



Red Comets and Red Stars: Tolkien, Martin, and the Use of Astronomy in Fantasy Series

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1. Introduction

Readers have eagerly immersed themselves in the complex “secondary” worlds of Middle-earth, Narnia, and Westeros since the publication of their respective series of novels. J.R.R. Tolkien defines a successful “secondary world” as one into which “your mind can enter.” Once immersed inside this world, any event is considered “true” by the reader because it “accords with the laws of that world. You therefore believe it, while you are, as it were, inside” (Flieger & Anderson, 2008, p. 52). In an interview with *Fantasmundo*, a Spanish online magazine, Polish fantasy author Andrzej Sapkowski likewise explains that his “vision of Fantasy is almost real. You have to believe that which occurs in the stories, because they are not a fairy tale” (Nolen, 2008). A successful secondary world must be fleshed out in considerable detail, in order to hold the reader’s attention and keep them from wandering off the map. J.R.R. Tolkien, George R.R. Martin, and C.S. Lewis are certainly among the best known examples of fantasy authors who have succeeded in this arduous task, as evidenced by the popularity of their respective series (both as novels and film or television adaptations). Another fantasy series that has achieved considerable success overseas, in part due to the richness of its secondary world, is the *Witcher* series of novels and short stories penned by Andrzej Sapkowski.¹

What is it about these particular series that draws readers into them so completely that they are read and reread with nearly religious fervor? There are a number of integral ingredients that are central to the construction of a successful secondary world. These include the creation of diverse and fascinating creatures and cultures (with their respective exotic customs, languages, mythologies, and religions), a detailed geography in which the action takes place, and a well-

¹ This paper will avoid important spoilers in all four series wherever possible.

defined set of local laws of nature (which define what is possible in the secondary world, and under what conditions). Another common element found in these fantasy series is an extremely detailed cosmology, descriptions of various parts of the universe and how they affect the lives of the intelligent species who inhabit this universe. This is not to be confused with astrology, although astrological elements can certainly be found in many of these series. What is meant here is that for these intelligent species their knowledge (and misunderstandings) of their universe impacts their lives. Examples include the use of moon phases to measure the passage of time, navigating by the stars, the construction of culturally relevant constellations and creation stories, and an understanding of the cycle of seasons and its relationship to climate. This paper will provide an overview of the cosmological elements of the fantasy series of Tolkien, Lewis, Martin, and Sapkowski.²

2. Series Summaries

The first of these series to be published was J.R.R. Tolkien's Middle-earth saga, consisting of *The Hobbit* (1937) and *The Lord of the Rings* (1954). A posthumously published prequel volume edited by his son, Christopher, entitled *The Silmarillion*, appeared in 1977, and a number of other volumes of Middle-earth based tales have subsequently been released. A series of classic tales of the struggle between good and evil in our fallen world, *The Hobbit* and *The Lord of the Rings* have both been adapted into a series of three films each by director Peter Jackson.

Tolkien's friend and fellow medievalist C.S. Lewis introduced his *Chronicles of Narnia* series to the world in 1950 with *The Lion, the Witch, and the Wardrobe*. A prequel, *The Magician's Nephew*, was published in 1955, with five other tales describing the entire history of the fantasy world of Narnia rounding out the series: *The Horse and his Boy* (1954), *Prince Caspian* (1951), *The Voyage of the Dawn Treader* (1952), *The Silver Chair* (1953) and *The Last Battle* (1956). Well-known to be a Christian allegory (with the lion Aslan playing the role of Christ), only three of the books have been made into films in the past decade.

George R.R. Martin's ongoing saga *A Song of Ice and Fire* began with the novel *A Game of Thrones* in 1996 and continued to unfold in *A Clash of Kings* (1998), *A Storm of Swords* (2000), *A Feast for Crows* (2005), *A Dance with Dragons* (2011), and a number of prequel novellas, and is expected to be completed in two future volumes, currently entitled *The Winds of Winter* and *A Dream of Spring*. Known for its extreme violence and sexuality, Martin's depiction of the struggles between several families for possession of the Iron Throne of the "Seven Kingdoms" has been adapted into a television series on HBO. The fourth season of the series was completed in the spring of 2014.

While certainly not as well known to American audiences, Andrzej Sapkowski's *Witcher* series is a best seller in his native Poland and has a devoted audience across the globe. While the Polish television series adaptation and resulting film (constructed by condensing the series) were largely panned by fans and critics, the video games based on the series are wildly popular and continue to introduce new fans to the literary source material. Unfortunately, some of this source

² This paper is meant to be an overview that compares and contrasts these four series, rather than to provide a detailed analysis of any one of them.

material remains untranslated into English with the exception of fan translations which can be freely found on the Internet.³ Sapkowski introduced the world to the genetically-modified monster killer (or "Witcher") Geralt, his sorceress lover Yennifer, and Ciri, the child of destiny, in a collection of short stories whose title translates into *The Sword of Destiny* in 1992 (although it has yet to be published in English). A set of prequel short stories was published in 1993 (and under the English title *The Last Wish* in translation in 2007), with a series of five novels subsequently published in 1994, 1995, 1996, 1997, and 1999. The first three novels have been officially translated into English: *Blood of Elves* (2008), *The Time of Contempt* (2013) and *Baptism of Fire* (2014). The remaining two, *The Tower of the Swallow* and *The Lady of the Lake*, remain to be officially translated into English.

3. Common Elements of a Fantasy Subcreation

A successful subcreation begins with a rich and detailed geography in which the events of the series unfold. For example, the unnamed planet in Martin's *A Song of Ice and Fire* series features a number of continents, the most important to the central action of the series being Westeros. Fans constructed detailed maps of the so-called "Known World" based on Martin's descriptions and local maps contained within the novels. One enterprising fan, serMountainGoat, created detailed maps of Westeros and the other continents, winning praise from Martin for coming close to the right answer based on the fractional available evidence (Davis, 2012). Martin afterwards issued his own official set of maps, introducing a previously undisclosed land mass (Martin, 2012). The entire scope of the unnamed planet is unknown, and Martin himself has made statements which have later either been contradicted or abandoned (Lough, 2013). The current era of the planet is medieval in technology (as well as many of the political systems) and references are made to events that occurred in the distant past (thousands of years before).

J.R.R. Tolkien published maps with both *The Hobbit* and *The Lord of the Rings*, focusing on the northwestern sections Middle-earth which form the stage for Bilbo's and Frodo's adventures (e.g. the Shire, Mirkwood, Rohan, and Mordor). These novels take place in the Third Age of Middle-earth; *The Silmarillion* proper recounts the events from the creation of the world through the end of the First Age, while two additional tales contained within the same book provide an overview of the events leading up to the end of the Second Age. Middle-earth has undergone a number of catastrophic events during its history that changed the landscape, the most important being the shift from a flat world to a spherical globe at the destruction of the Atlantean island nation of Númenor (Tolkien, 2001, p. 281). Karen Fonstad (1991) was able to construct detailed maps of Middle-earth across the ages by using details from the various texts. It is important to note that Tolkien envisioned Middle-earth as our Earth, just inhabited at an early time, with the destruction of the One Ring occurring possibly 6000 years before the present (Carpenter, 2000, p. 283).

Tolkien's world was flat in the beginning and became globed after a great catastrophe; Lewis's remained flat throughout the history of Narnia, in keeping with his positive viewpoint of the geocentric medieval cosmology despite its lack of "truth" (Lewis, 1964). Maps drawn by Pauline Baynes of the important locations in Narnia's world are included as illustrations in some editions of

³ For example, <http://archive.today/DwokN>.

the *Chronicles*. Correctly speaking, Narnia is actually the name of one country in the world Aslan created in *The Magician's Nephew*, and this world is just one of many that can be traveled to via the Wood between the Worlds. Our primary world is one member of this multiverse. Sapkowski's novels are similarly based in a multiverse that includes our world (or at least a world where the Arthurian legends are real history). A number of fan-drawn maps of Geralt's world have appeared on the Internet, and formed the basis for maps included with the *Witcher*-based video games. It is known that these maps contain errors.⁴

Once the fictional world has been created, intelligent beings are required to give meaning to the world and be the actors within it. Martin's unnamed world is inhabited with humans who belong to myriad cultures, some monotheistic, such as the followers of the Drowned God or the God of Light, and others decidedly polytheistic, such as the worshippers of the so-called Seven Gods. While a common tongue is used in trade, the various groups of humans have their individual languages, with one in particular, that of the Dothraki, especially well-developed in the television series adaptation of the saga (Peterson, 2012). There are also dragons, giants, wraithlike creatures known as the White Walkers and their zombie-like wights. Middle-earth is the home to humans, elves, dwarves, hobbits, orcs, trolls, wizards, dragons, and more. Tolkien fans can study two different elvish languages, Quenya and Sindar, as well as the native tongues of the Rohirrim, Númenóreans, Dwarves, or even the Black Speech of Mordor. Narnia is known for its talking animals, centaurs, fauns, sentient stars, witches, and several human cultures, including the Calormenes and Telmarines. The world of the *Witcher* series includes humans of various city-states and countries, elves, sorceresses, vampires, dwarves, and a wide selection of horrific monsters for Geralt the Witcher to hunt.

The inhabitants of these worlds are subject to the respective laws of nature which the author sees fit to invoke. These determine what is physically possible in these worlds. In each of these stories, some version of what we would consider to be magic can be found, from Gandalf's staff and the palantír to talking animals and healing spells. While immersed within the subcreation, the reader takes these impossibilities as conditionally true, so long as they are consistently used within the universe in which the novel takes place.

4. Secondary Cosmologies: How the Heavens Relate to Everyday Life in the Secondary World

An encyclopedic recounting of all the astronomical references in these four series would encompass an entire book (or more); therefore only selected examples will be explored in this section.

4.1. Stars and Constellations

The mythology of cultures both fictional and factual normally include explanations for the creation of the stars and their important patterns, the constellations. The Narnian stars were the first creation of Aslan. His song of creation was joined by the voices of the stars and planets, singing in harmony with "cold, tingling, silvery voices." The darkness is suddenly pieced by "a thousand,

⁴ See http://witcher.wikia.com/wiki/World_map.

thousand points of light" in the form of "single stars, constellations, and planets, brighter and bigger than any in our world" (Lewis, 1998, p. 42).

According to the Dothraki, the stars are "horses made of fire, a great herd that galloped across the sky by night." Upon a horselord's death, both rider and steed are burned together to begin their ride into the sky. It is believed that the "more fiercely the man burned in life, the brighter his star will shine in the darkness" (Martin, 2011b, p. 491; p. 803).

While there is no mythology concerning the origin of the stars in the Witcherverse, in Middle-earth the stars are the creation of Varda, Queen of the Valar. A first generation of primordial stars were later joined by brighter stars and then gathered into constellations so that the Elves would not awaken to complete darkness. Tolkien enumerates a number of stars and constellations, some of which have been unambiguously identified with real world counterparts by Tolkien himself or his son, Christopher (e.g. Menelmacar is Orion), while other identifications are more tentative (e.g. Larsen, 2005a; Larsen, 2010). One of Tolkien's constellations with an obvious primary world identification is the Valacirca or Sickle of the Gods, our Big Dipper. In *The Silmarillion* it is the last listed star grouping, set by Varda into the sky "as a challenge to Melkor" and "a sign of doom" (Tolkien, 2001, p. 48). While the Elves call it the Valacirca, Hobbits refer to it as The Sickle while humans termed it the Burning Briar. There may even be a dwarvish version of the constellation, Durin's Crown (Larsen, 2005b).

As previously noted, the stars of Narnia are brighter than those of our world, which makes sense as they are also nearer to the world. The stars also differ from those in our primary world by being sentient beings that sometimes retire to the earth, as is the case with Ramandu (Lewis, 1998, p. 357). They are arranged into constellations such as the summer patterns the Ship, Hammer, and Leopard (Lewis, 1998, p. 251).

The stars of Westeros are arranged into a number of constellations, including the Crone's Lantern, Galley, Ghost, Ice Dragon, King's Crown, Moonmaid, Shadowcat, Sow, Stallion, and Sword of the Morning. Not much is known about the constellations, with a few exceptions. For example, the Sword of the Morning has a "bright white star in its hilt" (Martin, 2011c, p. 405) and the Moonmaid is considered shy because she is often veiled by the treeline, meaning that she is a relatively southern constellation that does not climb very high into the sky. The Crone's Lantern is a direct reference to one of the seven "new" gods. There are seven "wanderers" or planets as well, apparently identified with the seven deities. For example, a red planet is sacred to the god known as the Smith (Martin, 2011c, p. 355).

Sapkowski's Ciri knows a number of her world's constellations, such as "the Seven Goats, the Jug, the Sickle, the Dragon, and the Winter Maiden" (Sapkowski 2013c, p. 266). Interestingly, the fan translations of these constellations' names are somewhat different: "The Seven Goats, the Vase, the Serpent, the Dragon and the Lady of Winter" (Sapkowski, 2013d, Chap. 6)⁵.

Cognizant of the importance of skylore to a culture, Martin has character Jon Snow ponder the differences in the names of heavenly bodies in his and the "wild woman" Ygritte's folklore. For example, the Smith's red planet was known as the Thief to Ygritte, while "the King's Crown was the Cradle, to hear her tell it; the Stallion was the Horned Lord." The Moonmaid, Ice Dragon, Shadowcat, and Sword of the Morning are common to both cultures. "We look up at the same stars, and see such

⁵ The fan translations of Sapkowski's works lack page numbers; therefore, these citations will be by chapter number.

different things," Jon muses (Martin, 2011c, p. 355). Jon half-jokingly asks his direwolf, Ghost, what he sees in the stars: "The Hare? The Doe? The She-Wolf?" (Martin, 2011c, p. 356).

Knowledge of the stars can be vitally important to travelers. Celestial navigation was the primary means of finding one's way across an ocean or desert before the 20th century. It was even taught by Harvard astronomers to Army and Navy officers in World War II in case their navigational equipment failed (Levy, 1993, p. 54-55). Lewis's Jill Pole is able to navigate by Narnia's North Star, called the Spear-Head and brighter than Polaris. She is also able to navigate by "other stars even when the Spear-Head was hidden" (Lewis, 1998, p. 477-478).

Tolkien also uses the stars to assert directionality and geography within his tale. For example, during Beren's flight south away from Morgoth's allies he is careful to make sure that the northern stars of the Big Dipper (the Burning Briar as it was known to men) are "set behind his back" (Tolkien, 1985, p. 345). Aragorn's travels have taken him so far south that he has found himself in lands "where the stars are strange" (Tolkien, 1993, p. 261).

In Martin's series, Brandon Stark asks Osha if she knows the way north. She replies that it is easy: "Look for the Ice Dragon, and chase the blue stars in the rider's eye" (Martin, 2011a, p. 521). Samwell Tarly also navigates by the heavens as he flees south, back to the Wall from Craster's Keep: "By day he took directions from the sun, and on clear nights they could follow the Ice Dragon's tail" (Martin, 2011c, p. 639-640).

In the *Witcher* novels various characters follow "the brightest star of the Seven Goats to the east" (Sapkowski 2014, 204). As she travels from world to world in the multiverse, Ciri tries to gauge whether or not she has returned to her own world by looking for familiar constellations. She is also resourceful when navigating by the stars; she selects a bright star that is visible in the direction she wants to travel in, and dubs it "The Eye" before following it (Sapkowski, 2013c, p. 266).

4.2. The Moon(s)

As told in the chapter "Of the Sun and Moon" in *The Silmarillion*, the moon and sun are the last silver flower of the tree Telperion and last golden fruit of the tree Laurelin, respectively. These precious lights are drawn across the sky by the Maiar Tilion and Arien, and Tilion's infatuation with the fiery Arien leads to the moon's path being "wayward," leading to the phases of the moon and occasional solar eclipses (Tolkien, 2001, pp. 100-101). The calendar systems of the various cultures of Middle-earth are described in detail in Appendix D of *The Return of the King*. While most of these are solar calendars (with 365.24 day years), it is common for the passage of time between events in Tolkien's novels to be signaled to the reader by mentioning the current phase of the moon. For example, in *The Fellowship of the Ring* Sam ponders the phase of the moon, both in the present and in his memories of arriving at and leaving from Lothlórien. He voices confusion about the nature of time in the enchanted realm. Aragorn explains that they had spent about a month there, and the "old moon passed, and a new moon waxed and waned in the world outside, while we tarried there" (Tolkien, 1993, p. 405).

While Tolkien was excruciatingly careful with his lunar chronology in *The Lord of the Rings*, the same cannot be said for *The Hobbit*. This is unfortunate, as the phases of the moon play an important role in the plotline – the keyhole for the secret entrance into the Lonely Mountain can

only be illuminated at sunset on Durin's Day, a special holiday on the Dwarves' lunar calendar. Indeed, the section of the map which explains the astronomical connection to the doorway itself is written in "moon-letters," special runes that can only be seen when the light of a moon of the same phase and time of year as the moment of their writing passes through them (Tolkien, 2007, 3). Over the decades that Tolkien tinkered with *The Hobbit* after its publication he attempted to correct several errors with the timing of the lunar phases in the book, but never came to a solution that would consistently and satisfactorily solve them all. Part of the problem (apparently unknown to Tolkien) is that he was erroneously using 28 days rather than 29.5 days as the length of the lunar cycle (Larsen, 2011a). *The Lord of the Rings* does not suffer from this mathematical problem, as Tolkien referred to an actual calendar with properly noted lunar phases to plot out the action in that more complex work (Tolkien, 1989, pp. 365-9).

There are a number of myths surrounding the moon of the world of Westeros. For example, there is a Qarthian story that there were once two moons, "but one wandered too close to the sun and cracked from the heat. A thousand thousand dragons poured forth." It is said that dragons will return when the remaining moon will "kiss the sun," probably a reference to a solar eclipse (Martin, 2011b, p. 235). The followers of the god R'hllor believe that when the ancient hero Azor Ahai tempered his sword in the live heart of his wife, Nissa Nissa, her "cry of anguish and ecstasy left a crack across the face of the moon" (Martin, 2011a, p. 155). The moon of Martin's world apparently has a phase cycle similar to that of our satellite, as Daenerys was born "nine moons" after the flight of her mother and brother from King's Landing in the great rebellion (Martin, 2011b, p. 30). Other characters reference time by the moon's phases as well; for example, when the direwolf cubs are found, it is noted that the "late summer snows had been heavy this moonturn" (Martin, 2011b, p. 17).

In Ciri's world, humans follow a lunar calendar of 12 months, which means that either Sapkowski is being sloppy in his astronomy (as there are about 12.4 lunar cycles in one solar year in our world)⁶ or that in Ciri's world there are exactly 12 lunar cycles in a year (Sapkowski, 2013e, Chap. 1). Finally, while Narnia has a large moon that rises and sets, and moonlit scenes are described, there is no evidence that its phases play an important role in the tale. Given the complex way that time moves between the various worlds, this lack of detail is not unexpected.

4.3. Portents in the Sky

Portents in the sky are either examples of astrological interpretations of celestial events or evidence of divine intervention (or both). However, since there must first be an astronomical event to be interpreted, such events fall under the purview of our current discussion. An example from Westeros is the belief of Ygritte's people that when the red planet known to them as the Thief was seen in the constellation the Moonmaiden "that was a propitious time for a man to steal a woman" (Martin, 2011c, p. 355). This is an astrological interpretation of the motion of a planet along the ecliptic (the plane of the "earth's" orbit projected against the stars) from one constellation to another as that planet orbits its star. If the fictional stellar system is in a plane (which makes the

⁶This fact makes lunar calendars quite complex, especially in the cultural and mathematical rules that are utilized to add an extra lunar month every few years in order to prevent the holidays from moving relative to the seasons, as happens in the truly lunar Islamic calendar.

most sense based on our understanding of the laws of physics), then all of the planets will tend to lie within a few degrees of this same plane. All bets are off for small bodies such as asteroids, comets, and Pluto-like dwarf planets, however. Having planets revolving around a star in roughly the same plane means that they will, from time to time, appear near each other in the sky, sometimes so close that they would both fit within the diameter of our full moon (despite the fact that, in reality, they are millions of miles apart). Such an apparent alignment is called a conjunction, and these have historically been given important astrological significance. We see this in the world of Narnia as well. In *Prince Caspian*, the titular character is told by his tutor, Doctor Cornelius, that the close conjunction of the bright planets Tarva and Alambil "means some great good for the sad realm of Narnia" (Lewis, 1998, p. 230). Glenstorm the centaur also reads the signs in the heavens and calls the conjunction evidence that the time is right for a war against their enemies (Lewis, 1998, p. 239).

The cosmos of Middle-earth has relatively few celestial portents as such, perhaps due to Tolkien's religious sensibilities (Larsen, 2014). The most important exception is, of course, the planet Venus (the so-called Morning Star and Evening Star), in the form of Eärendil sailing across the heavens in his ship Vingilot with one of the Silmarils strapped to his brow. In a draft letter dated August 1967, Tolkien describes how the name Eärendil (and its mythology within the legendarium) were influenced by the Anglo-Saxon *éarendel* and reference in religious writings to Christ or John the Baptist (Carpenter, 2000, p. 385). When Eärendil first sails the skies, the "people of Middle-earth beheld it from afar and wondered, and they took it for a sign, and called it Gil-Estel, the Star of High Hope." Understanding that the Valar must somehow be involved with such a marvel, "the Elves looked up, and despaired no longer; but Morgoth was filled with doubt" (Tolkien, 2001, p. 250). In an uncharacteristic blatant astronomical error (or alternately a miracle or example of artistic license) Eärendil is visible in the West all night long as Elros and the other faithful humans sail to their new island home, Númenor (Tolkien, 2001, p. 260).⁷

One of the most powerful heavenly portents in the works of Sapkowski and Martin is a comet.⁸ Generally speaking, comets have historically been seen as portents of evil by many primary world cultures (Ritchie, 1985). In Sapkowski's final *Witcher* novel, *The Lady of the Lake*, a "golden and red comet" is seen sweeping "across the sky from west to east, dragging behind it a line of fire" (Sapkowski, 2013b, Chap. 6). A merchant and two mercenaries discuss the celestial visitor, trying to decide whether the apparition is a sign of "disease and epidemics, plague, cholera and leprosy," "floods, cloudbursts, or prolonged rain," or perhaps even "death and bloodshed," and to which side of the war these calamities would befall (*Ibid*). The character Aarhenius Krantz, "a sage, alchemist, astronomer and astrologer" observes this comet and its "fiery red tail" with his simple telescope and, in a mixture of magic and science for which the *Witcher* series is well-known, decides that the comet is, indeed a portent of war, but since there is already a war in progress, he will scientifically

⁷ For more information on Tolkien's astronomical and mythological use of Eärendil, see Larsen (2011b).

⁸ I have no evidence that Sapkowski's use was a direct homage to Martin, but Sapkowski has said that he and Martin know each other, and one can look at the publications dates of the works in question to help settle the question in his or her own mind. Sapkowski does include some obvious nods to Tolkien's work, such as references to halflings and a character's dream of a battle in which someone cries "The Eagles! The Eagles!" (Sapkowski, 2013b, Chap. 2).

determine the orbit of the comet so that they will know when the comet will return and, hence, the next war will occur (Sapkowski, 2013b, Ch 7).

The culminating event in Martin's first novel is the funeral pyre of Daenerys Targareyn's Dothraki husband, Drogo, and the resulting hatching of her dragons. Before the pyre is lit the Dothraki search the sky for a sign of the star that was kindled by Drogo's soul. Instead of a star, a "comet, burning red. Bloodred; fire red" is seen, and taken as a positive portent (Martin, 2011b, p. 804). Daenerys follows the comet across the desert to the city of Qarth and interprets this "shierak qiya, the Bleeding Star" as a sign sent by the gods (Martin, 2011a, p. 188). Throughout *A Clash of Kings* various characters from different cultures note the comet in the sky, and name and interpret it through the lens of their personal belief systems and political allegiances. For example, the Brothers of the Night Watch on the Wall name it after their commander, referring to it as "Mormont's Torch, saying (only half in jest) that the gods must have sent it to light the old man's way through the haunted forest" (Martin, 2011a, p. 97). The followers of the Drowned God believe it to be a sign from their god, with Theon Greyjoy taking it as a personal sign of his right to be king (Martin, 2011a, p. 179). However, the court of the current holder of the Iron Throne refers to it as "King Joffrey's Comet"- at least to Joffrey's face – while Melisandre proclaims that the comet is the fulfillment of an ancient prophecy, and that Joffrey's uncle and claimant to the throne Stannis Baratheon is the reincarnation of the hero Azor Ahai (Martin, 2001a, p. 39; 2011c, p. 349). The comet is also said to be a "red flag of vengeance for Ned" Stark's death at the hands of King Joffrey, as well as an "omen of victory" for the Tullys of Riverrun (Martin, 2001, p. 117). Ser Brynden possibly has the most honest interpretation of all, especially given Martin's taste for killing off his characters: "That's blood up there, child, smeared across the sky.... Was there ever a war where only one side bled?" (Martin, 2011a, p. 118). Like many aspects of the series, the true interpretation of the comet is in the eye of the beholder, and will only be clear in hindsight after winter (and hence the end of the series) has come and gone. Interestingly, it is not possible for a comet to appear truly red (Howell, 2013). It is possible, however, for the normally yellowish dust tail of a comet to take on a pale rusty cast in photographs.⁹

4.4. Seasons and Climate

Speaking of seasons, these are a final example of how astronomy directly impacts human culture. From our roots as hunter-gatherers, through the dawn of the agricultural age, to the eras of sailing and polar exploration, and even today with Seasonal Affective Disorder, the yearly cycle of winter's cold through the rebirth of spring, heat of summer, and harvest of autumn is one of the most obvious cyclical changes our planet undergoes. In our primary world, seasons are caused by Earth's 23.5 degree axial tilt. Despite common misconceptions, Earth is not closer to the sun in summer, but rather in summer your hemisphere is tilted in such a way that the sun appears higher in the sky, so you enjoy more hours of sunlight and more direct sunlight that leads to more efficient heating of the ground. Any secondary world that has an axial tilt will also have seasons, the severity of which will depend on the severity of the tilt. Another way that a planet can have seasons is to have a highly elliptical orbit (in contrast to the nearly circular orbit of our own world). In this latter

⁹ An example is the photograph of Comet West found at http://www.kcv.ca/martin/astro/au/unit7/193/chp19_3_files/west.jpg.

case both hemispheres can have summer at the same time, in contrast to our world where one hemisphere's summer is simultaneously the other's winter.

Seasons in Middle-earth seem to mirror those of our Earth, which is to be expected given that Middle-earth IS envisioned to be Earth in an earlier time. In fact, climate scientists from the University of Bristol in England used real world climate models to investigate the climate of Middle-earth , and published the results in a tongue-in-cheek internet manuscript penned by "Radagast the Brown" (2013). It is interesting to note that these seasons apparently exist even when the world is flat, and a "magical" climate exists in Middle-earth (ouside of the Blessed Lands of the Valar) on the island of Númenor, which is crafted by the Valar to reward the Faithful among humanity after the defeat of the primal enemy Morgoth. The weather there is "ever apt to the needs and liking of Men: rain in due season and ever in measure; and sunshine, now warmer, now cooler, and winds from the sea" (Tolkien, 2001, p. 276).

The worlds of Aslan, Ned Stark, and Geralt the Witcher are not so fortunate, as what may be termed Ice Ages are important events in each subcreated universe. For example, in *The Lion, the Witch, and the Wardrobe*, the arrival of the Pevensie children in Narnia heralds the return of Father Christmas and Aslan, ending the century-long winter created by Jadis, the White Witch.

"Winter is Coming" is more than the motto of House Stark; it is a mantra and a warning threaded throughout *A Song of Ice and Fire*. Extreme winters of unpredictable length (perhaps decades in some cases) have occurred in the past and are presaged to come again in the (possibly) near future. A number of scientific explanations for the extreme seasons of the world of Westeros have been suggested by fans (e.g. Dvorsky, 2012; Kostov et al., 2013), including a variable axial tilt, a highly elongated orbit, and the possibility that Martin's world is part of a binary star system. While these works are admirable in their efforts to find a logical explanation for Ned's obsession, George R.R. Martin himself has stated that the cause of the extreme winters in his world is magical, not scientific, as will be revealed later in his series (Schweitzer, 2007).

One of the main ancient prophecies in the *Witcher* universe is that of the elf prophetess Ithlinne. It warns that an extreme Ice Age will descend upon the world, and a chosen child of specific genetic heritage will be able to open the doorway to a safer parallel world in the multiverse before this world is frozen and turns to death. Since the *Witcher* series openly mixes magic and science, it is interesting to note that there are characters within the series who discuss a completely scientific explanation for the coming Ice Age, namely the same scientific explanation often used in our primary world – the so-called Milankovitch cycles¹⁰ in which cyclical changes in the axial tilt of the Earth, shape of the Earth's orbit, and directional orientation of the axis conspire to lead to cycles in climate (Sapkowski, 2013b, Chap. 7).

5. Conclusion

While these worlds, and the laws under which they operate, are clearly fictional, their fictional nature does not detract from the experience of the reader. One can "know" that something is not "true" and still find beauty and power within it. For example, in his set of lectures entitled *The*

¹⁰ An excellent tutorial and applet that demonstrates the various aspects of the Milankovitch cycles can be found at <http://www.climate.gov/teaching/resources/milankovitch-cycles>.

Discarded Image, C.S. Lewis argues that, despite the fact that it is factually incorrect, the medieval geocentric model of the universe still resonates with the human spirit to this day. He urges his readers to take the time to walk beneath the stars, and picture themselves amidst a universe "lighted, warmed, and resonant with music" (Lewis, 1964, p. 112). The powerful image of the domed sky above our heads is not lost on the other authors discussed here. For example, in *The Fellowship of the Ring*, Frodo is comforted by the image of the constellations we know as Taurus (with its famed red star Aldebaran and star cluster the Pleiades) and Orion rising in the late September sky:

Away high in the East swung Remmirath, the Netted Stars, and slowly above the mists red Borgil rose, glowing like a jewel of fire. Then by some shifts of airs all the mist was drawn away like a veil. And there leaned up, as he climbed over the rim of the world, the Swordsman of the Sky, Menelvagor with his shining belt (Tolkien, 1993, p. 91).

Despite the differences in the names of the stars and constellations, the reader can find something of their own life in Frodo's experience. Perhaps they, too, have watched Orion climb into the sky on a crisp autumn evening. Martin's Dothraki "believed that all things of importance in a man's life must be done beneath the open sky" (Martin, 2011b, p. 236) and Jaime Lannister finds a rare and poignant moment of inner peace in a time of extreme physical and emotional pain by simply observing the heavens above him:

Jaime lay on his back afterward, staring up at the night sky, trying not to feel the pain that snaked up his right arm every time he moved it. The night was strangely beautiful. The moon was a graceful crescent; and it seemed as though he had ever seen so many stars. The King's Crown was at the zenith, and he could see the Stallion rearing, and there the Swan. The Moonmaid, shy as ever, was half-hidden behind a pine tree. *How can such a night be so beautiful?* he asked himself. Why would the stars want to look down on such as me? (Martin, 2011c, p. 415).

Why? Because the cosmos is an experience we all share, regardless of our class, culture, or century, whether we exist in the primary world or a secondary one. The stars are always above us, even if we do not see the same pictures and portents within them. Exploring these differences while simultaneously embracing our commonalities, helps us to realize that a piece of Faerie lies within us all.

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