

The Milky Way

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Historically, the Milky Way was viewed as an enigma, as the planets can move through it and the stars shine within it, and thus it was neither star nor planet. Aristotle (384–322 BC) discussed the Milky Way in *Meteorology*, his work on atmosphere, rather than in *On the Heavens*, his astronomical work. He described the Milky Way as always unchanged and one of the great circles of the sky but made up of a fiery band of hot cosmic material (*Meteorology* 345a5–35). Later, the poet Aratus (c. 315–240 BC) in his *Phaenomena* was not concerned with its composition, but he mused that its appearance could make a person “awestruck beneath a sky-dividing belt / Embossed with brightness” (*Phaenomena* 494–495 = Aratus 2010, 19).

For the Egyptians of the Old Kingdom the Earth was personified by the god Geb while the sky was embodied by the goddess Nut. As the sky goddess, Nut was an instrumental figure in the successful journey of the deceased king’s soul back to the stars. She had many different manifestations including as “She of a Thousand Bas” where the “Thousand Bas” are the night sky’s stars (Allen 2015, 365). She was also known as Shetpet, when she was in the form of the white salt, natron, used to cover the king’s body during the mummification process; the white of the natron mirrored the white of the Milky Way (Allen 2015, 76–77 = *Teti’s Pyramid Texts* 356). It would be an error to limit Nut solely to her manifestation as the Milky Way, but in this capacity she helped the departed soul of the king reach the circumpolar stars. Being linked to the soul’s journey was a theological theme associated with the Milky Way that became embedded in later Western thinking.

In *The Dream of Scipio* (Book 6 of *On the Republic*), Cicero (106–43 BC) describes the Milky Way as the residence of departed souls (*On the Republic* 6.16). In the dream Scipio is told that those who defend their country have a “special place prepared for them in the heavens, where they may enjoy an eternal life of happiness” (6.13 = Cicero 1988, 265) and that man “has been given a soul out of those eternal fires which you call stars and planets” (6.15 = Cicero 1988, 267). A good life, Scipio relates being told, is

"[...] the road to the Skies, to that gathering of those who have completed their earthly lives and been relieved of the body, and who live in yonder place which you now see" (it was the circle of light which blazed most brightly among the other fires), "and which you on earth borrowing a Greek term, call the Milky Circle."

(*On the Republic* 6.16 = Cicero 1988, 269)

The Milky Way was ignored in the early development of modern astronomy. Galileo Galilei (1564–1642) discovered that the Milky Way consisted of millions of stars; however, he left the implications of this unexplored (Jaki 1971, 165). Jaki (1972, 200) has observed that René Descartes also ignored it in his 1644 *Principles of Philosophy*, in which he argued that the cosmos was homogenous. Jaki suggested that seventeenth-century astronomers ignored the Milky Way because it challenged this Christian Platonist view of the cosmos as homogeneous and infinite.

In 1750, however, the English astronomer Thomas Wright published a theologically driven explanation of the heavens that maintained the homogenous universe but pondered the density of the stars in the *Via Lactea* (Milky Way) with the more scattered stars over the rest of the sphere of the heavens (Wright 1837 [1750], 12). Wright solved the problem of the uneven distribution of stars by making a single speculation (italics in original): "*that all the Stars are, or may be in motion*". With this speculation in place, Wright then argued that our Sun, like all other stars, orbited a central place. Wright reasoned:

'Tis true, the Sun may be said to be the Governor of all those bodies [planets] round him; but how? no otherwise than he himself may be governed by a superior agent, or a still more active force; [...] and that the Stars themselves are subject to no other direction than that which moves the whole machine of nature

(Wright, 1837 [1750], 94).

With this argument in place Wright then argued that God was located at the centre of this system, "omnipresently presiding, seated in the centre of infinity" (Wright 1837 [1750], 135–136). Thus Wright, while being correct in his assumptions about a centre to the galaxy, like the earlier Classical writers gave the idea a theological explanation. However, Wright's cosmology also challenged Christian theology as he identified a place in the cosmos where "the divine presence, or some corporeal agent, more immediately presides over his own creation" (Wright 1837 [1750], 136). Thus he located God in an exact place, at the galaxy's centre, rather than being universally in all places.

Astronomical arguments have moved on, and although the Milky Way is no longer an enigma there is however, still a tendency to ignore it in matters of cultural astronomy. This may be due to the privileging of single point horizon orientation in the discipline's methodology, or the difficulties of working with such a varying great circle. However, in a sky without light pollution and on a night of a Dark Moon, the Milky Way is the most visually spectacular heavenly object, and as Aratus said, it can render us awestruck. By understanding the movement of the Milky Way in a local topography, a researcher, therefore, can add another visual component to their skyscape research.

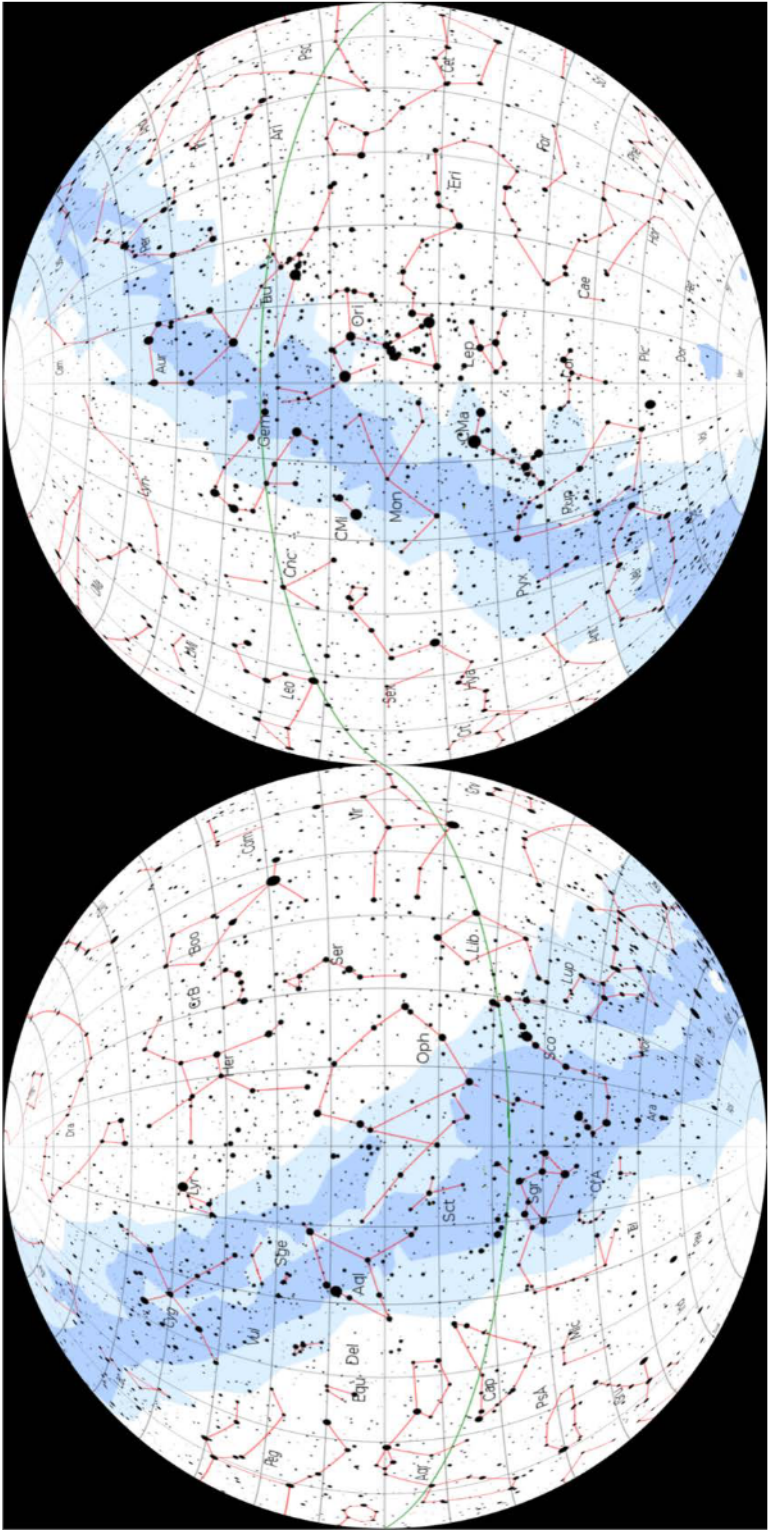


FIGURE 1. The Milky Way stretches from a declination 65° S to 65° N. It crosses the ecliptic at various points: the feet of Gemini, the horns of Taurus, the stars of Sagittarius and the tail of Scorpio (image: Wikimedia Commons).

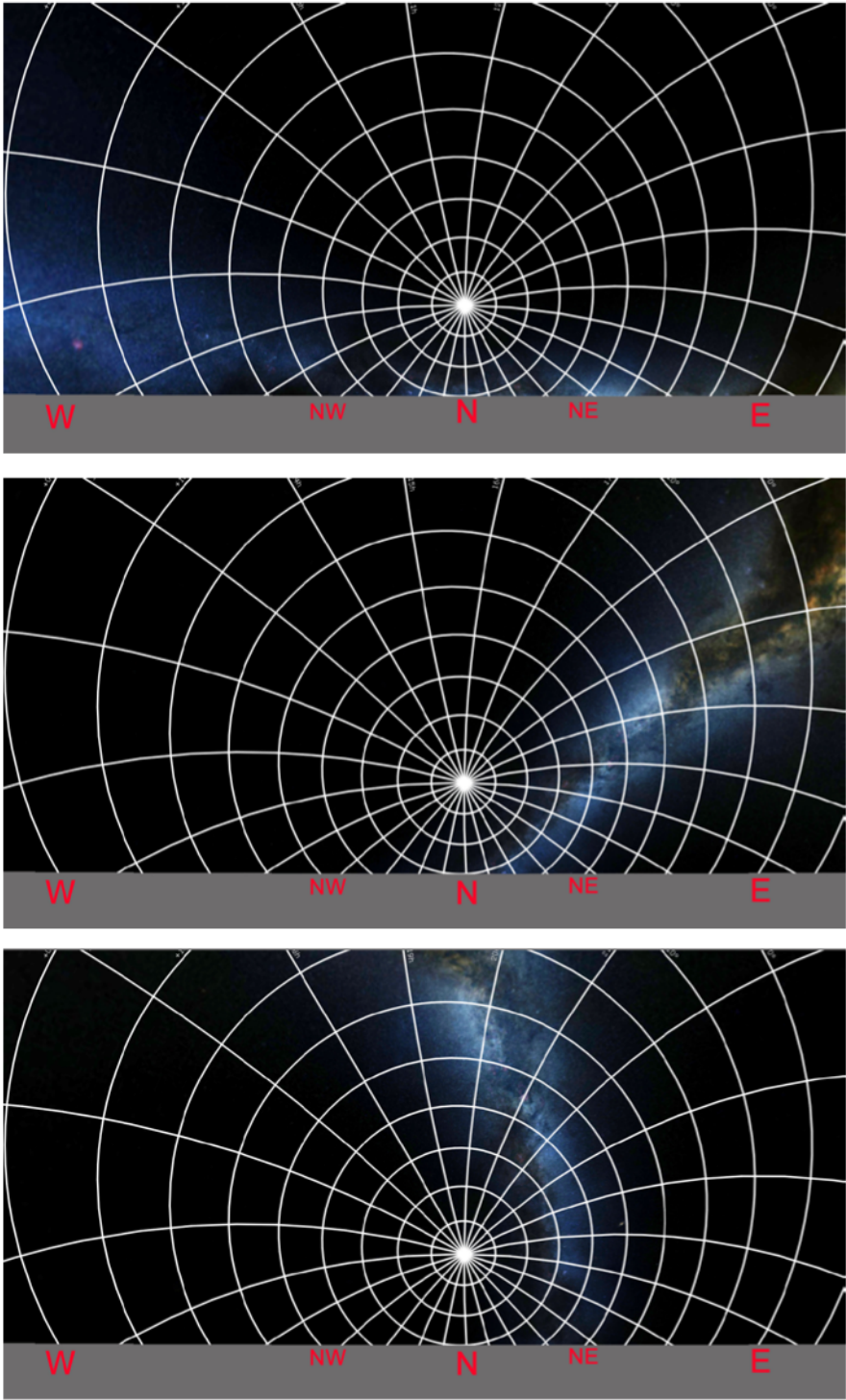
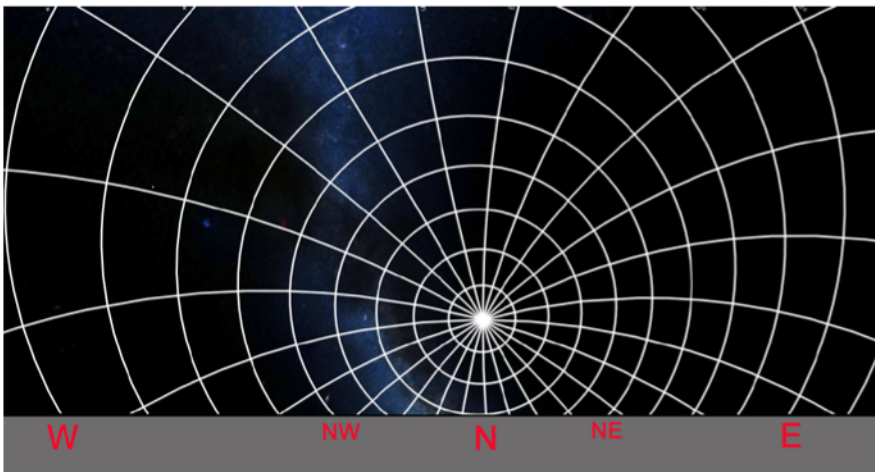
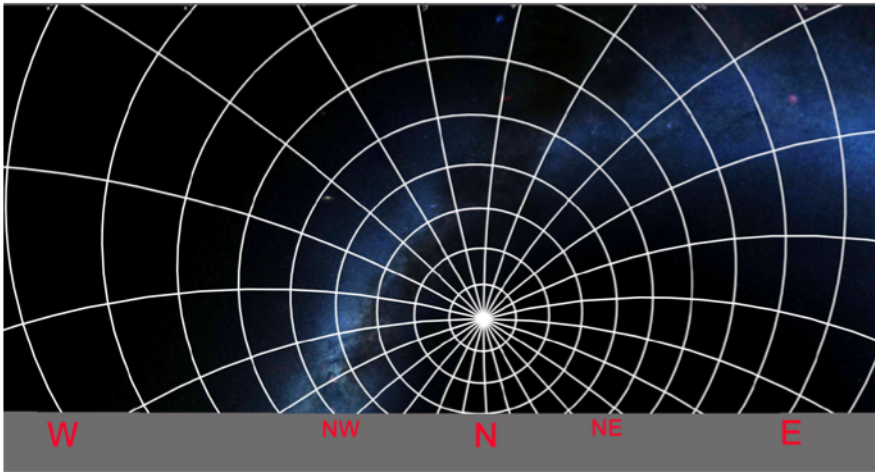


FIGURE 2. (above and opposite) The horizon view of the Milky Way to a latitude of 30° N, stepped through, 24 hours in four hour intervals (image by author, edited from Stellarium 2021).



The Milky Way - Understanding its Movement

The Milky Way, the galaxy to which our solar system belongs, is a visible cloud of white or darkness that divides the night sky roughly into two hemispheres. The galaxy's centre is located in the constellation Sagittarius, the brightest part of the Milky Way, and its anti-centre is in the constellation Auriga, known as the Charioteer. As a great circle, it is inclined about 60° to the ecliptic and touches around thirty constellations (Figure 1). Because of this high inclination, depending on the time of night and the date, the arc of the Milky Way may appear relatively low or relatively high in the sky. A key point to remember is that for any landscape within non-polar latitudes (65° N to 65° S) the Milky Way will be seen to pass through the zenith at night.

The Milky Way, in a given landscape, will have a range of rising or setting azimuths that will be a band along the horizon covering a declination range of nearly 130° . As an example, Figure 2 considers the movement of the Milky Way for a latitude of 30° N looking due north. Each image is a step of four hours so that over the course of 24 hours the great circle will shift from lying along the horizon to rising straight upwards and even arching across the view. The actual night-time view will depend on the time of the year, although in the northern hemisphere if Cepheus is close to the horizon then the Milky Way will be lying flat along the horizon.

In the southern hemisphere, when the constellation Centaurus is low on the horizon the Milky Way will also be lying on the horizon, thus "flooding" the land. The range of visuals varies from this to slowly "standing" until the Milky Way looks like a great column in the sky pointing up to the heavens. Notably, the stars rising or the stars setting that order this visual will be consistent for a given latitude. Learning a set of key marker stars can help the cultural astronomer become alert to a possible Milky Way narrative in a landscape.

A way to work with the Milky Way is to think of it as a series of long narrow "constellations" with different visual appearances that will engage with a landscape in a consistent manner. In the first century AD, Claudius Ptolemy recorded his observations of the Milky Way, providing insight into its level of visibility at that time. In the *Almagest*, he introduced the Milky Way by stating that "with our observations of each of its [the Milky Way] sections we shall try to describe the form which the individual parts appear to take" (*Almagest* 8.2 H170 = Ptolemy 1998, 400). He then plotted the Milky Way against the stars, defining what stars were in the milk and what were left out. In considering the galactic centre, he wrote that "the northern part of the milk encloses the three joints before the sting of Scorpius [...] while the southern rim touches the star in the right front hook of Sagittarius" (*Almagest* 8.2 H172 = Ptolemy 1998, 400). While plotting its course, he also wrote of the gaps, known as the Dark Rift, while noting the level of intensity of the milk. In returning to the centre of the galaxy, Ptolemy described the milk as "very dense indeed and appears smoky" (8.2 H172 = Ptolemy 1998, 401), whereas in other places as in the area around Argo he described the milk as "somewhat rarefied" (8.2 H177 = Ptolemy 1998, 403). Using Ptolemy's first-century observations, the Milky Way gives the cultural astronomer a rare view of the night sky around 100 AD. It also indicates that visually at that time it could be

seen in three sections: the spectacular Dark or Great Rift with its many colours and black inky shapes, the milky white section and a third, opaque or much fainter wash of white.

The Dark or Great Rift is the large bulging part of the Milky Way that looks like a dark lane or pathway dividing the Milky Way into two. It runs for about one-third of the entire length of the Milky Way. Considering it from north to south, it begins with a clear visual split of two roughly parallel milky lines starting at the constellation Cygnus (left on Figure 1, above). The western line runs through Aquila and the eastern line moves through Serpens near Ophiuchus. They merge in the bow of Sagittarius and the tail of Scorpio. From this point, as the merged line passes over the leg of Centaurus it becomes a less well-defined cloudy mass with black gaps, and finally a somewhat clear band around the area of the Southern Cross. The milky edges next to the Dark Rift are dense.

The dense milky section outside the Dark Rift starts north of Cygnus and moves onwards to Cepheus. At its northernmost point, as it runs through Cassiopeia, it turns south and moves through Perseus and Auriga.

The opaque or fainter band begins just after Auriga and runs from the feet of Gemini, through the area between Canis Major with its bright star Sirius and Orion, touching on his club. From there, it moves down to the keel of the Argo and then into the legs of Centaurus onto the stars of the Southern Cross, where the density of the milk phenomenon begins to increase as the Dark Rift begins.

These three sections will all have a unique relationship with a given location. Understanding the ways of the Milky Way and how it relates to a given landscape can give the cultural astronomer a new approach to a site while also reducing the desire to find a single orientation. Indeed, the Milky Way offers a dynamic visual which can be seen like a fuzzy creature rising and lowering and dancing on mountains, hiding in valleys and extending rivers into the sky.

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