Tycho Brahe's Mars Observations

Source: Tychonis Brahe Dani Opera Omnia
Imput by: Wayne Pafko (March 24, 2000)
[MS] = Mars Symbol (you know…the "male" sign)

Year	Day	Time	Quote	Volume
1582	DIE 12 NOUEMBRIS, MANE.		Declinatio [MS] 23 7 B	10
1582	DIE 30 DECEMBRIS		Afc. R. [MS] 107o 56' Declin. 26o 36'	10
1582	DIE 27 DECEMBRIS		declinatio [MS] 26o 22 1/3' et Afcenfio	10
1583	DIE 18 JANUARIJ, VESPERI.		Declinatio 27 18 minus bona	10
1584	DIE 13 NOUEMBRIS, A.M.	H.13 26 P.M.	Declinatio [MS] B. 15 54	10
1584	DIE 27 NOUEMBRIS	H.2 15'	Declinatio [MS] 14 42	10
1584	DIE 20 DECEMBRIS AD VESPERAS.		Decl. [MS] (erat prope horizont.) 14 24	10
1584	DIE 21 DECEMBRIS AD VESPERAS.		Declinatio [MS] 14 21 1/2	10
1584	DIE 21 DECEMBRIS AD VESPERAS.		Declinatio [MS] 14 21 1/4	10
1585	DIE 7 JANUARIJ.		Declin. [MS] I 15 35 II 15 35	10
1585	DIE 9 JANUARIJ.	A.M.	Decl. [MS] 15 50 per Arm. Bor.	10
1585	Die 14 Januarij	H. 16 M. 40 P.M.	Decl. eius B. 16 27	10
1585	Die 22 Jan.	H.14 55 P.M.	Decl. [MS] B. 17 31 0	10
1585	Die 31 Jan. circa mediam noctem.		Decl. [MS] Sept. 18 43 0	10
1585	DIE 3 FEBRUARIJ.	H.9 M.43	Decl. [MS] fept. 19 1 1/6 per Armillas /	10
1585	DIE 3 FEBRUARIJ.	H.9 M.39	Declinatio [MS] per Armillas Boreales 1	10
1585	Die 3 Feb.	H. 6 1/4 P.M.	Declinatio [MS] 19 2 0	10
1585	DIE 4 FEBRUARIJ.	H.9 M.14	Decl. [MS] fept. 19 9 3/4 per Armillas I	10
1585	DIE 4 FEBRUARIJ.	H.8 M.16	Decl. [MS] 19 8 per Armilas Auftrales.	10
1585	DIE 4 FEBRUARIJ.	H.6.40 P.M.	Decl. [MS] B. 19 9 45.	10
1585	DIE 17 FEBRUARIJ.	H.9.45	Decl. [MS] 20 21 45	10
1585	DIE 17 FEBRUARIJ.	H. 9 1/2	Decl. [MS] 20 21 1/2	10
1585	DIE 17 FEBRUARIJ.	H. 9 5/6	Decl. [MS] 20 21 1/2 B.	10
1585	Die 12 Martij	H. 9 1/3 P.M.	Declinatio [MS] B. 20 32 3/4	10
1585	Die 16 Martij	H. 7 5/6	Declin. [MS] B. 20 23 0	10
1585	Die 19 Marij	H. 8 1/4	Declin. [MS] 20 5 30	10
1585	DIE 26 MARTIJ.	H. 8 1/3 P.M.	Declinatio [MS] B. 19 44 0	10
1585	DIE 15 APRILIS.	H. 9 48'	Decl. [MS] Bor. 17o 38 2/3'.	10
1585	Die 15 Aprils	H. 9 50	Declin. [MS] B. 17 38 3/4	10
1585	DIE 26 APRILIS.	H. 9 50	Decl. [MS] B. 16 8 1/2 per Armillas Bo	10
1585	DIE 7 MAIJ.	H. 11 24 1/2	Declinatio [MS] 14 22 1/2 per Armillas	10
1585	DIE 7 MAIJ.	H. 9 1/3	Decl. [MS] 14 22	10
1585	DIE 7 MAIJ.	H. 11 1/4	Decl [MS] 14 22 1/2 B.	10
1585	DIE 12 MAIJ.		declinatio [MS] B. 13o 30 1/4' per Auft	10
1585	DIE 17 MAIJ.	H.11 30	Decl. [MS] B. 12 38 1/2 per Arm. auft.	10
1585	DIE 18 MAIJ.	H.10 40	Decl. [MS] 12 27 B. per Arm. auft.	10
1586	DIE 23 SEPTEMBRIS.	H.5 M.12 P.M.N.	Declin. [MS] B. 18 5 1/2	11
1586	DIE 24 SEPTEMBRIS A.M.	H.3 M.55	Declin. [MS] Bor. 17 56 1/2	11
1586	DIE 10 OCTOBRIS.	H.2 M.32	Declin. [MS] per Armillas 15 3 3/4 B.	11
1586	DIE 10 OCTOBRIS.	H.2 M.32	alt. pinnac. 15 3 1/2	11
1586	DIE 10 OCTOBRIS.	H.6 M.14	Declin. [MS] B. vno 13 0 1/2	11
1586	DIE 10 OCTOBRIS.	H.6 M.14	alt. pinnac. 13 0 2/3	11
1586	DIE 24 OCTOBRIS.	H.6 M.35	Declin. [MS] B. 12 39 3/4	11

1586	DIE 25 OCTOBRIS A.M.	H.5 M.11	Declinatio [MS] 12 29 1/3	11
1586	DIE 25 OCTOBRIS A.M.	H.5 M.16	Repetita Decl. [MS] 12 29 1/3	11
1586	DIE 25 OCTOBRIS A.M.	H.5 M.32	Declin. [MS] vt prius 12 29 1/3	11
1586	DIE 1 NOUEMBRIS A.M.	H.5 M.6	Declin. [MS] Bor. 11 2 3/4	11
1586	DIE 2 NOUEMBRIS A.M.	H.4 M.46 1/6	Declin. [MS] Bor. 11 3	11
1586	DIE 8 NOUREMBRIS A.M.	H.6 M.34	Declin. [MS] Bor. 10 4 1/2	11
1586	DIE 10 NOUEMBRIS A.M.	H.7 M.20	Declin. Bor. 9 32 1/2	11
1586	DIE 10 NOUEMBRIS A.M.	H.7 M.28 1/2	Repetita Declin. [MS] 9 33	11
1586	DIE 11 NOUEMBRIS A.M.	H.4 M.19 S.50	Declin [MS] Bor. 9 25 1/2	11
1586	DIE 11 NOUEMBRIS A.M.	H.7 M.6 45"	Decl. ex alt. 9 25 0	11
1586	DIE 23 NOUEMBRIS A.M.	H.6 M.15	Declin. [MS] B. vno 7 19 3/4	11
1586	DIE 23 NOUEMBRIS A.M.	H.7 M.24	Declin. [MS] B. vno pinn. 7 19 2/3	11
1586	DIE 23 NOUEMBRIS A.M.	H.7 M.24	altero pinac. 7 19 5/6	11
1586	DIE 1 DECEMBRIS.	H.7 M.35 1/2	Declin. [MS] Bor. 6 2 1/6	11
1586	DIE 1 DECEMBRIS.	H.7 M.35 1/2	Alt. pinnac. 6 2 1/4	11
1586	DIE 16 DECEMBRIS, MANE.	H.6 M.4	Decl. [MS] per Armillas 3 53 1/2	11
1586	DIE 16 DECEMBRIS, MANE.	H.6 M.4	alt. pinn. 3 54	11
1586	DIE 27 DECEMBRIS A.M.	H.4 M.8	Declin. [MS] Bor. vno 2 40	11
1586	DIE 27 DECEMBRIS A.M.	H.4 M.8	alt. pin. 2 40	11
1586	DIE 27 DECEMBRIS A.M.	H.7 M.2 S.50	Declin. Martis repet. 2 38 3/4	11
1586	DIE 27 DECEMBRIS A.M.	H. 3 5/6	Declinatio [MS] tis 2 39 1/2 B.	11
1586	DIE 27 DECEMBRIS A.M.	H.4 0	Declinatio 2 39 2/3 B.	11
1587	DIE 1 JANUARIJ A.M.	H.7 M.8	Declin. [MS] per Armill. fubt. 2 11 1/2	11
1587	DIE 1 JANUARIJ A.M.	H.7 M.8	altero pinnacidio 2 12 1/2	11
1587	DIE 9 JANUARIJ A.M.	H.6 M.35 S.56	Declin. [MS] vno 1 39 1/2	11
1587	DIE 9 JANUARIJ A.M.	H.6 M.35 S.56	altero pinn. 1 39 5/6	11
1587	DIE 10 JANUARIJ A.M.	H. 5 M.15	[MS] Decl. Bor. 1 35 bis, bona	11
1587	DIE 11 JANUARIJ.	H.6 M.48	Declin. 1 31 Bor.	11
1587	DIE 11 JANUARIJ.	H.6 M.48	1 31 1/4 dubia	11
1587	DIE 14 JANUARIJ.	H.7 M.44 1/2	Declin. [MS] B. vno pinn. 1 26	11
1587	DIE 14 JANUARIJ.	H.7 M.44 1/2	alt. pinn. 1 25 1/2	11
1587	DIE 14 JANUARIJ.	H.8 M.0	Repetita Declin. [MS] Bor. vno 1 26	11
1587	DIE 14 JANUARIJ.	H.8 M.0	altero 1 25 1/2	11
1587	DIE 15 JANUARIJ, MANE.	H.4 M.45	Declin. [MS] Bor. vno 1 23 1/2	11
1587	DIE 15 JANUARIJ, MANE.	H.4 M.45	altero 1 23	11
1587	DIE 16 JANUARIJ, A.M.	H.4 M.51	Declinatio [MS] 1g 21' B vnico pinnacidi	11
1587	DIE 26 JANUARIJ, MANE.	H.4 M.28	Declin. [MS] B. vno pinn. 1 16 1/2	11
1587	DIE 26 JANUARIJ, MANE.	H.4 M.28	altero 1 16	11
1587	DIE 26 JANUARIJ, MANE.	H.6 M.8	Declin. [MS] B. vno 1 16 1/2	11
1587	DIE 26 JANUARIJ, MANE.	H.6 M.8	altero pinn. 1 16	11
1587	DIE 28 JANUARIJ, MANE.	H.4 M.25	Decl. [MS] Bor. vno pinn. 1 19	11
1587	DIE 28 JANUARIJ, MANE.	H.4 M.25	altero pinn. 1 18 1/2	11
1587	DIE 28 JANUARIJ, MANE.	H.5 M.10	Repetita declin. [MS] Bor. 1 19	11
1587	DIE 29 JANUARIJ, MANE.	H.5 M.12 2/3	Declinatio [MS] Bor. per Armillas 1 21	11
1587	DIE 29 JANUARIJ, MANE.	H.6 M.14	Repetita decl. [MS] Bor. 1 21 1/2	11
1587	DIE 9 JANUARIJ (FEB???)	H.6 M.0	Declin. [MS] 1 39 3/4 B.	11
1587	DIE 9 JANUARIJ (FEB???)	H.7 M.20	Declinatio B. 1 39 3/4	11
1587	DIE 10 JANUARIJ (FEB???)	H.5 M.6	Decl. [MS] B. 1 34 1/2	11
1587	DIE 10 JANUARIJ (FEB???)	H.5 M.17	Declin. Bor. 1 34 30	11
1587	DIE 14 JANUARIJ (FEB???)	H.7 M.4	Declinatio Bor. 1 25 3/4	11

From Raw to Corrected Observations

Parallax Correction

From the observed angular position to the angular position of the object as observed along a line from it to the center of the Earth; depends on location of observer on the Earth and the distance from the Earth to the observed object *in units of Earth-radii*, for which remotely accurate values did not emerge until after 1680

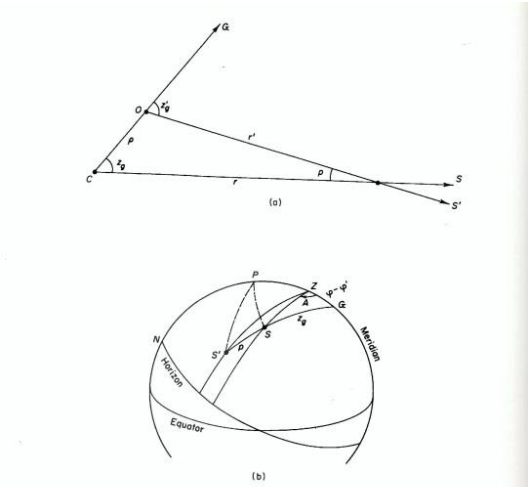


FIG. 10. Geocentric parallax. (a) *C*, center of Earth; *O*, observer; *G*, geocentric zenith; *S*, geocentric direction; and *S'*, topocentric direction. (b) *Z*, geodetic zenith; *P*, celestial pole; and *G*, geocentric zenith.

Atmospheric Refraction Correction

From observed angular position to the angular position of the object as it would be observed in the absence of the optical refraction from the Earth's atmosphere, as classically estimated from motion (primarily of the Sun) after correcting for parallax; uncertainty about this correction gave reason for preferring observations when object is most nearly directly overhead

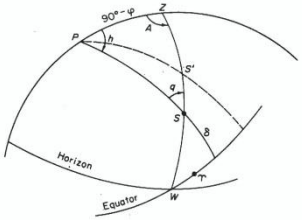
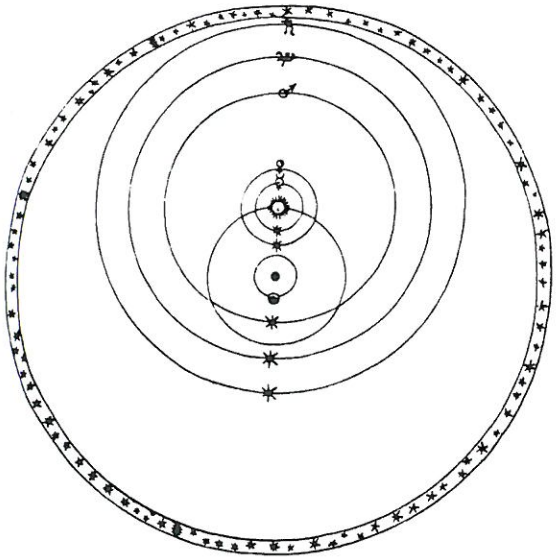
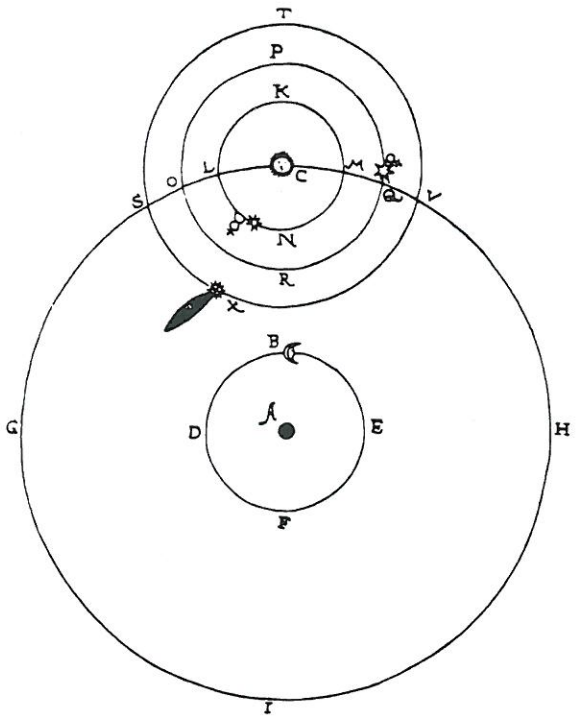


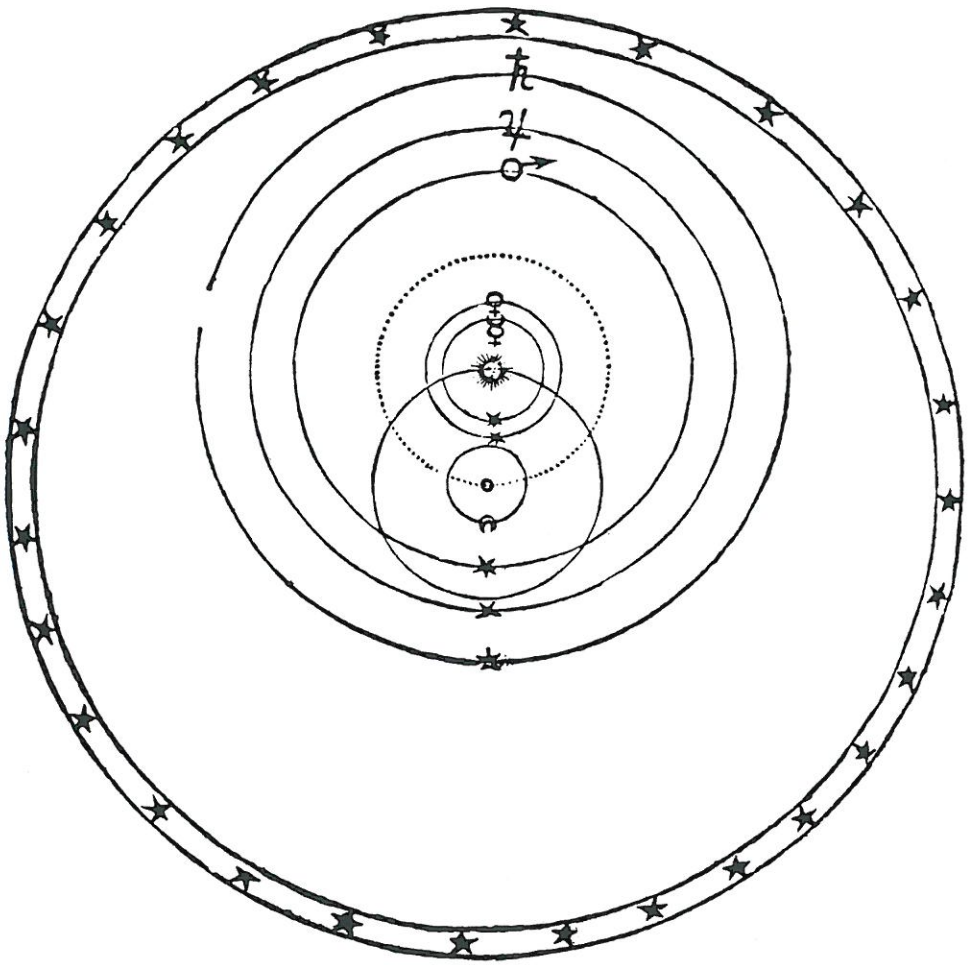
FIG. 15. Refraction in right ascension and declination: *S*, geometric position and *S'* position affected by refraction.



1.4. The Tychonic world system. The Earth is at rest at the centre, encircled by the stars. The five planets orbit around the Sun, while the Sun and the Moon orbit around the Earth.



1.5. The comet of 1577 in relation to the inner bodies of the Tychonic system. Mercury, Venus, and the comet orbit the Sun, while the Sun and the Moon orbit the Earth.



3.4. Gassendi's drawing of the Tychonic system, but with the alternative (Copernican) motion of the Earth added as a dotted curve.