



# Astronomy and catastrophes through myth and old texts

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**Abstract.** In the old myths and iconographies there are some motives that indicate at least one cataclysmic event that influenced many old religions and myths, that could be linked to the impact of the celestial object. We investigate the hypothesis of coherent catastrophism put forward in recent years by Clube, Bailey, Napier and others from both astrobiological and culturological points of view. The conventional idea that the quasi-periodic break-up of celestial bodies influence terrestrial conditions can today be placed in both wider (astrobiological) and deeper (historico-culturological) context. In particular, we point out that the link between the Neolithic history of astronomy, and origin of Mithraism. We speculate that the main icon of Mithraic religion could pinpoint an event that happened around 4000 BC, when the spring equinox entered the constellation of Taurus. We also, link some motives in other old religions and myths to the same event, or to some similar events that inspired those myths.

**Key words.** archaeo-astronomy – history and philosophy of astronomy – Earth: general

## 1. Introduction

In assessing the importance of archaeological information for our understanding of the interaction of Earth with small Solar System bodies, notably comets, asteroids and dust particles, we need to take into account important developments which occurred over the last quarter of century not only on purely factographical, but even more on the epistemological and methodological level. Perhaps the most important such development has been the dismantling of gradualism (or uniformitarianism) an obsolete XIX century doctrine suggesting that no process occurring in the past was either qualitatively or quantitatively different from its present-day state. Although it

never had strong roots in astronomy and astrophysics (which, one is tempted to speculate, contributed to spectacular progress of these fields), gradualism reigned supreme in Earth sciences for about a century and half, and continues to heavily influence contemporary research in these fields. This was manifested, for instance, in all debates related to by now well-confirmed Alvarez hypothesis for catastrophic extinction of dinosaurs and many other species at the K/T boundary; it is not necessary to mention other recent catastrophe related discoveries like the Snowball Earth episodes, etc. (e.g. Ager 1993; Huggett 1998; Palmer 2003)

Gradualism, parenthetically, has not shone as a brilliant guiding principle in astrophysics and cosmology. It is well-known, for instance, how the strictly gradualist (and from

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many points of view methodologically superior) steady-state theory of the universe of Bondi & Gold (1948), as well as Hoyle, has after the "great controversy" of 1950s and early 1960s succumbed to the rival evolutionary models, now known as the standard ("Big Bang") cosmology Kragh (1996). Balashov (1994) has especially stressed this aspect of the controversy by showing how deeply justified was the introduction by the Big Bang cosmologists of events and epochs never seen or experienced. Similar arguments are applicable in archaeoastronomy, which might be considered to be in an analogous immature state today as cosmology was half a century ago.

Therefore, we propose to set up a stricter methodological approach to the relevant archaeoastronomical data; in particular, we need to look at possible catastrophic explanations without rosy-tinted glasses of gradualism, and to assess the evidence accordingly; reevaluate the evidence according to general epistemological notions of falsifiability, scope, simplicity, etc., instead of succumbing to the preconceived ideas of limits to what is conceivable or not; follow a wider culturological tendency to relinquish the notion of a closed-box system when investigating history of Earth (both generally and in historical times) in favor of open complex systems; take into account systematic biases and observation selection effects Bostrom (2002).

In this contribution, we would like not only to argue for a future research program aimed at a particular set of puzzles in the history of religious and mythological thought, of which some case studies are briefly discussed below, but also to suggest that these (and other related) guidelines can provide us with a fuller and more salutary understanding of more general issues pertaining to the cosmic context of the Earth as well as to the essential unity of knowledge.

## **2. Coherent catastrophism and consequences for archaeoastronomy**

An astronomical theory which offers a significant motivation for archaeoastronomical re-

search is the coherent catastrophism developed by Clube, Napier, Bailey, Asher, Steel, and others (Clube & Napier 1984, 1990; Steel 1993). In brief, it suggests quasi-periodic decays of giant comets as the major source of Earth-impacting objects at various scales in both deep geological and historical times. While we cannot enter technical details here, it is important to mention that one of the important predictions (or retrodictions, as it turns out) of the coherent catastrophic theory is recurrent activity connected with the break-up of the comet Encke progenitor and several associated meteor streams and meteoroid swarms, notably Taurid and Beta Taurid streams (which Earth crosses between November 3 and 15, and June 24-July 6). Before suggesting case studies to illuminate possible consilience of some of the mythological and archaeological data with this hypothesis, we make an important caveat.

It is easy to see intuitively how observation selection effects prevent us from justifiably use past history of Earth and humanity as a straightforward yardstick for estimating the catastrophic threats. All our observations are made under the unique limiting condition: that they were not preceded (scale-dependently) by extinction-level or other large catastrophes perturbing physical, chemical, and other preconditions for our existence as intelligent observers in a given epoch. Quite clearly, we cannot observe traces of K/T level mass-extinction impact during the Pleistocene, since it would certainly destroy our hominid ancestors and prevent us from appearing in the first place. Modern Bayesian epistemology (as quantified, e.g., by the observation equation of Bostrom (2002)) gives us a superb methodological tool for numerically estimating for how much do we overestimate our future prospects on the basis of the historical record so far. *Mutatis mutandis*, this applies to any particular epoch in recent (i.e. human-recorded) history. Unfortunately, the relevant calculations have not been performed in the literature so far.

Many different myths from different parts of the world use the same motives, like fire from the skies, followed by or accompanied with the rain of fire from the sky, making a

disaster after which the Sun do not rise for several days, weeks or months, and tsunamis or deluges, that flood everything right after, and make extinctions, after which follows new creation of the world, are often used in many myths of creation. Those motives imply to the same type of event (or to the same or related event), that could be explained as events that accompany falling of celestial (cometary) body to the Earth. Such motives are present in the myths of Phaethon, Typhon (in Greek myths), Marduk (epic of Gilgamesh), Quetzalcoatl (Mesoamerica), St. Elias, Lucifer (in Christianity)... In more recent myths or religions, there are more detailed interpretations of such event, or icons that contain comet representation or for e.g. fire chariot, or fire arrow or lighting. All such representation are associated with the stories or a myths that could be connected with events of celestial impacts and catastrophes. Often, supernatural creatures are associated with these stories, like some kind of snake-like fiery creatures, dragons, or similar elongated shaped forms at the sky. Also, many of flood myths and stories of world creation contain these kind of representation. In studies of Bruce Masse (Masse 2007; Carney 2007), who analyzed 175 flood myth, indicating many details that are connected with celestial impact. In these studies the author claim that there had to be at least one global impact event, that is possibly 4800 years old

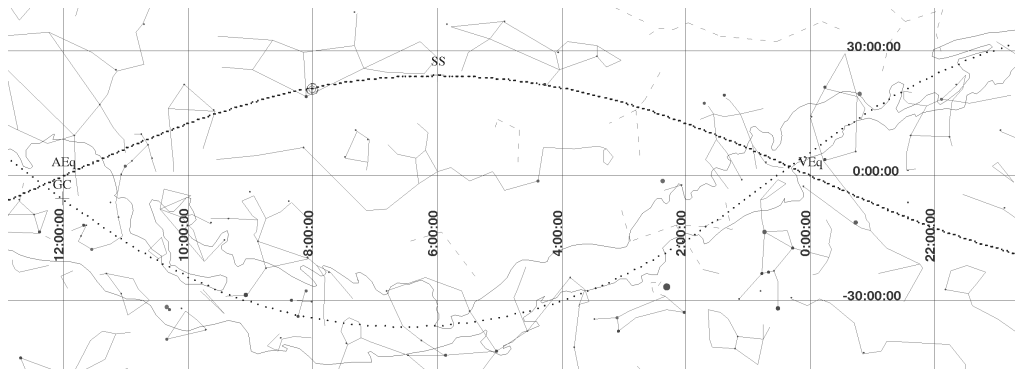
There were substantial body of evidences that celestial catastrophes influenced old religions and myths. In most cases the scenes of creation of the world was presented with motives of celestial body falling from the sky, or with catastrophic events that followed. It is certain that such events happened many times in human history and left deep traces in culture and religions of Asia Minor, Europe and North-West Africa, but they are hard to locate in time. Since, the early religions contained scenes that could be linked to the celestial body fallen from the sky and catastrophic consequences that followed, we can indicate that at least, one such event could influence those early religions. We can conclude that such event happened before or during the rise of these early cultures. That would indicate that

such event happened at least as early as the third millennium BC.

Without the direct physical evidence left behind by such an event (e.g., an impact crater) it is very hard to locate in time such a catastrophic event. An alternative possibility is to do an astronomical dating, by using the icons or sacred texts, than could reveal some special positions of the sky that could be re-dated.

Also, nearly all religions had at least some motives in iconography or sacred texts connected to large celestial bodies and constellations. That could reveal some positions on the skies that would be recognizable for only special times in history. One such religion was Mithraism that was spread from Asia Minor to the Europe in about second to first century BC. The iconography that had been left behind contained strange choice of constellations, depicted in the scene of the creation. All constellations presented this scene, could be lined in the sky (see Fig. 1) as the position of the celestial equator of about 4000 BC Bon et al. (2002). The constellations that were represented on the main icon of the Mithraism (see Fig. 2) were Taurus (bull), Canis Minor (the dog), Hydra (the serpent), Corvus (the crow), Leo (the lion), Crater (the cup), Gemini (the torch bearers) and Scorpius (the scorpion). Mithra was represented with the constellation of Perseus, so the Mithra was position to be sitting on the Celestial Bull (Taurus), trying to stab the knife into the Bull at the place where the Pleiades are positioned. The scene of creation was presenting the God Mithra sacrificing the celestial Bull, from which blood came out and made the flooding, that enabled life on earth. After the bull slaying, Mithra went in the fire chariot with God Helios back to the sky (Ulansey 1989).

For some reason, this scene was sometimes depicted together with the representation of Phaethon myth. This myth contains clear motives of the description of celestial body impact. Phaethon was the son of God Helios who had fallen from the skies in fire chariot with a fire tail of his burning hair. On the spot where he had fallen, a crater was formed, with the earthquake and meteor shower (raining Gods blood) that followed. Also, the Sun did not rise



**Fig. 1.** Starmap of sky position in about 4000 BC (this plot was made using XEphem planetarium software (Bruning and Talcott 1995))

in sorrow for Phaethon. According to the myth, Phaethon fell into the Eridan, the river-ocean that surrounded the world. All these motives in the Phaethon myth, clearly indicate that this myth was connected to the quite a large object that had fallen from the skies, putting the dust into the air so the Sun light was blocked (see for e.g. Clube 1995).

Since these two scenes were often depicted together, and Mithra like Phaethon is often depicted while riding the fire chariot together with Helios, there could be a possible indication that scene of creation in the Mithras iconography could represent the cataclysmic event, after which followed the events that people in those times could describe as the creation of the world (Ulansey 1989). If this is the case, then Mithraic iconography could be used to locate this event in time. According to previous studies the iconography of the scene of creation have celestial character (see Ulansey 1989; Bon et al. 2002), with representation of equatorial constellations during the Ages of Taurus (the times while the spring equinox was positioned in constellation of Taurus). According to Ulansey (1989) the scene of tauroctony (killing of the bull) represents the time when the spring equinox was in transition from the constellation of Taurus to constellation Aries, about 2300 B.C. In this study, some of the figures of this icon could not be explained as constellations and there was no explanation how and why the constella-

tion of Orion was not mentioned in this myth, since it was also equatorial constellation during those times. This constellation was very important in many precious cultures and religions so it could not be just accidentally forgotten. Starting from this assumption, Bon et al. (2002) dated back this scene to about 4000 B.C., by trying to find the position of the celestial equator, such that the constellation of Orion would not be included in the equatorial constellations, while all the other constellations that were represented in this icon, were still equatorial. This position was found to be at approximately 4000 B.C. In fact, this position of the skies, all figures in this icon could be explained as equatorial constellations (Bon et al. 2002).

### 3. Conclusions

This could indicate that there was a cataclysmic event that was initiated by celestial body infall. This event must be older than 2300 B.C., and it is very probably old as 4000 B.C. This event obviously influenced many of first religions in their iconography and creation myths.

It is obviously too early to draw any definite conclusions about the importance of possible impact-caused catastrophic occurrences in archaeological and cultural record. Much work on both observational, historical, and epistemological grounds remains to be done. However, there is an obvious need for



**Fig.2.** Tauroctony of Mithras at the British Museum London (originally from en.wikipedia.org, taken at the British Museum by Mike Young)

such a work to be done, not just for the sake of pure knowledge on the past, but for the sake of future either.

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