

An examination of the chronology of RgVeda based on astronomical references using Planetarium Software

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Introduction

It has been well known that more than a hundred years ago Jacobi and Tilak independently arrived at the conclusion that astronomical references in RgVeda can lead to a determination of the chronology of RgVeda. This topic has been discussed extensively in the literature. Recently Talageri has published an absolute chronology for RgVeda based on his analysis of RgVeda and Avesta. He has also established a relative chronology for different *maṇḍala*-s(Books) of the RgVeda. It will be interesting to examine this chronology in the light of the chronology based on astronomical methods using Planetarium software.

Talageri's Chronology

Talageri arrives at the following chronology for the Books of RgVeda:

Early	VI, III, VII	3400-2600 BCE
Middle	IV, II, middle portion of I	2600-2200 BCE
Late	V, VIII, IX, X and rest of I	2200-1400 BCE

Key References for the astronomy based chronology

Although there are literally hundreds of references on the astronomical method, we restrict our consideration to the following references as being the most pertinent for purposes of this brief report:

Tilak, Jacobi, Dixit, Sengupta.

The astronomical references considered most pertinent and treated in the above key references are the legends of *ṛbhu*-s, legend of *vr̥ṣākapi*, the legend of *maṇḍūka*-s, the legend of *yama* and his two dogs, the solar eclipse attributed to sage *atri*, and finally the occurrence of Vernal equinox in *kṛttikā*, *mṛgaśirā*, *ārdrā*, and *punarvasu* .

The legend of *ṛbhu*-s

ṛbhu-s occur in eleven *sūktas* in RgVeda, I. 20, I. 110, I. 161, I. 164, IV. 33- IV.-39.

ṛbhu-s are three in number, *ṛbhu*, *vibhvan* and *vāja*. They represent the three seasons of the year (lunar year of 354 days) at the end of which they take rest for 12 days in the house of *aghoya* (the unconcealable, the sun). They are awakened from their sleep and *vasta* gives the information that they were awakened by the hound.

Tilak interprets this legend as referring to the time when the year commenced with equinox in Canis Major.

The legend of *vr̥ṣākapi*

The legend appears in RgVeda X.86 and is not an easy hymn to understand. Tilak gives a long verse by verse discussion of this hymn and concludes that the import of the legend can be understood by taking *vr̥ṣākapi* to represent the sun at vernal equinox when the dog star started the equinoctial year. According to Tilak, this means vernal equinox occurring at Orion.

However, Sengupta interprets the *ṛbhu* legend as referring to the heliacal rising of Canis Major after the summer solstice.

The legend of *maṇḍūka*-s

The so-called ‘Frog Song’, is the famous *sūkta* in RgVeda, VII.103. Jacobi finds in this *sūkta* a reference to the beginning of the year in the rainy season, which occurs after the summer solstice. According to Jacobi, the first rainy month was *Bhādrapada*, the full moon near the *nakṣatra proṣṭhapada* with the summer solstice occurring in the *uttaraphālgunī nakṣatra*. Jacobi finds support for his argument from the ritual of *upākāṇa* mentioned in the *dharma* and *gṛhya sūtra*-s.

As Law has pointed out, this hymn VII.103 (considered a late hymn by Macdonnell) should not be considered in isolation, but along with two previous hymns, VII.101 and 102. These three are prayers addressed to *parjanya* for rain. *Nirukta* also indicates that this hymn is an invocation by *Vasiṣṭha* to *parjanya* for rainfall. Law indicates that summer solstice in *uttaraphālgunī* also corresponds to vernal equinox in *mṛgaśiras*.

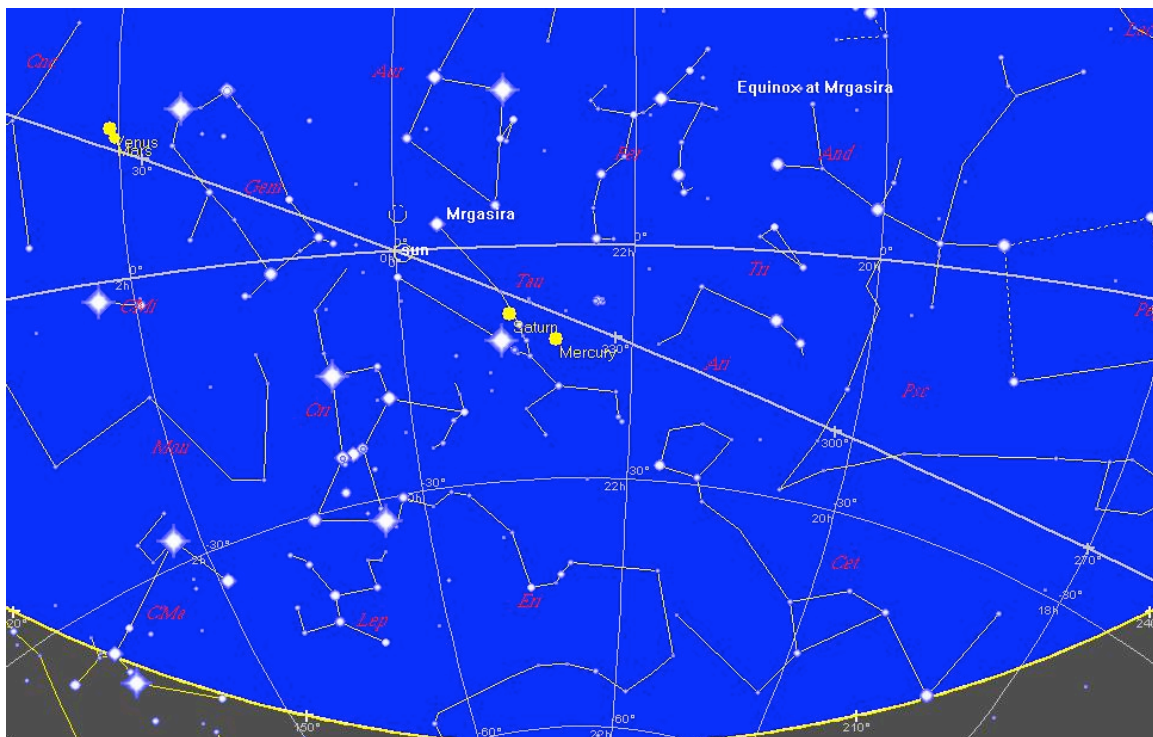


Figure 1 Equinox at Mrgasira (zeta Tau) 4240 BCE

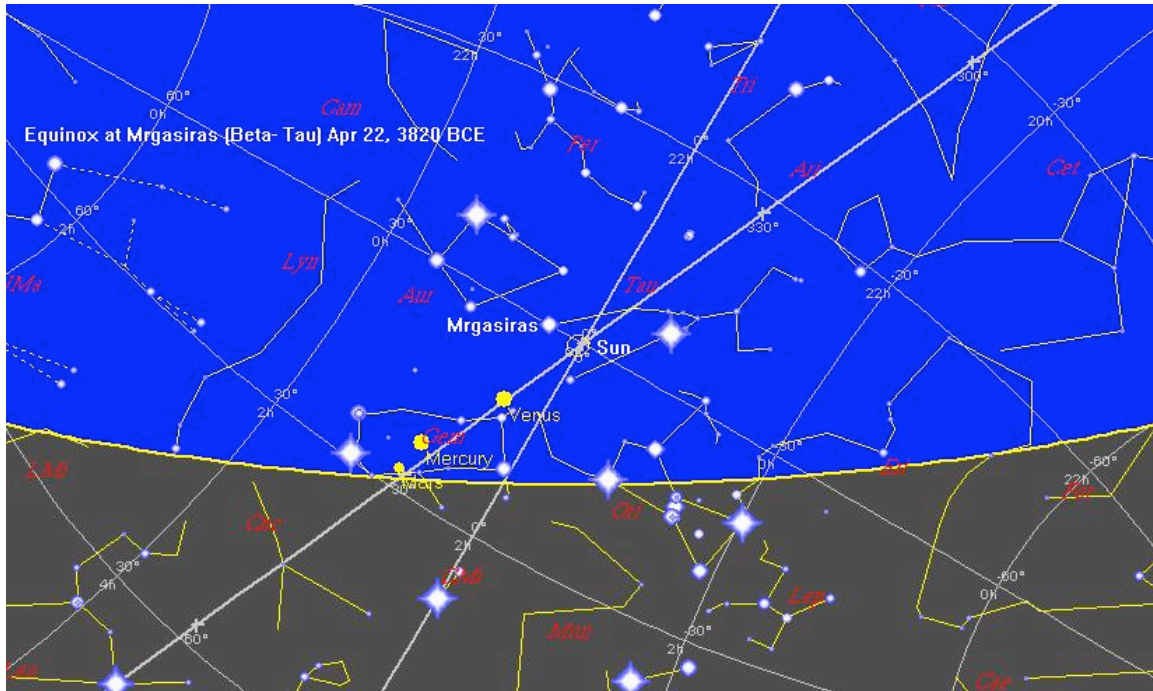


Figure 2 Equinox at Mrgasira (beta-Tau) 3820 BCE

This is based on the new identification of *mṛgaśiras* with Beta-Tau rather than Lambda-Ori, as the former is closer to the Ecliptic and brighter.

The legend of *yama* and his two dogs

This legend occurs in RgVeda X.14 , in the following two verses :

“pass by a secure path beyond the two spotted four-eyed dogs, the progeny of *saramā*, and join the wise *pitr*-s who rejoice fully with *yama*.

Entrust him, o king, to thy two dogs which are thy protectors, *yama*, the four-eyed guardians of the road, renowned by man, and grant him prosperity and health.” (Wilson,s translation)

The astronomical interpretation according to Sengupta, is that the two stars, α -Canis Minoris and α -Canis Majoris pointed to the south celestial pole. In other words, this referred to a time when the two stars crossed the meridian at the same time or, the two had the same right ascension.

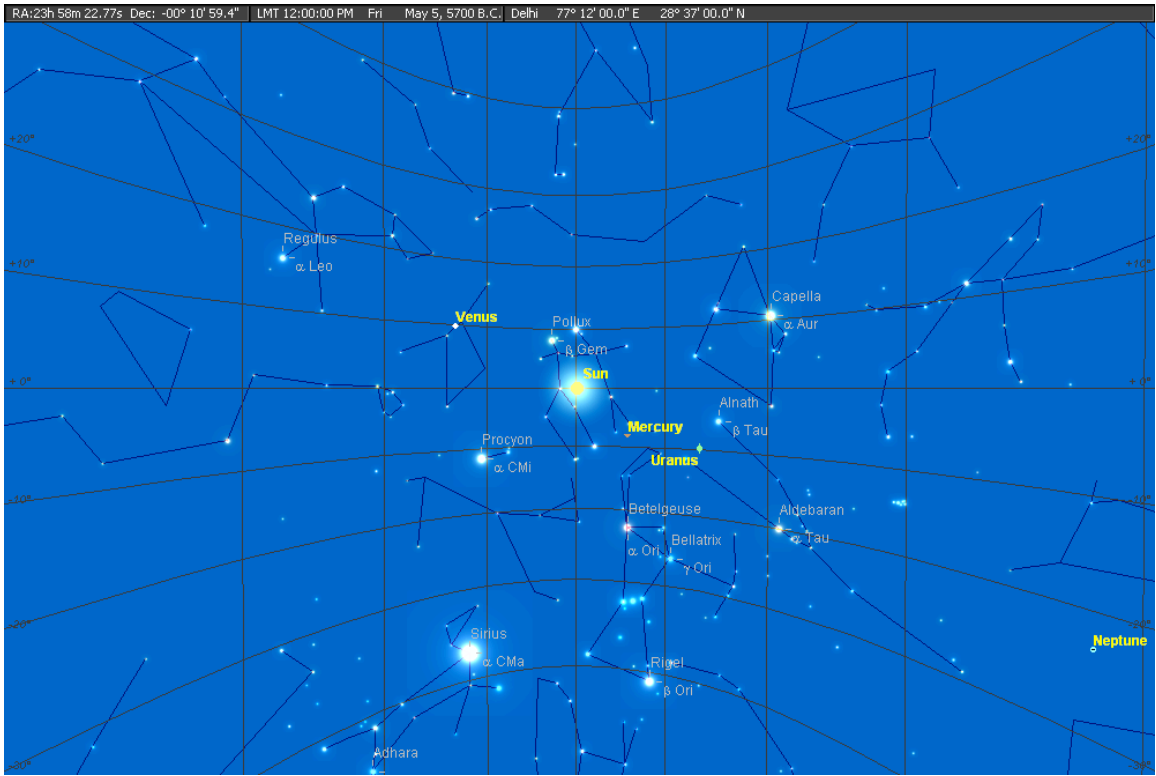


Figure 3. Equinox at Punarvasu 5700 BCE

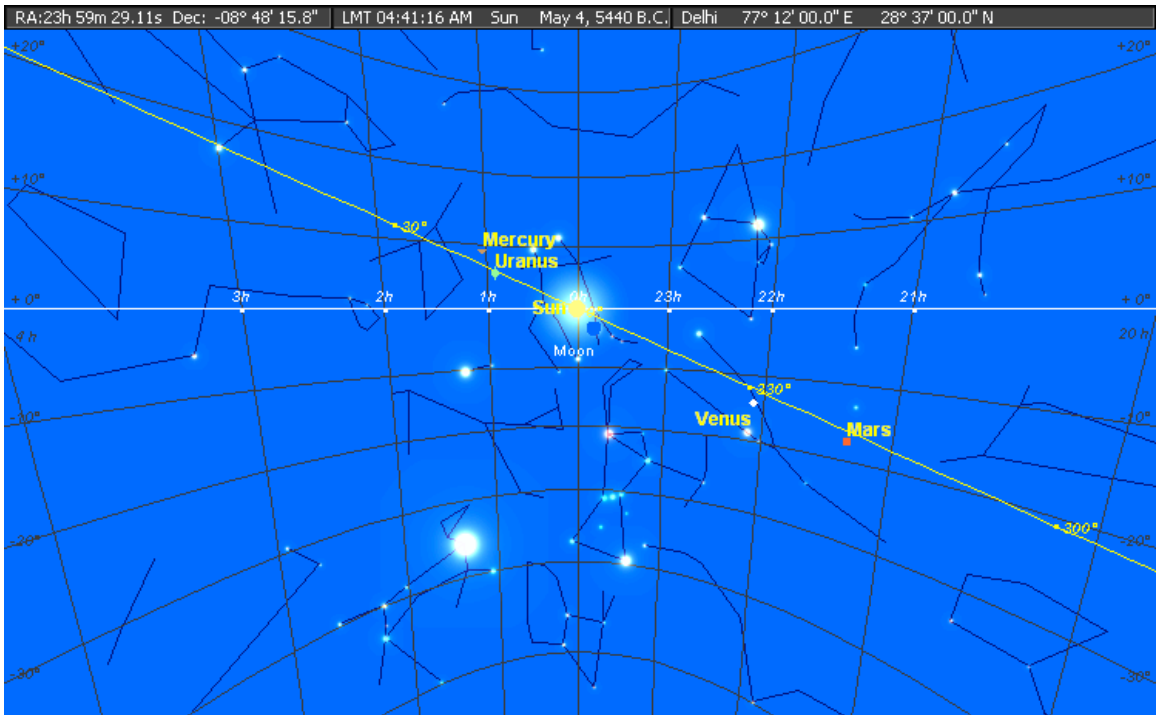


Figure 4. Equinox at Ardra May 4, 5440 BCE

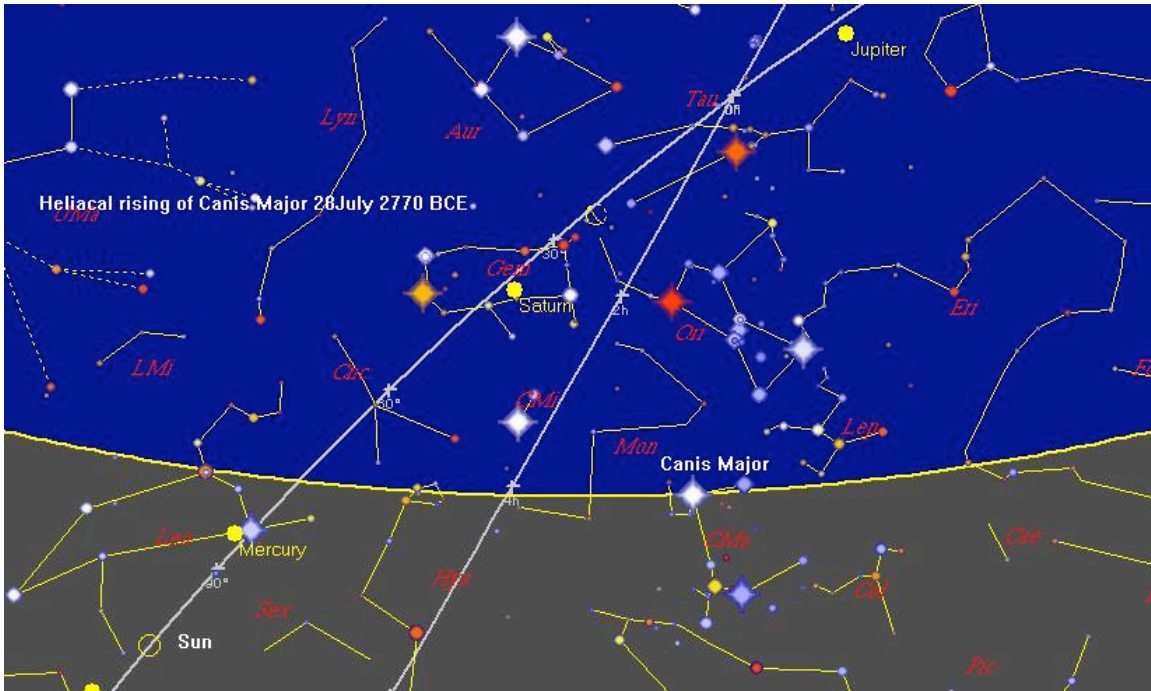


Figure 5. Heliacal rising of Canis Major 12 days after summer solstice. The sun is 18 degrees below the horizon when the star rises. The year turns out to be 2770 BCE

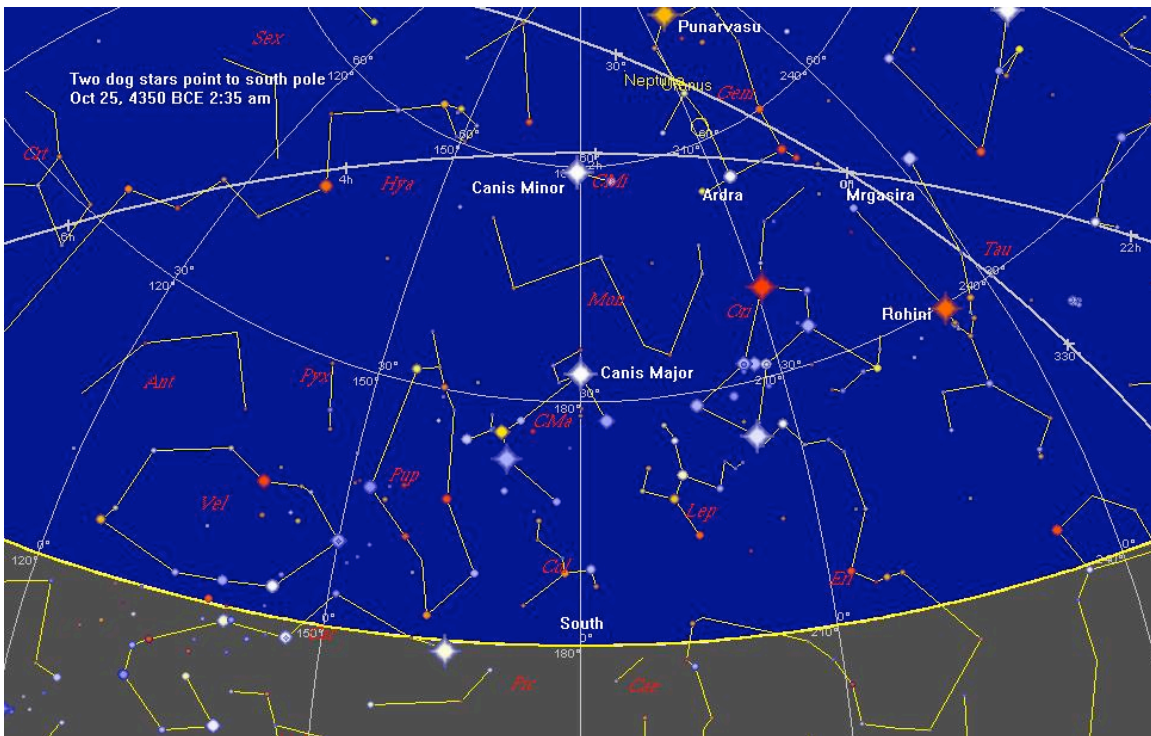


Figure 6. Two dogstars point to south pole 4350 BCE

The solar eclipse observed by *atri*

A solar eclipse observed by *atri* is described in RgVeda V.40 the first attempt to date it was made by Ludwig. Sengupta determines the date of this eclipse to be July 26, 3928 BCE and regards this as also the date of *atri*. It may be noted that there are many places in RgVeda where reference is made to *atri*, including the following: I.51.3, I.112.7, I.116.8, I.119.6, I.139.9, I.180.4, I.183.5, V. 73.6-7, VII. 68.5, VII.71.5, VIII.35.19, VIII.36.7, VIII.42.5, VIII.62.3-8, X.39.9,X.143.1-3,X.150.5. In particular, the legend of *aśvini*-s occurs in V. 73.

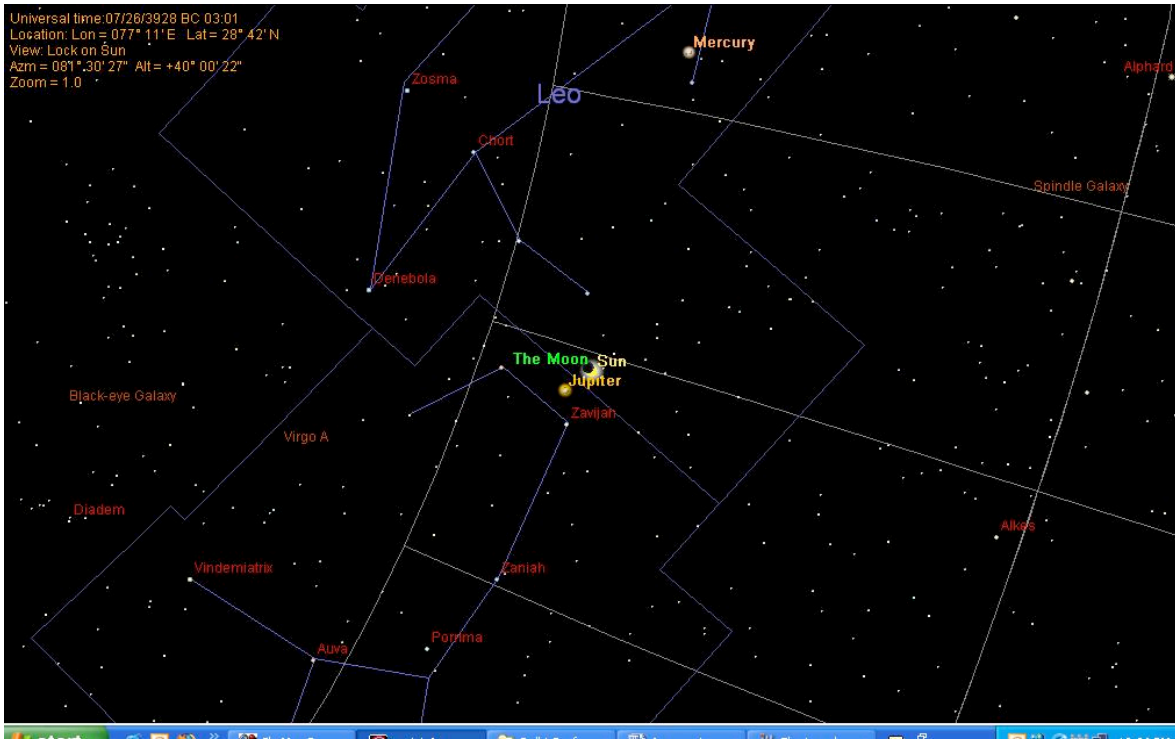


Figure 7. Solar eclipse at Uttaraphalguni July 26, 3928 BCE

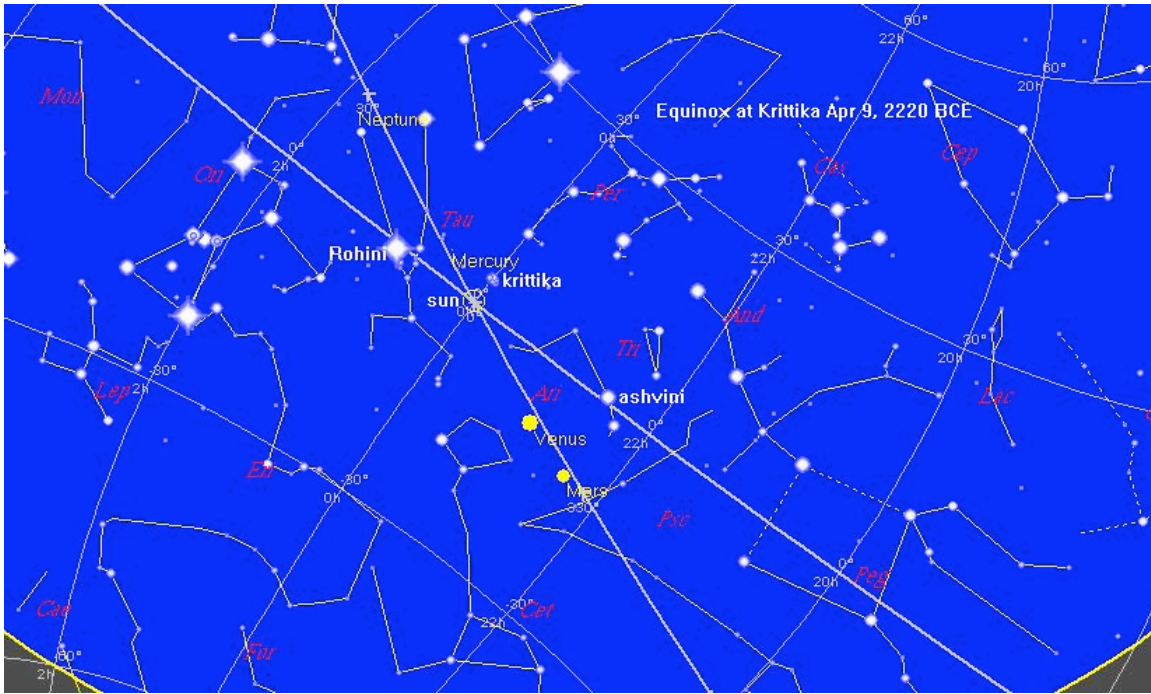
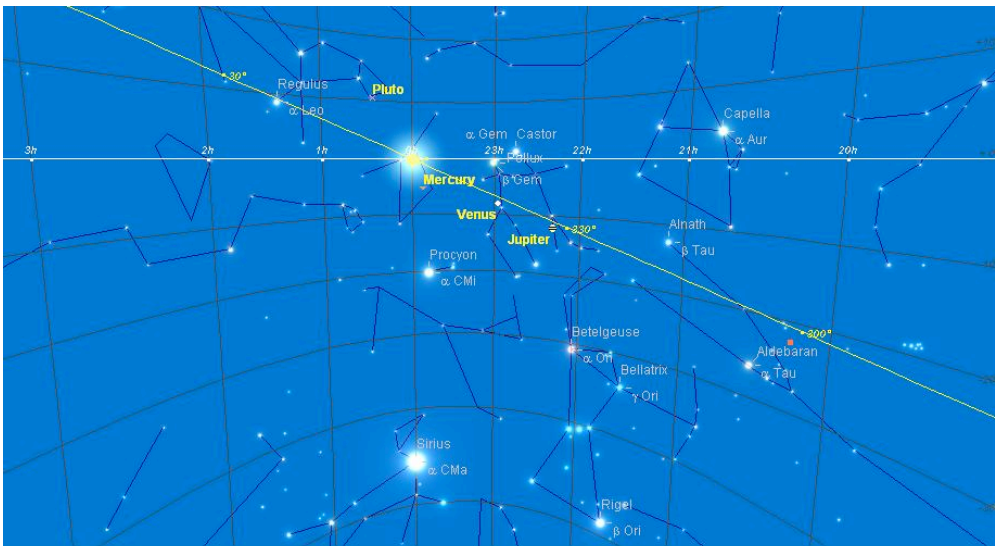


Figure 8. Equinox at Krittika 2220 BCE

The following sky chart in figure 9 shows the occurrence of autumnal equinox at canis major, in 7240 BCE



Discussion

The dates derived from astronomical references span a range from 7000 BCE-2200 BCE. The references are derived from almost all the books of RgVeda. These dates are consistent with the date of Mahabharata war derived on the basis of astronomical references and planetarium software by the author. However, the range of dates for RgVeda based on astronomical references and verified by planetarium software does not agree with either the relative or absolute chronology proposed by Talageri

Acknowledgement

The figures 1,2,5,6, and 8 were generated by SkyMapPro software, 3,4 and 9 were generated by SkyGazer and figure 7 was produced by Redshift 5 software.

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