

Celestial Sphere Models 1

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Instructions

PLEASE NOTE! The author has tried to ensure that the following plans are correct, but as of September 6, 2021, he has not tested them yet himself. As mentioned above, this material is distributed **without a warranty**. I recommend that users check it themselves before investing a lot of time and effort into cutting out the paper models.

Any corrections will be gratefully received by the author. Contact information can be found on the title page.

The two models are provided in two versions each, white on black and black on white. They include the 200 brightest stars, except for Polaris, which would have been at an inconvenient location on the models, namely at the north pole.

The separate file [clstsph1_a4.pdf](#) in DIN A4 format contains data for the stars on the models.

The first model is made up of spherical biangles. They should not be folded but rather bent and attached to each other using the tabs on the left side, forming a sphere.

The second model uses “panels”. While the left and right sides of the sections appear to be curved, they are in fact made up of straight lines. The sections should be folded on the horizontal lines (declination) and again attached using the tabs. The result is an irregular polyhedron approximating a sphere.

The “globes” on pages 11–12 illustrate how the positions of the stars on the spherical biangles and panels were derived.

Assembling the models should present no particular difficulty except possibly for keeping the spherical biangles from slipping while attaching them to each other. A fast-setting glue might be helpful in this case, and/or patience.

The longitudes of the stars are found by rotating counter-clockwise from right ascension 0h 0' 0". I believe that the result of this is that the model represents the celestial sphere as seen by an observer looking at it from the outside. I hope someone will correct me if I'm wrong. The famous early star atlas of Johannes Hevelius from 1690 also shows the stars in this way¹.

However, in principle it wouldn't be difficult to reverse the representation. The difficulty would be in reversing the labels, but I think this problem could be solved.

The plans could also be generated for larger or smaller models. In addition, the limit of 200 stars is arbitrary and was chosen to correspond to the size of these versions of the models (sphere radius 7cm). As of September 6, 2021, the database table containing the star data has entries for over 1400 stars. However, not all of the entries contain all of the necessary data yet. If you want to make models of a different size and/or with a different number of stars, please send an email to the author at the address listed above.

Greek Alphabet

α	alpha	ν	nu
β	beta	ξ	xi
γ	gamma	o	omicron
δ	delta	π, ϖ	pi
ϵ, ε	epsilon	ρ, ϱ	rho
ζ	zeta	σ, ς	sigma
η	eta	τ	tau
θ, ϑ	theta	υ	upsilon
ι	iota	ϕ, φ	phi
κ	kappa	χ	chi
λ	lambda	ψ	psi
μ	mu	ω	omega

Constellations

Full name, genitive, abbreviation.

2. Andromeda , Andromedae, And	22. Cetus , Ceti, Cet	42. Horologium , Horologii, Hor
3. Antlia , Antliae, Ant	23. Chamaeleon , Chamaeleontis, Cha	43. Hydra , Hydrae, Hya
4. Apus , Apodis, Aps	24. Circinus , Circini, Cir	44. Hydrus , Hydri, Hyi
5. Aquarius , Aquarii, Aqr	25. Columba , Columbae, Col	45. Indus , Indi, Ind
6. Aquila , Aquilae, Aql	26. Coma Berenices , Comae Berenices, Com	46. Lacerta , Lacertae, Lac
7. Ara , Arae, Ara	27. Corona Borealis , Coronae Borealis, CrB	47. Leo , Leonis, Leo
8. Aries , Arietis, Ari	28. Corona Australis , Coronae Australis, Cra	48. Leo Minor , Leonis Minoris, LMi
9. Auriga , Aurigae, Aur	29. Corvus , Corvi, Crv	49. Lepus , Leporis, Lep
10. Boötes , Boötis, Boo	30. Crater , Crateris, Crt	50. Libra , Librae, Lib
11. Caelum , Caeli, Cae	31. Crux , Crucis, Cru	51. Lupus , Lupi, Lup
12. Camelopardalis , Camelopardalis, Cam	32. Cygnus , Cygni, Cyg	52. Lynx , Lyncis, Lyn
13. Cancer , Cancri, Cnc	33. Delphinus , Delphini, Del	53. Lyra , Lyrae, Lyr
14. Canes Venatici , Canum Venaticorum, CVn	34. Dorado , Doradus, Dor	54. Mensa , Mensae, Men
15. Canis Major , Canis Majoris, CMa	35. Draco , Draconis, Dra	55. Microscopium , Microscopii, Mic
16. Canis Minor , Canis Minoris, CMi	36. Equuleus , Equulei, Equ	56. Monoceros , Monocerotis, Mon
17. Capricornus , Capricorni, Cap	37. Eridanus , Eridani, Eri	57. Musca , Muscae, Mus
18. Carina , Carinae, Car	38. Fornax , Fornacis, For	58. Norma , Normae, Nor
19. Cassiopeia , Cassiopeiae, Cas	39. Gemini , Geminorum, Gem	59. Octans , Octantis, Oct
20. Centaurus , Centauri, Cen	40. Grus , Gruis, Gru	60. Ophiuchus , Ophiuchi, Oph
21. Cepheus , Cephei, Cep	41. Hercules , Herculis, Her	61. Orion , Orionis, Ori

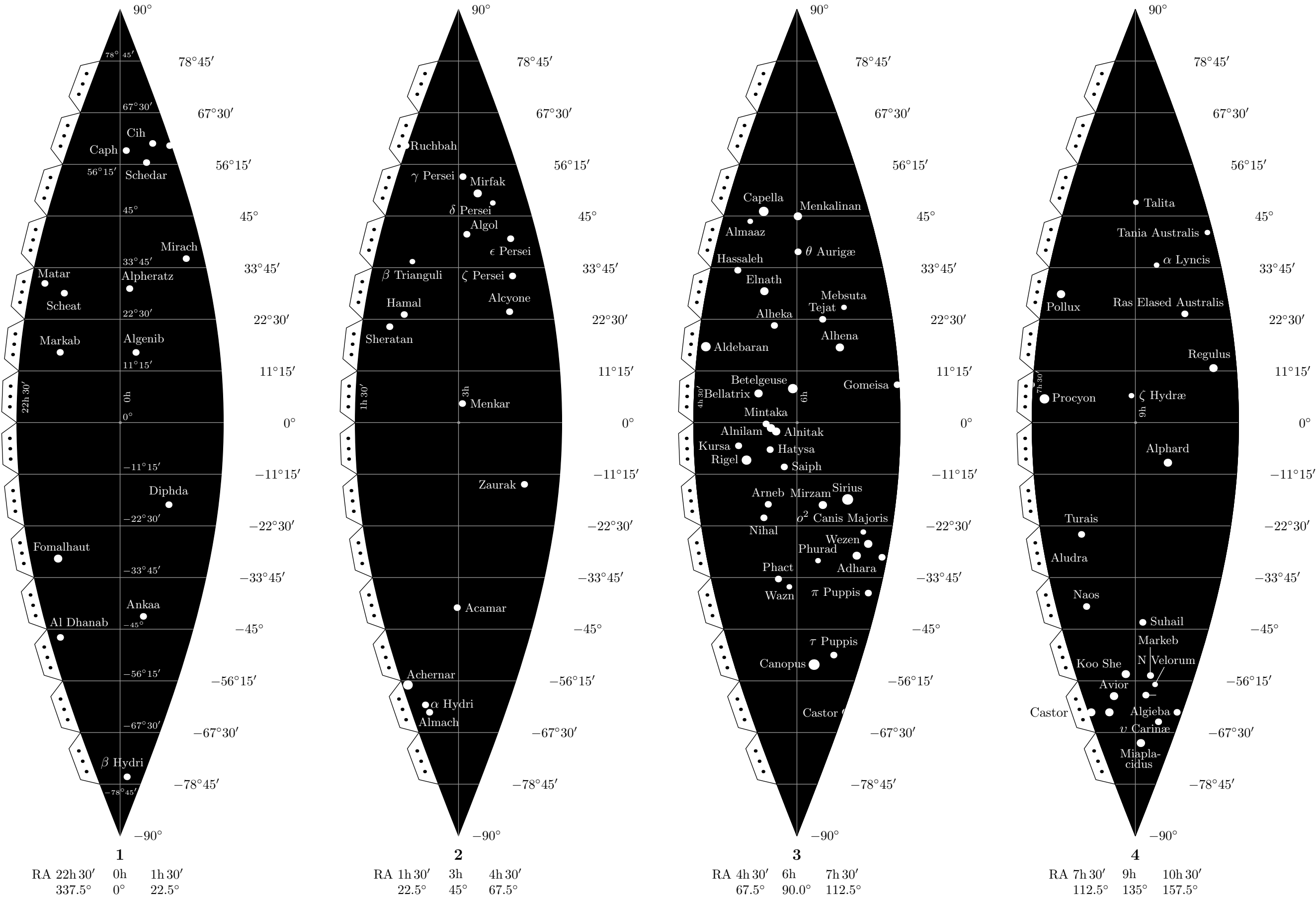
¹ Menzel, Donald H. and Pasachoff, Jay M., *Stars and Planets. Peterson Field Guides*, p. 21.

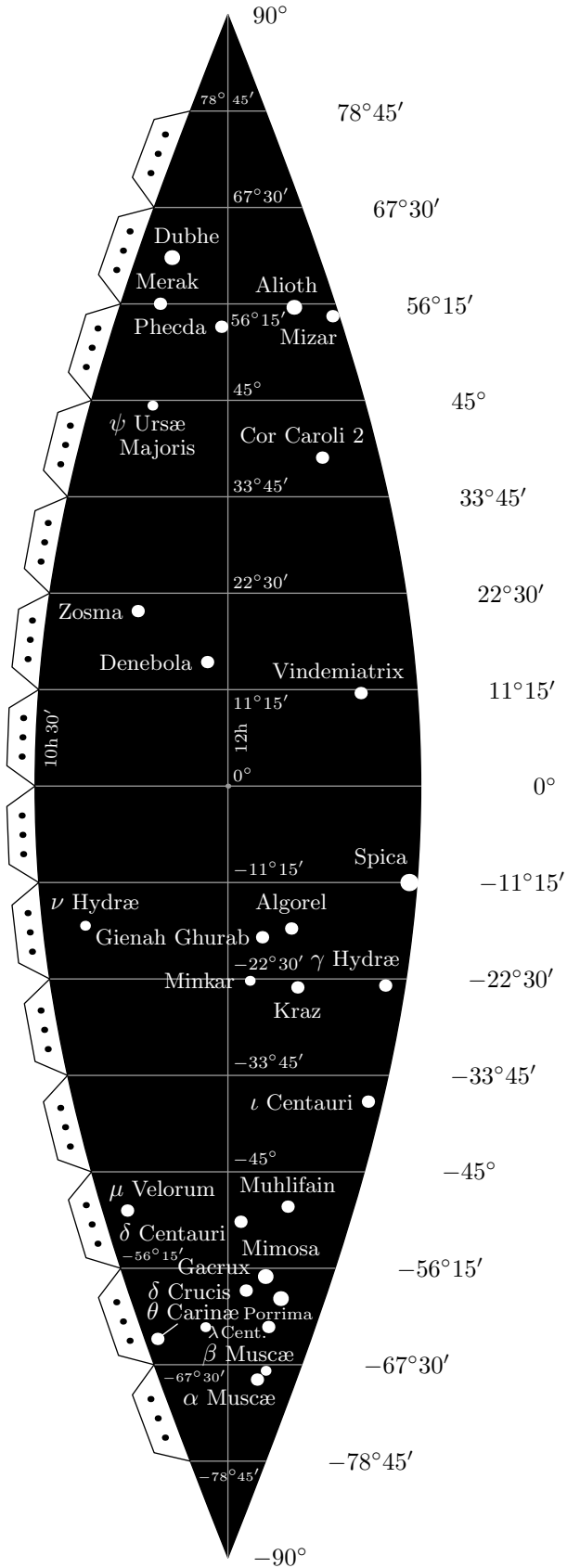
- 62. **Pavo**, Pavonis, Pav
- 63. **Pegasus**, Pegasi, Peg
- 64. **Perseus**, Persei, Per
- 65. **Phoenix**, Phoenicis, Phe
- 66. **Pictor**, Pictoris, Pic
- 67. **Pisces**, Piscium, Psc
- 68. **Piscis Austrinus**, Piscis Austrini, PsA
- 69. **Puppis**, Puppis, Pup
- 70. **Pyxis**, Pyxidis, Pyx
- 71. **Reticulum**, Reticuli, Ret

- 72. **Sagitta**, Sagittae, Sge
- 73. **Sagittarius**, Sagittarii, Sgr
- 74. **Scorpius**, ScorpII, Sco
- 75. **Sculptor**, Sculptoris, Scl
- 76. **Scutum**, Scuti, Sct
- 77. **Serpens**, Serpentis, Ser
- 78. **Sextans**, Sextantis, Sex
- 79. **Taurus**, Tauri, Tau
- 80. **Telescopium**, Telescopii, Tel
- 81. **Triangulum**, Trianguli, Tri

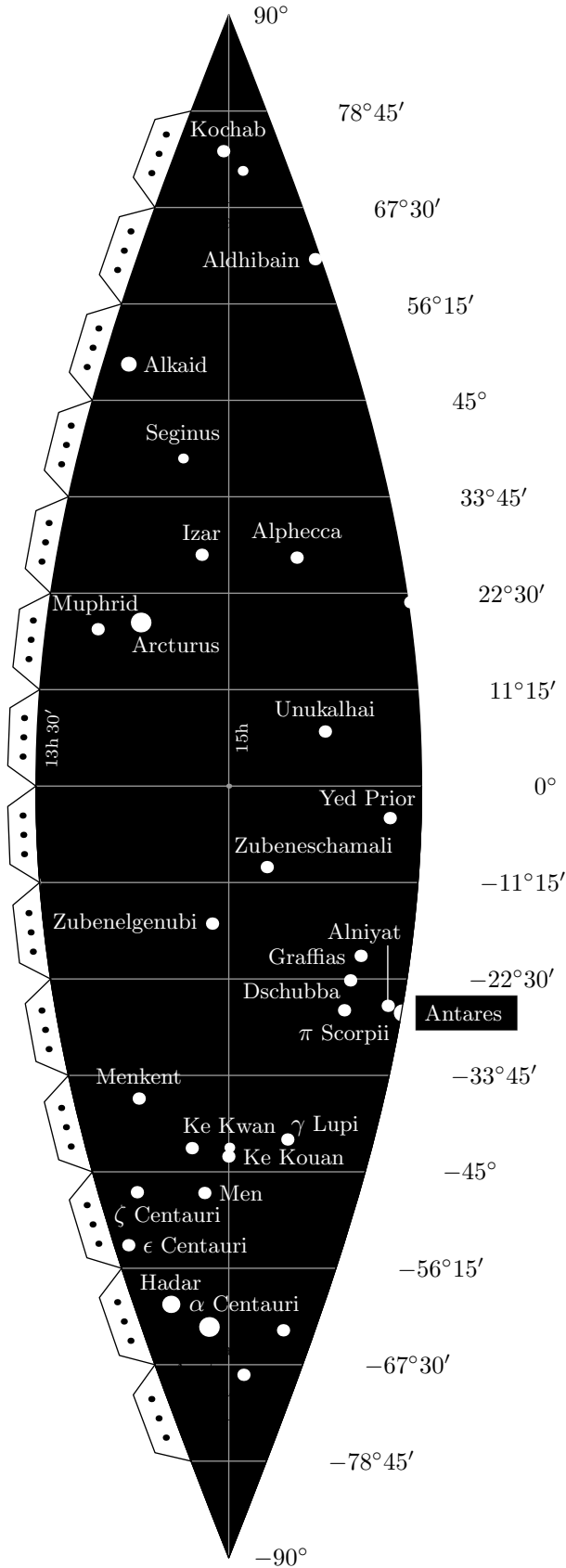
- 82. **Triangulum Australe**, Trianguli Australis, TrA
- 83. **Tucana**, Tucanae, Tuc
- 84. **Ursa Major**, Ursae Majoris, UMa
- 85. **Ursa Minor**, Ursae Minoris, UMi
- 86. **Vela**, Velorum, Vel
- 87. **Virgo**, Virginis, Vir
- 88. **Volans**, Volantis, Vol
- 89. **Vulpecula**, Vulpeculae, Vul

Spherical Biangles

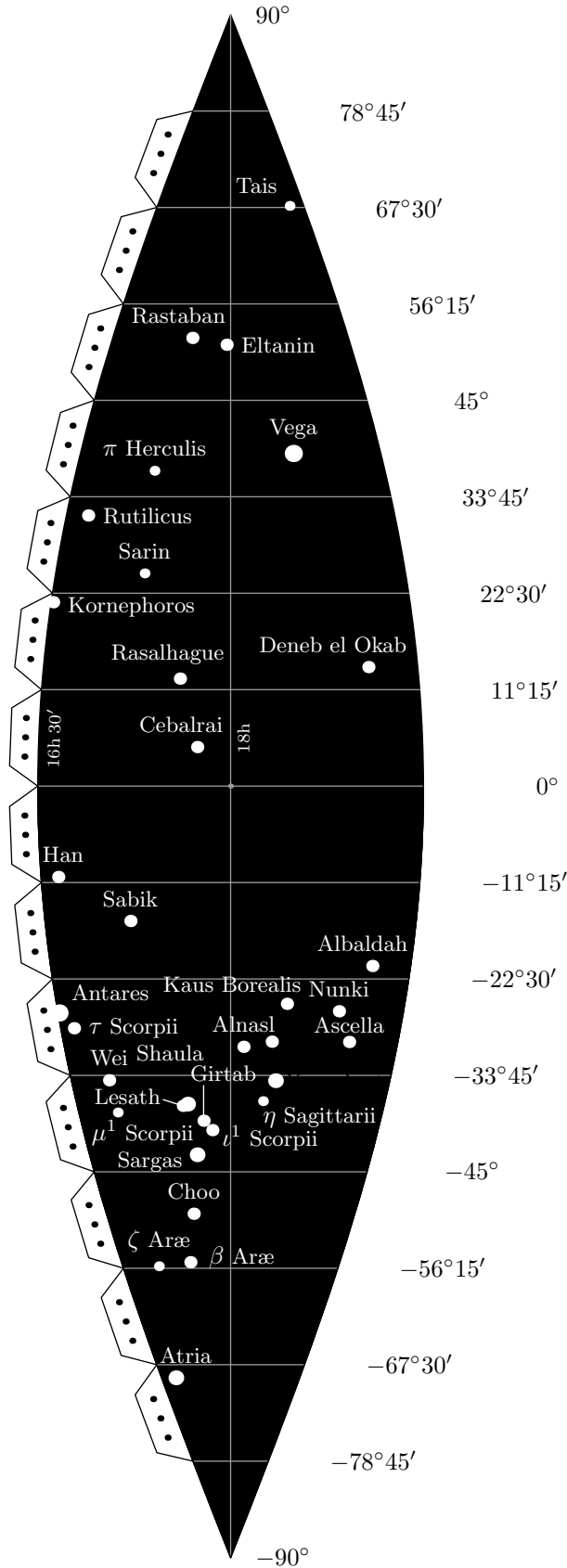




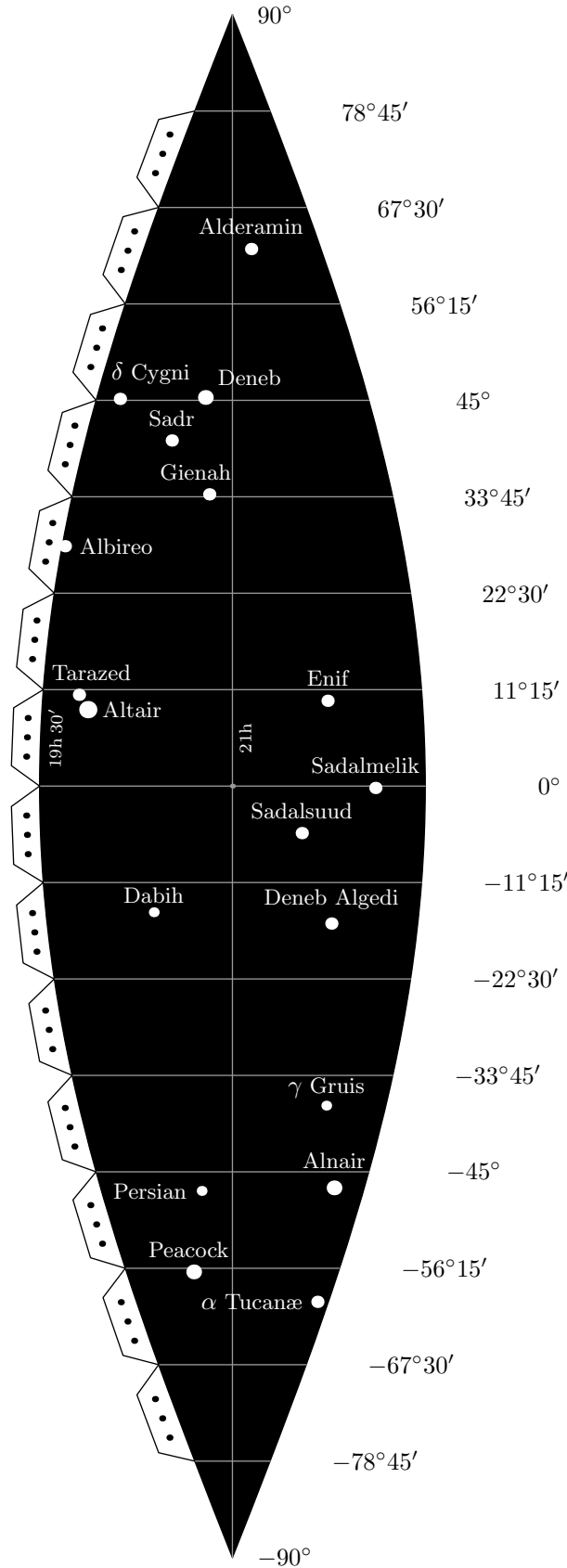
5
RA 10h 30' 12h 13h 30'
157.5° 180° 202.5°



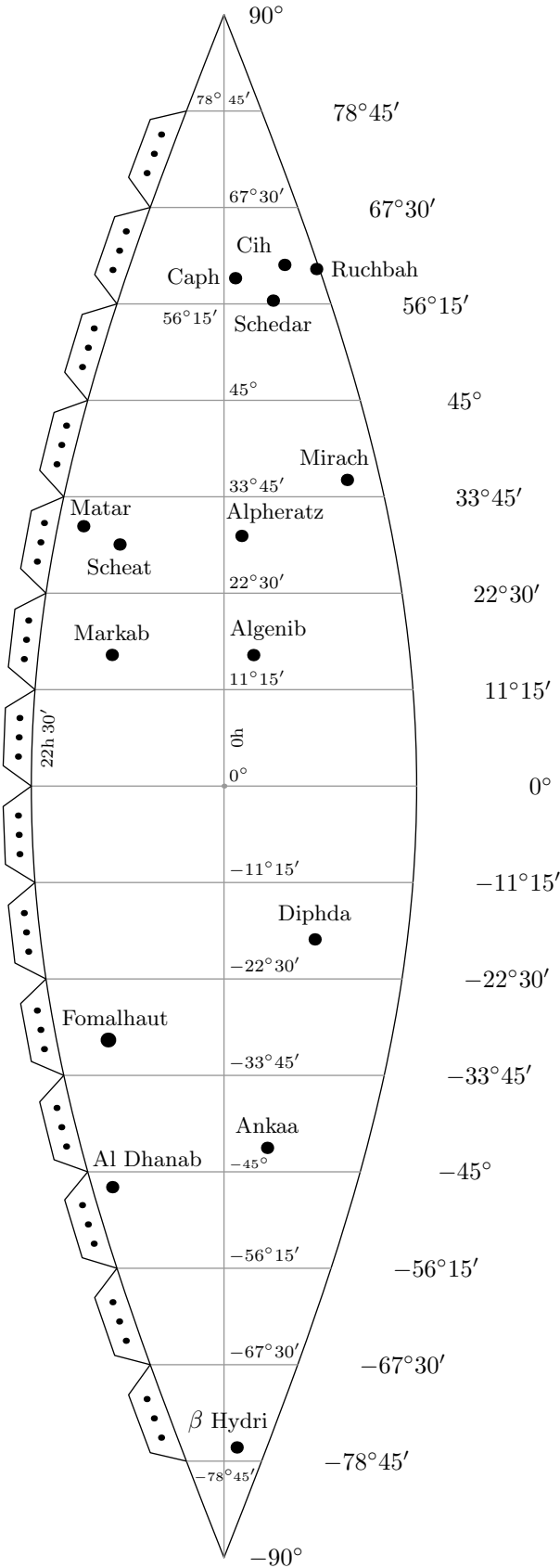
6
RA 13h 30' 15h 16h 30'
202.5° 225° 247.5°



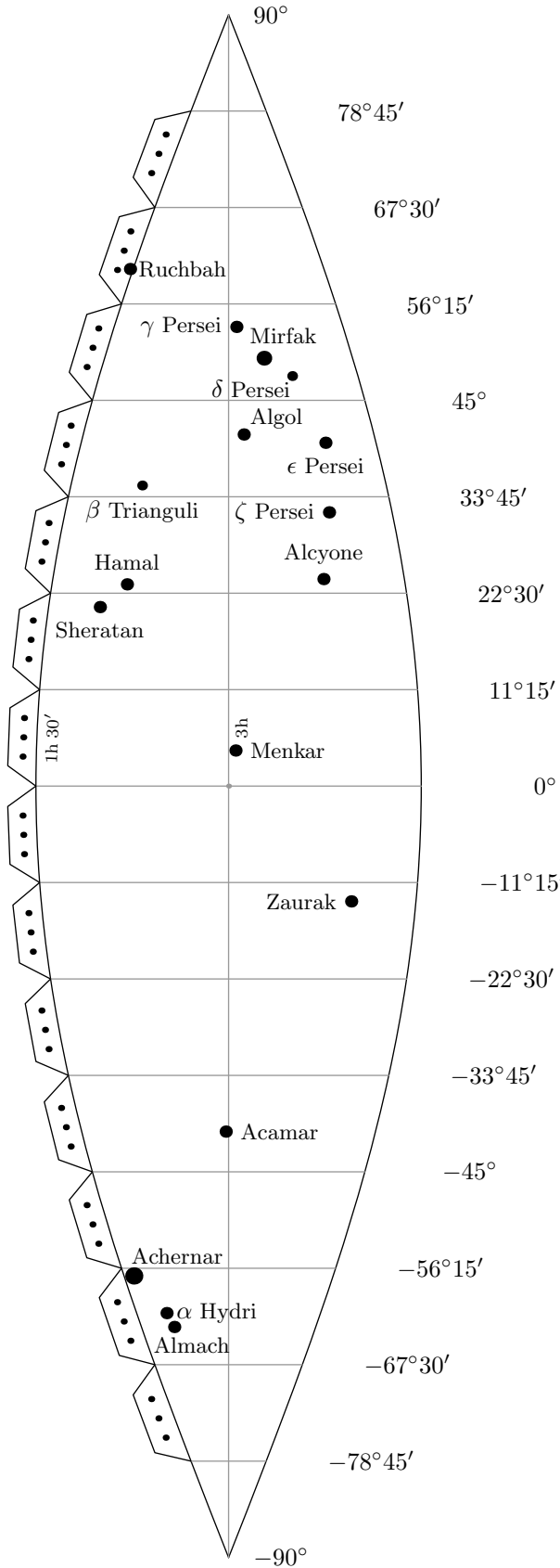
7
RA 16h 30' 18h 19h 30'
247.5° 270° 292.5°



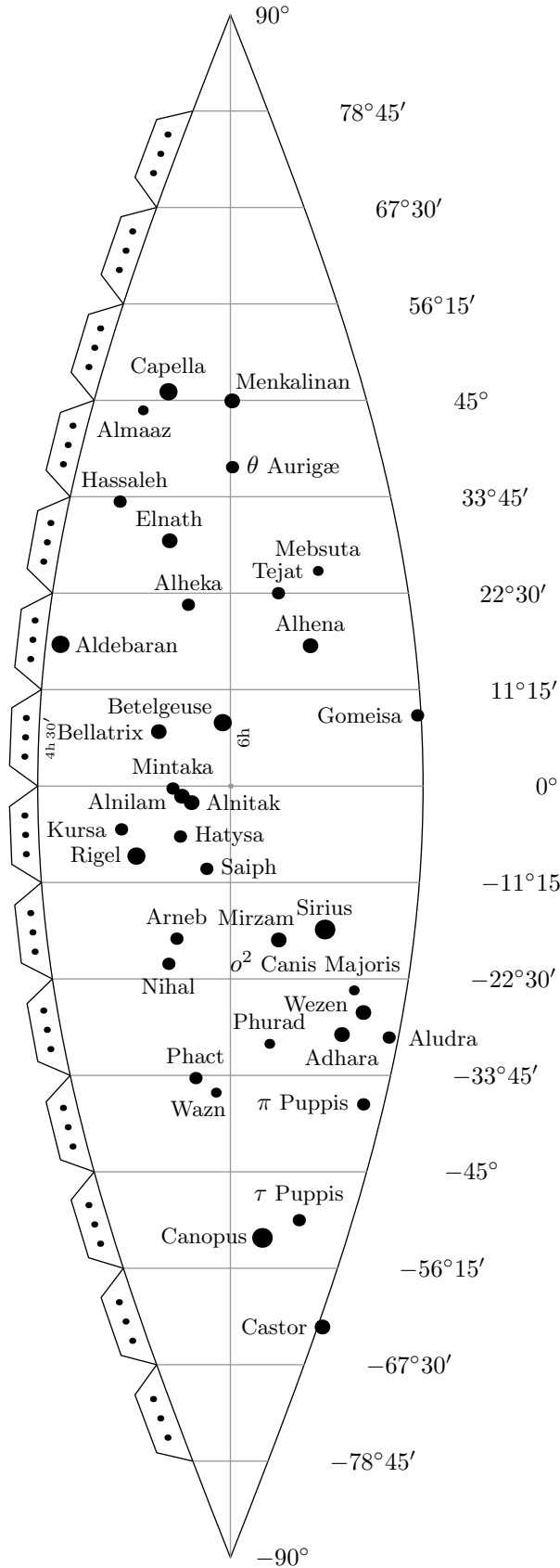
8
RA 19h 30' 21h 22h 30'
292.5° 315° 337.5°



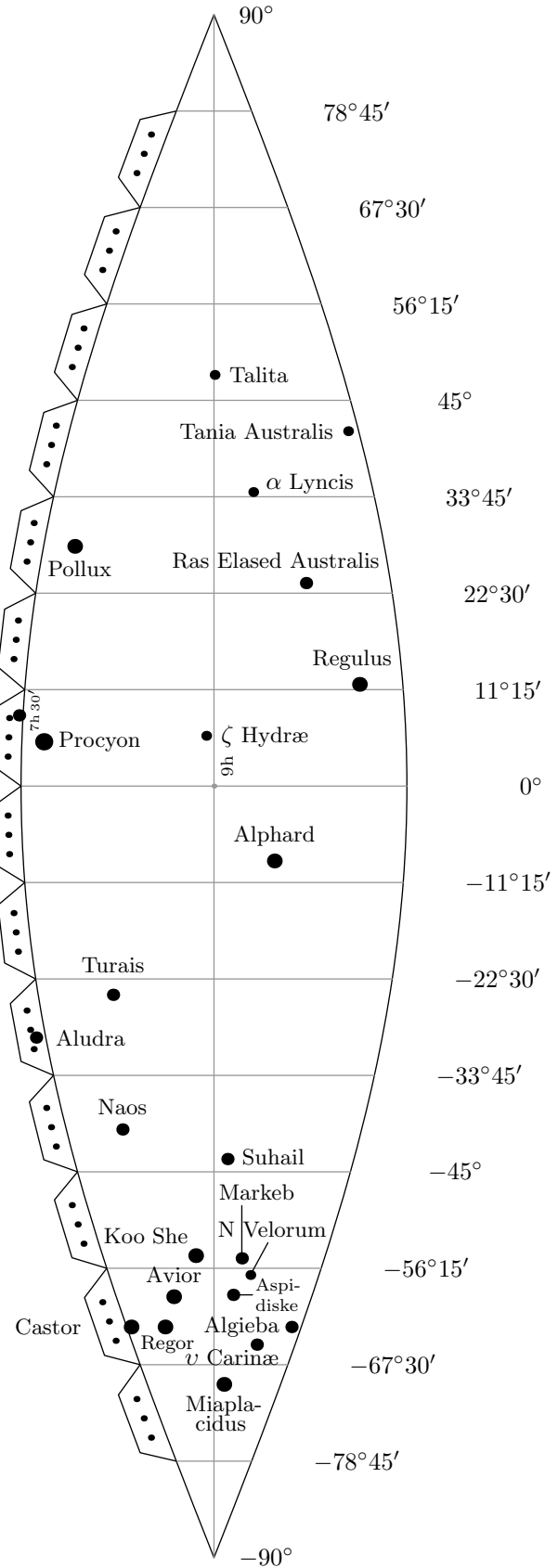
1
RA 22h 30' 0h 1h 30'
337.5° 0° 22.5°



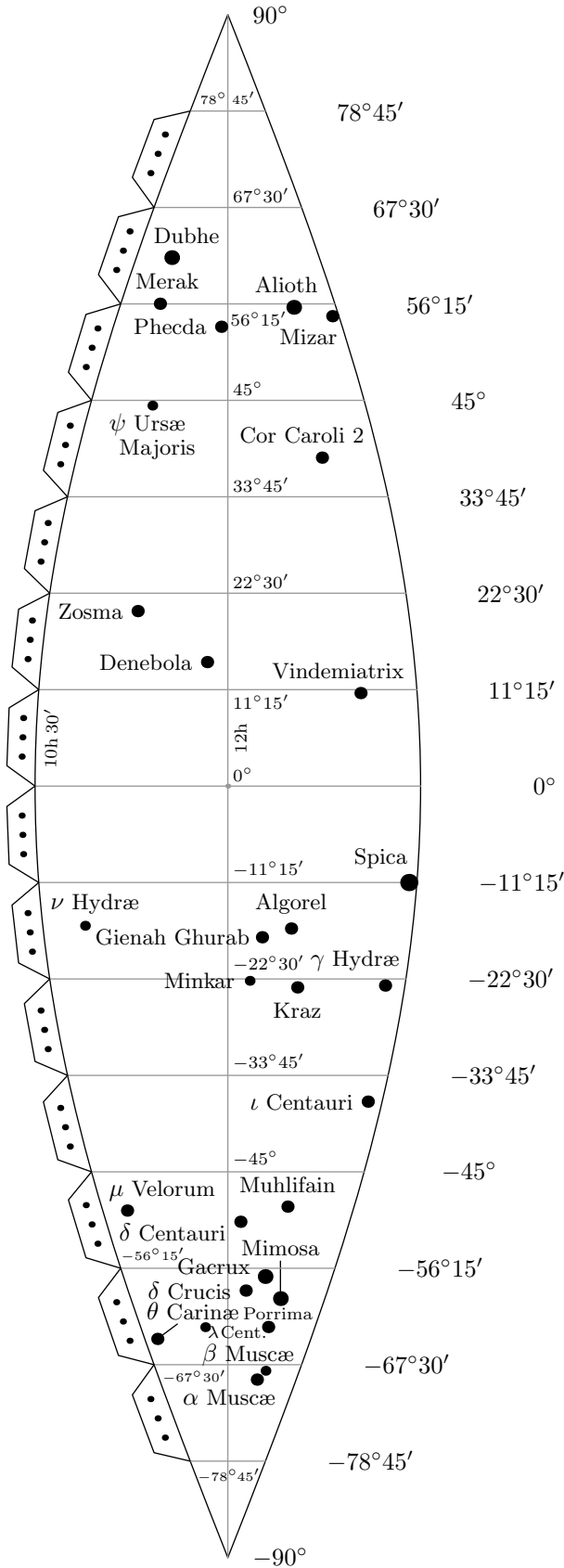
2
RA 1h 30' 3h 4h 30'
22.5° 45° 67.5°



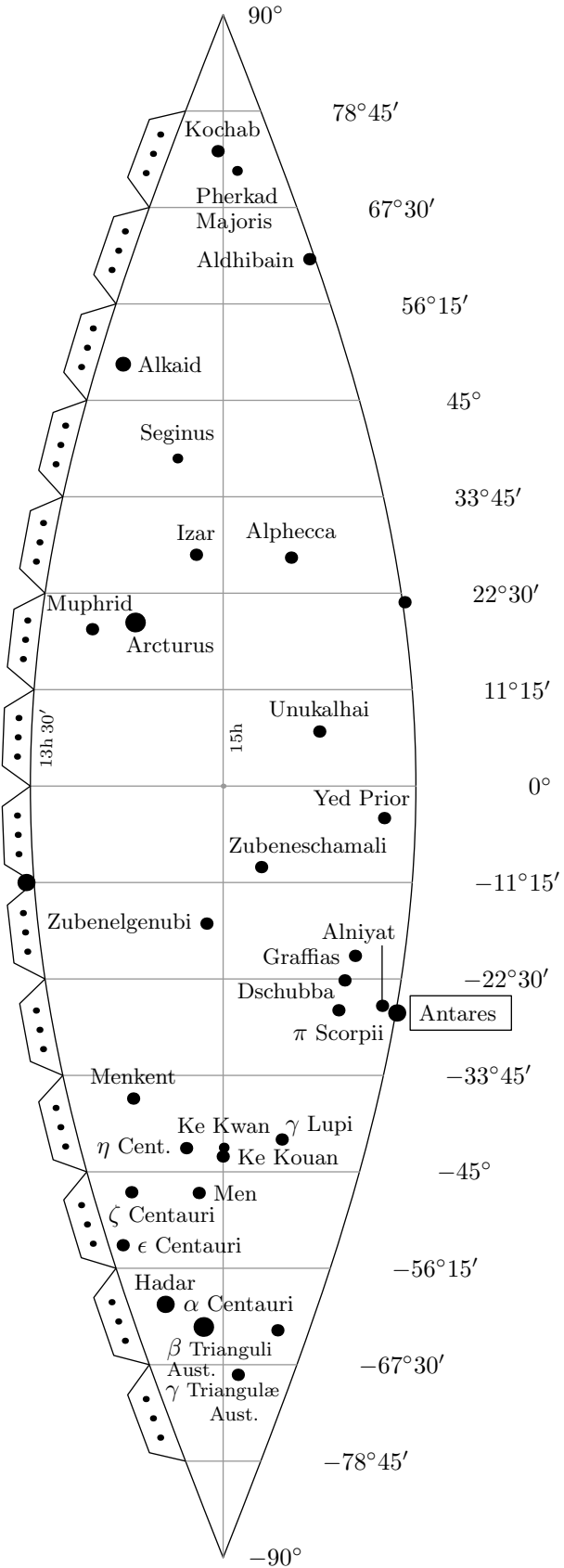
3
RA 4h 30' 6h 7h 30'
67.5° 90.0° 112.5°



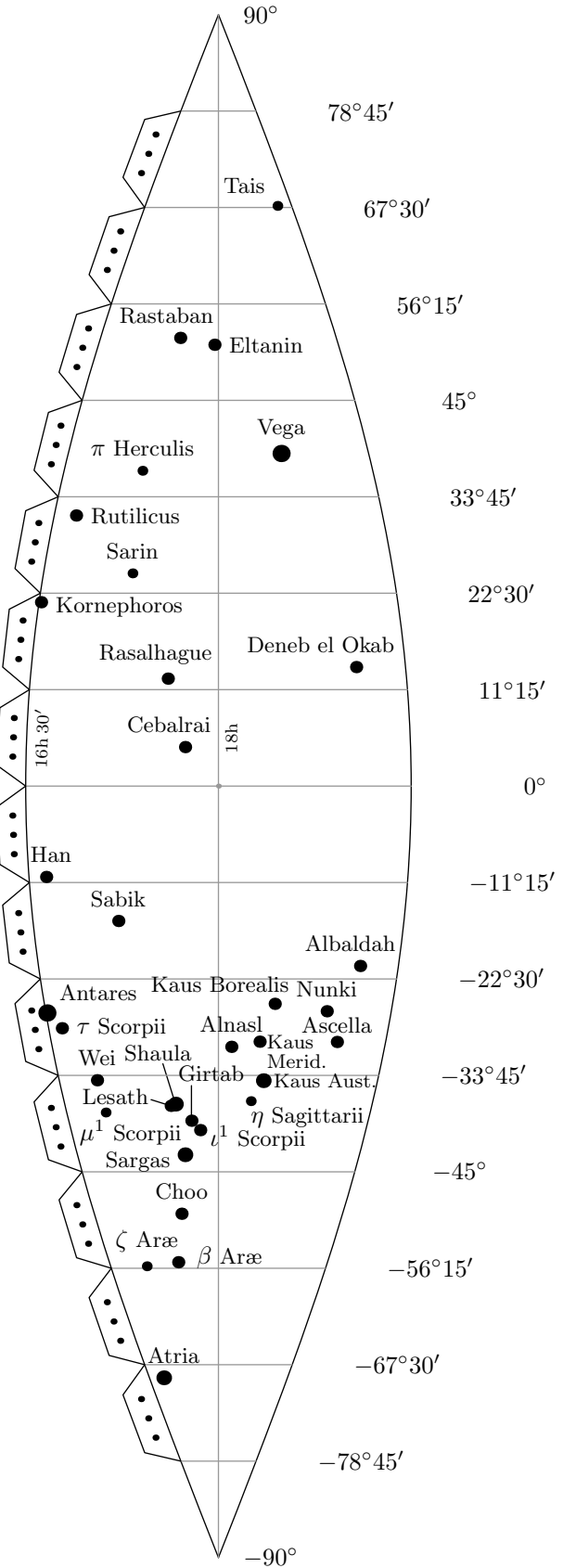
4
RA 7h 30' 9h 10h 30'
112.5° 135° 157.5°



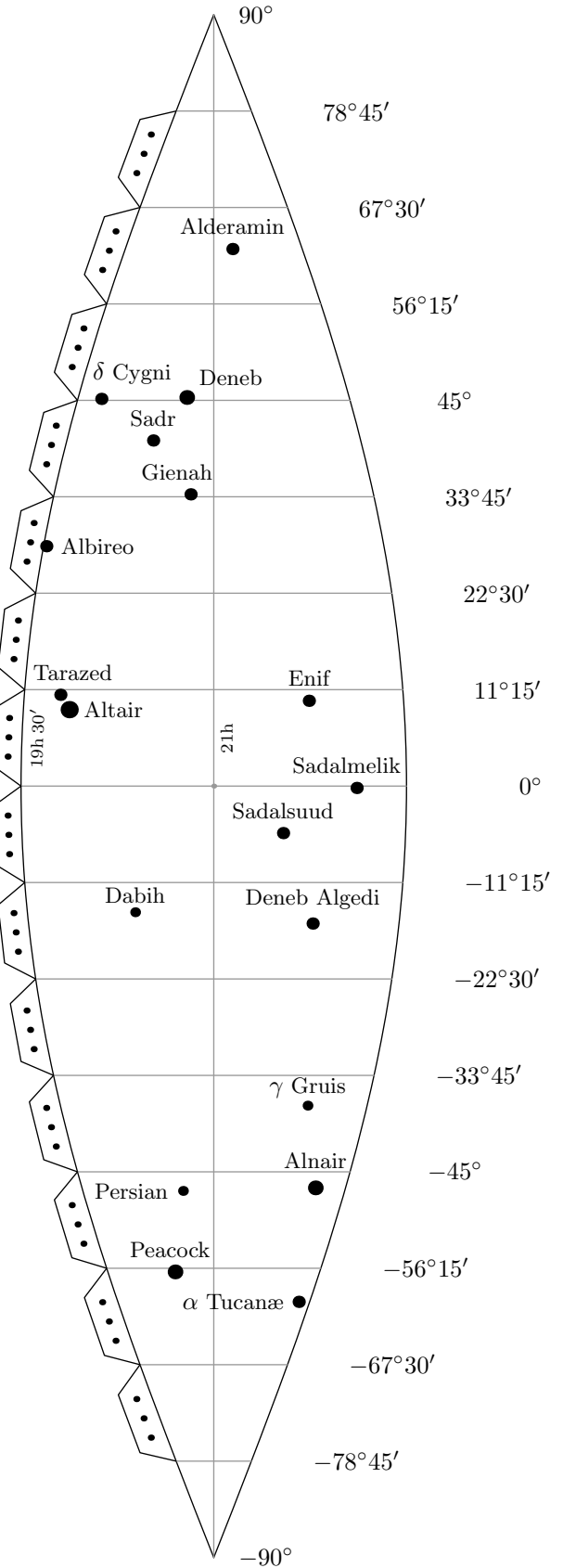
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6

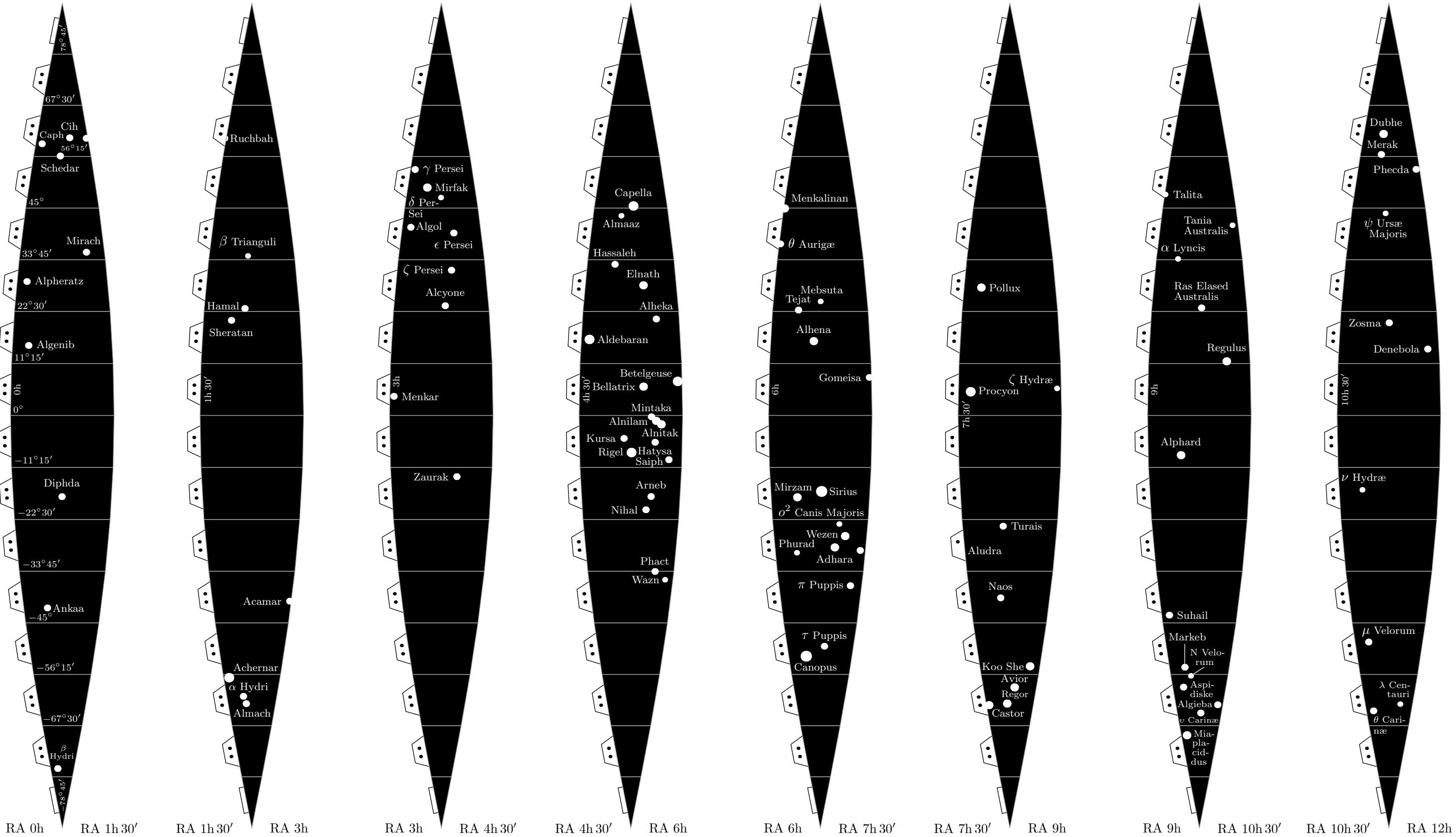


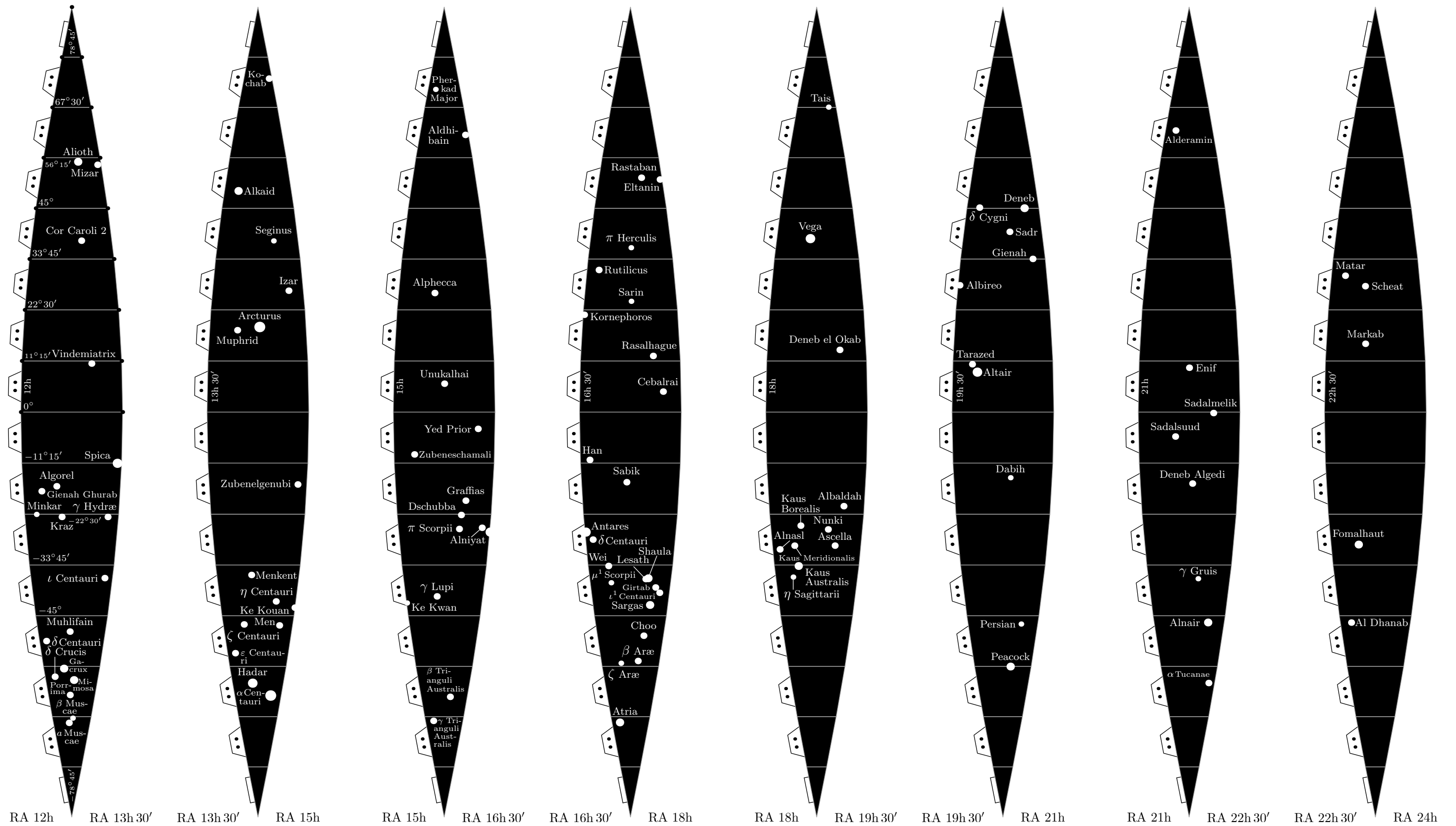
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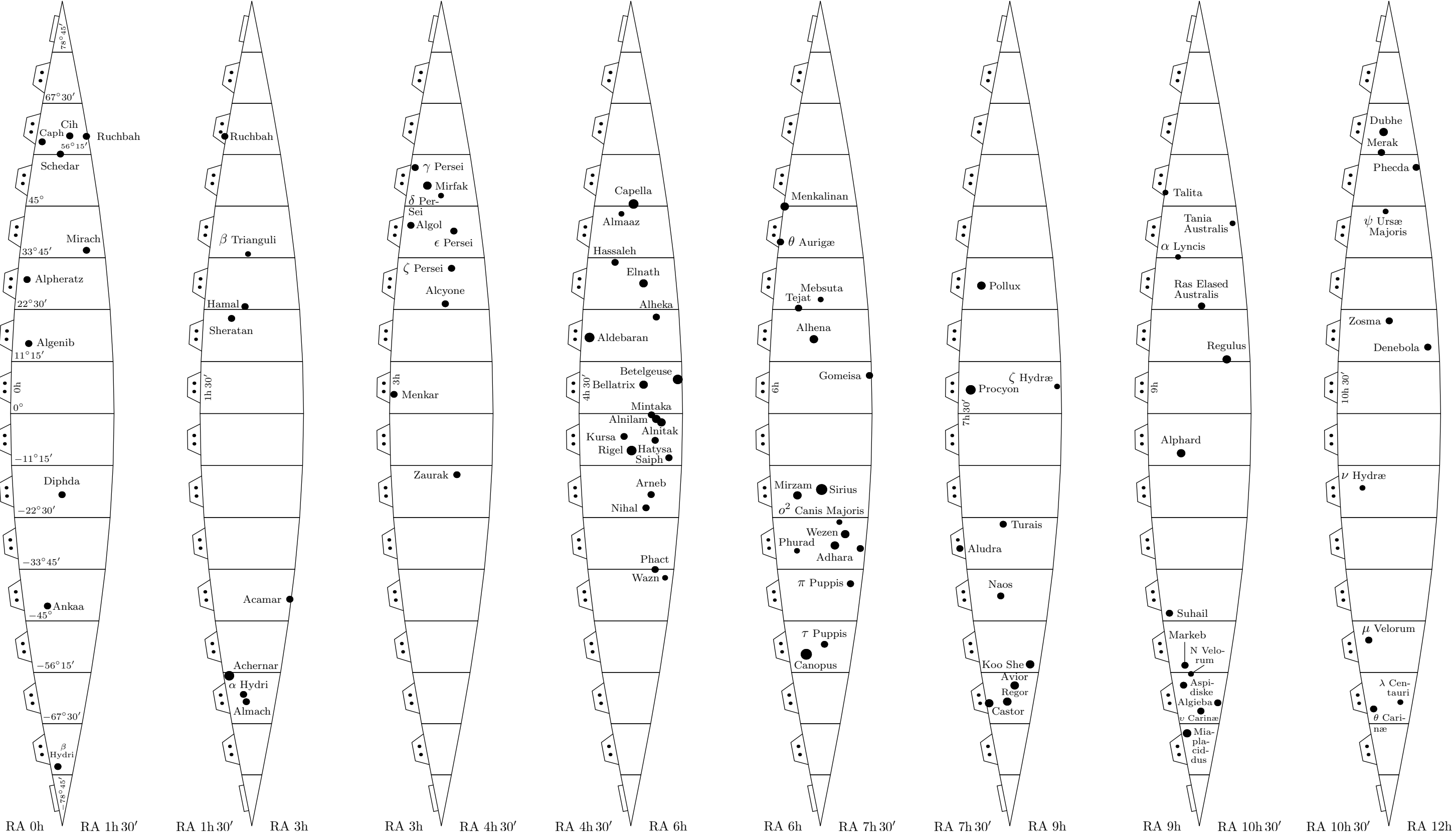


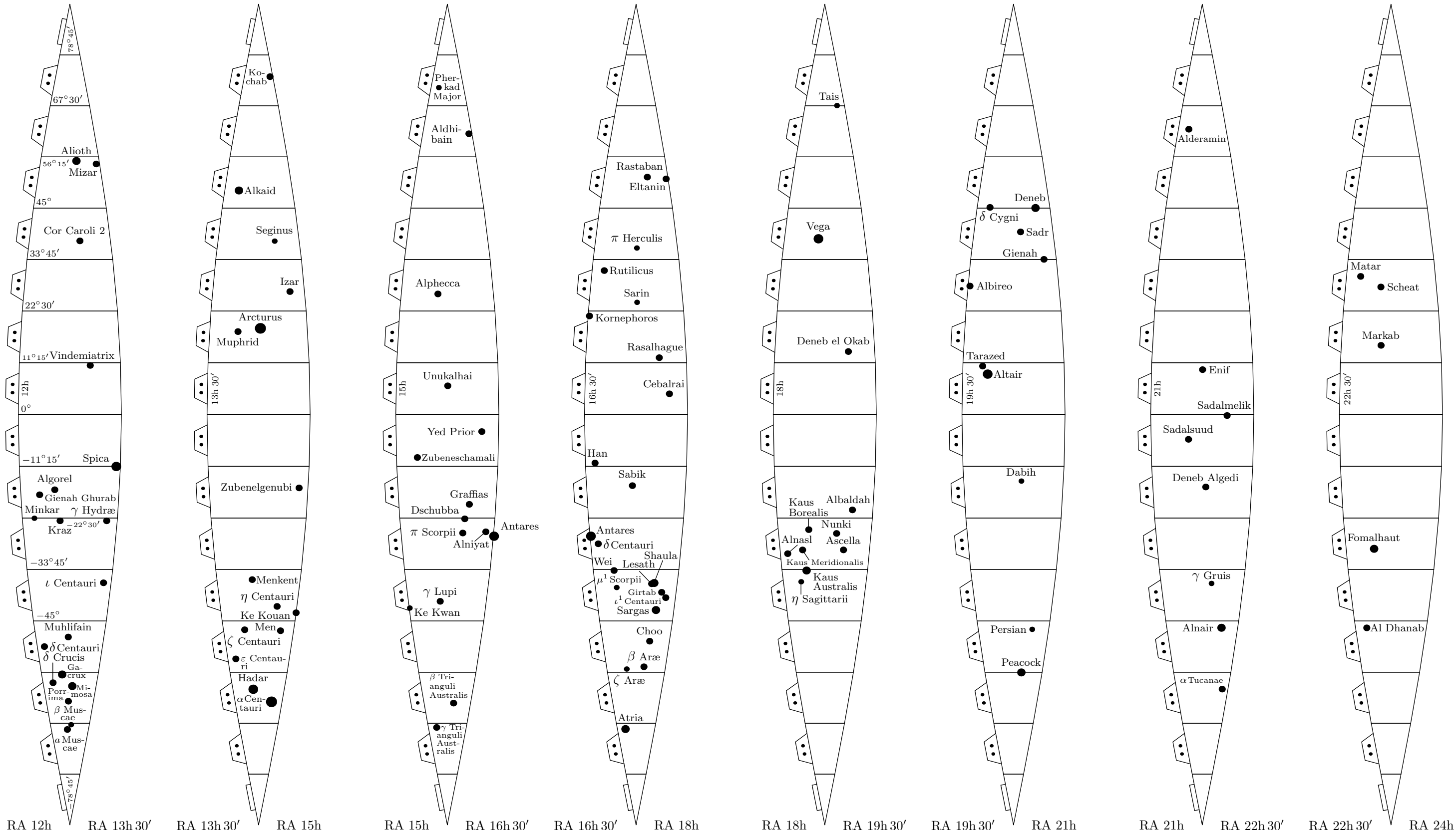
8

Panels (Isoceles Trapezoids and Triangles)

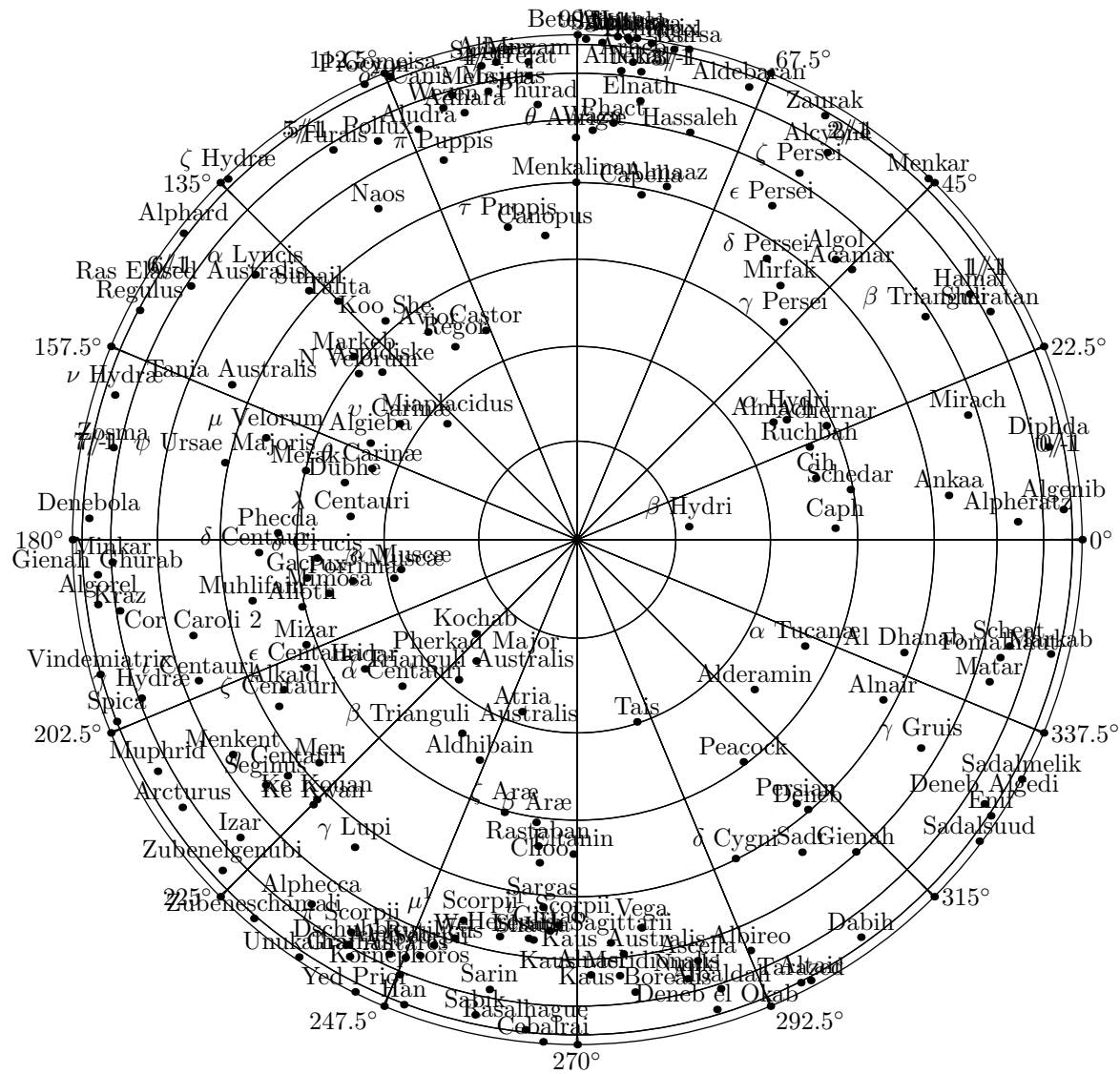




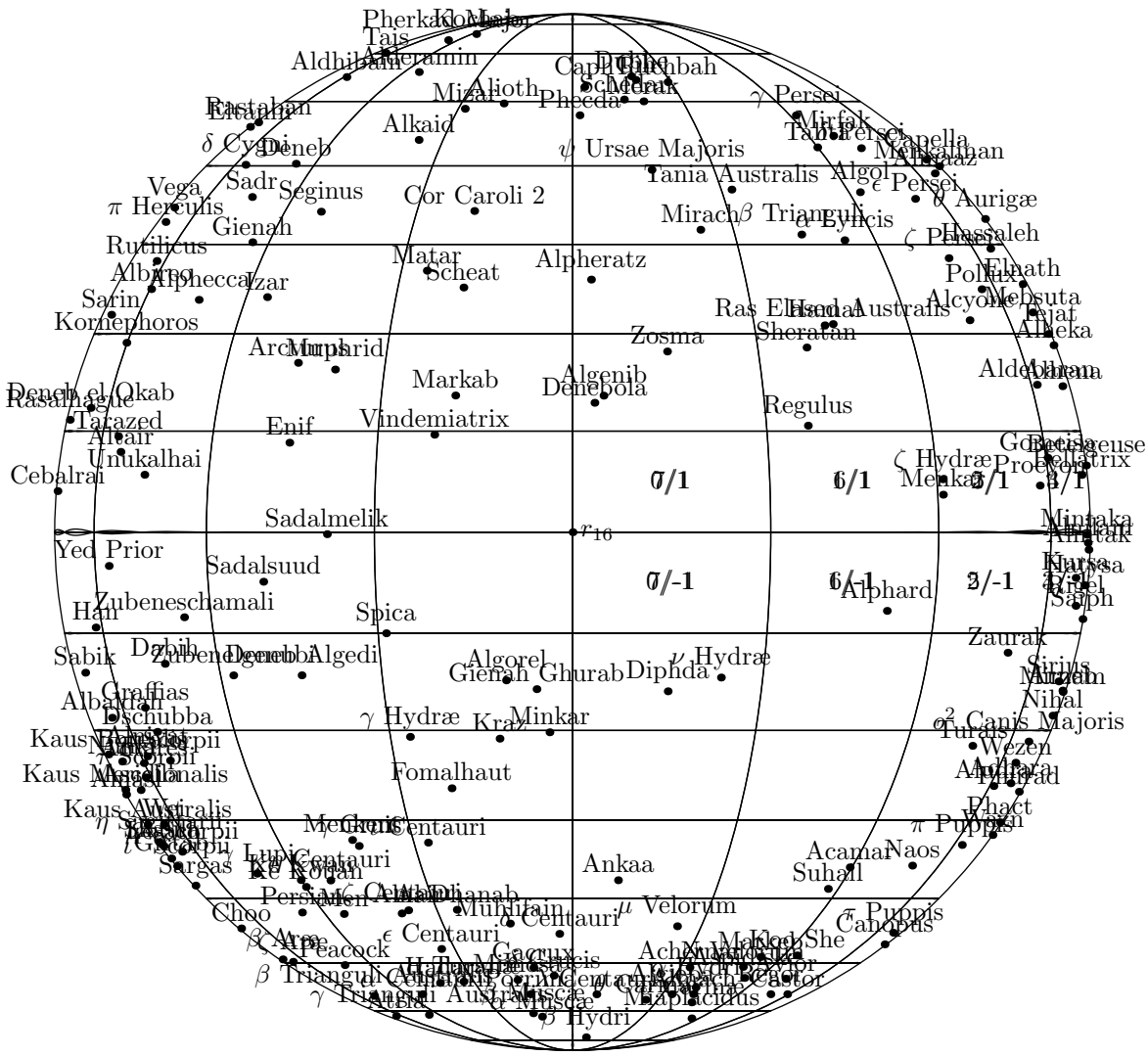








Parallel X-Z (Viewed from above)



Parallel Z-Y (Viewed from the right side)

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If you have Invariant Sections without Cover Texts, or some other combination of the three, merge those two alternatives to suit the situation.

If your document contains nontrivial examples of program code, we recommend releasing these examples in parallel under your choice of free software license, such as the GNU General Public License, to permit their use in free software.