Osnove orientacije na nebu

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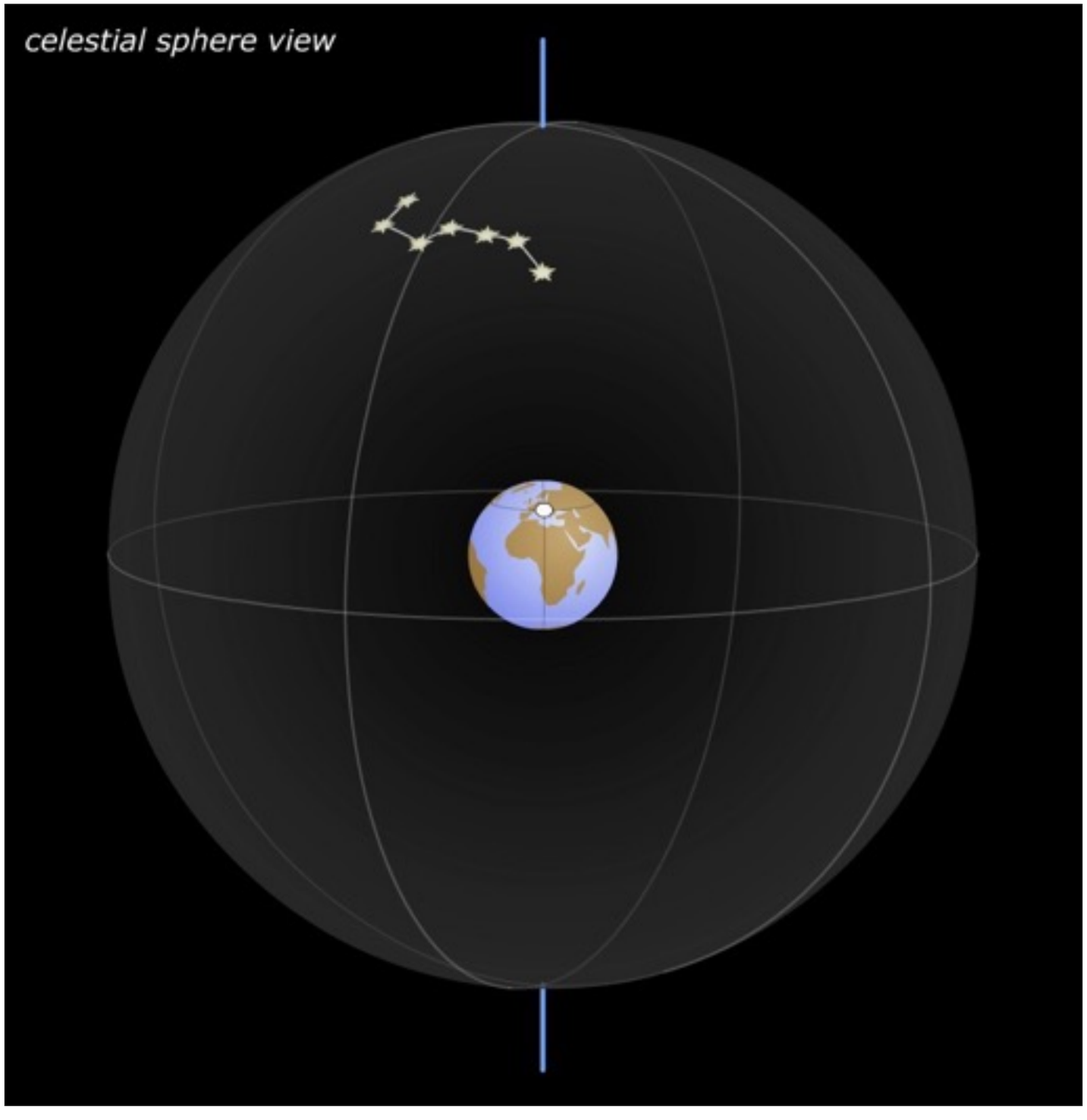
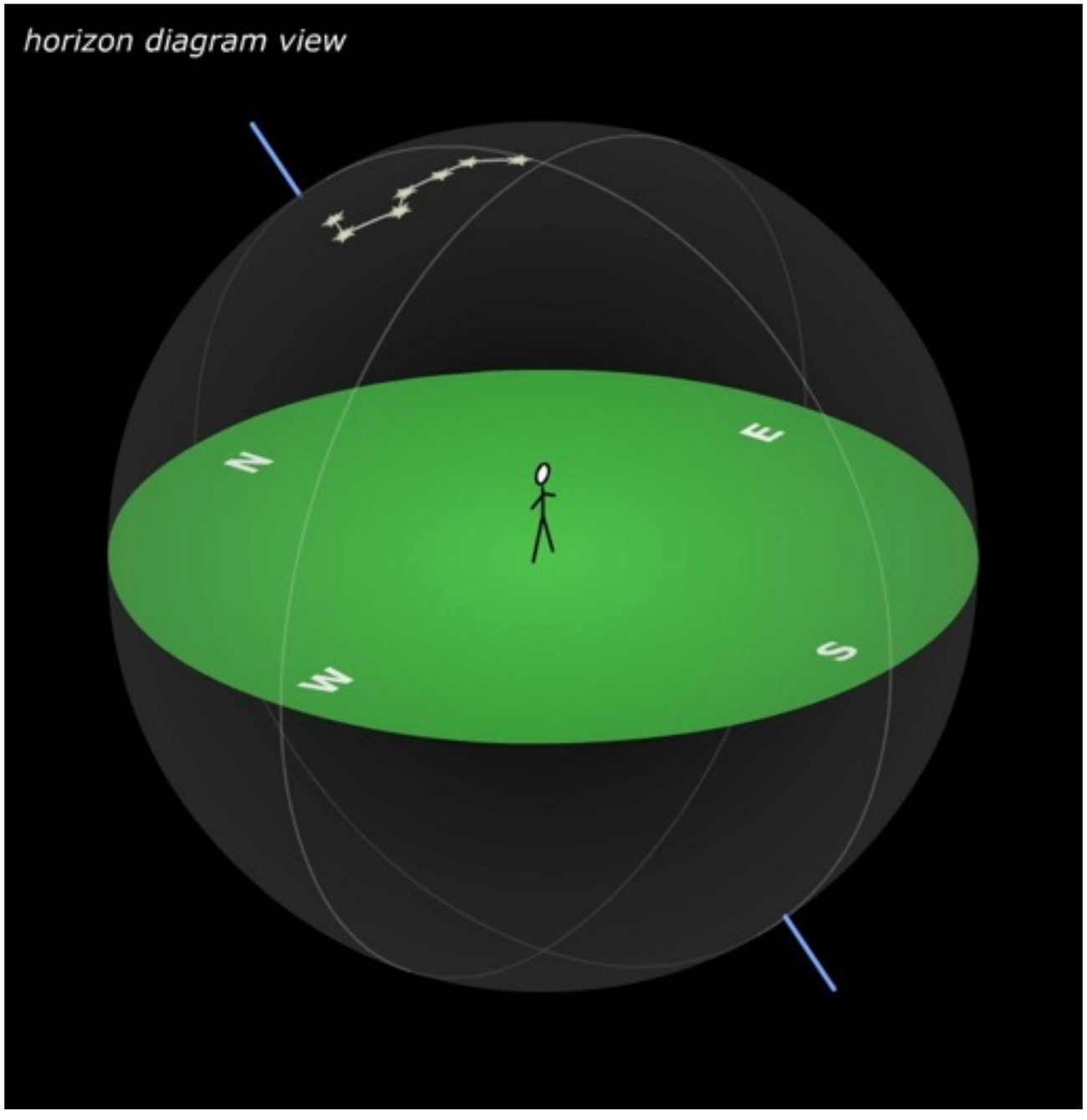
nebesna krogla

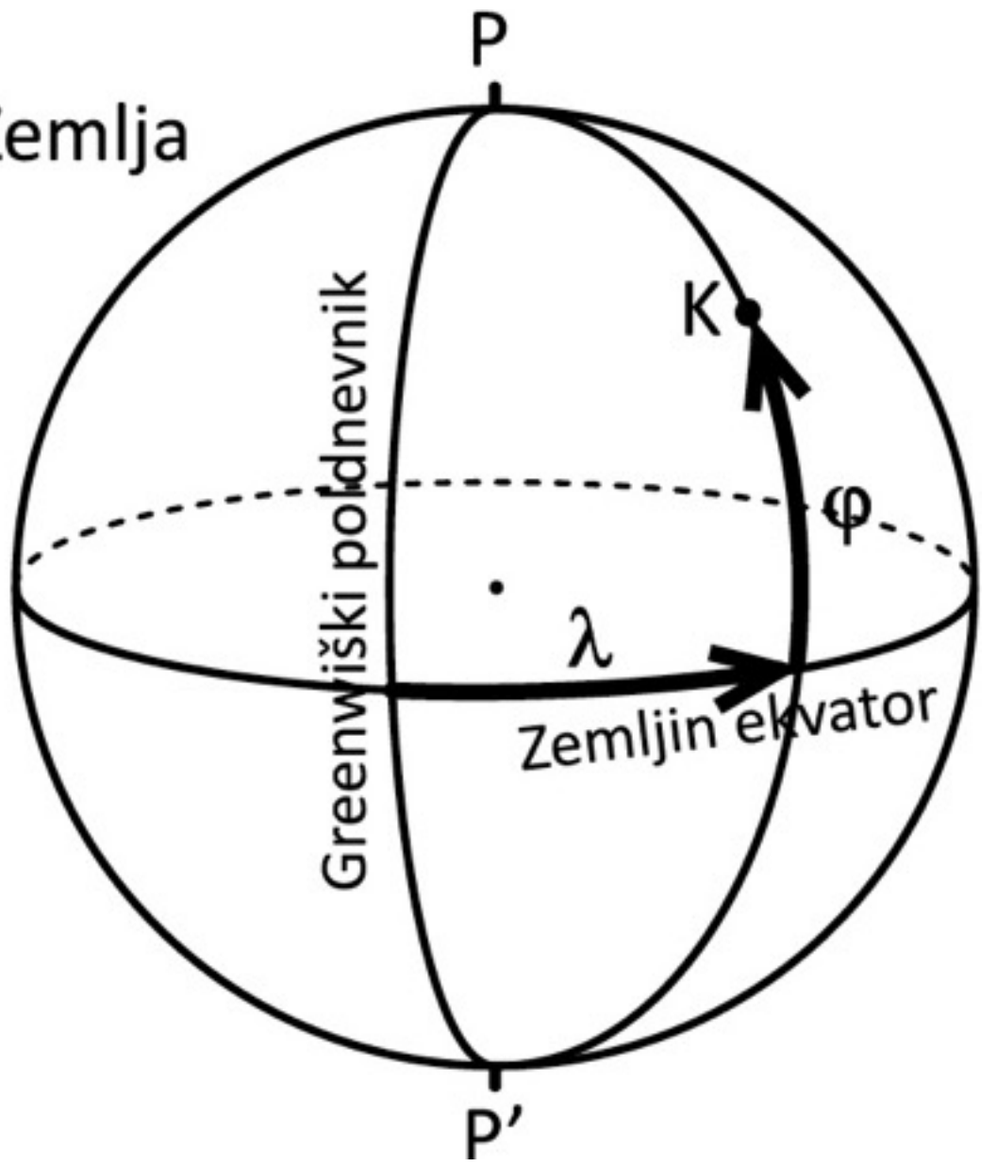


nebesna krogla - pogled opazovalca na Zemlji



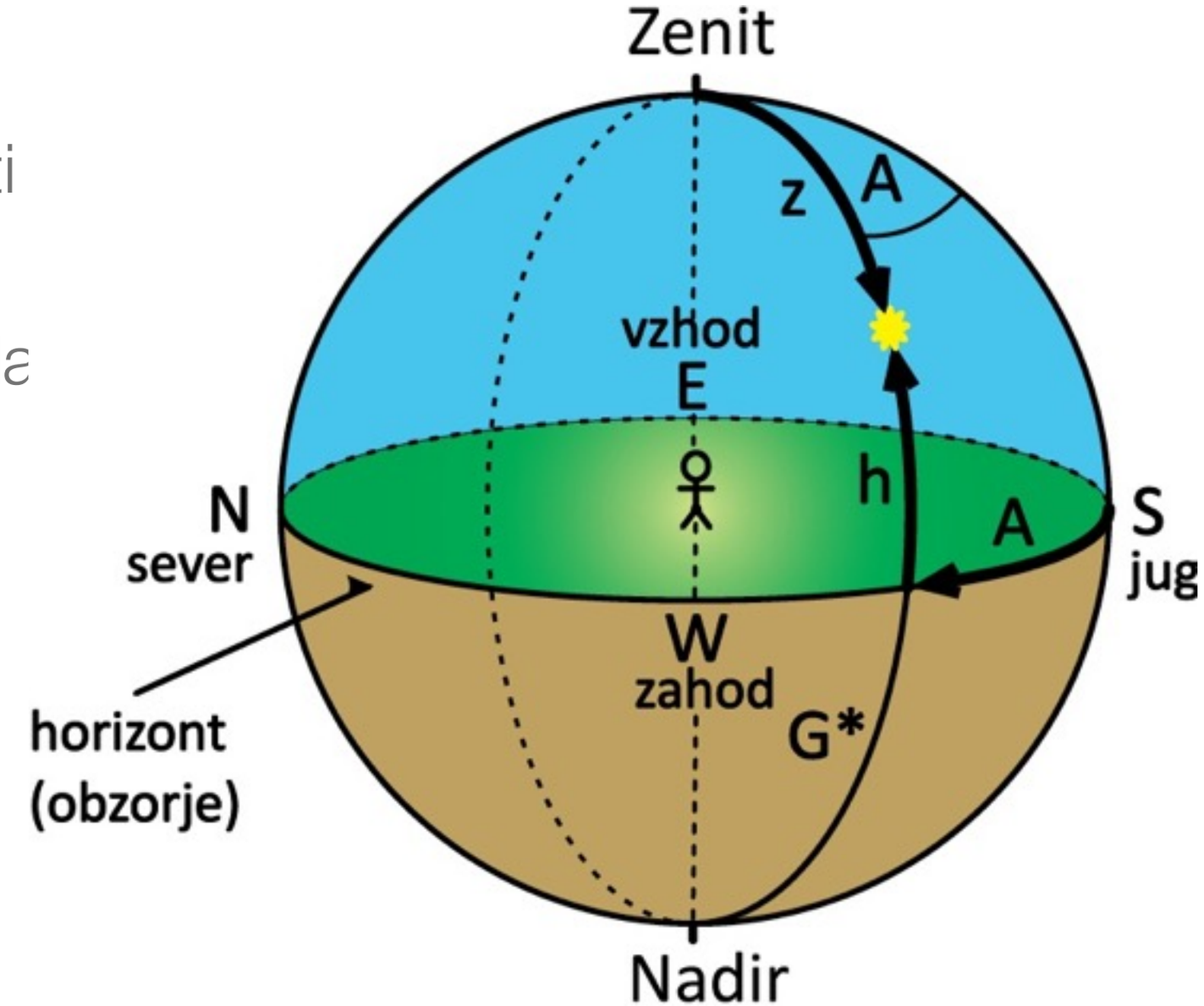
opis položaja na krogli - primer: Zemlja

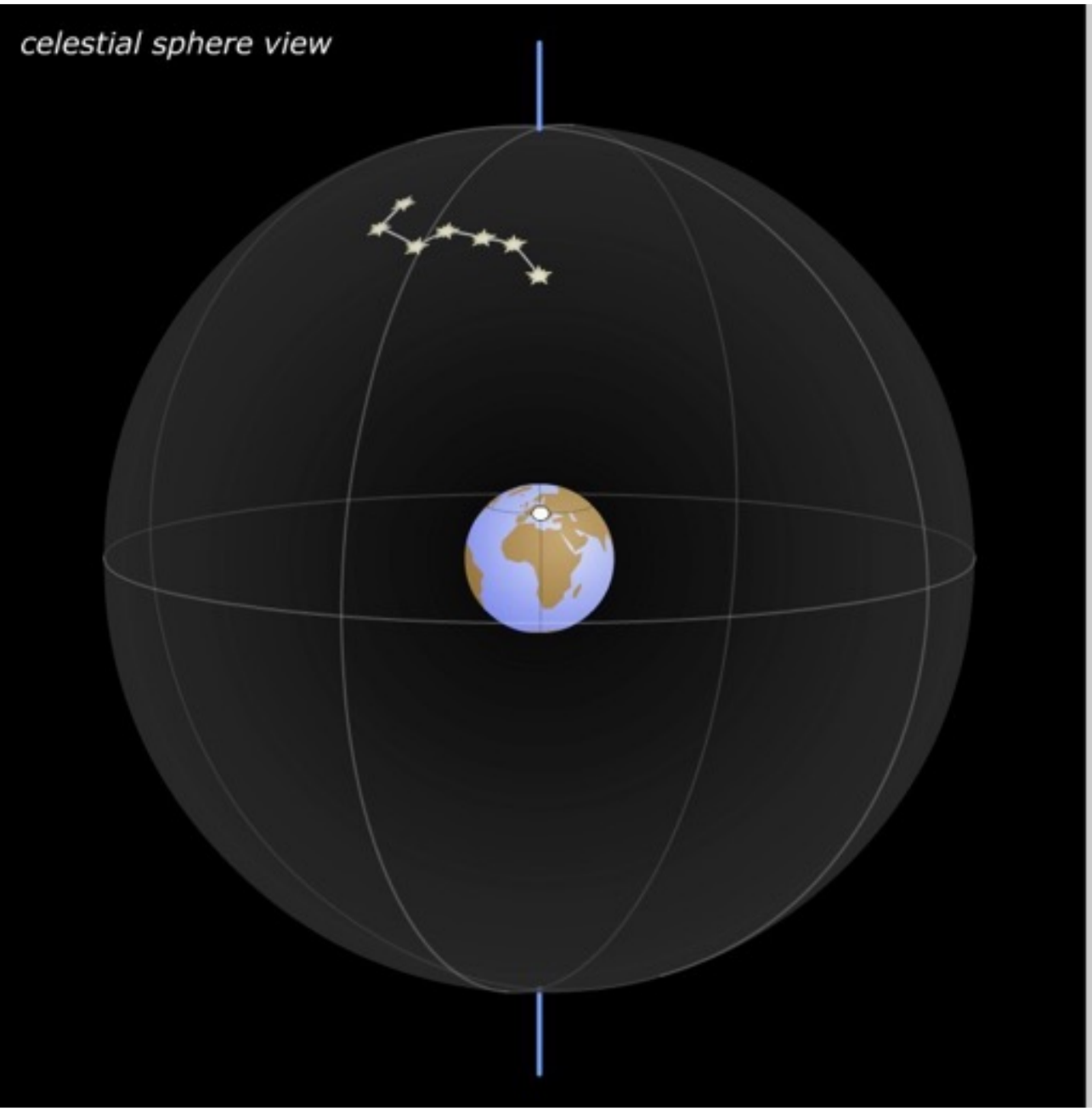
- severni in južni Zemljin pol
- Zemljin ekvator
- Greenwiški poldnevnik
- zemljepisna dolžina λ
- zemljepisna širina ϕ

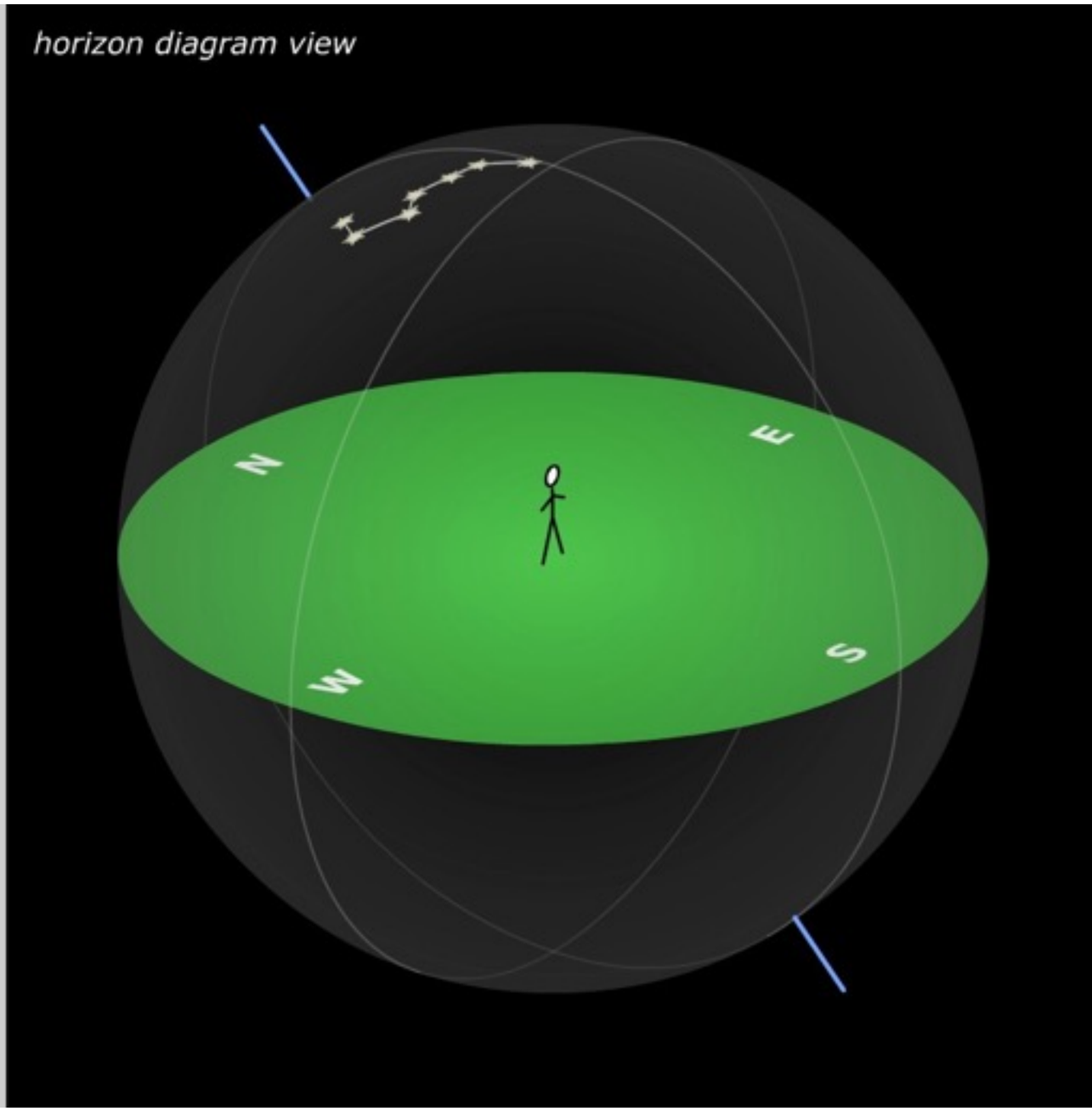


opis položaja na nebesni krogli - horizontni sistem

- zenit in nadir
- horizont
- nebesni poldnevnik (proti
- azimut A
- višina h (oz. zenitna razda

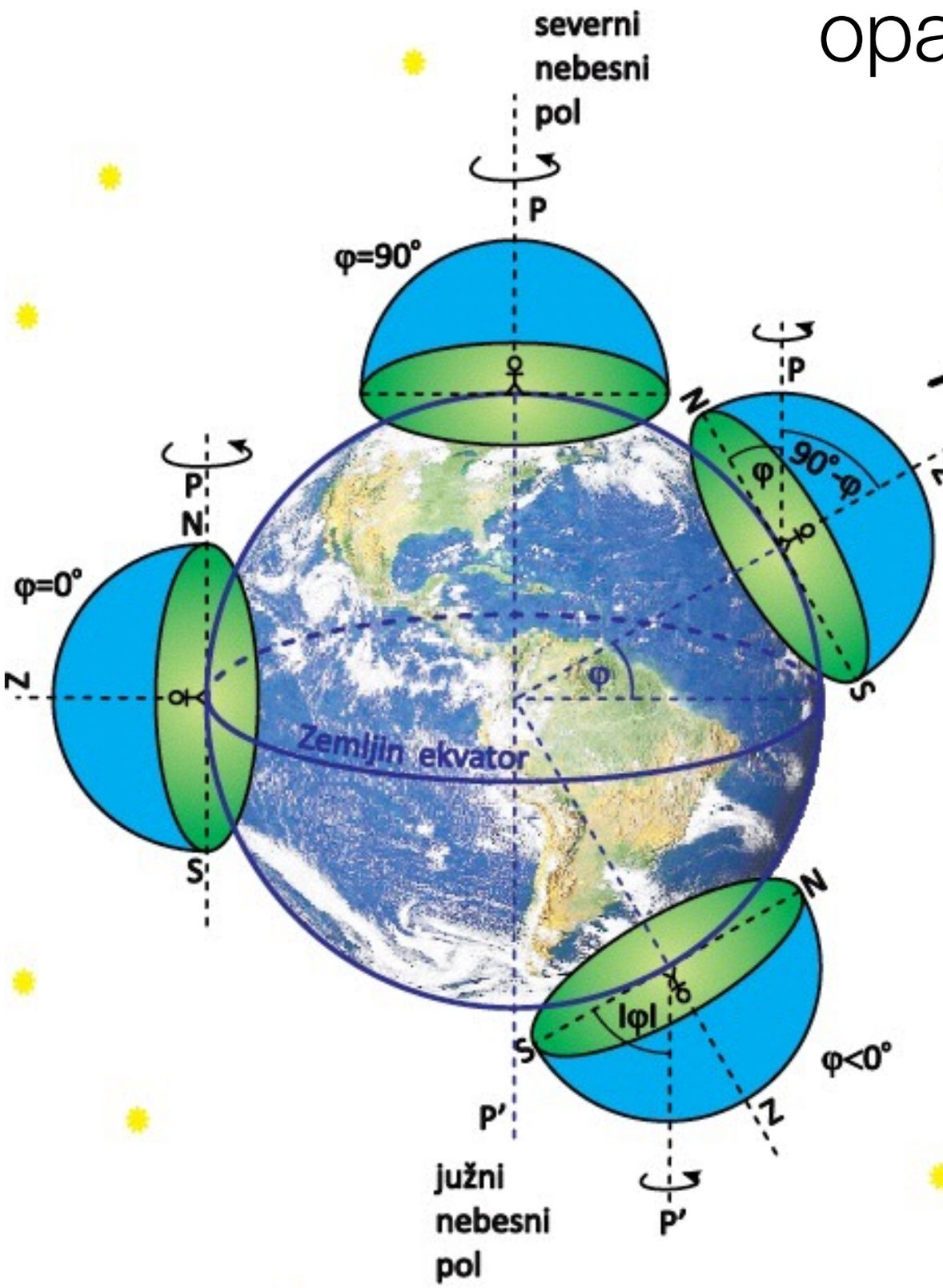


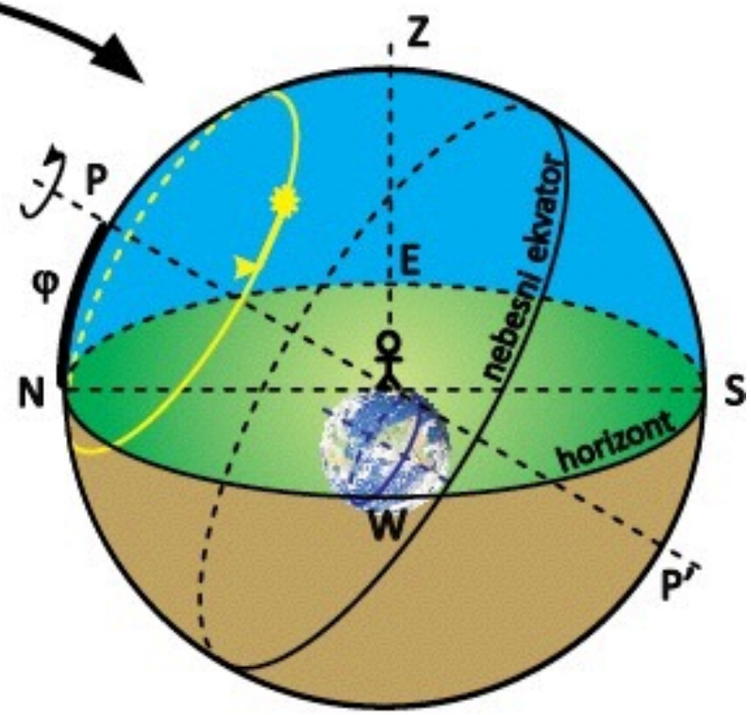




animacija: http://astro.unl.edu/naap/motion2/animations/ce_hc.html

opazovališča + vrtenje Zemlje

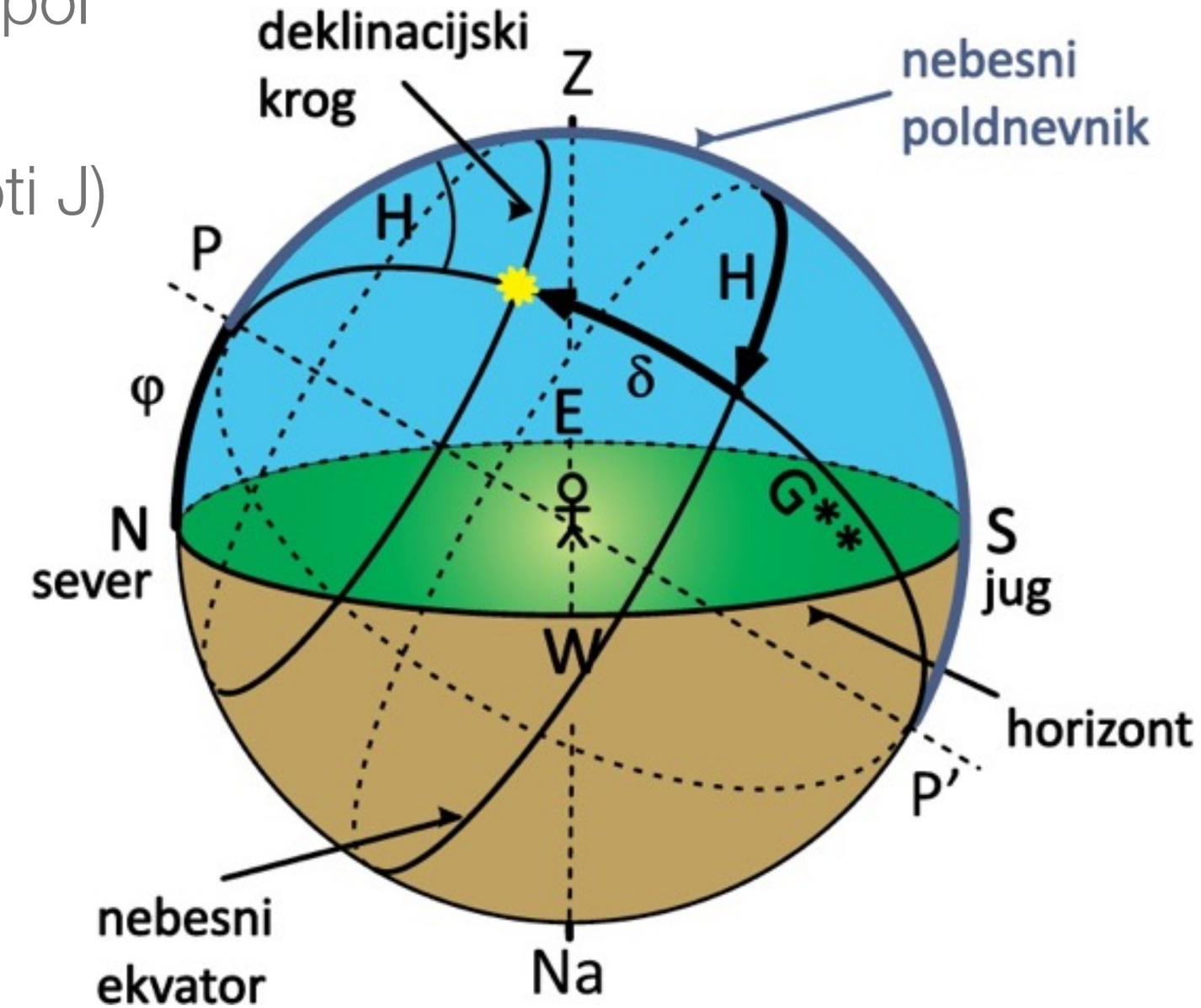




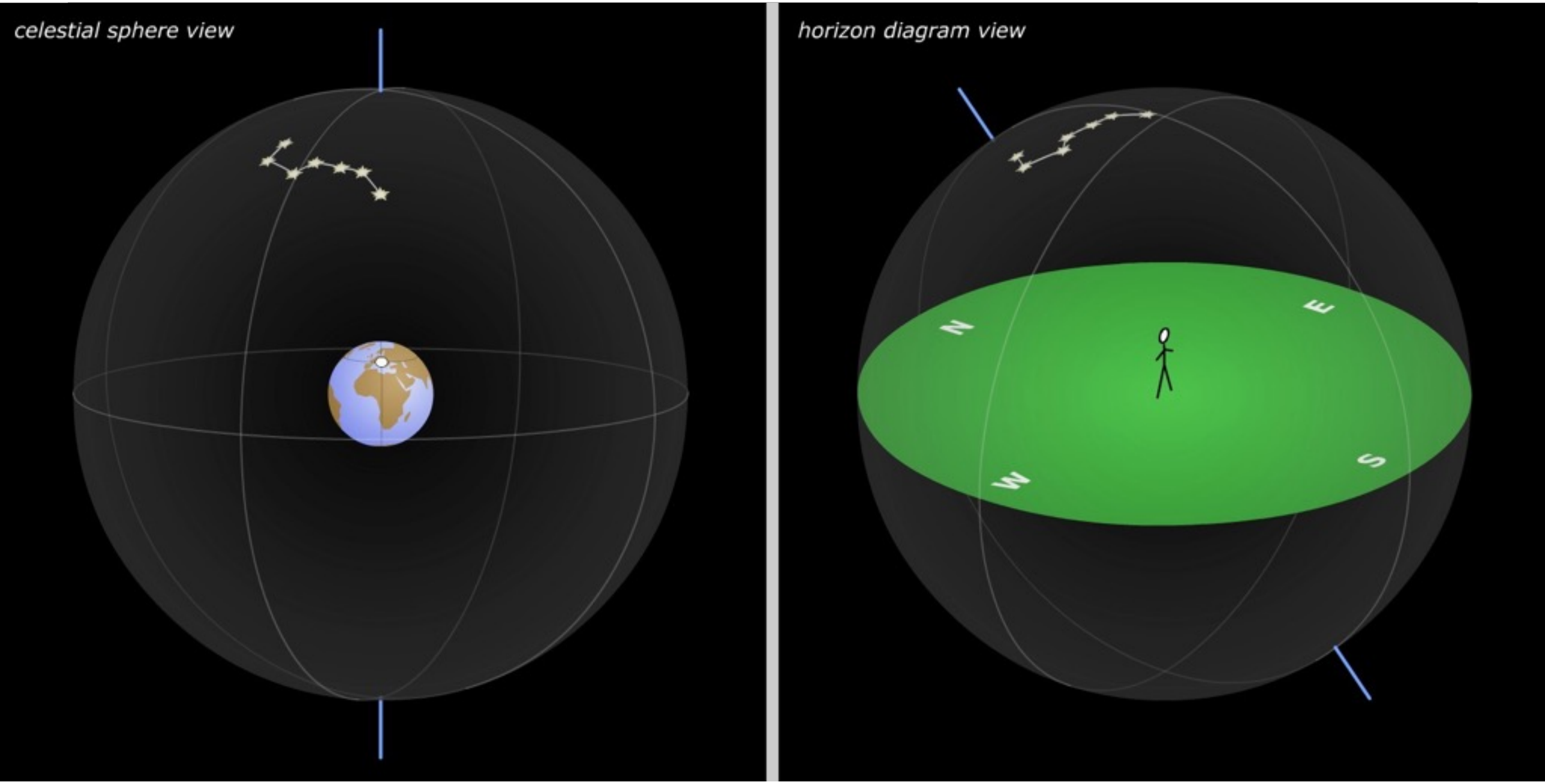
opis položaja na nebesni krogli - ekvatorski sistem 1

- severni in južni nebesni pol
- nebesni ekvator
- nebesni poldnevnik (proti J)
- časovni kot H
- deklinacija δ

- časovni kot H narašča linearno s časom

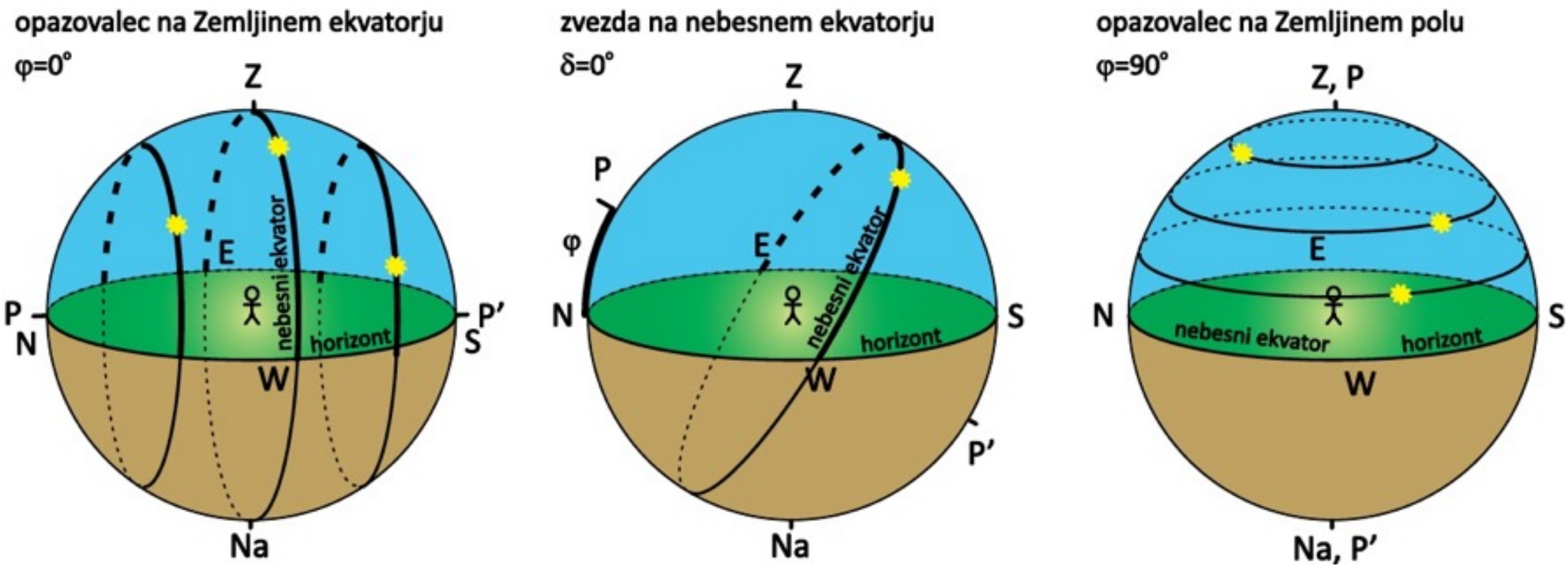


navidezno dnevno gibanje zvezd



animacija: http://astro.unl.edu/naap/motion2/animations/ce_hc.html

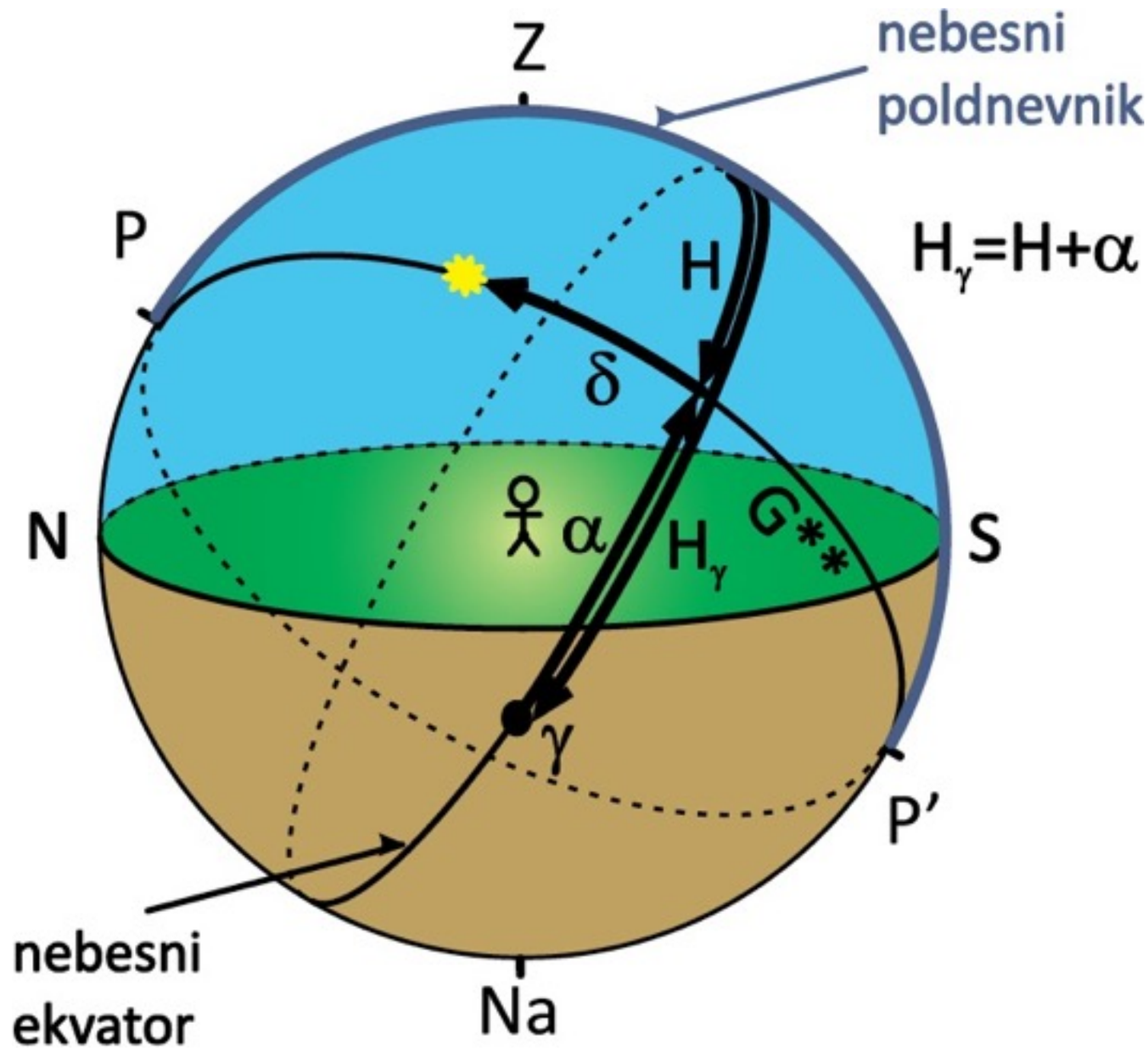
navidezno gibanje zvezd iz različnih opazovališč



opis položaja na nebesni krogli - ekvatorski sistem 2

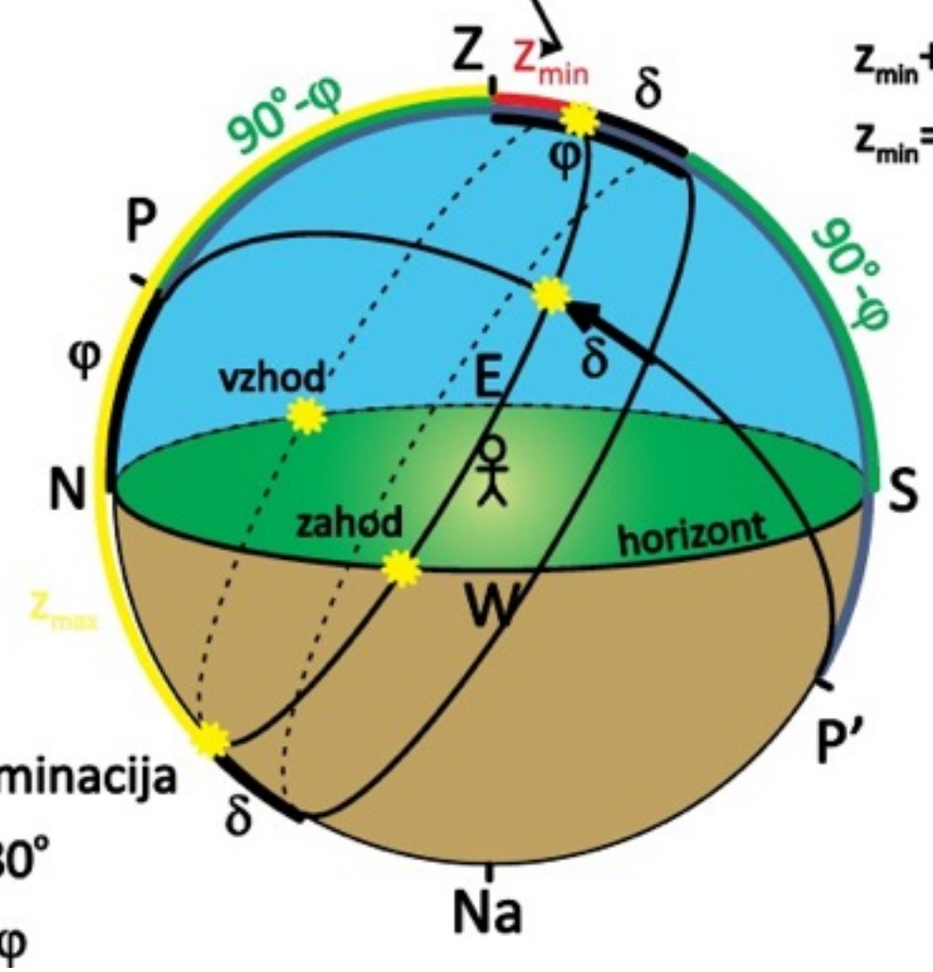
- severni in južni nebesni pol
- nebesni ekvator
- pomladišče - točka gama
- rektascenzija alfa
- deklinacija δ

rektascenzija in deklinacija zvezd nista odvisni od opazovališča in časa*



* če ne upoštevamo lastnega gibanja zvezd

zgornja kulminacija
(južno od zenita)



$z_{min}+\delta+90^\circ-\varphi=90^\circ$

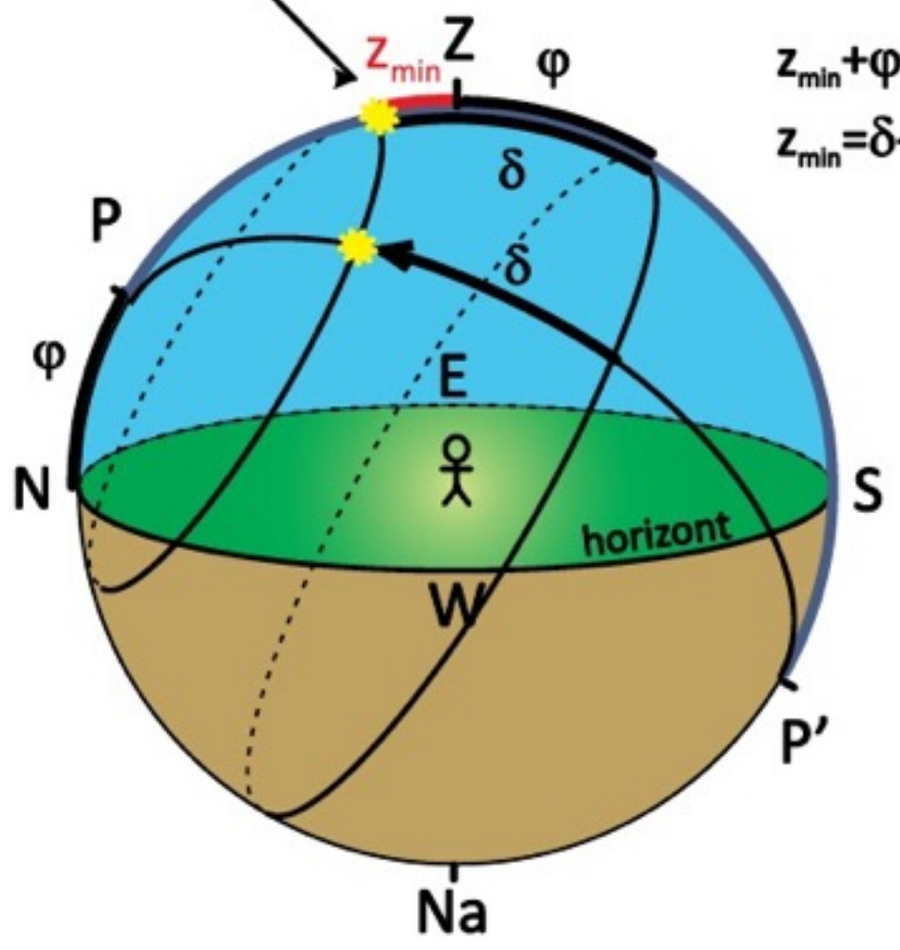
$z_{min}=\varphi-\delta$

spodnja kulminacija

$\delta+z_{max}+\varphi=180^\circ$

$z_{max}=180^\circ-\delta-\varphi$

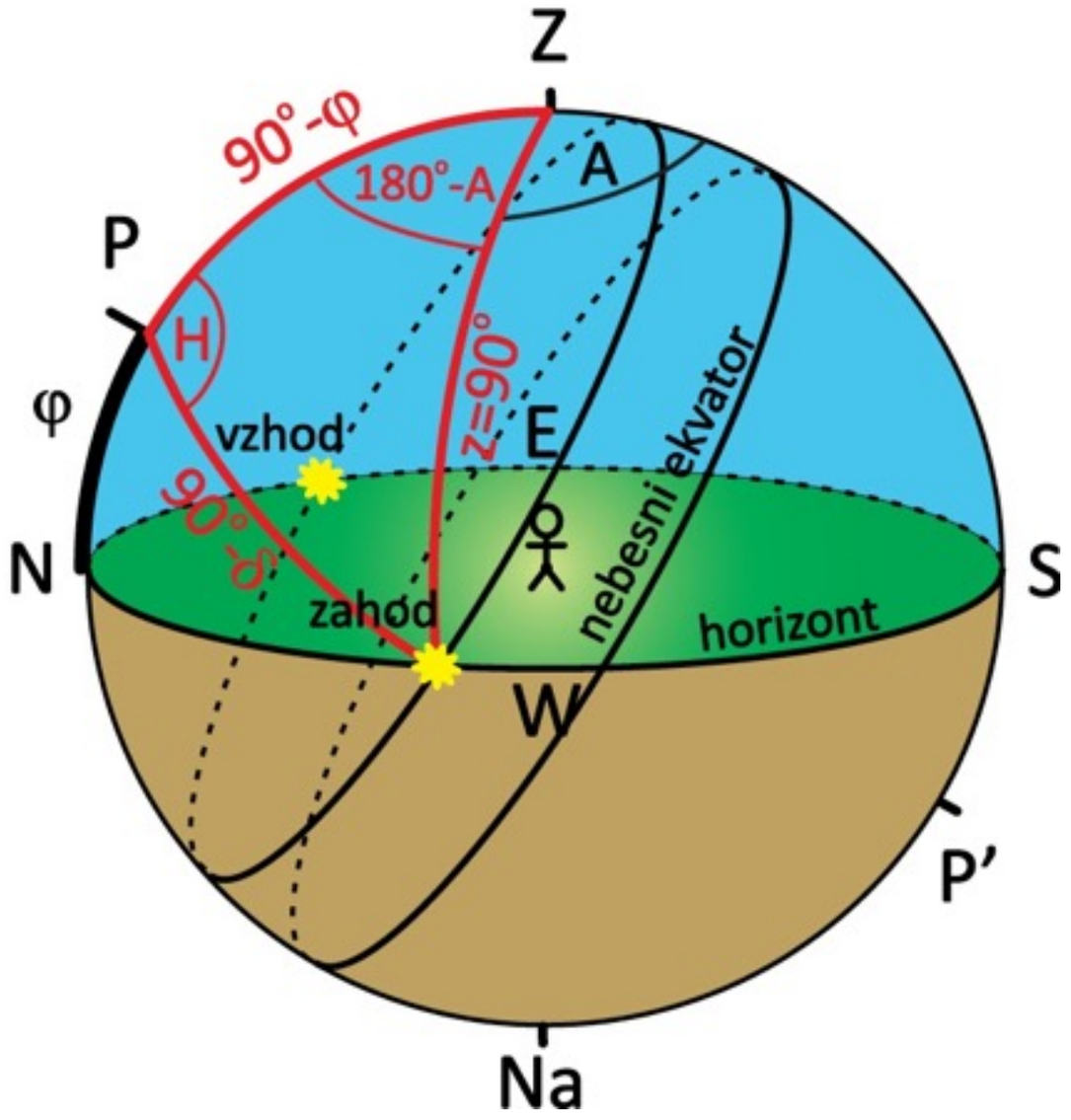
zgornja kulminacija
(severno od zenita)



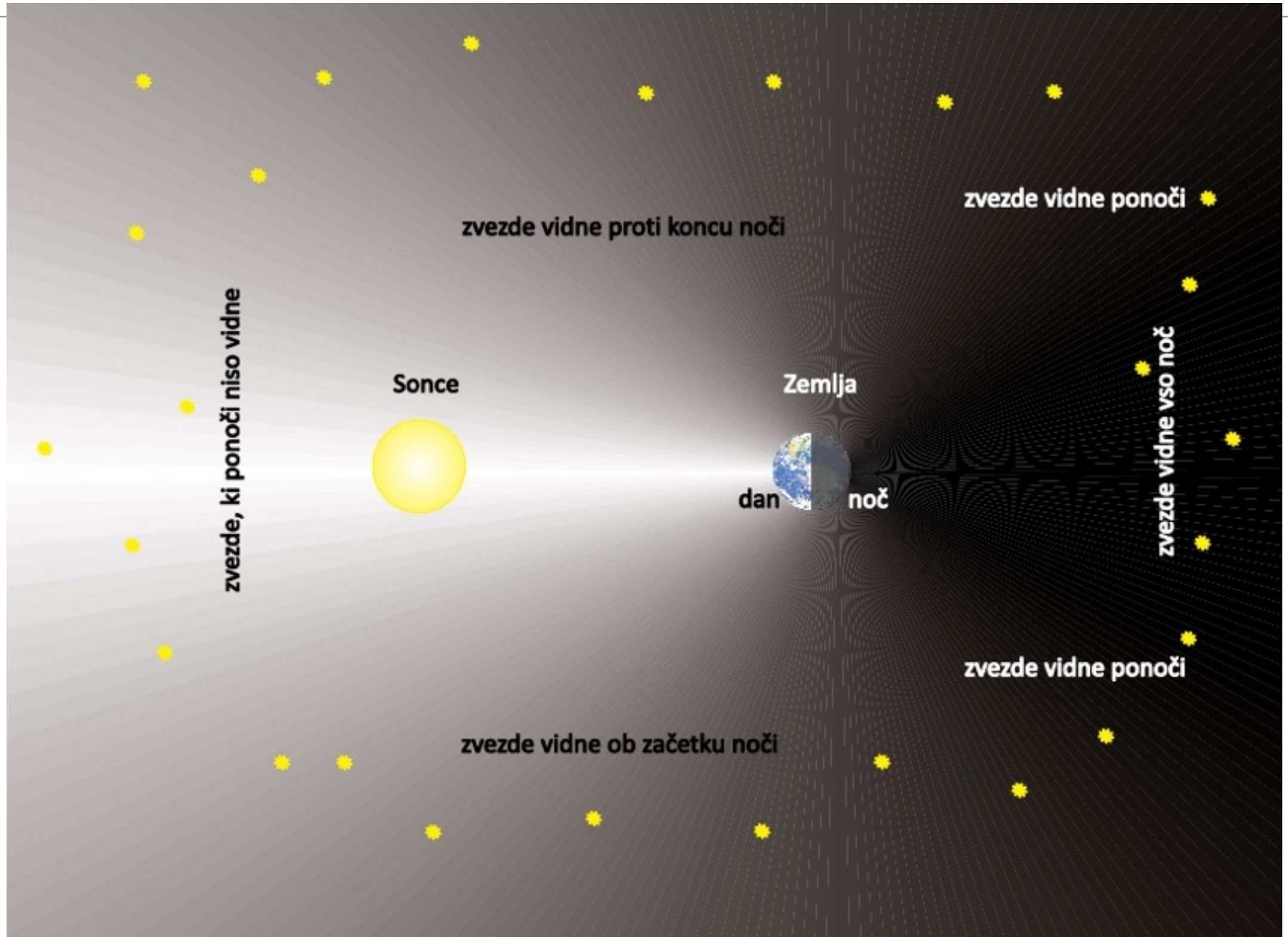
$z_{min}+\varphi=\delta$

$z_{min}=\delta-\varphi$

zahod


Z
90°-φ
180°-A
A
P
H
φ
vzhod
z=90°
E
δ
90°-δ
N
zahod
nebesni ekvator
horizont
S
W
P'
Na

letno spreminjanje nočnega neba

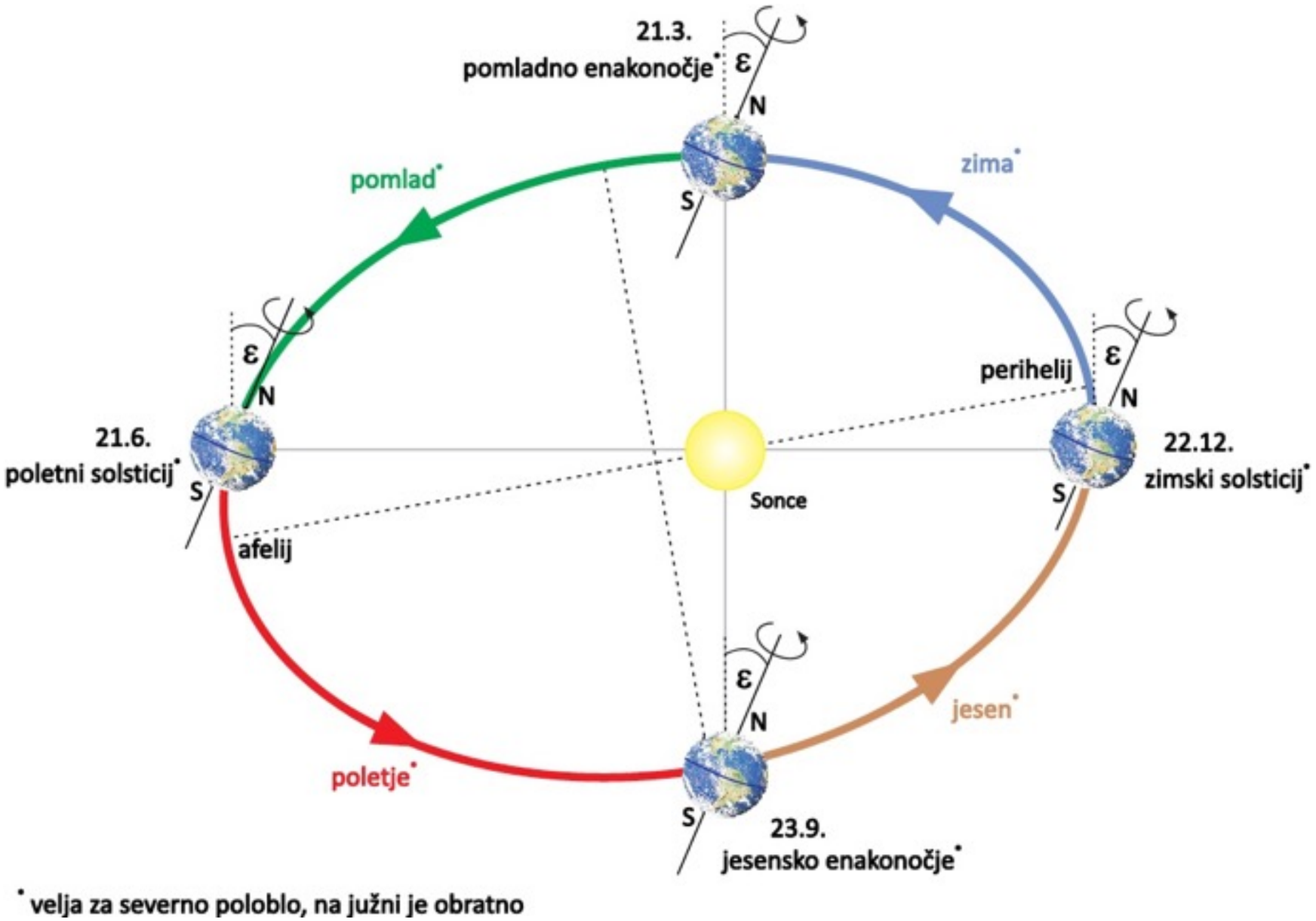


gibanje Sonca

- **dnevno** - podobno kot za zvezde - navidezno kroži okoli nebesnega pola (zaradi vrtenja Zemlje): vzide, kulminira, zaide…

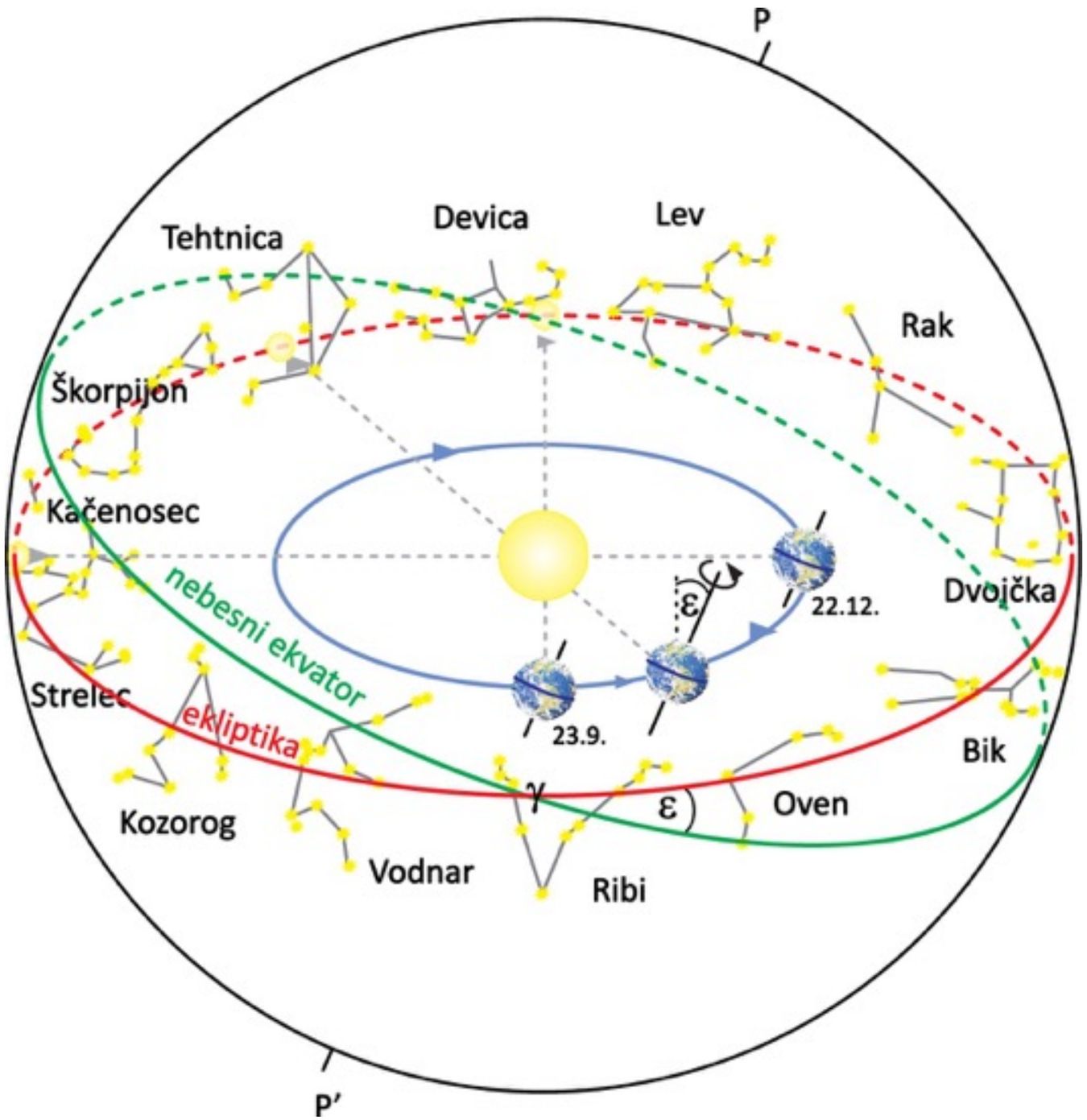
- **letno** - drugačno, zaradi gibanja Zemlje okoli Sonca

gibanje Zemlje okoli Sonca



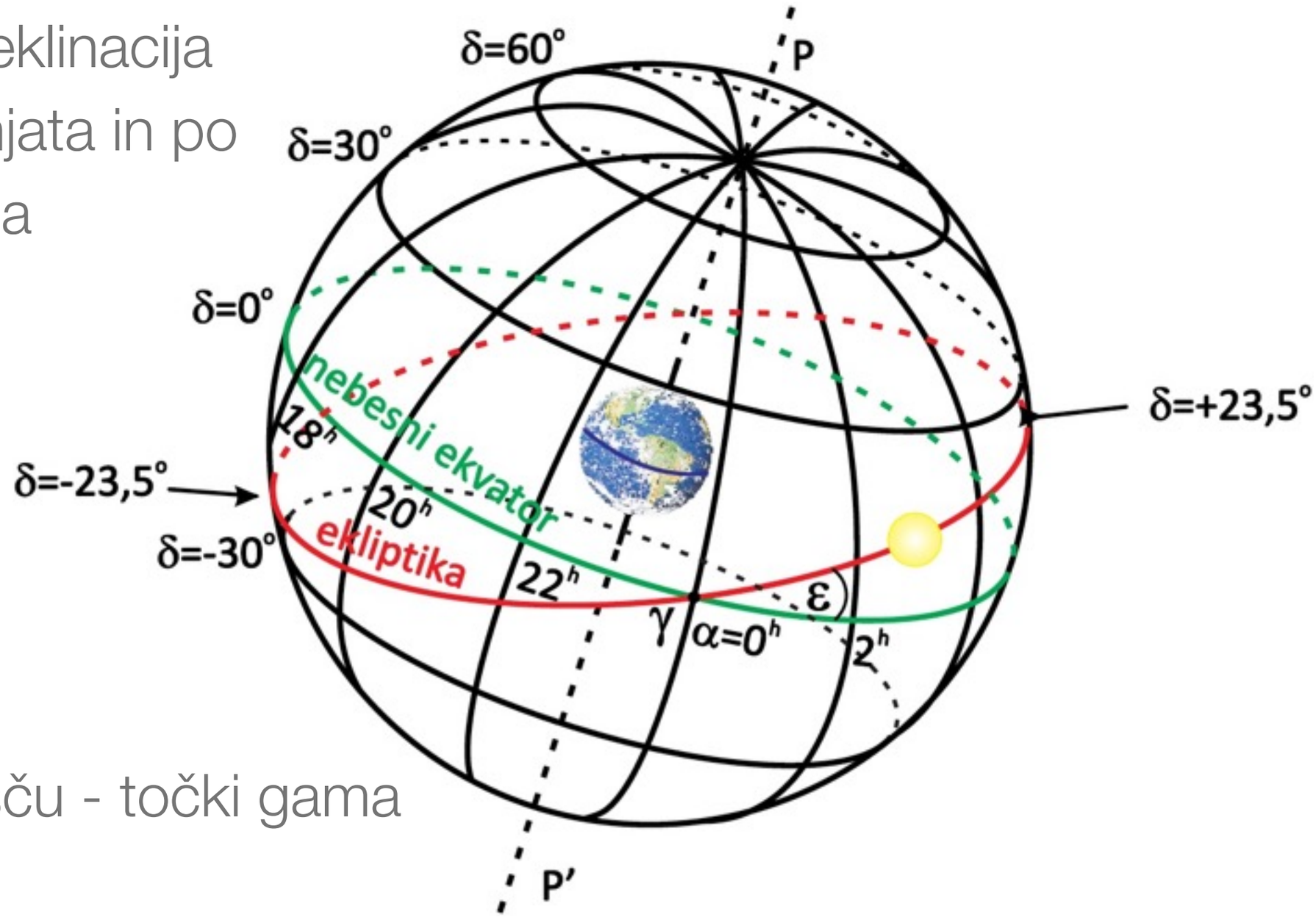
animacija smer žarkov: http://astro.unl.edu/naap/motion1/animations/seasons_ecliptic.html

ekliptika - ozvezdja živalskega kroga



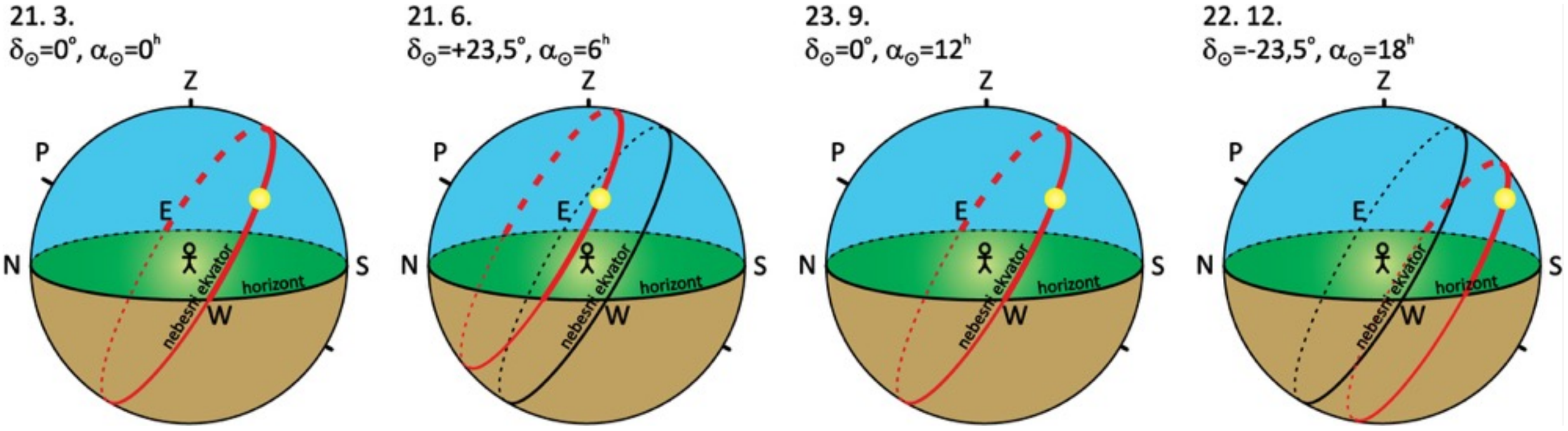
Sonce navidezno potuje po eklitpiki

rektascenzija in deklinacija
Sonca se spreminjata in po enem letu ponovita



ob pomladnem enakonočju je Sonce v pomladišču - točki gama

višina Sonca nad obzorjem in dolžina dneva



animacija: http://astro.unl.edu/naap/motion3/animations/sunmotions.html

višina Sonca, dolžina dneva, smer in dolžina sence

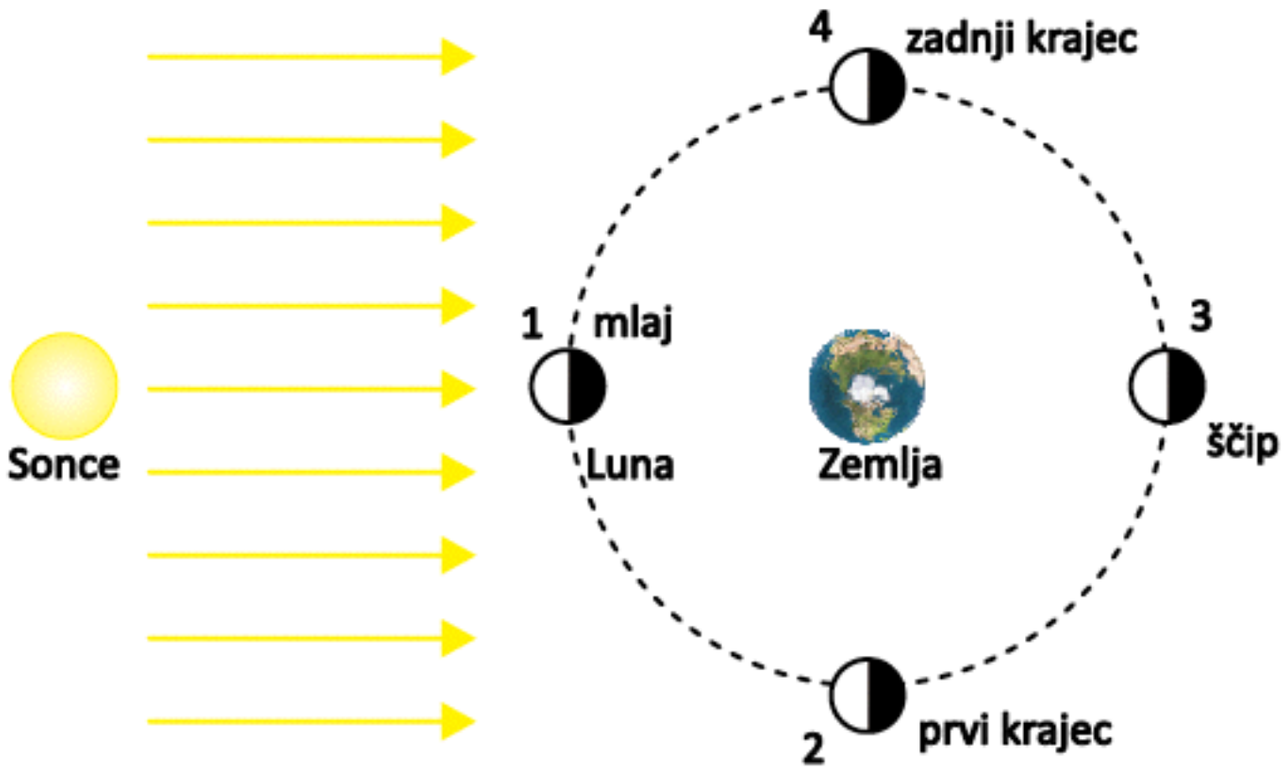
- animacije University of Nebraska-Lincoln:

animacija: http://astro.unl.edu/naap/motion3/animations/sunmotions.html

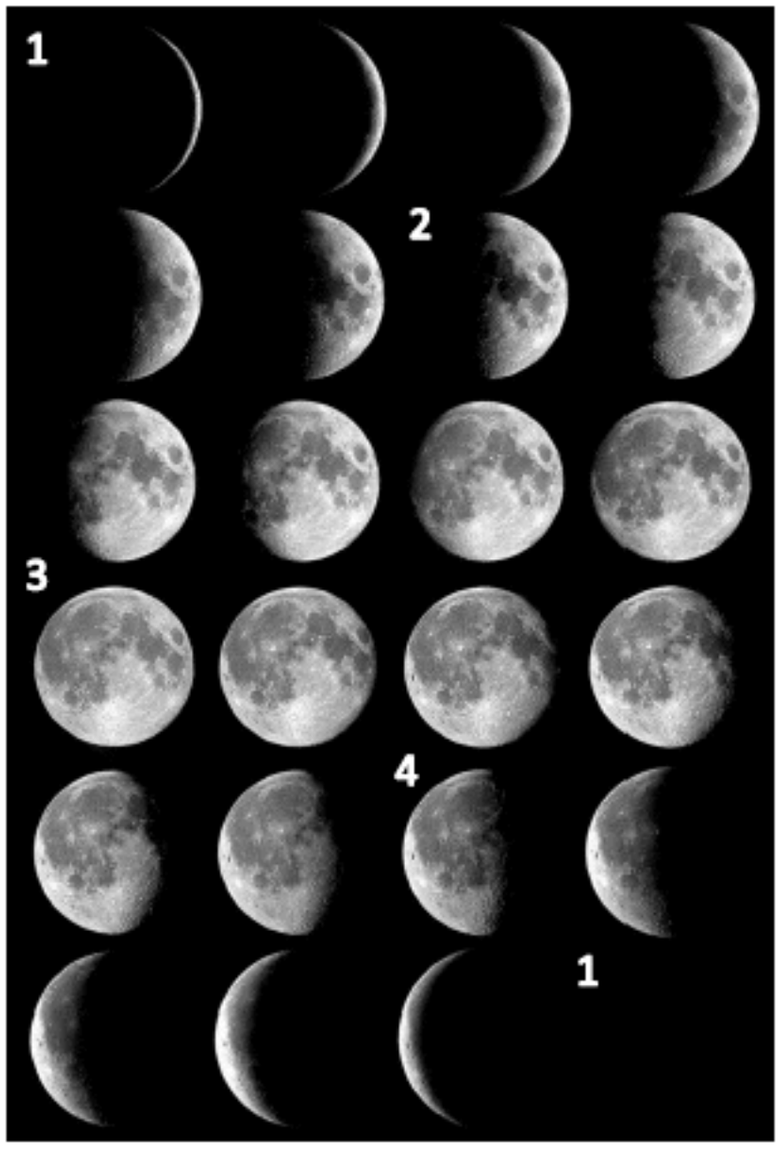
poskusite tudi sami in spreminjajte:

- dan v letu
- kraj opazovališča
- …
- položaj Sonca na nebu ob 12:00 po lokalnem času

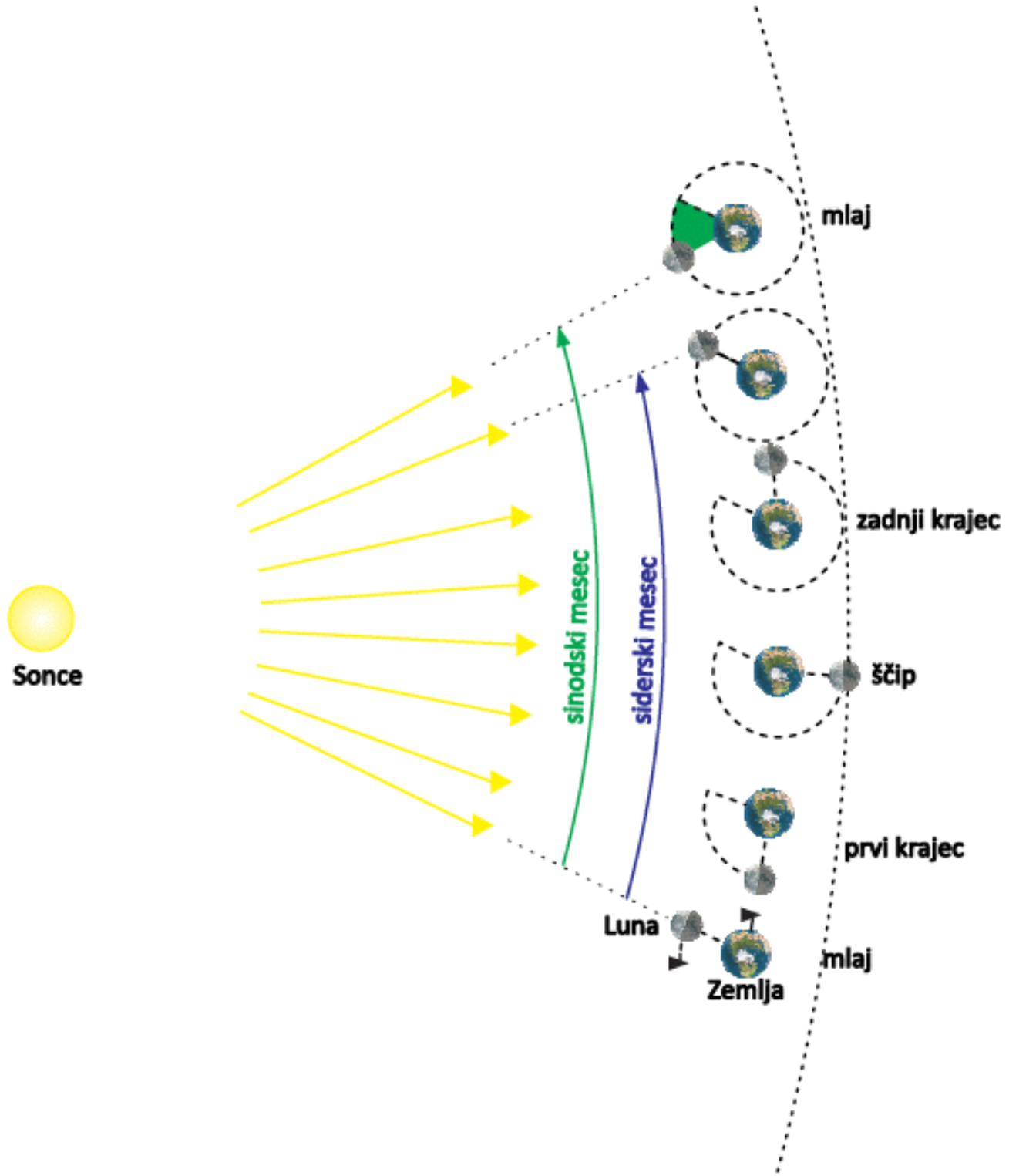
apparent motion of the Moon



Moon phases



videz Lune na Zemljini severni polobli


mlaj
zadnji krajec
ščip
prvi krajec
mlaj
sinodski mesec
siderski mesec
Sonce
Luna
Zemlja

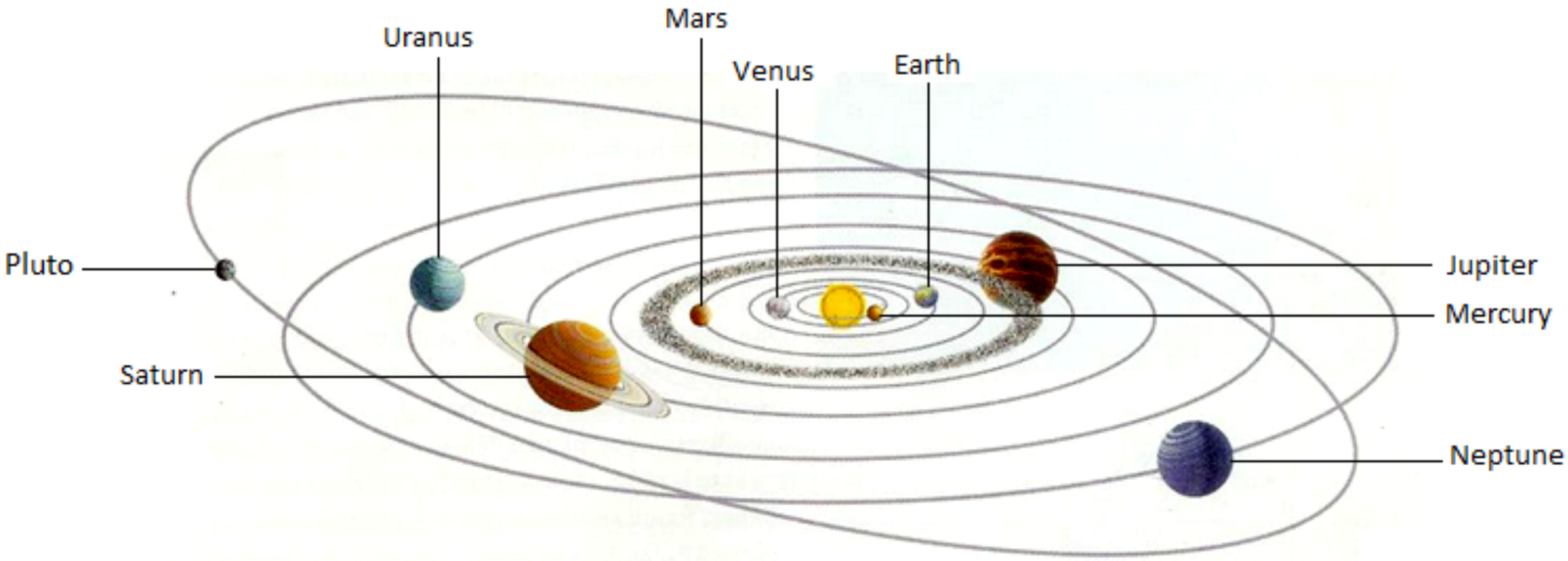
relation between sidereal (P^*) and synodic(P^S) period

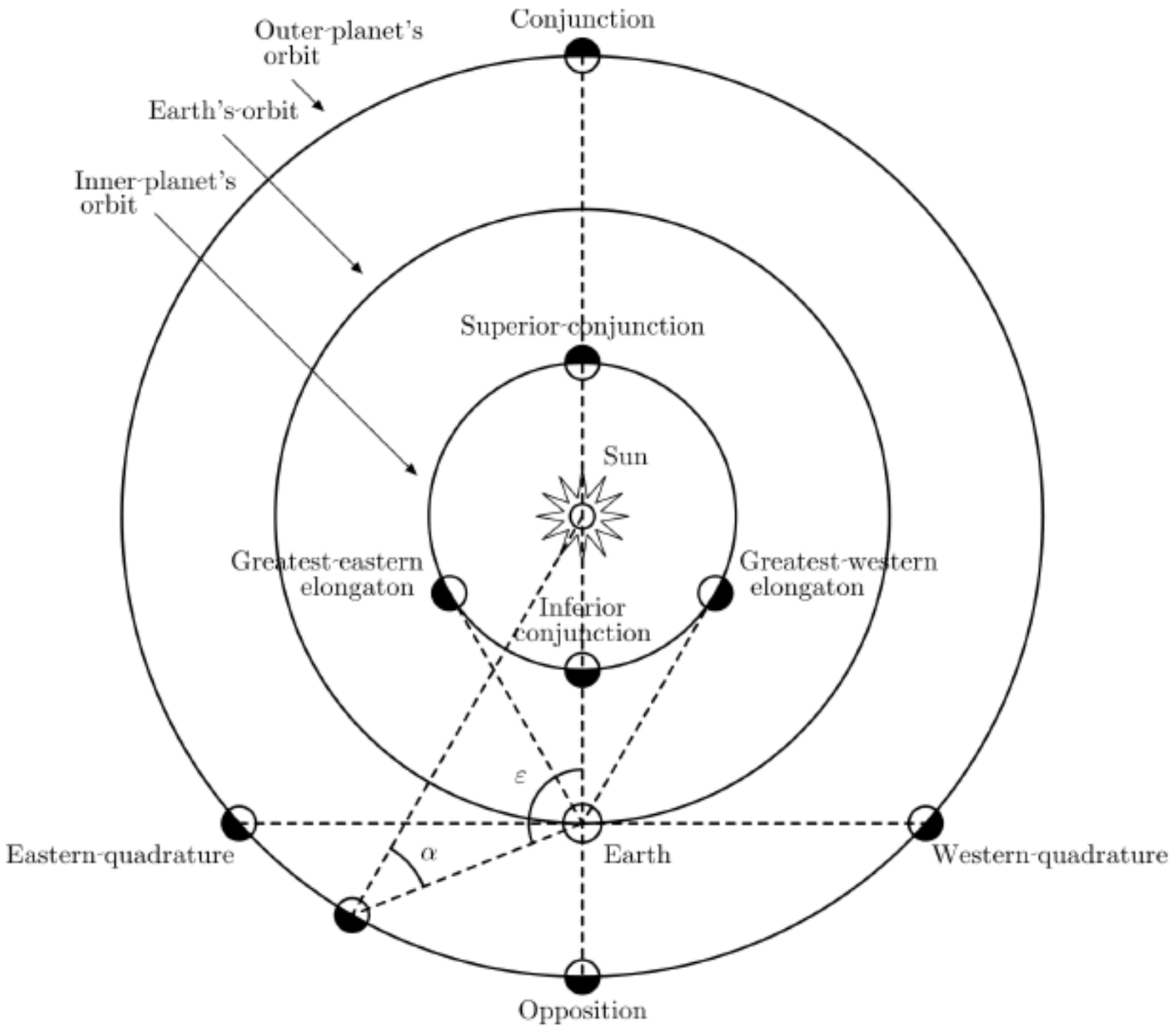
$$\frac{1}{P^{\mathrm{S}}} = \frac{1}{P*} - \frac{1}{P_{\oplus}}$$

- P^*_{Moon}=27.3 days, P^S_{Moon}=29.5 days

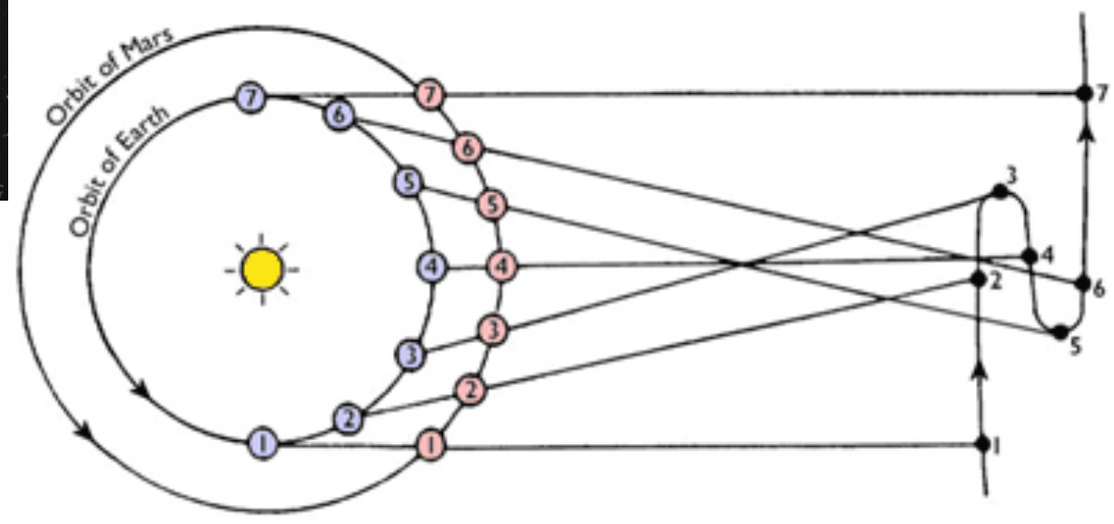
motion of planets

- close to the ecliptic plane

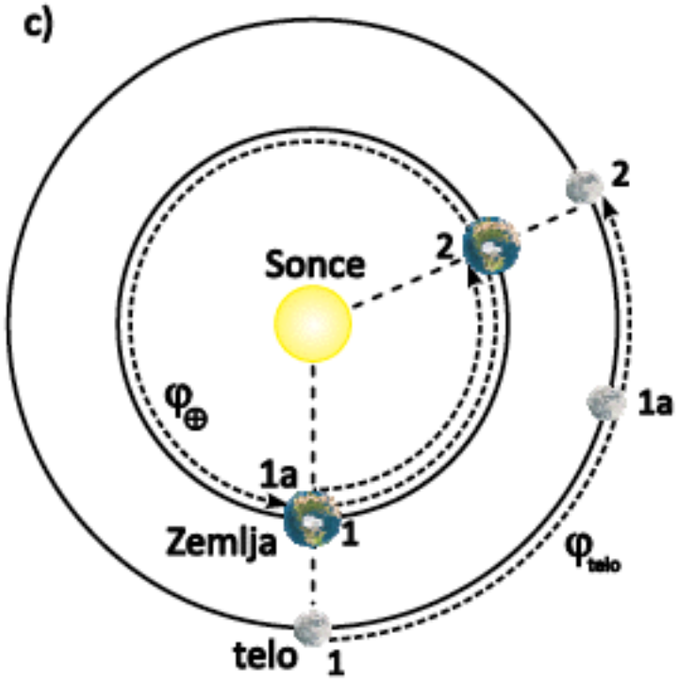



Outer-planet's orbit
Conjunction
Earth's-orbit
Inner-planet's orbit
Superior-conjunction
Sun
Greatest-eastern elongaton
Greatest-western elongaton
Inferior conjunction
ε
α
Eastern-quadrature
Earth
Western-quadrature
Opposition

retrograde motion

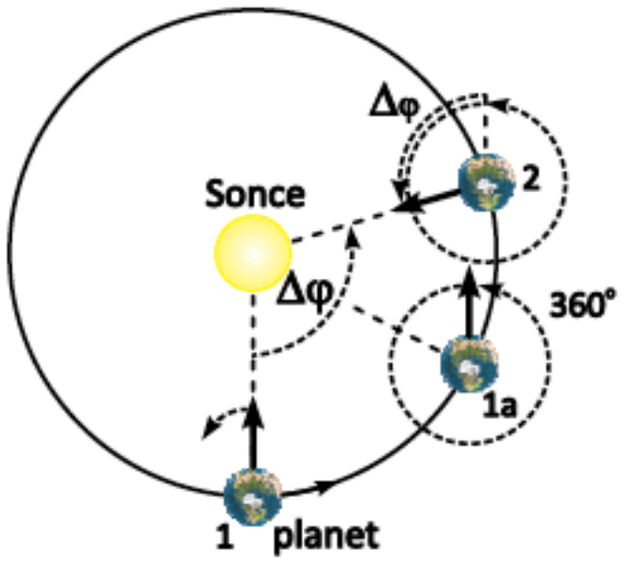


c)



$$\frac{1}{P^{\mathrm{S}}} = \frac{1}{P_{\oplus}} - \frac{1}{P^{*}}$$

d)



$$\frac{1}{T^{\mathrm{S}}} = \frac{1}{T^{*}} - \frac{1}{P_{\mathrm{pl}}}$$