Continent *(dir. George Pal, prod. Metro Goldwyn Mayer, USA, 1961).* ***A.*** *The volcanic eruption;* ***B.*** *The heat ray.*

The origin of the myth of Atlantis (ancient Greek: Ἀτλαντίς/Atlantís) comprises two philosophical narratives by Plato (428–348 BCE): the *Dialogues*, including the *Critias*, and the *Timaeus* (see translations by David Horan [Plato, 2021]). These *Dialogues* set out how Athens stopped the belligerent expansionism of the people from Atlantis, an island that Plato located beyond the Columns

of Hercules. After the victory of Athens against the Atlanteans, a cataclysm caused by Zeus engulfed Atlantis in the ocean that still bears its name today.

Rediscovered in the Western world during the Renaissance, the myth of Atlantis has been the subject of diverse theories and speculations (Vidal-Naquet, 2005), including its hypothetical location (Kieffer, 2004). Among the many theories of the location of Atlantis, it is certainly the one that situates the lost continent on the archipelago of Santorini (in modern Greek: Σαντορίνη/Santoríni) that is closest to the scenario described in the film *Atlantis the Lost Continent*, at least the final catastrophic volcanic eruption (***fig. 9a***). According to some researchers (Galanopoulos & Bacon, 1969; Marinatos, 1971; Pellegrino, 1993), the eruption of the Santorini volcano in the Minoan era is one of the possible origins of the myth of Atlantis. Without getting into the debates, let us only recall that the Minoan eruption occurred around 1600 BCE (Sigurdsson *et al.* 2006), while Plato dates the collapse of Atlantis to 9,000 years before the time of Solon, an Athenian statesman of the 7th and 6th centuries BCE (Gill, 1977; Kieffer, 2004; Vidal-Naquet, 2005).

The prevailing consensus is that the myth of Atlantis is a fictive creation of Plato, more akin to a fable than an historical account (Gill, 1979; Naddaf, 1994; Nesselrath, 2002; Leveau, 2005). The interpretation of Plato's story based on real events by some authors is therefore, in this sense, a pseudoarchaeological approach (Collina-Girard, 2009). In this context, and as a source of creative inspiration, Atlantis has become and still remains a theme widely treated in art, literature, cinema or video games, in the genres of fantasy, peplum and/or science fiction (Treuil, 2012). The originality of the film *Atlantis the Lost Continent* is precisely to be a mixture of peplum and science fiction. The film was directed by Georges Pal, the same director as the science fiction film *The Time Machine* released in 1960. Among the various science fiction aspects (*e.g.* a submarine) shown in the film *Atlantis the Lost Continent*, the heat ray (***fig. 9b***) draws attention to the scientific discoveries and technical experiments undertaken during antiquity. This device, which consists of a crystal that absorbs and concentrates sunlight onto a single point, recalls "Archimedes' heat ray". If the device producing the heat ray shown in *Atlantis the Lost Continent* is inspired by the invention attributed to Archimedes, some descriptions given to us by the ancient documentary sources must be cited. Indeed, Archimedes would have invented such a device, which would have been used against the Roman fleet during the siege of Syracuse in 213 BCE. According to the Byzantine mathematician, engineer and architect Anthemius of Tralles (474–534 CE; see translation by M. Dupuy [Anthemius of Tralles 1777]), Archimedes would have developed giant mirrors to focus sunlight in order to set alight the sails of approaching Roman ships (Huxley, 1959; Rashed, 2002; La Souchère, 2018). Nonetheless, the scientific credibility of Archimedes' heat ray has been a topic of debate since the Renaissance. It was in the 20th century when the technical impossibility of this experiment, due to the constraints of the ancient context and events in question, was conclusively confirmed (Simms, 1977). Recent experiments have demonstrated the feasibility of the concept at the time (Wallace, 2005), but the multitude of contradictory results stemming from various reconstructions has only served to intensify the controversy surrounding this subject (La Souchère, 2018). This device was developed and deployed in 1969, well after the siege of Syracuse, using the "solar oven" built in Odeillo in the French Eastern Pyrenees.

2.5. *From Hollywood to scientific hypothesis:* 10,000 BC*, lost Ice Age civilizations and ancient apocalypse theories*

In the film *Atlantis the Lost Continent*, George Pal attributes the creation of a "burning ray" and other technologically anachronistic innovations to Atlantis. Through this narrative choice, he inadvertently perpetuates the myth of the sunken city as a symbol of a scientifically and technologically advanced civilization lost in the annals of time. This is a theme that is often found in

fictional literature, cinema, and also the vast field of pseudoarchaeology. Several decades after the "golden age" of peplums, the film *10,000 BC* by Roland Emmerich revives this theme, marrying the myth of Atlantis with the monumental architecture of ancient Egypt and Mesopotamia (***fig. 10***). The film *10,000 BC* (dir. Roland Emmerich, prod. Warner Bros., Legendary Pictures, and Centropolis Entertainment, USA, 2008) is a prehistoric-fantasy film, depicting, 12,000 years ago, an advanced civilization predating that of ancient Egypt or Mesopotamia but with similar monumental architecture (pyramids: ***fig. 10a***; ziggurat: ***fig. 10b***), blending both the anachronistic and the spectacular.

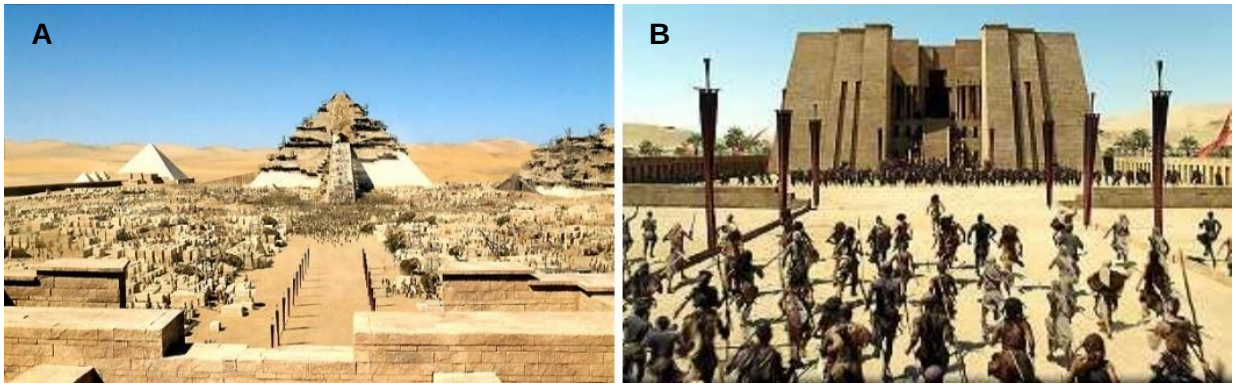

Figure 10. *Images from the film* 10,000 BC *(dir. Roland Emmerich, prod. Warner Bros., Legendary Pictures, and Centropolis Entertainment, USA, 2008).* ***A.*** *Construction works on pyramids;* ***B.*** *Battle in front of the "Almighty" palace, with architecture inspired by Mesopotamian ziggurats.*

The film *10,000 BC* features pyramids constructed 10,000 years BCE, and interestingly, it shares certain elements with the 1994 film *Stargate*, both of which were directed by Roland Emmerich. We will discuss this later in the article. Historically, Mesopotamian ziggurats were built from the 5th millennium BCE onwards and the pyramids of Egypt were built in the 3rd millennium BCE (Crawford, 2004; Bard, 2015). The film *10,000 BC* is inspired by the controversial and pseudoscientific theories of British journalist Graham Hancock, developed in his book *Fingerprints of the Gods* (Hancock, 1995). G. Hancock argues that an advanced civilization (associated with Atlantis in the film *10,000 BC*) was destroyed thousands of years before the construction of the pyramids of Egypt.

In his book *Magicians of the Gods* (Hancock, 2015), Graham Hancock supports the controversial Younger Dryas impact hypothesis as a cause of a global cataclysm at the end of the last ice age that would have caused the collapse of this lost ice age civilization. Indeed, he attributes the abrupt climate change of the Younger Dryas to a meteoritic impact.

The Younger Dryas, the last cold stadial of the Late Glacial (dating of the Late Glacial: approximately 14,500 to 11,700 years BP), was a period of rapid climate change that marks the transition from the Last Glacial Period to the Holocene (our current interglacial period). The Late Glacial period was characterized by oscillating climatic conditions associated with alternating warm interstadials and cold stadials (Peteet, 2001). Quaternary climate variations, *i.e.* the cyclic alternation between glacial and interglacial periods, have been explained by orbital forcings (cycles of tens to hundreds of thousands of years: Milanković, 1941; PAGES, 2016). At much shorter timescales, abrupt climate changes during the Late Glacial have been attributed to episodes of massive iceberg discharges in the North Atlantic Ocean (Heinrich, 1988; Broecker, 1994). The Younger Dryas was thus the last major cold period before the Holocene warming, dated between 12,900 and 11,700 years BP (Rasmussen *et al.*, 2014; Cheng *et al.*, 2020; Naughton *et al.*, 2023). This cold oscillation was

attributed in particular to the breakup of Lake Agassiz, a large meltwater lake on the margins of the North American ice sheet (Stokes *et al.*, 2015), and also to iceberg breakups and freshwater discharges from the Laurentine (Carlson *et al.*, 2007; Murton *et al.*, 2010) and Fennoscandian ice sheets (Muschitiello *et al.*, 2015) in the North Atlantic and Arctic Oceans (Tarasov & Peltier, 2005). The sudden and massive inflow of fresh water into the North Atlantic Ocean would have disrupted thermohaline circulation and climate (Broecker *et al.*, 1989; McManus *et al.*, 2004; Wünsch, 2006; Eisenman *et al.*, 2009; Carlson, 2013; Ritz *et al.*, 2013; Teller, 2013).

Richard B. Firestone *et al.* (2006 & 2007) proposed a controversial theory suggesting that a cosmic impact played a pivotal role in triggering the cooling of the Younger Dryas period. In their theory, the fall of an asteroid to Earth would have resulted in an "impact winter" resulting from the injection of dust and ash into the Earth's atmosphere (Covey *et al.*, 1994). Although no impact crater from this era has been identified, traces possibly associated with a major cosmic impact have been found at various sites around the world (Kennett *et al.*, 2015; Sweatman, 2021), but its role in driving climate change during the Younger Dryas is debated (Pinter *et al.*, 2011; Van Hoesel *et al.*, 2014). Indeed, this hypothesis has come into scrutiny, primarily due to evidence from the Late Glacial Period, which reveals other cold episodes resembling the Younger Dryas but unrelated to meteoritic impacts (Carlson, 2008; Boslough *et al.*, 2012). Mark Boslough (2022) also points out that the article by Richard B. Firestone *et al.* (2007) has co-authors in common with the paper by Ted E. Bunch (2021; see section 3.2.) which proposed a similarly controversial theory, to explain the destruction of Sodom.

Graham Hancock recently presented his theories in an eight episodes pseudoarchaeological series entitled *Ancient Apocalypse*, produced by ITN Productions (a UK-based media production) and released by Netflix in 2022. The American Archaeological Society opposed the classification of this series as "documentary" and asked Netflix to reclassify it as "science fiction". This was due to the false interpretation of certain archaeological discoveries (fanciful dating, false evidence), its lack of alternative interpretations and evidence contradicting those of Graham Hancock, and some themes considered as conspiratorial, or even racist (accusation of white supremacism), deemed harmful to both the public and the scientific community [3]. One of the key arguments of Graham Hancock is the construction of some monumental structures, e.g. the megalithic site of Göbekli Tepe in Türkiye, built in the 10th millennium BCE (Schmidt, 2011 & 2015), which he considers too complex to have been built by hunter-gatherers. According to him, a more advanced civilization must have imparted this construction technique to them. This concept, known as hyperdiffusionism, developed in the early 20th century (Smith, 1915; Perry, 1918 & 1923), has been widely criticized as purely speculative, pseudoscientific and based on racist theories (Williams, 1991; Kehoe, 2008; Storey & Jones, 2010). Indeed, hunter-gatherers were anatomically modern humans and thus had the same cognitive capacities. Furthermore, there is no inherent evolution of knowledge, implying that they could have engaged in advanced calculations and orchestrated the construction of monumental structures (Fagan, 2006; Kehoe, 2008).

When the most recent episodes (Season 2) were released on 16 October 2024, *Ancient Apocalypse* was still considered a documentary series by all the websites that promoted it.

2.6. *From Noah's Flood to current global warming: examining climate change narratives*

The Hebrew flood myth is included in the cataclysmic and destructive amalgam imagined by Graham Hancock (Hancock, 2002). The Flood refers to a very old legendary catastrophic flood

[3] Sandweiss, D. H., 2022. Letter to Netflix company officials regarding the series "Ancient Apocalypse". Society for American Archaeology, November 30, 2022. URL: https://documents.saa.org/container/docs/default-source/doc-governmentaffairs/saa-letter-ancient-apocalypse.pdf

assumed to have been caused by torrential and continuous rains. Best known as Noah's Ark story in the Hebrew Bible (Bandstra, 2010), similar flooding narratives are common in many cultures. Indeed, more than 600 versions have been listed around the world and the similarities have led scholars to investigate the common cultural and historical threads that might have influenced the development of such stories across different societies (Ducœur, 2016). The Genesis flood story (chapters 6–9 of the *Book of Genesis*) describes God's decision to return the universe to its pre-creation state of watery chaos (Leeming, 2010). The biblical flood, in particular, has long been the focus of numerous theories, interpretations (Cohn, 1996) and artistic adaptations extending from ancient times to the modern era of cinema. In the film *Noah* (dir. Darren Aronofsky, prod. Disruption Entertainment, New Regency Pictures, and Protozoa Pictures, USA, 2014), the biblical Flood narrative was reimagined through the lens of contemporary ecological concerns, addressing issues such as resource overexploitation and depletion (***fig. 11a***) and resulting conflicts. This adaptation effectively transposes present-day anxieties about humanity's near future into a remote historical setting.

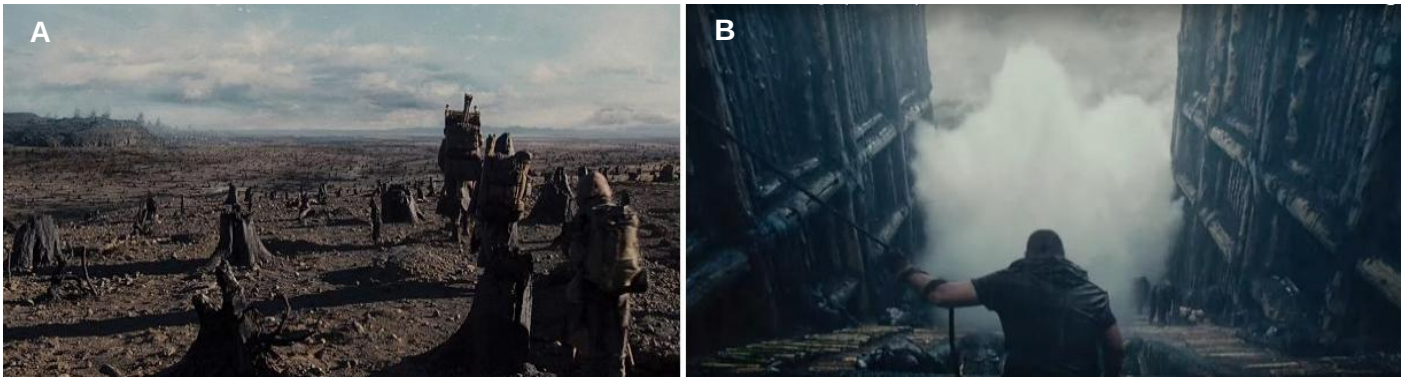

Figure 11. *Images from the film Noah (dir. Darren Aronofsky, prod. Disruption Entertainment, New Regency Pictures, and Protozoa Pictures, USA, 2014).* ***A.*** *A world overexploited and devastated;* ***B.*** *The Flood seen from inside Noah's Ark.*

In the film *Noah*, the biblical patriarch is depicted as the first "environmental activist", mirroring present anxieties of the Anthropocene. The resulting rise in alarmism and discourses of fear in society (Walter, 2008; Marriner *et al.*, 2010; Latour, 2015; Aït-Touati, 2019 & 2021) has encouraged cinema to incorporate an eco-apocalyptic dimension in the scenarios (Neyrat, 2015). For example, some scenes of the Flood in the film *Noah* (***fig. 11b***) are reminiscent of scenes from the New York flood in the film *The Day After Tomorrow* by Roland Emmerich (2004) and *London's Flood* by Tony Mitchell (2007): see Olivier Planchon *et al.* (2022). With such a scenario, we can consider the film *Waterworld* by Kevin Reynolds (1995) as a continuation of the film *Noah*… Or rather, given the release dates of the two films: *Noah* a prequel of *Waterworld*.

The Flood narrative is the basis of various catastrophist theories (Ducœur, 2016), including the creationist and pseudoscientific theory of "Flood geology", which attempts to argue that such a global flood actually occurred (Isaak, 2007). Holocene global warming and its repercussions are occasionally highlighted as factors contributing to the genesis of flood myths, exemplified by the contentious Black Sea deluge hypothesis (Ryan *et al.*, 1997). During the peak of the Last Glacial Maximum between 22,000 and 18,000 BP, with the growth of the large ice sheets, the mean level of the oceans was between 120 and 130 m below its current level (Rotaru *et al.*, 2006; Murray-Wallace & Woodroffe, 2014; ***fig. 12***).

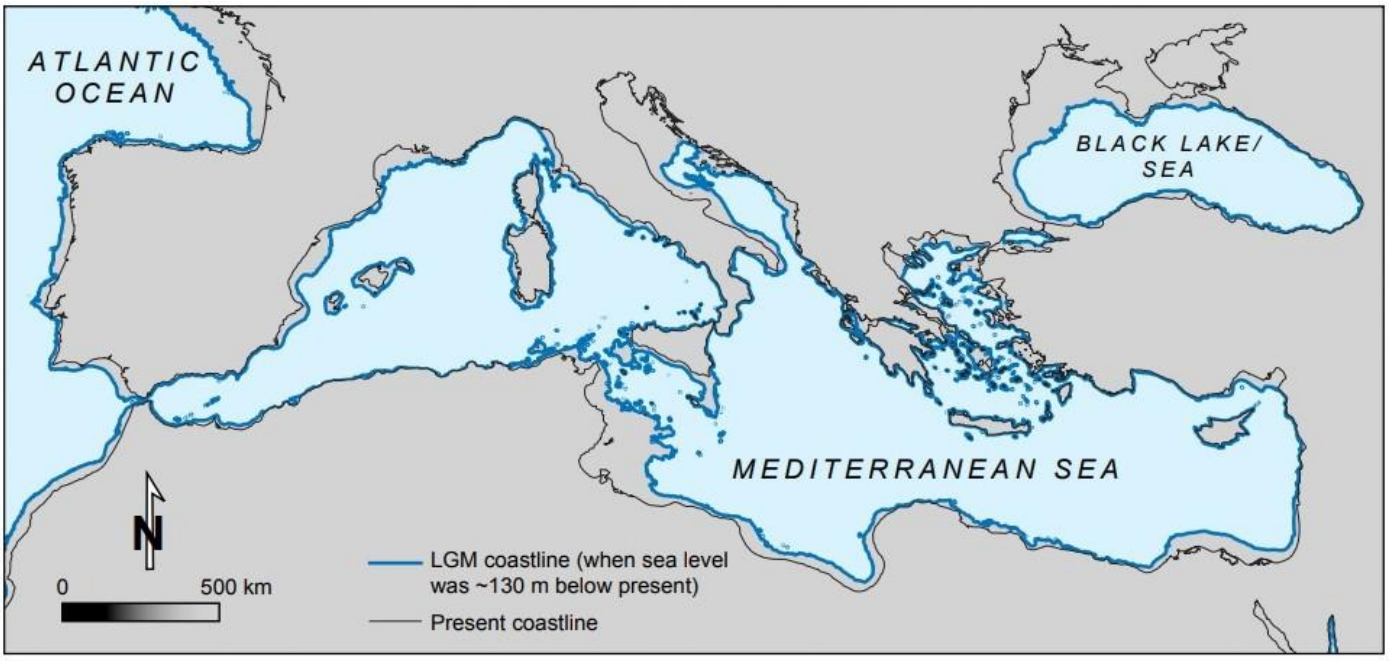

Figure 12. *Mediterranean coastline during the Last Glacial Maximum (22,000-18,000 BP; data source: Zickel* et al., *2016).*

From the Late Glacial Period, global warming and associated ice-cap melting caused a rapid 20 m rise in sea level during the Bølling warm interstadial (14,600–14,100 BP), then an average of 1.5 cm per year until 7,500 BP (Deschamps *et al.*, 2012). Rising sea levels completely reshaped the geography of the world's coastlines, particularly in areas with a wide continental shelf. Thus, Northern Europe, freed from the ice, split into peninsulas and archipelagos, and the plain covering the current Persian Gulf about 12,000 years BP became almost completely submerged by 8,000 BP (Lambeck, 1996; Cuttler *et al.*, 2012). Following an abrupt sea-level rise caused by the collapsing Laurentide ice sheet in Canada, the Mediterranean Sea suddenly poured through the Bosphorus about 7,600 BP, into the freshwater lake at the bottom of the current Black Sea basin (Ryan *et al.*, 1997). This influx of seawater would have dramatically expanded the size of the Black Sea and inundated land that had previously existed in the region. Some authors have interpreted the abrupt rise of the Black Sea, resulting from a catastrophic inflow of Mediterranean seawater, as the origin of the Biblical Flood because of its brutality (Ryan & Pitman, 1998; Ballard *et al.*, 2000; Yanko-Hombach *et al.*, 2011; Yanchilina *et al.*, 2017). Indeed, the level of the Black Sea would have risen ~150 m in just two years, flooding an area of more than 100,000 km^2 and probably displaced populations to its newly formed shorelines. Such an event might have imposed substantial stresses upon contemporary human populations and persisted in cultural memory as the Great Flood (Yanko-Hombach *et al.*, 2011). The physical side of this is still debated, with other less dramatic theories proposed to explain the filling of the Black Sea. The Laurentide ice sheet retreated over a long period (mostly between 12,000 and 6,000 BP: Dyke, 2004). William B.F. Ryan *et al.* (2003) revised the dating of the early Holocene flood to 8,800 years BP, and a non-catastrophic progressive flood model (or gradual inflow model) has been proposed to explain the Late Quaternary sea-level history of the Black Sea (Ferguson, 2012; Ferguson *et al.*, 2018). A time gap of approximately 900 years between the initial marine inflow and the extinction of lacustrine species in Black Sea sediments suggests that it took roughly ten centuries to establish the present-day bidirectional exchange with the Mediterranean and the global ocean (Soulet *et al.*, 2011). In conclusion, the intricate and debated theory of the Black Sea deluge hypothesis should be noted in contrast to the biblical account of Noah's flood, which is depicted as a global event.

Holocene warming and the climatic optimum, in a context of more contrasting seasons (obliquity of 24.23° 9000 years BP versus 23.45° currently: Kutzbach, 1981; Guetter & Kutzbach, 1990), strengthened the monsoons and shifted rainbelts to higher latitudes (COHMAP Members, 1988) leading to pluvial periods on the "green Sahara" (Gasse, 2000; Lézine, 2009) and the Arabian Peninsula (Lézine *et al.*, 2010; Dinies *et al.*, 2015; Fersi *et al.*, 2016; Nicholson *et al.*, 2021). Rock engravings and paintings depicting savanna fauna in various parts of the Sahara (Butzer, 1958), but also in the Namibian desert in southern Africa (Blümel, 2002), are first-hand accounts of this period marked by more frequent and abundant rainfall over today's arid areas. In the Eastern Mediterranean, dominated by mid-latitude climate systems, records of speleothems show maximum precipitation during early-to-mid Holocene (Bar-Matthews *et al.*, 1999; Verheyden *et al.*, 2008; Fleitmann *et al.*, 2009; Develle *et al.*, 2010; Cheng *et al.*, 2015), and fluctuations of the Dead Sea lake levels show an early Holocene wet phase (Migowski *et al.*, 2006). Early Holocene conditions were therefore not as catastrophic as some authors claim. On the contrary, this time of generally favourable climatic conditions after the cold and dry Younger Dryas was also the time of the Neolithic Revolution (Bar-Yosef, 2011). The Neolithic Revolution was the wide-scale transition of numerous human cultures from a lifestyle of hunting and gathering to one of agriculture and settlement, thanks to the domestication of various types of plants (into crops) and animals (see *e.g.* Bocquet-Appel, 2011; Price & Bar-Yosef, 2011; Pollard *et al.*, 2015). As an example, this occurred in the Southern Levant before 11,500 BP (Zeder, 2011). With the development of agriculture, the Neolithic was characterized by the development of the first villages and pre-urban agglomerations, such as Jericho (see section 2.2). The construction of the monumental megalithic complex of Göbekli Tepe (see section 2.5) is part of the cultural changes observed at this time in the Eastern Mediterranean and Southwest Asia (Weninger *et al.*, 2009; Dietrich *et al.*, 2019, Peters *et al.*, 2020).

Thus, the Holocene period was subjected to climatic conditions in which human civilization was certainly able to develop across continents. However, the impending Anthropocene climate change presents a starkly different narrative—a warning articulated in the film *Noah*. This cautionary tale draws more from the Club of Rome's "Limits to Growth" report (Meadows *et al.*, 1972) than from the biblical *Book of Genesis*.

Conclusion

Apart from the *Clash of the Titans*, *The Ten Commandments*, and *10,000 BC*, a destructive natural disaster is the final outcome of all the studied movies. In the three films cited above, the disaster (not shown in *10,000 BC*) only occurs at the margin of the main plot. In the other movies studied in this paper, the disasters can be divided in two categories: on the one hand those in which disasters are at the center of the storyline and that are the direct subject of the movie, *i.e.* the cause of the disaster (*The Last Days of Pompeii* and *Pompeii*) or the object on which the disaster will manifest itself in the most spectacular way (*The Colossus of Rhodes*), are sometimes presented from the beginning of the film; on the other hand, movies in which disasters only influences the characters' decisions in the final scenes (*Sodom and Gomorrah*, *Atlantis the Lost Continent*, and *Noah*).

Some of the palaeo-disasters presented in these fictions are plausible, such as the tsunami in the *Clash of the Titans* movie; or the possible earthquakes that destroyed the Colossus of Rhodes, and the hypothetical event that lead to the destruction of Sodom. Moreover, the Vesuvius eruption that destroyed the cities of the Bay of Naples, including Pompeii, is scientifically attested and has been precisely dated to 79 CE. Nevertheless, the Black Sea deluge hypothesis seen in *Noah*, and the multi-disaster scenario depicted in the fictional retelling of *The Ten Commandments*, persist as enduring myths in contemporary understanding. Even if a volcanic eruption near Santorini occurred in the past,

the stories around the Atlantis lost city also remain myths. The meteoritic impact hypothesis described in the Sodom and Gomorrah fictions, and supposed to be one of the causes of their destruction, is still highly debated in the scientific literature. The cataclysm of unknown origin that led to the demise of an Ice Age civilization in the film *10,000 BC* is inspired by myths and legends such as Atlantis, but on which also rely some very controversial pseudo-archaeological theories. Roland Emmerich was criticized on this, but Emmerich's co-writer, Harald Kloser, replied: "Roland and I never intended for *10,000 BC* to be a documentary" (Turan, 2008). If some other films assumed the use of myths (*Sodom and Gomorrah*, *Clash of the Titans*, *The Ten Commandments*, *Atlantis the Lost Continent*, and *Noah*), all selected films studied in this article do not claim they are scientifically accurate, nor do they have scientific advisors on staff (so far as we can tell). If the peplums are certainly not historical documentaries, they are a reflection and witness of the society of their time (Winkler, 2004; Bessières, 2019).

Conflicts of interest

No conflicts of interest to declare.

Evaluation

Reviewers for this paper are Ania Szczepanska and Christophe Petit.

Peer-reviewer responsibilities

Reviewer evaluations are given serious consideration by the editors and authors in the preparation of manuscripts for publication. Nonetheless, being named as a reviewer does not necessarily denote approval of a manuscript; the editors of *Archaeology, Society and Environment* take full responsibility for final acceptance and publication of an article.

Bibliographical references

Aït-Touati, F., 2019. *Vivre dans un monde abîmé*. Éditions de Minuit (Récits de la Terre. Critique : revue générale des publications françaises et étrangères, 860–861), Paris, 5–16.

Aït-Touati, F. (ed.) 2021. *Le cri de Gaïa : penser la terre avec Bruno Latour*. Ed. La Découverte (Les Empêcheurs de penser en rond), Paris.

Aknin, L., 2009. *Le péplum*. Armand Colin, Paris.

Alfonsi, L., Cinti, F. R., Di Mauro, D., Marco, S., 2012. Archaeoseismic Evidence of Two Neolithic (7,500–6,000 B.C.) Earthquakes at Tell es-Sultan, Ancient Jericho, Dead Sea Fault. *Seismological Research Letters*. 83(4), 639–648. URL: https://doi.org/10.1785/0220110144

Al-Zoubi, A. S., Abu-Hamatteh, Z. S. H., Abdealkaderer, A., 2006. The seismic hazard assessment of the Dead Sea rift, Jordan. *Journal of African Earth Sciences*. 45 (4–5), 489–501.

Altinok, Y., Alpar, B., Özer, N., Aykurt, H., 2011. Revision of the tsunami catalogue affecting Turkish coasts and surrounding regions. *Natural Hazards and Earth System Sciences*. 11, 273–291. URL: https://doi.org/10.5194/nhess-11-273-2011

Ambraseys, N. N., 1962. Data for the investigation of the seismic seawaves in the Eastern Mediterranean. *Bulletin of the Seismological Society of America*. 52 (4), 895–913. URL: https://doi.org/10.1785/BSSA0520040895

Ambraseys, N. N., 2009. *Earthquakes in the Mediterranean and Middle East: a multidisciplinary study of seismicity up to 1900*. Cambridge University Press, Cambridge.

Ambraseys, N. N., Jackson, J. A., 1998. Faulting associated with historical and recent earthquakes in the Eastern Mediterranean region. *Geophysical Journal International*, 133 (2), 390–406. URL: https://doi.org/10.1046/j.1365-246X.1998.00508.x

Anthemius of Tralles, 1777. Sur des Paradoxes de Mécanique (Greek: Περι παραδοξων μηχανηματον), Dupuy, M. (trans.), in: Remacle, P., Renault, P., Fournier, F.-D., Murcia, J.P., Vebr, T., Carrat, C., *Site de l'Antiquité grecque et latine et du Moyen-Âge*. URL: https://remacle.org/bloodwolf/erudits/anthemius/fragments.htm

Antonopoulos, J., 1980. Data from investigation on seismic sea-waves events in the Eastern Mediterranean from the birth of Christ to 1980 AD (6 parts). *Annali di Geofisica*. 33 (1), 141–248. URL: https://doi.org/10.4401/ag-4701

Atkinson, B., 2018. *Heroes Never Die: The Italian Peplum Phenomenon 1950–1967*. Midnight Marquee Press, Inc., Parkville, MD.

Aziza, C., 2008. *Guide de l'Antiquité imaginaire : Roman, cinéma, bande dessinée*. Les Belles Lettres, Paris.

Ballard, R. D., Coleman, D. F., Rosenberg, G. D., 2000. Further evidence of abrupt Holocene drowning of the Black Sea shelf. *Marine Geology*. 170 (3–4), 253–261. URL: https://doi.org/10.1016/S0025-3227(00)00108-0

Bandstra, B. L., 2010. *Reading the Old Testament: an introduction to the Hebrew Bible*. Walsworth Publishing Company, Marceline, MO.

Bar-Matthews, M., Ayalon, A., Kaufman, A., Wasserburg, G. J., 1999. The Eastern Mediterranean paleoclimate as a reflection of regional events: Soreq cave, Israel. *Earth and Planetary Science Letters*. 166, 85–95. URL: https://doi.org/10.1016/S0012-821X(98)00275-1

Bar-Yosef, O., 2011. Climatic Fluctuations and Early Farming in West and East Asia. *Current Anthropology*. 52 (S4), 175–193. URL: https://doi.org/10.1086/659784

Bard, K. A., 2015. *An introduction to the archaeology of ancient Egypt*. Wiley-Blackwell, Hoboken, NJ.

Baron, A. M. (ed.), 2016. *La Bible à l'écran*. Éditions Charles Corlet (CinémAction, 160), Athis-Val de Rouvre.

Berquist, J. L., 2007. *Approaching Yehud: New Approaches to the Study of the Persian Period*. SBL Press, Atlanta.

Bessières, V., 2016. *Le péplum, et après ? L'Antiquité gréco-romaine dans les récits contemporains*. Classiques Garnier, Paris.

Bessières, V., 2019. Déterritorialisation du péplum. Société Française de Littérature Générale et Comparée (SFLGC), Bibliothèque comparatiste. URL: https://sflgc.org/acte/bessieres-vivien-deterritorialisation-du-peplum/

Bini, M., Zanchetta, G., Perşoiu, A., Cartier, R., Català, A., Cacho, I., Dean, J. R., Di Rita, F., Drysdale, R. N., Finnè, M., Isola, I., Jalali, B., Lirer, F., Magri, D., Masi, A., Marks, L., Mercuri, A. M., Peyron, O., Sadori, L., Sicre, M.-A., Welc, F., Zielhofer, C., Brisset, E., 2019. The 4.2 Ka BP Event in the Mediterranean Region: An Overview. *Climate of the Past*. 15 (2), 555–577. URL: https://doi.org/10.5194/cp-15-555-2019

Blümel, W. D., 2002. *20 000 Jahre Klimawandel und Kulturgeschichte – von der Eiszeit in die Gegenwart*. Wechselwirkungen, Jahrbuch aus Lehre und Forschung der Universität Stuttgart, Stuttgart.

Bocquet-Appel, J.-P., 2011. When the World's Population Took Off: The Springboard of the Neolithic Demographic Transition. *Science*. 333 (6042), 560–561. URL: https://doi.org/10.1126/science.1208880

Boslough, M., Nicoll, K., Daulton, T. L., Meltzer, D., Pinter, N., Scott, A. C., Surovell, T., Claeys, P., Gill, J., Paquay, F., Marlon, J., Bartlein, P., Whitlock, C., Grayson, D., Jull, A. J. T., 2012. Arguments and evidence against a Younger Dryas impact event. *Climates, Landscapes, and Civilizations*. 198, 13–26. URL: http://doi.org/10.1029/2012GM001209

Boslough, M., 2022. Sodom meteor strike claims should be taken with a pillar of salt. *Skeptical Inquirer*. 46 (1), 10–14. URL: https://skepticalinquirer.org/2021/12/sodom-meteor-strike-claims-should-be-taken-with-a-pillar-of-salt/

Boulton, S. J., Whitworth, M. R. Z., 2018. Block and boulder accumulations on the southern coast of Crete (Greece): evidence for the 365 CE tsunami in the Eastern Mediterranean. *Geological Society*. S456, 105–125.

Broecker, W., Kennett, J., Flower, B., Teller, J., Trumbore, S., Bonani, G., Wolfli, W., 1989. Routing of meltwater from the Laurentide Ice Sheet during the younger Dryas cold episode. Nature, 341, 318–321. URL: https://doi.org/10.1144/SP456.4

Broecker, W. S., 1994. Massive iceberg discharges as triggers for global climate change. *Nature*. 372, 421–424. URL: https://doi.org/10.1038/372421a0

Bryant, E., 2005. *Natural hazards*. Cambridge University Press, Cambridge.

Bunch, T. E., LeCompte, M. A., Adedeji, A. V., Wittke, J. H., Burleigh, T. D., Hermes, R. E., Mooney, C., Batchelor, D., Wolbach, W. S., Kathan, J., Kletetschka, G., Patterson, M. C. L., Swindel, E. C., Witwer, T., Howard, G. A., Mitra, S., Moore, C. R., Langworthy, K., Kennett, J. P., West, A., Silvia, P. J., 2021. A Tunguska sized airburst destroyed Tall el-Hammam a Middle Bronze Age city in the Jordan Valley near the Dead Sea. *Scientific Reports*. 11 (18632), 1–64. URL: https://doi.org/10.1038/s41598-021-97778-3

Butzer, K. W., 1958. *Studien zur vor- und frühgeschichtlichen Landschaftswandel der Sahara. Abhandl. math. - naturwiss. Klasse*, vol. 1, Verlag der Akademie der Wissenschaften und der Literatur, Mainz, 49 p.

Cambridge Dictionary, 2024. Myth. Cambridge University Press & Assessment, https://dictionary.cambridge.org

Carlino, S., 2019. *Neapolitan Volcanoes: A Trip Around Vesuvius, Campi Flegrei and Ischia*. Springer International Publishing (Springer Nature Earth and Environmental Science), Cham.

Carlson, A. E., Clark, P. U., Haley, B. A., Klinkhammer, G. P., Simmons, K., Brook, E. J., Meissner, K. J., 2007. Geochemical proxies of North American freshwater routing during the Younger Dryas cold event. *Proceedings of the National Academy of Sciences*. 104 (16), 6556–6561. URL: https://doi.org/10.1073/pnas.0611313104

Carlson, A. E., 2008. Why there was not a Younger Dryas-like event during the Penultimate Deglaciation. *Quaternary Science Reviews*. 27, 882–887. URL: https://doi.org/10.1016/j.quascirev.2008.02.004

Carlson, A. E., 2013. The Younger Dryas Climate Event, in: Elias, S. A. (ed.), *The Encyclopedia of Quaternary Science*, vol. 3. Elsevier, Amsterdam, 126–134.

Champclaux, C., Tahir-Meriau, L., 2016. *Le péplum*. Guy Trédaniel groupe – Le Courrier du Livre Paris.

Cheng, H., Sinha, A., Verheyden, S., Nader, F. H., Li, X. L., Zhang, P. Z., Yin, J. J., Yi, L., Peng, Y. B., Rao, Z. G., Ning, Y. F., Edwards, R. L., 2015. The climate variability in northern Levant over the past 20,000 years. *Geophysical Research Letters*. 42 (20), 8641–8650. URL: https://doi.org/10.1002/2015GL065397

Cheng, H., Zhang, H., Spötl, C., Baker, J., Sinha, A., Li, H., Bartolomé, M., Moreno, A., Kathayat, G., Zhao, J., Dong, X., Li, Y., Ning, Y., Jia, X., Zong, B., Ait Brahim, Y., Pérez-Mejías, C., Cai, Y., Novello, V. F., Cruz, F. W., Severinghaus, J. P., An, Z., Edwards, R. L., 2020. Timing and Structure of the Younger Dryas Event and Its Underlying Climate Dynamics. *Proceedings of the National Academy of Sciences*. 117 (38), 23408–23417. URL: https://doi.org/10.1073/pnas.2007869117

Clavel-Lévêque, M., 2017. *Rome et l'histoire : Quand le mythe fait écran*. Éditions L'Harmattan, Paris.

COHMAP Members, 1988. Climatic changes of the last 18,000 years: observations and model simulations. *Science*. 241 (4869), 1043–1052. URL: https://doi.org/10.1126/science.241.4869.1043

Cohn, N., 1996. *Noah's Flood: The Genesis Story in Western Thought*. Yale University Press, New Haven.

Collina-Girard, J., 2009. *L'Atlantide retrouvée ?* Belin, Paris.

Covey, C., Thompson, S. L., Weissman, P. R., MacCracken, M. C., 1994. Global climatic effects of atmospheric dust from an asteroid or comet impact on Earth. *Global and Planetary Change*. 9 (3–4), 263–273. URL: https://doi.org/10.1016/0921-8181(94)90020-5

Crawford, H., 2004. *Sumer and the Sumerians*. Cambridge University Press, Cambridge.

Cuttler, R., Abdulla Al-Naimi, F., Fitch, S., 2012. Considering the "Terra incognita" and the implications for the cultural resource management of the Arabian Gulf palaeolandscape, in: Potts, D., Al Naboodah, H., Hellyer, P. (eds.), *Archaeology of the United Arab Emirates: Proceedings of the Second Conference on the Archaeology of the UAE*. Trident press, London, 233–243.

Dan, A., Gehrke, H. J., de Vincenzo, S., Blasetti Fantauzzi, C., 2020. Les concepts en sciences de l'Antiquité : mode d'emploi. *Dialogues d'histoire ancienne : Entre violence et anomie dans le monde antique*. 46/1 (1), 275–387. URL: https://doi.org/10.3917/dha.461.0275

Deschamps, P., Durand, N., Bard, E., Hamelin, B., Camoin, G., Thomas, A., Henderson, G., Okuno, J., Yokoyama, Y., 2012. Ice sheet collapse and sea-level rise at the Bølling warming 14,600 yr ago. *Nature*. 483, 559–564. URL: https://doi.org/10.1038/nature10902

Develle, A.-L., Herreros, J., Vidal, L., Sursock, A., Gasse, F., 2010. Controlling factors on a paleo-lake oxygen isotope record (Yammoûneh, Lebanon) since the last glacial maximum. *Quaternary Science Reviews*. 29, 865–886. URL: https://doi.org/10.1016/j.quascirev.2009.12.005

Dietrich, L., Meister, J., Dietrich, O., Notroff, J., Kiep, J., Heeb, J., Beuger, A., Schütt, B., 2019. Cereal processing at Early Neolithic Göbekli Tepe, southeastern Turkey. *PLoS ONE*. 14 (5), 1–34. URL: https://doi.org/10.1371/journal.pone.0215214

Dinies, M., Plessen, B., Neef, R., Kürschner, H., 2015. When the desert was green: Grassland expansion during the early Holocene in northwestern Arabia. *Quaternary International*. 382, 293–302. URL: https://doi.org/10.1016/j.quaint.2015.03.007

Doronzo, D. M., Di Vito, M. A., Arienzo, I., Bini, M., Calusi, B., Cerminara, M., Corradini, S., de Vita, S., Giaccio, B., Gurioli, L., Mannella, G., Ricciardi, G.P., Rucco, I., Sparice, D., Todesco, M., Trasatti, E., Zanchetta, G., 2022. The 79 CE eruption of Vesuvius: A lesson from the past and the need of a multidisciplinary approach for developments in volcanology. *Earth-Science Reviews*. 231 (104072). URL: https://doi.org/10.1016/j.earscirev.2022.104072

Drews, C., Han, W., 2010. Dynamics of Wind Setdown at Suez and the Eastern Nile Delta. *PLoS ONE*. 5 (8), e12481. URL: https://doi.org/10.1371/journal.pone.0012481

Ducœur, G., 2016. Le mythe du déluge de l'Inde ancienne et les théories des origines entre 1829 et 1872. *Revue de l'histoire des religions*. 3, 389–418. URL: https://doi.org/10.4000/rhr.8575

Dyke, A. S., 2004. An outline of North American Deglaciation with emphasis on central and northern Canada, in: Ehlers, J., Gibbard, P. L. (eds.), Quaternary Glaciations-Extant and Chronology. Part II, v. 2B. Elsevier Science and Technology Books, Amsterdam, 373–424. URL: https://doi.org/10.1016/S1571-0866(04)80209-4

Eisenman, I., Bitz, C., Tziperman, E., 2009. Rain driven by receding ice sheets as a cause of past climate change. *Paleoceanography*. 24 (4), PA4209. URL: https://doi.org/10.1029/2009PA001778

Engel, M., Jacobson, K., Boldt, K., Frenzel, P., Katsonopoulou, D., Soter, S., Alvarez Zarikian, C.A., Brückner, H., 2016. New Sediment Cores Reveal Environmental Changes Driven by Tectonic Processes at Ancient Helike, Greece. *Geoarchaeology*. 31, 140–155. URL: https://doi.org/10.1002/gea.21540

Enmarch, R., 2009. *A World Upturned: Commentary on and Analysis of The Dialogue of Ipuwer and the Lord of All*. British Academy, London. URL: https://doi.org/10.5871/bacad/9780197264331.001.0001

Evans, C. A., 2008. *Exploring the Origins of the Bible: Canon Formation in Historical, Literary, and Theological Perspective*. Baker Academic (Acadia Studies in Bible and Theology), Ada, MI.

Fagan, G. G., 2006. *Archaeological Fantasies: How pseudoarchaeology misrepresents the past and misleads the public*. Routledge, London-New York.

Fereng, Y., 2020. *L'art des ruines, les ruines en art*. Bibliothèque nationale de France (BnF). URL: https://www.bnf.fr/fr/lart-des-ruines-les-ruines-en-art

Ferguson, S., 2012. Evaluation of Pleistocene to Holocene (MIS 5 to 1) climatic changes in southwestern Black Sea: A palynological study of DSDP Site 380, Master's thesis of Science. Louisiana State University and Agricultural and Mechanical College (Department of Geology and Geophysics), Baton Rouge, LA. URL: https://digitalcommons.lsu.edu/gradschool_theses/3005

Ferguson, S., Warny, S., Escarguel, G., Mudie, P. J., 2018. MIS 5-1 dinoflagellate cyst analyses and morphometric evaluation of Galeacysta etrusca and Spiniferites cruciformis in southwestern Black Sea. *Quaternary International*, 465 (Part A), 117–129. URL: https://doi.org/10.1016/j.quaint.2016.07.035

Fersi, W., Lézine A.-M., Bassinot, F., 2016. Hydro-climate changes over Southwestern Arabia and the Horn of Africa during the last Glacial-Interglacial transition: A pollen record from the Gulf of Aden. *Review of Palaeobotany and Palynology*. 233, 176–185. URL: https://doi.org/10.1016/j.revpalbo.2016.04.002

Firestone, R., West, A., Warwick-Smith, S., 2006. *The Cycle of Cosmic Catastrophes: How a Stone-Age Comet Changed the Course of World Culture*. Bear & Company, Rochester.

Firestone, R. B., West, A., Kennett, J. P., Becker, L., Bunch, T. E., Revay, Z. S., Schultz, P. H., Belgya, T., Kennett, D. J., Erlandson, J. M., Dickenson, O. J., Goodyear, A. C., Harris, R. S., Howard, G. A., Kloosterman, J. B., Lechler, P., Mayewski, P. A., Montgomery, J., Poreda, R., Darrah, T., Que Hee, S. S., Smith, A. R., Stich, A., Topping, W., Wittke, J. H., Wolbach, W. S., 2007. Evidence for an extraterrestrial impact 12,900 years ago that contributed to the megafaunal extinctions and the Younger Dryas cooling. *Proceedings of the National Academy of Sciences of the United States of America*. 104 (41), 16016–16021. URL: https://doi.org/10.1073/pnas.0706977104

Flaux, C., Marriner, N., el-Assal, M., Kaniewski, D., Morhange, C., 2017. Late Holocene erosion of the Canopic promontory (Nile Delta, Egypt). *Marine Geology*. 385, 56–67. URL: https://doi.org/10.1016/j.margeo.2016.11.010

Fleitmann, D., Cheng, H., Badertscher, S., Edwards, R. L., Mudelsee, M., Göktürk, O. M., Fankhauser, A., Pickering, R., Raible, C. C., Matter, A., Kramers, J., Tüysüz, O., 2009. Timing and climatic impact of Greenland interstadials recorded in stalagmites from northern Turkey. *Geophysical Research Letters*. 36 (19). URL: https://doi.org/10.1029/2009GL040050

Fourcart, F., 2012. *Le Péplum italien (1946-1966): Grandeur et décadence d'une antiquité populaire*. Éditions IMHO, Paris.

Freedman, D. N., Myers, A. C., Beck, A. B. (eds.), 2000. *Eerdmans Dictionary of the Bible*. William B. Eerdmans Publishing, Grands Rapids, MI.

Galanopoulos, A. G., 1960. Tsunamis observed on the coasts of Greece from Antiquity to present time. *Annali di Geofisica*. 13 (3–4), 369–386. URL: https://doi.org/10.4401/ag-5477

Galanopoulos, A. G., Bacon, E., 1969. *Atlantis. The truth behind the legend*. Nelson, London.

Gasse, F., 2000. Hydrological changes in the African tropics since the Last Glacial Maximum. *Quaternary Science Reviews*. 19 (1–5), 189–211. URL: https://doi.org/10.1016/S0277-3791(99)00061-X

Gates, C., 2011. *Ancient Cities: The archaeology of urban life in the ancient Near East and Egypt, Greece and Rome*. Routledge, London.

Giacomelli, L., Perrotta, A., Scandone, R., Scarpati, C., 2003. The eruption of Vesuvius of 79 AD and its impact on human environment in Pompeii. *Episodes*. 26 (3), 235–238. URL: https://doi.org/10.18814/epiiugs/2003/v26i3/014

Gill, C., 1977. The Genre of the Atlantis Story. *Classical Philology*, 72 (4), 287–304. URL: https://www.jstor.org/stable/267878

Gill, C., 1979. Plato's Atlantis story and the birth of fiction. *Philosophy and Literature*, 3 (1), 64–78. URL: https://doi.org/10.1353/phl.1979.0005

Giovannini, A., 1985. Peut-on démythifier l'Atlantide ? *Museum Helveticum*. 42 (2), 151–156.

Goodman-Tchernov, B. N., Dey, H. W., Reinhardt, E. G., McCoy, F., Mart, Y., 2009. Tsunami waves generated by the Santorini eruption reached Eastern Mediterranean shores. *Geology*, 37 (10), 943–946. URL: https://doi.org/10.1130/G25704A.1

Greene, J. A., 2004. Sodom and Gomorrah, in: Metzger, B. M., Coogan, M. D. (eds.), *The Oxford Guide To People And Places Of The Bible*. Oxford University Press, Oxford.

Grimal, P., 2008. *Récits et légendes de l'Olympe*. Larousse (Dieux, mythes & Héros), Paris.

Grosman, L., Munro, N. D., Abadi, I., Boaretto, E., Shaham, D., Belfer-Cohen, A., Bar-Yosef, O., 2016. Nahal Ein Gev II, a Late Natufian Community at the Sea of Galilee. *PLoS ONE*. 11 (1), e0146647. URL: https://doi.org/10.1371/journal.pone.0146647

Guetter, P. J., Kutzbach, J. E., 1990. A modified Köppen classification applied to model simulations of glacial and interglacial climates. *Climatic Change*, 16 (2), 193–215. URL: https://doi.org/10.1007/BF00134657

Guidoboni, E., Comastri, A., Traina, G., 1994. *Catalogue of earthquakes in the Mediterranean Region up to the 10th century*. Istituto Nazionale di Geofisica, Roma-Bologna.

Habib, A., 2011. *L'attrait de la ruine*. Yellow Now, Crisnée.

Hamiel, Y., Amit, R., Begin, Z. B., Marco, S., Katz, O., Salamon, A., Zilberman, E., Porat, N., 2009. The Seismicity along the Dead Sea Fault during the Last 60,000 Years. *Bulletin of the Seismological Society of America*, 99 (3), 2020–2026. URL: https://doi.org/10.1785/0120080218

Hancock, G., 1995. *Fingerprints of the Gods*. Three Rivers Press, New York.

Hancock, G., 2002. *Underworld: The Mysterious Origins of Civilization*. Penguin Books, London.

Hancock, G., 2015. Magicians of the Gods: The Forgotten Wisdom of Earth's Lost Civilization. Coronet Books, London.

Harris, G., Beardowin, A., 1995. The destruction of Sodom and Gomorrah: a geotechnical perspective. *Quarterly Journal of Engineering*, 28 (4), 349–362. URL: https://doi.org/10.1144/GSL.QJEGH.1995.028.P4.04

Heinrich, H., 1988. Origin and consequences of cyclic ice rafting in the northeast Atlantic Ocean during the past 130 000 years. *Quaternary Research*, 29 (2), 142–152. URL: https://doi.org/10.1016/0033-5894(88)90057-9

Hennebelle, G. (ed.), 1998. Le péplum : l'Antiquité au cinema. Corlet Eds (CinémAction 89), Condé-en-Normandie.

Herodotus, *Histories* (in Greek: *Ἱστορίαι*), Book VIII: *Urania*, trans. Mensch, P. (2014), ed. Romm, J., Hackett Publishing Company, Cambridge (USA).

Howell, A., Jackson, J., England, P., Higham, T., Synolakis, C., 2015. Late Holocene uplift of Rhodes, Greece: evidence for a large tsunamigenic earthquake and the implications for the tectonics of the eastern Hellenic Trench System. *Geophysical Journal International*, 203 (1), 459–474. URL: https://doi.org/10.1093/gji/ggv307

Humbert, D., 2015. Le Santorin, artisan des plaies d'Égypte ? *Les cahiers de Science & Vie*, 156, 74–79.

Huxley, G. L., 1959. *Anthemius of Tralles. A Study in Later Greek Geometry*. Cambridge University Press (Greek, Roman and Byzantine Monographs, 1), Cambridge (Mass.).

Isaak, M., 2007. *The Counter-Creationism Handbook*. University of California Press, Berkeley.

Jacques, F., Bousquet, B., 1984. Le raz de marée du 21 juillet 365. *Mélanges de l'école française de Rome*, 96 (1), 423–461. URL: https://doi.org/10.3406/mefr.1984.1412

Kaniewski, D., Marriner, N., Cheddadi, R., Guiot, J., Van Campo, E., 2018. The 4.2 ka BP event in the Levant. *Climate of the Past*, 14 (10), 1529–1542. URL: https://doi.org/10.5194/cp-14-1529-2018

Kaniewski, D., Marriner, N., Cheddadi, R., Morhange, C., Bretschneider, J., Jans, G., Otto, T., Luce, F., Van Campo, E., 2019. Cold and dry outbreaks in the eastern Mediterranean 3200 years ago. *Geology*, 47 (10), 933–937. URL: https://doi.org/10.1130/G46491.1

Katsonopoulou, D., Koukouvelas, I., 2022. Comment on "The 373 B. C. Helike (Gulf of Corinth, Greece) Earthquake and Tsunami, Revisited" by Stiros (2022). *Seismological Research Letters*, 93 (4), 2401–2405. URL: https://doi.org/10.1785/0220210301

Kehoe, A. B., 2008. *Controversies in Archaeology*. Routledge, London and New York.

Kennett, J. P., Kennett, D. J., Culleton, B. J., Aura Tortosa, J. E., Bischoff, J. L., Bunch, T. E., Randolph Daniel Jr., I., Erlandson, J. M., Ferraro, D., Firestone, R. B., Goodyear, A. C., Israde-Alcántara, I., Johnson, J. R., Jordá Pardo, J. F., Kimbel, D. R., LeCompte, M. A., Lopinot, N. H., Mahaney, W. C., Moore, A. M. T., Moore, C. R., Ray, J. H., Stafford Jr., T. W., Barnett Tankersley, K., Wittke, J. H., Wolbach, W. S., West, A., 2015. Bayesian chronological analyses consistent with synchronous age of 12,835 12,735 Cal B.P. for Younger Dryas boundary on four continents. *Proceedings of the National Academy of Sciences*, 112 (32), e4344-e4353. URL: https://doi.org/10.1073/pnas.1507146112

Kieffer, G., 2004. À la recherche des sources de l'Atlantide, in: Foulon, E. (ed.), *Connaissance et représentations des volcans dans l'Antiquité. Actes du colloque de Clermont-Ferrand, Université Blaise Pascal, 19-20 septembre 2002*. Clermont-Ferrand: Université Blaise-Pascal, CRCA, p. 86.

Klinger, Y., Avouac, J. P., Dorbath, L., Abou Karaki, N., Tisnerat, N., 2000. Seismic behaviour of the Dead Sea fault along Araba valley. Jordan. *Geophysical Journal International*, 142 (3), 769–782. URL: https://doi.org/10.1046/j.1365-246x.2000.00166.x

Kontogianni, V. A., Tsoulos, N., Stiros, S. C., 2002. Coastal uplift, earthquakes and active faulting of Rhodes Island (Aegean Arc): Modeling based on geodetic inversion. *Marine Geology*, 186 (3–4), 299–317. URL: https://doi.org/10.1016/S0025-3227(02)00334-1

Kutzbach, J. E., 1981. Monsoon climate of the early Holocene: climate experiment with the Earth's orbital parameters for 9000 years ago. *Science*, 214 (4516), 59–61. URL: https://doi.org/10.1126/science.214.4516.59

La Souchère (de), M.-C., 2018. *Les miroirs d'Archimède enflamment les esprits*. La Recherche, 537.

Lafond, Y., 1998. Die Katastrophe von 373 v. Chr. und das Versinken der Stadt Helike in Achaia, in: Olshausen, E., Sonnabend, H. (eds.), *Naturkatastrophen in der antiken Welt. Stuttgarter Kolloquium zur historischen Geographie des Altertums*, vol. 6. Steiner, Stuttgart, 118–123.

Lambeck, K. 1996. Shoreline reconstructions for the Persian Gulf since the last glacial maximum. *Earth and Planetary Science Letters*, 142, 43–57.

Lambert, F., 2023. Le motif populaire du volcan dans le film catastrophe : irruptions et éruptions sur l'écran de cinéma. *Antiquipop. L'Antiquité dans la culture populaire contemporaine*. URL: https://doi.org/10.58079/vejd

Laronde, A., 2006. Séisme et diplomatie : Rhodes en 228 av. J.-C., in: *L'homme face aux calamités naturelles dans l'Antiquité et au Moyen Âge. Actes du 16ème colloque de la Villa Kérylos à Beaulieu-sur-Mer les 14 & 15 octobre 2005*. Académie des Inscriptions et Belles-Lettres (Cahiers de la Villa Kérylos, 17), Paris, 2006, 61–71. URL: https://www.persee.fr/doc/keryl_1275-6229_2006_act_17_1_1120

Latour, B., 2015. *Face à Gaïa: Huit conférences sur le nouveau régime climatique*. Les Empêcheurs de penser en rond, Paris.

Leeming, D. A., 2010. *Creation Myths of the World: An Encyclopedia*. ABC-CLIO, Santa Barbara.

Léone, F., Péroche, M., 2021. Le risque tsunami en Méditerranée occidentale : exposition et solutions préventives (France). Rapport de recherche UVED, ref. hal-03702578.

Lespez, L., Lescure, S., Saulnier-Copard, S., Glais, A., Berger, J.-F., Lavigne, F., Pearson, C., Virmoux, C., Müller Celka, S., Pomadère, M., 2021. Discovery of a tsunami deposit from the Bronze Age Santorini eruption at Malia (Crete): impact, chronology, extension. *Scientific Reports*, 11 (15487). URL: https://doi.org/10.1038/s41598-021-94859-1

Leterrier, J., Maury, R. C., Thonon, P., Girard, D., Marchal, M., 1982. Clinopyroxene composition as a method of identification of the magmatic affinities of paleo-volcanic series. *Earth and Planetary Science Letters*, 59 (1), 139–154. URL: https://doi.org/10.1016/0012-821X(82)90122-4

Leveau, P., 2005. Mythe, référence à l'Antique et mémoire des catastrophes dans les médias scientifiques. Le déluge de la Bible à Platon. Les scientifiques croient-ils aux mythes antiques ? in: Favier, R., Granet-Abisset, A.-M., (eds.), *Récits et représentations des catastrophes depuis l'Antiquité*. MSH-Alpes, Grenoble, 145–149.

Lézine, A.-M., 2009. Climatic history of the African and Arabian deserts. *Comptes Rendus. Géoscience, Histoire climatique des déserts d'Afrique et d'Arabie*, 341 (8–9), 569–574. URL: https://doi.org/10.1016/j.crte.2009.09.002

Lézine, A.-M., Robert, C., Cleuziou, S., Inizan, M.-L., Braemer, F., Saliège, J.-F., Sylvestre, F., Tiercelin, J.-J., Crassard, R., Méry, S., Charpentier, V., Steimer-Herbet, T., 2010. Climate change and human occupation in the Southern Arabian lowlands during the last deglaciation and the Holocene. *Global and Planetary Change*, 72 (4), 412–428. URL: https://doi.org/10.1016/j.gloplacha.2010.01.016

Liritzis, I., Westra, A., Miao, C., 2019. Disaster geoarchaeology and natural cataclysms in world cultural evolution: An overview. *Journal of Coastal Research*, 35 (6), 1307–1330. URL: https://doi.org/10.2112/JCOASTRES-D-19-00035.1

Livadie, C. A., 2011. Nola, une Pompéi du Bronze ancien 1800-1700 environ avant J.-C., in: Garcia, D. (ed.), *L'âge du Bronze en Méditerranée. Recherches récentes*. Errance, Paris, 65–82.

Lochman, T., Späth, T., Stähli, A. (eds.), 2008. *Antike im Kino: auf dem Weg zu einer Kuturgeschichte des Antikenfilms*. Verlag der Skulpturhalle, Basel.

Maramai, A., Brizuela, B., Graziani, L., 2014. The Euro-Mediterranean Tsunami Catalogue. *Annals of Geophysics*, 57 (4). URL: https://doi.org/10.4401/ag-6437

Marriner, N., Morhange, C., Skrimshire, S., 2010. Geoscience meets the four horsemen? Tracking the rise of neo-catastrophism. *Global and Planetary Change*, 74 (1), 43–48. URL: https://ui.adsabs.harvard.edu/link_gateway/2010GPC....74...43M/doi:10.1016/j.gloplacha.2010.07.005

Marinatos, S., 1971. *Some words about the legend of Atlantis*. General Directorate of Antiquities and Cultural Heritage, Athens.

Mathes-Schmidt, M., Papanikolaou, J., Reicherter, K., Pallikarakis, A., 2019. Event deposits in the Eastern Thermaikos Gulf and Kassandra Peninsula (Northern Greece) and evidence of the 479 BC Herodotus-tsunami. *Zeitschrift für Geomorphologie*, 62 (2), 101–125. URL: https://doi.org/10.1127/zfg_suppl/2019/0612

McManus, J. F., Francois, R., Gherardi, J.-M., Keigwin, L. D., Brown-Leger, S., 2004. Collapse and rapid resumption of Atlantic meridional circulation linked to deglacial climate changes. *Nature*, 428 (6985), 834–837. URL: https://doi.org/10.1038/nature02494

Meadows, D. H., Meadows, D. L., Randers, J., Behrens, W. W., 1972. *The Limits to Growth*. Potomac Associates, Washington.

Merleau-Ponty, M., 1945. *Phénoménologie de la perception*. Gallimard, Paris.

Migowski, C., Stein, M., Prasad, S., Negendank, J. F. W., Agnon, A., 2006. Holocene climate variability and cultural evolution in the Near East from the Dead Sea sedimentary record. *Quaternary Research*, 66 (3), 421–431. URL: https://doi.org/10.1016/j.yqres.2006.06.010

Milanković, M., 1941. *Kanon der Erdbestrahlungen und seine Anwendung auf das Eiszeitenproblem*. Royal Serbian Academy special publications (Section of Mathematical and Natural Sciences, 132), Belgrade.

Mordechai, L., Pickett, J., 2018. Earthquakes as the Quintessential SCE: Methodology and Societal Resilience. *Human Ecology*, 46, 335–348. URL: https://doi.org/10.1007/s10745-018-9985-y

Morton, R. A., Gelfenbaum, G., Jaffe, B. E., 2007. Physical criteria for distinguishing sandy tsunami and storm deposits using modern examples. *Sedimentary Geology*, 200 (3–4), 184–207.

Murphy-O'Connor, J., 1998. *The Holy Land: An Oxford Archaeological Guide from Earliest Times to 1700*. Oxford University Press, Oxford.

Murray-Wallace, C. V., Woodroffe, C. D., 2014. Quaternary Sea-Level Changes: A Global Perspective. Cambridge University Press, Cambridge. URL: https://doi.org/10.1017/CBO9781139024440

Murton, J. B., Bateman, M. D., Dallimore, S. R., Teller, J. T., Yang, Z., 2010. Identification of Younger Dryas outburst flood path from Lake Agassiz to the Arctic Ocean. *Nature*, 464 (7289), 740–743. URL: https://doi.org/10.1038/nature08954

Muschitiello, F., Pausata, F. S. R., Watson, J. E., Smittenberg, R. H., Salih, A. A. M., Brooks, S. J., Whitehouse, N. J., Karlatou-Charalampopoulou, A., Wohlfarth, B., 2015. Fennoscandian freshwater control on Greenland hydroclimate shifts at the onset of the Younger Dryas. *Nature Communication*, 6 (8939). URL: https://doi.org/10.1038/ncomms9939

Musset, A., 2019. Esthétique des ruines du futur. *Terrain*, 71. URL: https://doi.org/10.4000/terrain.18252

Naddaf, G., 1994. The Atlantis Myth: An Introduction to Plato's Later Philosophy of History. *Phoenix*, 48 (3), 189–209. URL: https://doi.org/10.2307/3693746

Naughton, F., Sánchez-Goñi, M. F., Landais, A., Rodrigues, T., Vazquez Riveiros, N., Toucanne, S., 2023. The Younger Dryas Stadial, in: Palacios, D., Hughes, P. D., García-Ruiz, J. M., Andrés, N. (eds.), *European Glacial Landscapes, Part II: Climate changes during the Last Deglaciation in the Eastern North Atlantic region*. Elsevier Inc., Amsterdam, 51–57. URL: https://doi.org/10.1016/B978-0-323-91899-2.00024-3

Nesselrath, H.-G., 2002. Platon und die Erfindung von Atlantis. K.G. Saur (Lectio Teubneriana 11), Munich & Leipzig.

Nicholson, S. L., Jacobson, M. J., Hosfield, R., Fleitmann, D., 2021. The Stalagmite Record of Southern Arabia: Climatic Extremes, Human Evolution and Societal Development. *Frontiers in Earth Science*, 9 (1169). URL: https://doi.org/10.3389/feart.2021.749488

Nof, D., Paldor, N., 1992. Are there oceanographic explanations for the Israelites' crossing of the Red Sea? *Bulletin American Meteorological Society*, 73 (3), 305–314. URL: https://doi.org/10.1175/1520-0477(1992)073%3C0305:ATOEFT%3E2.0.CO;2

Nur, A., Burgess, D., 2008. *Apocalypse. Earthquakes, archaeology, and the wrath of God*. Princeton University Press, Princeton and Oxford.

PAGES Past Interglacials Working Group, 2016. Interglacials of the last 800,000 years. *Reviews of Geophysics*, 54 (1), 162–219. URL: https://doi.org/10.1002/2015RG000482

Papadopoulos, G. A., 2001. Tsunamis in the East Mediterranean: a catalogue for the area of Greece and adjacent seas, in: Proc. Joint IOCIUGG International Workshop, *Tsunami Risk Assessment beyond 2000: Theory, Practice and Plans*. Moscow (Russia), 14–16 June 2000, 34–43.

Papadopoulos, G. A., Chalkis, B., 1984. Tsunamis observed in Greece and the surrounding area from antiquity up to the present times. *Marine Geology*, 56 (1–4), 309–317. URL: https://doi.org/10.1016/0025-3227(84)90022-7

Papadopoulos, G. A., Daskalaki, E., Fokaefs, A., Giraleas, N., 2007. Tsunami hazards in the Eastern Mediterranean: strong earthquakes and tsunamis in the East Hellenic Arc and Trench system. *Natural Hazards and Earth System Sciences*, 7 (1), 57–64. URL: https://doi.org/10.5194/nhess-7-57-2007

Papazachos, B. C., Papazachou, C. B., 1997. *The earthquakes of Greece*. Ziti Edit.,Thessaloniki.

Pausanias, 1918. *Description of Greece*, Jones, W. H. S., Ormerod, H. A. (trans.). Harvard University Press and William Heinemann Ltd., Cambridge (MA) and London.

Pellegrino, C., 1993. *L'Atlantide découverte. Une odyssée archéologique*. Éditions Robert Laffont, Paris.

Perry, W. J., 1918. *The Megalithic Culture of Indonesia*. Manchester University Press and Longmans, Green, and Co., Manchester and London.

Perry, W. J., 1923. *The Children of the Sun*. Methuen & Co., London.

Peteet, D. M., 2001. Late Glacial climate variability and general circulation model (GCM) experiments: An Overview, in: Markgraf, V. (ed.). *Interhemispheric Climate Linkages*, Academic Press, Cambridge (MA), 417–431. URL: https://doi.org/10.1016/B978-012472670-3/50025-2

Peters, J., Schmidt, K., Dietrich, L., Dietrich, O., Pöllath, N., Kinzel, M., Clare, L., 2020. Göbekli Tepe: Agriculture and Domestication, in: Smith, C. (ed.), *Encyclopedia of Global Archaeology*. Springer, New York, 4607–4616. URL: https://doi.org/10.1007/978-1-4419-0465-2_2226

Pinter, N., Scott, A. C., Daulton, T. L., Podoll, A., Koeberl, C., Anderson, R. S., Ishman, S. E., 2011. The Younger Dryas impact hypothesis: a requiem. *Earth-Science Reviews*, 106 (3–4), 247–264. URL: https://doi.org/10.1016/j.earscirev.2011.02.005

Pirazzoli, P. A., Laborel, J., Stiros, S. C., 1996. Earthquake clustering in the Eastern Mediterranean during historical times. *Journal of Geophysical Research: Solid Earth*, 101 (B3), 6083–6097. URL: https://doi.org/10.1029/95JB00914

Planchon, O., Pohl, B., Pouzet, P., Lallement, B., Jacob-Rousseau, N., 2022. Le climat dans les films catastrophe, dystopiques et post-apocalyptiques. *Climatologie*, 19 (6), 36 p. URL: https://doi.org/10.1051/climat/202219006

Plato, *The Dialogues: Critias, Timaeus*, Horan, D. (trans.), 2021. The Foundation for Platonic Studies, Trinity College, Dublin.

Pliny the Younger, 2016 [2001]. *Letters*, LXV: *To Tacitus*, Melmoth W. (trans.), Bosanquet, F. C. T. (ed.). The Project Gutenberg EBook of Letters of Pliny, https://www.gutenberg.org/files/2811/2811-h/2811-h.htm

Pollard, E., Rosenberg, C., Tigor, R., 2015. *Worlds together, worlds apart*, vol. 1: *Beginning through the 15th century*. W.W. Norton & Company, New York.

Polonia, A., Bonatti, E., Camerlenghi, A., Lucchi, R. G., Panieri, G., Gasperini, L., 2013. Mediterranean megaturbidite triggered by the AD 365 Crete earthquake and tsunami. *Scientific Reports*, 3 (1285). URL: https://doi.org/10.1038/srep01285

Price, T. D., Bar-Yosef, O., 2011. The Origins of Agriculture: New data, New ideas. *Current Anthropology*, 52 (S4), 163–174. URL: https://doi.org/10.1086/659964

Rashed, R., 2002. *Les Catoptriciens grecs*. Les Belles-Lettres, Paris.

Rasmussen, S. O., Bigler, M., Blockley, S. P., Blunier, T., Buchardt, S. L., Clausen, H. B., Cvijanovic, I., Dahl-Jensen, D., Johnsen, S. J., Fischer, H., Gkinis, V., Guillevic, M., Hoek, W. Z., Lowe, J. J., Pedro, J. B., Popp, T., Seierstad, I. K., Steffensen, J. P., Svensson, A. M., Vallelonga, P., Vinther, B. M., Walker, M. J. C., Wheatley, J. J., Winstrup, M., 2014. A Stratigraphic Framework for Abrupt Climatic Changes during the Last Glacial Period Based on Three Synchronized Greenland Ice-Core Records: Refining and Extending the INTIMATE Event Stratigraphy. *Quaternary Science Reviews*, 106, 14–28. URL: https://doi.org/10.1016/j.quascirev.2014.09.007

Reches, Z., Hoexter, D. F., 1981. Holocene seismic and tectonic activity in the Dead Sea area. *Tectonophysics*, 80 (1–4), 235–254. URL: https://doi.org/10.1016/0040-1951(81)90151-7

Ritz, S. P., Stocker, T. F., Grimalt, J. O., Menviel, L., Timmermann, A., 2013. Estimated strength of the Atlantic overturning circulation during the last deglaciation. *Nature Geoscience*, 6 (3), 208–212. URL: https://doi.org/10.1038/ngeo1723

Robinson, D., Goddio, F., 2015. *Thonis-Heracleion in Context*. Oxford Centre for Maritime Archaeology, Oxford.

Römer, T. C., 2007. The so-called Deuteronomistic history: a sociological, historical, and literary introduction. Bloomsbury Academic, London and New York.

Rotaru, M., Gaillardet, J., Steinberg, M., Trichet, J., 2006. *Les climats passés de la Terre*. Société Géologique de France, Vuibert, Paris.

Ryan, W. B. F., Pitman, W. C., Major, C. O., Shimkus, K., Moskalenko, V., Jones, G. A., Dimitrov, P., Gorür, N., Sakinç, M., 1997. An abrupt drowning of the Black Sea shelf. *Marine Geology*, 138 (1–2), 119–126. URL: https://doi.org/10.1016/S0025-3227(97)00007-8

Ryan, W. B. F., Pitman, W. C., 1998. Noah's Flood: The new scientific discoveries about the event that changed history. Touchstone, New York.

Ryan, W. B. F., Major, C. O., Lericolais, G., Goldstein, S. L., 2003. Catastrophic flooding of the Black Sea. *Annual Review of Earth and Planetary Sciences*, 31 (1), 525–554. URL: https://doi.org/10.1146/annurev.earth.31.100901.141249

Şahoğlu, V., Sterba, J. H., Katz, T., Çayır, Ü., Gündoğan, Ü., Tyuleneva, N., Tuğcu, İ., Bichler, M., Erkanal, H., Goodman-Tchernov, B. N., 2021. Volcanic ash, victims, and tsunami debris from the Late Bronze Age Thera eruption discovered at Çeşme-Bağlararası (Turkey). PNAS, 119 (1), e2114213118, 8 p. URL: https://doi.org/10.1073/pnas.2114213118

Scandone, R., Giacomelli, L., Speranza, F. F., 2006. The volcanological history of the volcanoes of Naples: a review, in: De Vivo, B., (ed.), Volcanism in the Campania Plain: Vesuvius, Campi Flegrei and Ignimbrites. Dipartimento di Scienze della Terra Università di Napoli Federico II (Developments in Volcanology, 9), Napoli, 1–26.

Scandone, R., Giacomelli, L., 2008. Precursors of eruptions at Vesuvius (Italy). *Journal of Volcanology and Geothermal Research*, 171 (3–4), 191–200. URL: https://doi.org/10.1016/j.jvolgeores.2007.11.018

Scarth, A., Tanguy, J.-C., 2001. *Volcanoes of Europe*. Oxford University Press, Oxford.

Schmidt, K., 2011. Göbekli Tepe: A Neolithic Site in Southeastern Anatolia, in: Steadman, S. R., McMahon, G. (eds.), *Handbook of ancient Anatolia (10,000–323 B.C.E.)*. Oxford University Press, Oxford, 917–933.

Schmidt, K., 2015 [2007]. *Le premier temple : Göbekli Tepe*, Guiot-Houdart (trad.). CNRS Éditions, Paris.

Schnapp, A., 2020. *Une histoire universelle des ruines, Des origines aux Lumières*. Seuil, Paris.

Seguin, J. C., 1999. *Alexandre Promio ou les énigmes de la lumière*. L'Harmattan, Paris.

Sigurdsson, H., Carey, S., 2002. The Eruption of Vesuvius in AD 79, in: Feemster Jashemski, W. M., Meyer, F. G. (eds.), *The natural history of Pompeii*. The Press Syndicate of the University of Cambridge, Cambridge, 37–64.

Sigurdsson, H., Carey, S., Alexandri, M., Vougioukalakis, G., Croff, K., Roman, C., Sakel Lariou, D., Anagnostou, C., Rousakis, G., Ioakim, C., Gogou, A., Ballas, D., Misaridis, T., Nomikou, P., 2006. Marine investigations of Greece's Santorini volcanic field. *Eos, Transactions American Geophysical Union*, 87 (34), 337–342. URL: https://doi.org/10.1029/2006EO340001

Simms, D. L., 1977. Archimedes and the Burning Mirrors of Syracuse. *Technology and Culture*, 18 (1), 1–24. URL: https://doi.org/10.2307/3103202

Smith, G. E., 1915. *The Migrations of Early Culture*. University Press, Longmans, Green & Company, London & New York.

Soloviev, S. L., 1990. Tsunamigenic zones in the Mediterranean Sea. *Natural Hazards*, 3, 183–202. URL: https://doi.org/10.1007/BF00140432

Soloviev, S. L., Solovieva, O. N., Go, C. N., Kim, K. S., Shchetnikov, N. A., 2000. *Tsunamis in the Mediterranean Sea 2000 B.C.-2000 A.D.* Springer (Advances in Natural and Technological Hazards Research, 13), Dordrecht.

Soulet, G., Menot, G., Lericolais, G., Bard, E., 2011. A revised calendar age for the last reconnection of the Black Sea to the global ocean. *Quaternary Science Reviews*, 30 (9–10), 1019–1026. URL: https://doi.org/10.1016/j.quascirev.2011.03.001

Stanley, J.-D., 2003. Nile flow failure at the end of the Old Kingdom, Egypt: Strontium isotopic and petrologic evidence. *Geoarchaeology*, 18 (3), 395–402. URL: https://doi.org/10.1002/gea.10065

Stefanakis, M. J., 2006. Natural catastrophes in the Greek and Roman World: Loss or gain? Four cases of seaquake-generated tsunamis. *Mediterranean Archaeology and Archaeometry*, 6 (2), 5–22.

Stiros, S. C., Blackman, D. J., 2014. Seismic coastal uplift and subsidence in Rhodes Island, Aegean Arc: evidence from an uplifted ancient harbour. *Tectonophysics*, 611, 114–120. URL: https://doi.org/10.1016/j.tecto.2013.11.020

Stokes, C. R., Tarasov, L., Blomdin, R., Cronin, T. M., Fisher, T. G., Gyllencreutz, R., Hättestrand, C., Heyman, J., Hindmarsh, R. C. A., Hughes, A. L. C., Jakobsson, M., Kirchner, N., Livingstone, S. J., Margold, M., Murton, J. B., Noormets, R., Peltier, W. R., Peteet, D. M., Piper, D. J. W., Preusser, F., Renssen, H., Roberts, D. H., Roche, D. M., Saint-Ange, F., Stroeven, A. P., Teller, J. T., 2015. On the reconstruction of palaeo-ice sheets: Recent advances and future challenges. *Quaternary Science Reviews*, 125, 15–49. URL: https://doi.org/10.1016/j.quascirev.2015.07.016

Storey, A., Jones, T. L., 2010. Diffusionism in Archaeological Theory: The Good, The Bad, and The Ugly, in: Jones, T. L., Storey, A. A., Matisoo-Smith, E., Ramirez-Aliaga, J. M. (eds.), *Polynesians in America: Pre-Columbian Contacts with the New World*. AltaMira Press, Lanham, 7–24.

Sweatman, M. B., 2021. The Younger Dryas impact hypothesis: review of the impact evidence. *Earth-Science Reviews*, 218, 103677. URL: https://doi.org/10.1016/j.earscirev.2021.103677

Tarasov, L., Peltier, W. R., 2005. Arctic freshwater forcing of the Younger Dryas cold reversal. *Nature*, 435, 662–665. URL: https://doi.org/10.1038/nature03617

Teller, J.T., 2013. Lake Agassiz during the Younger Dryas. *Quaternary Research*, 80 (3), 361–369. URL: https://doi.org/10.1016/j.yqres.2013.06.011

Treuil, R., 2012. *Le Mythe de l'Atlantide*. CNRS Éditions, Paris.

Trevisanato, S. I., 2005. *The Plagues of Egypt: Archaeology, History and Science Look at the Bible*. Gorgias Press, Piscataway.

Trevisanato, S. I., 2006. Six medical papyri describe the effects of Santorini's volcanic ash, and provide Egyptian parallels to the so-called biblical plagues. *Medical Hypotheses*, 67 (1), 187–190. https://doi.org/10.1016/j.mehy.2006.01.008

Triantafyllou, I., Gogou, M., Mavroulis, S., Lekkas, E., Papadopoulos, G. A., Thravalos, M., 2021. The tsunami caused by the 30 October 2020 Samos (Aegean Sea) M_w7.0 Earthquake: hydrodynamic features, source properties and impact assessment from post-event field survey and video records. *Journal of Marine Science and Engineering*, 9 (1), 68. URL: https://doi.org/10.3390/jmse9010068

Turan, K., 2008. Way out of the past. *Los Angeles Times*, March 7, 2008. URL: https://www.latimes.com/archives/la-xpm-2008-mar-07-et-ten7-story.html

Van Hoesel, A., Hoek, W. Z. Pennock, G. M., Drury, M. R., 2014. The Younger Dryas impact hypothesis: a critical review. *Quaternary Science Reviews*, 83, 95–114. URL: https://doi.org/10.1016/j.quascirev.2013.10.033

Vellekoop, J., Sluijs, A., Smit, J., Schouten, S., Weijers, J. W., Sinninghe Damsté, J. S., Brinkhuis, H., 2014. Rapid short-term cooling following the Chicxulub impact at the Cretaceous-Paleogene boundary. *Proceedings of the National Academy of Sciences*, 111 (21), 7537–7541. URL: https://doi.org/10.1073/pnas.1319253111

Verheyden, S., Nader, F., Cheng, H., Edwards, L., Swennen, R., 2008. Paleoclimate reconstruction in the Levant region from the geochemistry of a Holocene stalagmite from the Jeita cave, Lebanon. *Quaternary Research*, 70 (3), 368–381. URL: https://doi.org/10.1016/j.yqres.2008.05.004

Veyne, P., 2014 [1983]. *Les Grecs ont-ils cru à leurs mythes ? Essai sur l'imagination constituante*. Editions du Seuil, Paris.

Vidal-Naquet, P., 2005. *L'Atlantide. Petite histoire d'un mythe platonicien*. Les Belles-Lettres, Paris.

Walker, G. P. L., 1981. Plinian eruptions and their products. *Bulletin Volcanologique*, 44, 223–240. URL: https://doi.org/10.1007/BF02600561

Wallace, D., 2005. *Archimedes Death Ray: Idea Feasibility Testing*. Massachusetts Institute of Technology, Cambridge (Massachusetts).

Walter, F., 2008. La montée de l'alarmisme, in: Walter, F. (ed.), *Catastrophes. Une histoire culturelle, XVI^e^-XXI^e^ siècles*. Le Seuil, Paris, 306–332.

Weiss, H., Courty, M.-A., Wetterstrom, W., Guichard, F., Senior, L., Meadow, R., Curnow, A., 1993. The genesis and collapse of third millennium North Mesopotamian Civilization. *Science*, 261 (5124), 995–1004. URL: https://doi.org/10.1126/science.261.5124.995

Weninger, B., Clare, L., Rohling, E., Bar-Yosef, O., Böhner, U., Budja, M., Bundschuh, M., Feurdean, A., Gebel, H.-G., Jöris, O., Linstädter, J., Mayewski, P., Mühlenbruch, T., Reingruber, A., Rollefson, G., Schyle, D., Thissen, L., Todorova, H., Zielhofer, C., 2009. The impact of rapid climate change on prehistoric societies during the Holocene in the Eastern Mediterranean. *Documenta Praehistorica*, 36, 551–583. URL: http://dx.doi.org/10.4312/dp.36.2

Williams, S., 1991. *Fantastic Archaeology: The Wild Side of North American Prehistory*. University of Pennsylvania Press, Philadelphia.

Winkler, M. M., 2004. *Gladiator: Film and History*. Wiley-Blackwell, Hoboken (NJ).

Woodhouse, C. A., Overpeck, J. T., 1998. 2000 years of drought variability in the central United States. *Bulletin of the American Meteorological Society*, 79 (12), 2693–2714. URL: https://doi.org/10.1175/1520-0477(1998)079%3C2693:YODVIT%3E2.0.CO;2

Wünsch, C., 2006. Abrupt climate change: An alternative view. *Quaternary Research*, 65 (2), 191–203. URL: https://doi.org/10.1016/j.yqres.2005.10.006

Yanko-Hombach, V., Mudie, P., Gilbert, A. S., 2011. Was the Black Sea catastrophically flooded during the post-glacial? Geological evidence and impacts, in: Benjamin, J., Bonsall, C., Pickard, C., Fischer, A. (eds.), *Underwater Archaeology and the Submerged Prehistory of Europe*. Oxbow Books, Barnsley, 245–262. URL: https://doi.org/10.2307/j.ctvh1dx0v

Yanchilina, A. G., Ryan, W. B. F., McManus, J. F., Dimitrov, P., Dimitrov, D., Slavova, K., Filipova-Marinova, M., 2017. Compilation of geophysical, geochronological, and geochemical evidence indicates a rapid Mediterranean-derived submergence of the Black Sea's shelf and subsequent substantial salinification in the early Holocene. *Marine Geology*, 383, 14–34. URL: https://doi.org/10.1016/j.margeo.2016.11.001

Yeates, R., 2021. *American Cities in Post-Apocalyptic Science Fiction*. UCL Press, London.

Zeder, M. A., 2011. The Origins of Agriculture in the Near East. *Current Anthropology*, 52 (S4), 221–235. URL: https://doi.org/10.1086/659307

Zickel, M., Becker, D., Verheul, J., Yener, Y., Willmes, C., 2016. Paleocoastlines GIS dataset. CRC806-Database. URL: https://doi.org/10.5880/SFB806.20

Filmography

Aldrich, R., 1962. *Sodom and Gomorrah*. Titanus, Pathé Consortium Cinéma, and Société Générale de Cinématographie, Italy, France and USA, 154 min.

Anderson, P. W. S., 2014. *Pompeii*. Constantin Film and Impact Pictures, USA, Germany and Canada, 105 min.

Aronofsky, D., 2014. *Noah*. Disruption Entertainment, New Regency Pictures, and Protozoa Pictures, USA, 138 min.

Bonnard, M., Leone, S., 1959. *The Last Days of Pompeii* [*Gli ultimi giorni di Pompei*]. ABC Filmverleih, Transocean-Film Vasgen Badal & Co, Cineproduzioni Associate, Domiciana, and Procusa, West Germany, Spain, Italy and Monaco, 100 min.

Davis, D., 1981. *Clash of the Titans*. Charles H. Schneer Productions, Metro-Goldwyn-Mayer, Titan Productions, and Peerford Ltd., USA and United Kingdom, 118 min.

DeMille, C. B., 1956. *The Ten Commandments*. Paramount Pictures and Motion Picture Associates, USA, 220 min.

Emmerich, R., 1994. *Stargate*. Canal+, Centropolis Film Productions and Carolco Pictures, USA and France, 121 min.

Emmerich, R., 2004. *The Day After Tomorrow*. Centropolis Entertainment, Lions Gate Films, and The Mark Gordon Company, USA, 124 min.

Emmerich, R., 2008. *10,000 BC*. Warner Bros., Legendary Pictures, and Centropolis Entertainment, USA, 109 min.

Feist, F. E., 1933. *Deluge*. Admiral Productions, USA, 70 min.

Leone, S., 1961. *The Colossus of Rhodes* [*Il colosso di Rodi*]. CTI, Cineproduzioni Associati, CFF, and Procusa, France, Italy and Spain, 128 min.

Leterrier, L., 2010. *Clash of the Titans*. Legendary Pictures, The Zanuck Company, Thunder Road Pictures, USA, United Kingdom and Australia, 108 min.

Mitchell, T., 2007. *Flood*. Justin Bodle, United Kingdom, 110 min.

Pal, G., 1960. *The Time Machine*. Metro-Goldwyn-Mayer and Galaxy Films, USA, 103 min.

Pal, G., 1961. *Atlantis the Lost Continent*. Metro Goldwyn Mayer, USA, 90 min.

Reynolds, K., 1995. *Waterworld*. Gordon Company, Davis Entertainment, and Licht/Mueller Film Corporation, USA, 135 min.