Planejamento das observações

Catálogos de coordenadas e ferramentas para preparar as observações

Desligar o celular (smartphone, iphone, tablet, laptop, etc) na sala de aula, *ou deixe o aparelho em casa ou fora da sala*.

Sistema Equatorial

(α, δ)

α = **ascensão reta**

$0^h \leq \alpha < 24^h$

$0^0 \leq \alpha < 360^0$
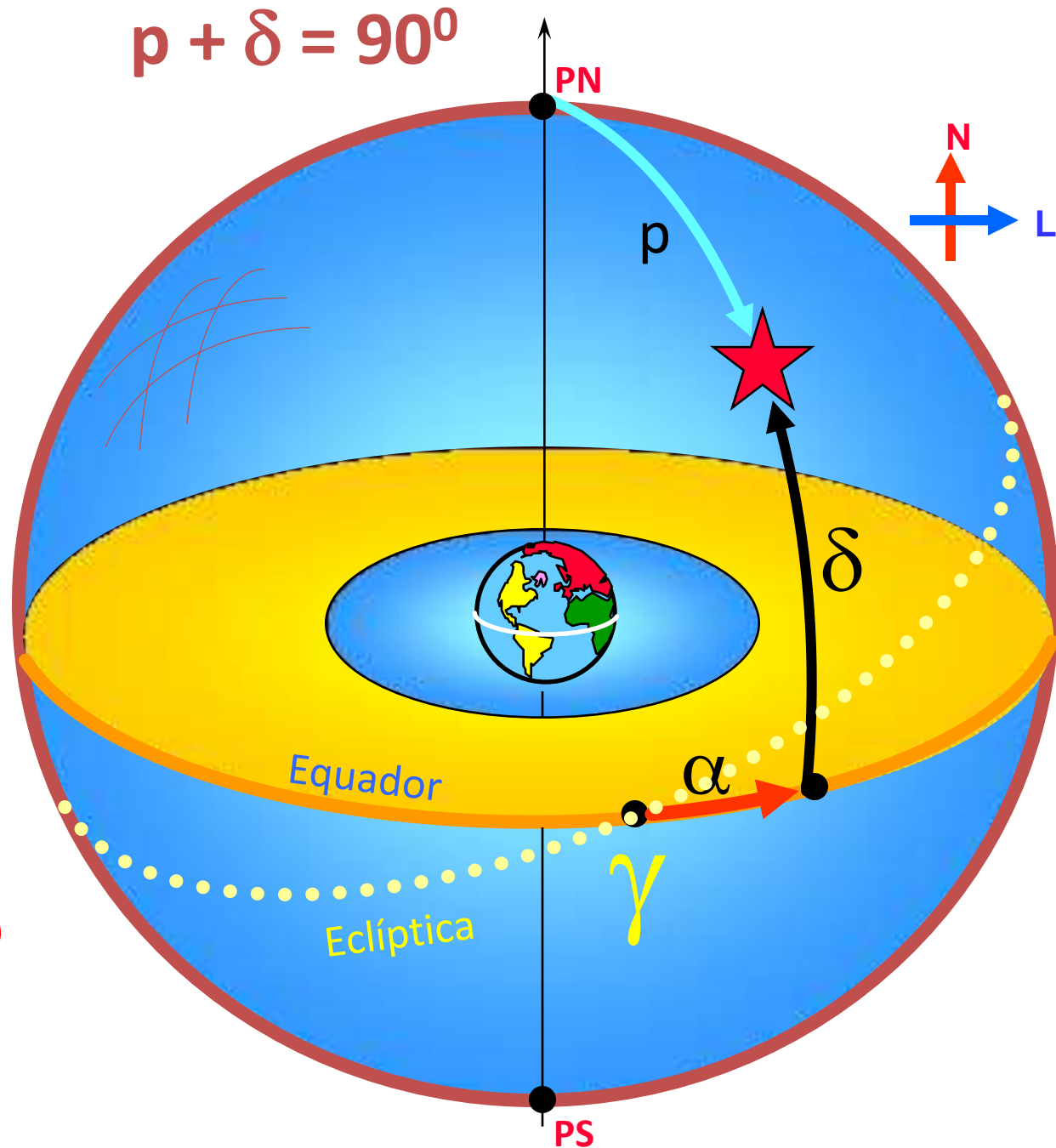
1 hora $\equiv 15^0$

δ = **declinação**

(S) $-90^0 \leq \delta \leq +90^0$ (N)

p = distância polar

(N) $0^0 \leq p \leq +180^0$ (S)

Slide adapted from Prof. Boczko

$p + \delta = 90^0$

Sistema Horizontal e Equatorial
para Observador em Londres (lat 51,5º)

Slide adapted from Prof. Boczko
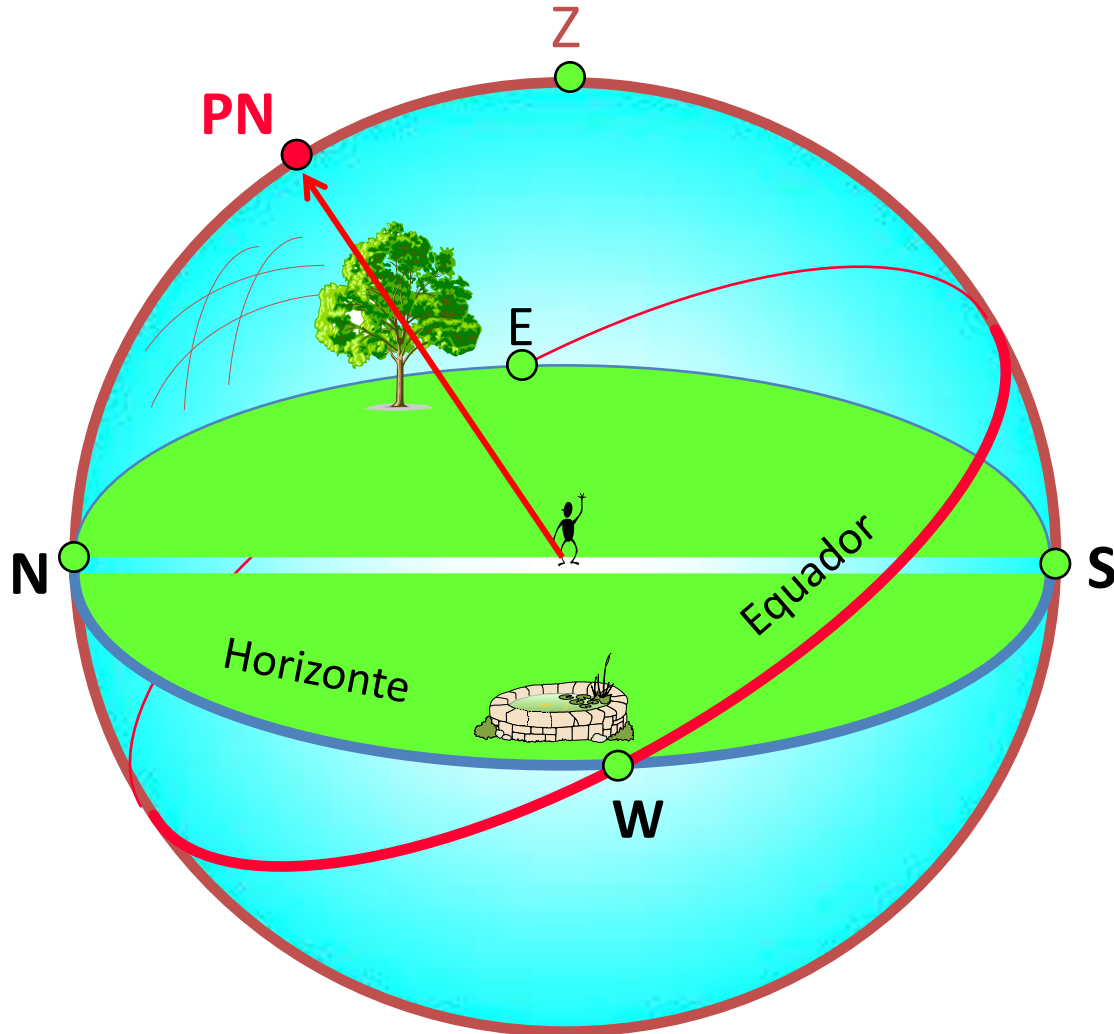
Do it yourself: estrela em Londres com ângulo horario H=3h e declinação δ=15°?
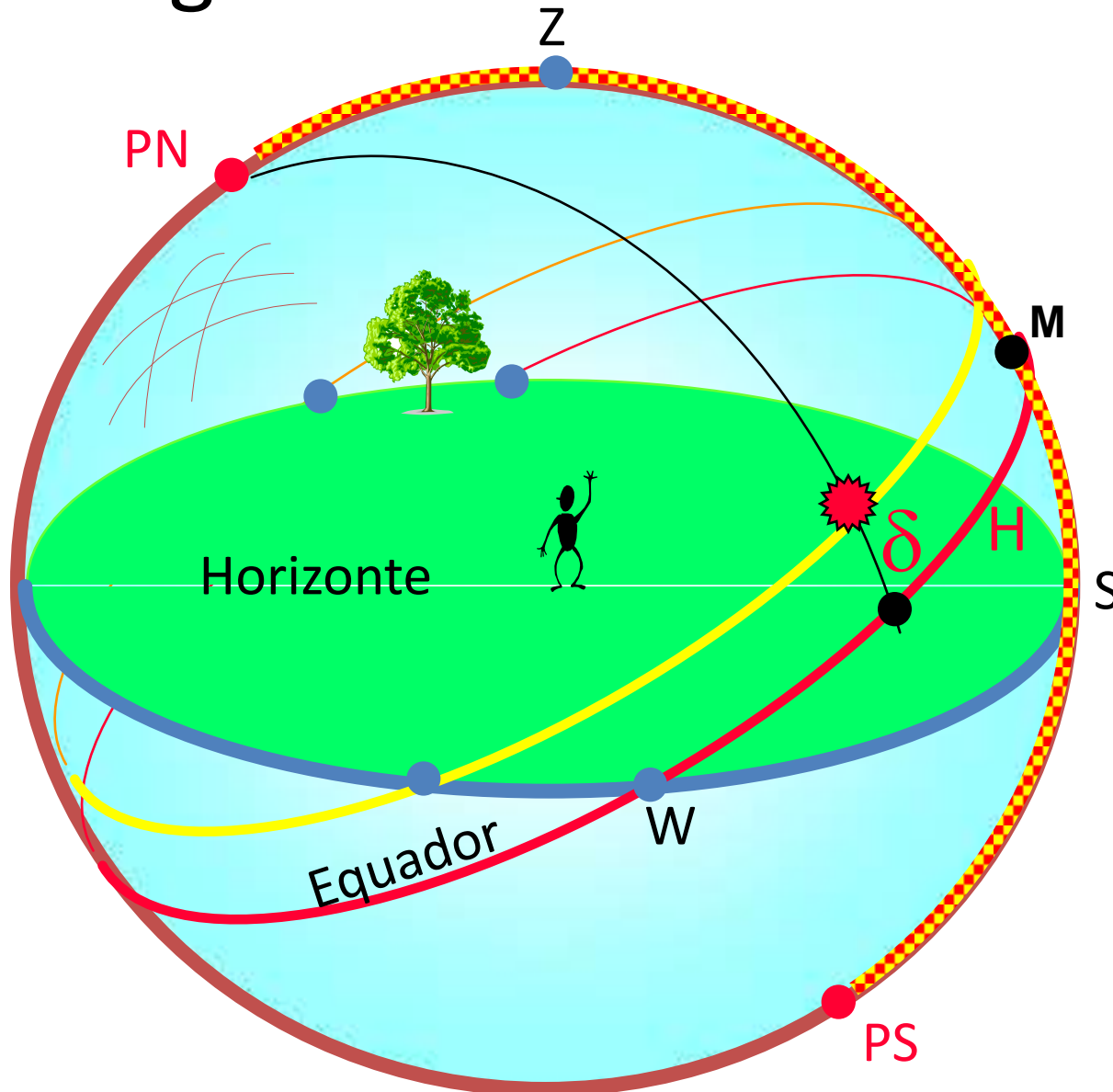
Do it yourself: estrela em Londres com H=3h, δ=15° e α=1h30m, desenhar α
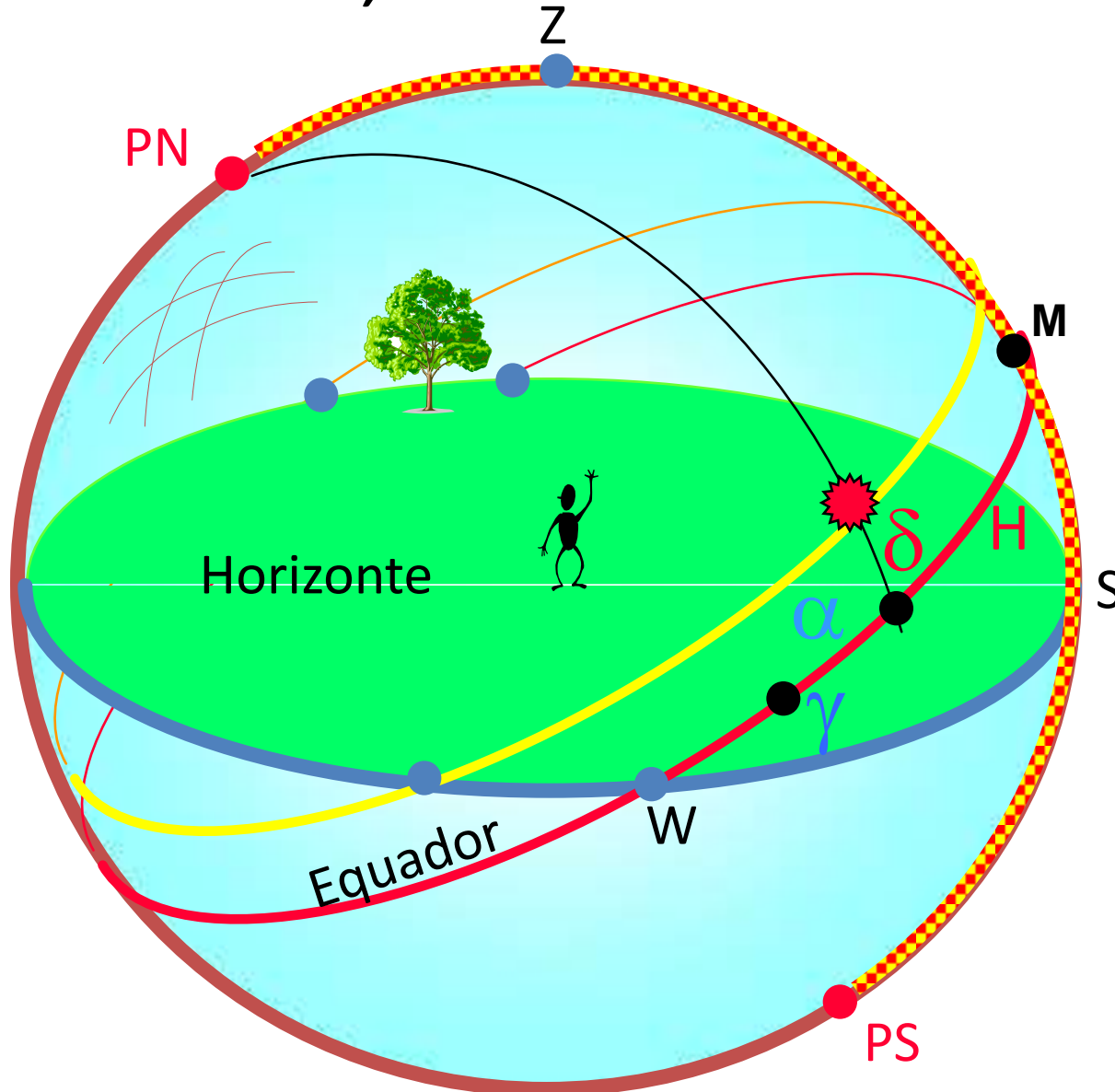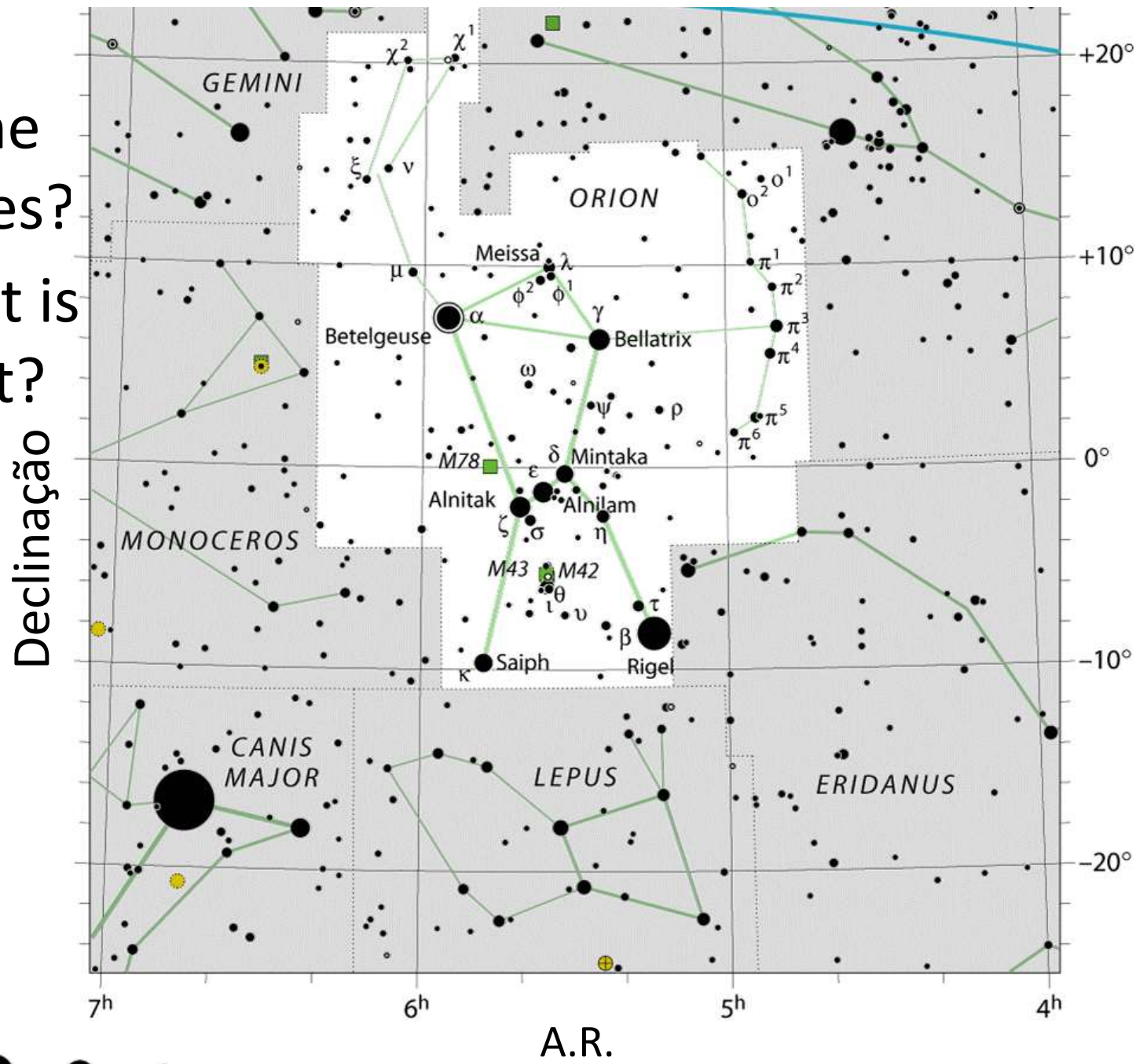

Qual o tempo sideral TS?

TS = 4h30m

Do it yourself:

desenhar Orion visto de São Paulo (23.5° S, 46.6° W) na passagem meridiana

How to obtain the coordinates?

How bright is my target?

A.R. e Dec de Mintaka?

Magnitude?

Declinação

A.R.

8

Planejamento de observações

Coordenadas : Simbad

http://simbad.u-strasbg.fr/simbad/sim-fid

Object query : mintaka

Basic data :

* del Ori A -- Eclipsing binary of Algol type (detached)

A.R. (hh mm ss)   dec (º ' ")

Other object types:	Al* () , EB* () , * (*,AG,ALS,BD,CGO,CSI,FK5,GC,GCRV,GEN#,GOS,GSC,HD,HGAM,HIC,HIP,HR,JP , ** (**,ADS,IDS,PMSC,WDS) , X (1E,2E,1ES,1RXS) , UV (CEL,EUVE) , SB* (
ICRS coord. (ep=J2000) :	05 32 00.40009 -00 17 56.7424 (Optical) [4.92 2.38 0] A 2007A&A
FK5 coord. (ep=J2000 eq=2000) :	05 32 00.400 -00 17 56.74 (Optical) [4.92 2.38 0] A 2007A&A...4
FK4 coord. (ep=B1950 eq=1950) :	05 29 27.03 -00 20 04.4 (Optical) [28.43 13.71 0] A 2007A&A...4
Gal coord. (ep=J2000) :	203.8559 -17.7397 (Optical) [4.92 2.38 0] A 2007A&A...474..653V
Proper motions *mas/yr* [error ellipse]:	0.64 -0.69 [0.56 0.27 0] A 2007A&A...474..653V
Radial velocity / Redshift / cz :	V(km/s) 18.50 [0.5] / z(~) 0.000062 [0.000002] / cz 18.50 [0.50]
Parallaxes *mas*:	4.71 [0.58] A 2007A&A...474..653V
Spectral type:	B0III+O9V C 2001AJ....122.3466M
Fluxes (8) :	U 0.96 [~] C 2002yCat.2237....0D
	B 2.02 [~] C 2002yCat.2237....0D

Magnitude V 2.41 [0.01] C 2002A&A...384..180F

10

Identifiers (55) :

V* del Ori

* 34 Ori A

* del Ori A

** STF 4014A

** HEI 42

ADS 4134 A

AG-00 648

ALS 14779

BD-00 983

CEL 764

CGO 92

CSI-00 983 3

CSI-00 983 1

1E 052926+0020.0

2E 1293

2E 0529.4-0019

1ES 0529-00.3

EUVE J0532-00.2

FK5 206

GC 6847

GCRV 3361

GEN# +1.00036486A

GOS G203.86-17.74 01

GSC 04766-02445

HD 36486

HGAM 419

HIC 25930

HIP 25930

HR 1852

IDS 05269-0022 A

IRAS 05294-0020

JP11 1136

2MASS J05320040-0017566

MCW 324

N30 1185

NAME MINTAKA AE-D

NAME MINTAKA

PMC 90-93 149

PMSC 05269-0022AB

PMSC 05269-0022A

PPM 175888

ROT 839

1RXS J053200.8-001755

SAO 132220

SBC7 233

SBC9 331

SKY# 8880

TDSC 12038 A

TYC 4766-2445-1

UBV 21591

UBV M 11108

UBV 21590

WDS J05320-0018Aa,Ab

WDS J05320-0018A

WH 141

Uma estrela pode ter diversos nomes de catálogos

* 18 Sco -- Variable Star

[query around] with radius 2

Other object types:	* (*,BD,CSI,GC,GCRV,GEN#,GJ,HD,HIC,HIP,HR,LPM,N30,PLX,PPM,SAO,SKY#,SPOCS,TYC,UBV,uvby98,YZ,[B10]) , PM* (Ci,LFT,LHS,LTT,NLTT,PM) , ** (CCDM,IDS,WDS) , IR (AKARI,IRAS,2MASS) , V* (CSV,NSV) , UV (TD1)
ICRS coord. (ep=J2000) :	16 15 37.26946 -08 22 09.9870) [4.48 2.90 0] A 2007A&A...474..653V
FK5 coord. (ep=J2000 eq=2000) :	16 15 37.269 -08 22 09.99 (Optical) [4.48 2.90 0] A 2007A&A...474..653V
FK4 coord. (ep=B1950 eq=1950) :	16 12 53.98 -08 14 19.0 (Optical) [25.89 16.75 0] A 2007A&A...474..653V
Gal coord. (ep=J2000) :	004.6952 +29.1570 (Optical) [4.48 2.90 0] A 2007A&A...474..653V
Proper motions mas/yr [error ellipse]:	230.77 -495.53 [0.51 0.33 0] A 2007A&A...474..653V
Radial velocity / Redshift / cz :	V(km/s) 11.79 [0.09] / z(~) 0.000039 [0.000000] / cz 11.79 [0.09] (~) A 2002ApJS..141..503N
Parallaxes mas:	71.94 [0.37] A 2007A&A...474..653V
Spectral type:	G2Va C 2011ARep...55...31S
Fluxes (5) :	B 6.15 [~] C ~
	V 5.50 [~] C ~
	J 4.667 [0.260] D 2003yCat.2246....0C
	H 4.162 [0.178] D 2003yCat.2246....0C
	K 4.186 [0.292] D 2003yCat.2246....0C

Identifiers (41) :

* 18 Sco	HD 146233	N30 3644	TD1 19005
AKARI-IRC-V1 J1615373-082213	HIC 79672	NLTT 42344	TYC 5613-1378-1
BD-07 4242	HIP 79672	NSV 7577	UBV 13804
CCDM J16156-0822A	HR 6060	PLX 3687	UBV M 21288
Ci 20 976	IDS 16102-0806 A	PLX 3687.00	uvby98 100146233
CSI-07 4242 1	IRAS 16129-0814	PM 16129-0814	WDS J16156-0822A
CSV 101566	LFT 1259	PPM 199464	YZ 98 5647
GC 21864	LHS 3171	SAO 141066	[B10] 4137
GCRV 9353	LPM 594	SKY# 29346	
GEN# +1.00146233	LTT 6482	SPOCS 698	
GJ 616	2MASS J16153726-0822096	SV* ZI 1223	

Uma estrela pode ter diversos nomes de catálogos

- 18 Sco (Flamsteed)
- HD 146233 (Henry Draper)
- HIP 79672 (Hipparcos)
- HR 6060 (Bright Star Catalogue)
- BD -07 4242 (*Bonner Durchmusterung*)
- 2MASS J16153726-0822096 (2MASS)

Simbad

HD 75302 -- High proper-motion Star

Other object types: * (HD,AG,ASCC,BD,GSC,HIC,HIP,PPM,SAO,SKY#,SPOCS,TYC,USNO,u...
                       IR (2MASS) ,**X** (1RXS)

ICRS coord. (ep=J2000) : 08 49 12.53044 +03 29 05.1266 (Optical) [7.11 4.22 84]

Época 2000   hh mm ss   o ' "

A.R.   declinação

query around with radius 2 arc

HD 75302 -- High proper-motion Star

Other object types: * (HD,AG,ASCC,BD,GSC,HIC,HIP,PPM,SAO,SKY#,SPOCS,TYC,USNO,uvby98,YZ) ,**PM*** (LSPM) ,
                       IR (2MASS) ,**X** (1RXS)

ICRS coord. (ep=J2000) :   08 49 12.53044 +03 29 05.1266 (Optical) [7.11 4.22 84] A 2007A&A...474..653V
FK5 coord. (ep=J2000 eq=2000) :   08 49 12.530 +03 29 05.13 (Optical) [7.11 4.22 84] A 2007A&A...474..653V
FK4 coord. (ep=B1950 eq=1950) :   08 46 36.17 +03 40 12.4 (Optical) [40.72 25.02 0] A 2007A&A...474..653V
Gal coord. (ep=J2000) :   223.9743 +27.6703 (Optical) [7.11 4.22 84] A 2007A&A...474..653V
Proper motions *mas/yr* [error ellipse]: -146.56 60.17   0.81 0.48 0] A 2007A&A...474..653V
Radial velocity / Redshift / cz : V(km/s) 10.32 [0.45] / z(~) 0.000034 [0.000002] / cz 10.32 [0.45]   (~) A
                                  2007AJ....133.2524W
Parallaxes *mas*:   32.26 [0.71] A 2007A&A...474..653V
Spectral type: G5V C 2007AJ....133.2524W
Fluxes (12) :   B 8.128 [0.016] D 2000A&A...355L..27H
                                  V 7.43 [0.01] D 2000A&A...355L..27H
                                  R 7.0 [~] E 2003AJ....125..984M
                                  I 6.7 [~] E 2003AJ....125..984M
                                  J 6.238 [0.021] C 2003yCat.2246....0C
                                  H 5.952 [0.049] C 2003yCat.2246....0C
magnitudes   K 5.840 [0.020] C 2003yCat.2246....0C
                                  u (AB) 12.871 [0.006] C 2009yCat.2294....0A
                                  g (AB) 11.846 [0.005] C 2009yCat.2294....0A
                                  r (AB) 11.318 [0.006] C 2009yCat.2294....0A
                                  i (AB) 10.117 [0.006] C 2009yCat.2294....0A
                                  z (AB) 8.515 [0.001] C 2009yCat.2294....0A

6.2' x 6.2'

Formato do OPD

Nome	AR	DEC	MAG	Movimento próprio AR	Movimento próprio DEC
HR9077	TAB 00 00 19.2 TAB	-44 17 26 TAB	6.29 TAB	0.08 TAB	-0.111
HR9078	TAB 00 00 23.9 TAB	+26 55 06 TAB	6.46 TAB	0.044 TAB	-0.052
HR9079	TAB 00 00 30.9 TAB	+59 33 35 TAB	6.19 TAB	-0.077 TAB	-0.024
HR9080	TAB 00 00 43.Espaço	15 15 12 TAB	6.38 TAB	0.027 TAB	0.005
HR9081	TAB 00 01 04.5 TAB	-48 48 36 TAB	5.71 TAB	-0.022 TAB	-0.009
HR9083	TAB 00 01 19.3 TAB	+49 58 54 TAB	6.22 TAB	0.018 TAB	-0.006

Atenção: todos os catálogos carregados deverão possuir coordenadas J2000.

HR 9079 -- Star

Other object types:	* (HR,AG,BD,CSI,FK5,GC,GCRV, (IRAS,IRCO,2MASS)
ICRS coord. (ep=J2000) :	00 00 30.88833 +59 33 34.849 2007A&A...474..653V
FK5 coord. (ep=J2000 eq=2000) :	00 00 30.888 +59 33 34.85 (
FK4 coord. (ep=B1950 eq=1950) :	23 57 58.02 +59 16 54.0 (Op
Gal coord. (ep=J2000) :	116.5145 -02.6761 (Optical
Proper motions *mas/yr* [error ellipse]:	-80.81 -23.64 [0.37 0.28 0]

-0.081   -0.02364

OPD: proper motion em "/ano:
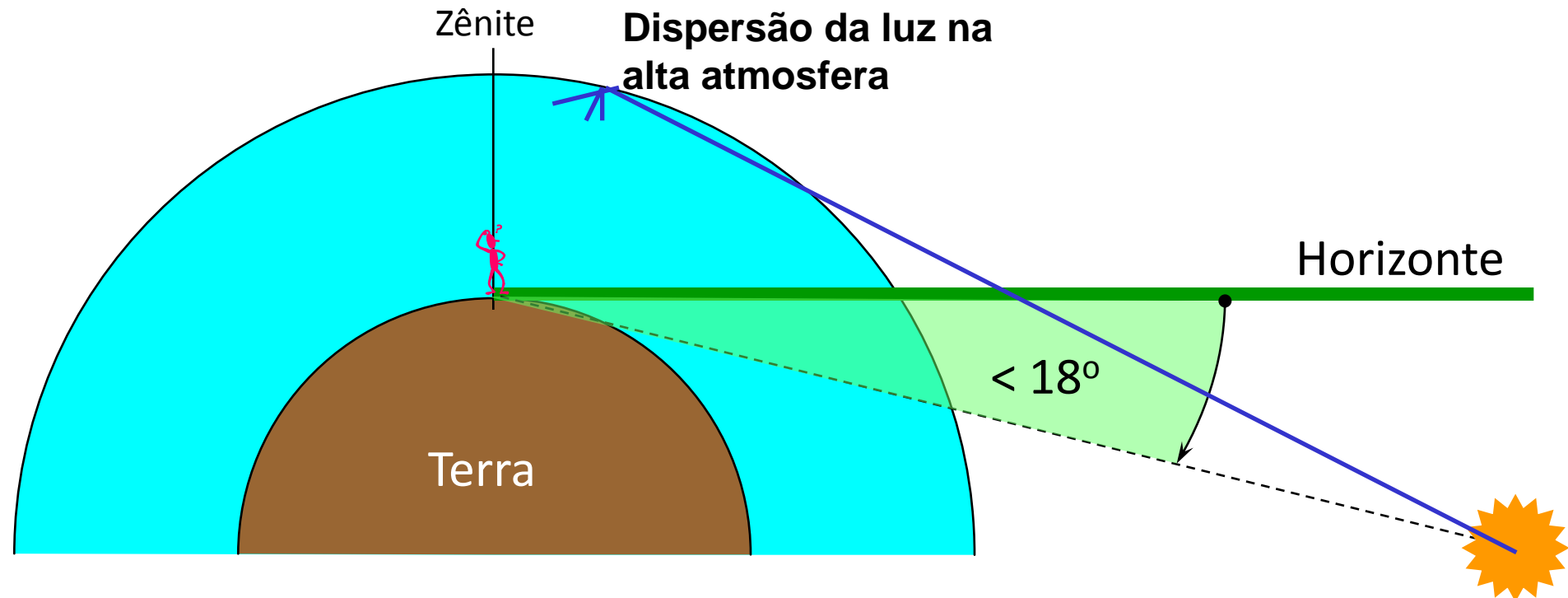Dividir por 1000 o valor do SIMBAD!

A que horas começar a observar?

- Sunset?
- Quando ficar escuro?
- A que horas fica bem escuro?
- Crepúsculo?
- Qual crepúsculo?

Dispersão e Crepúsculo

O crepúsculo é o resultado da dispersão da luz solar nas altas camadas da atmosfera.

Zênite

Dispersão da luz na alta atmosfera

Horizonte

< 18º

Terra

Iluminação durante os crepúsculos
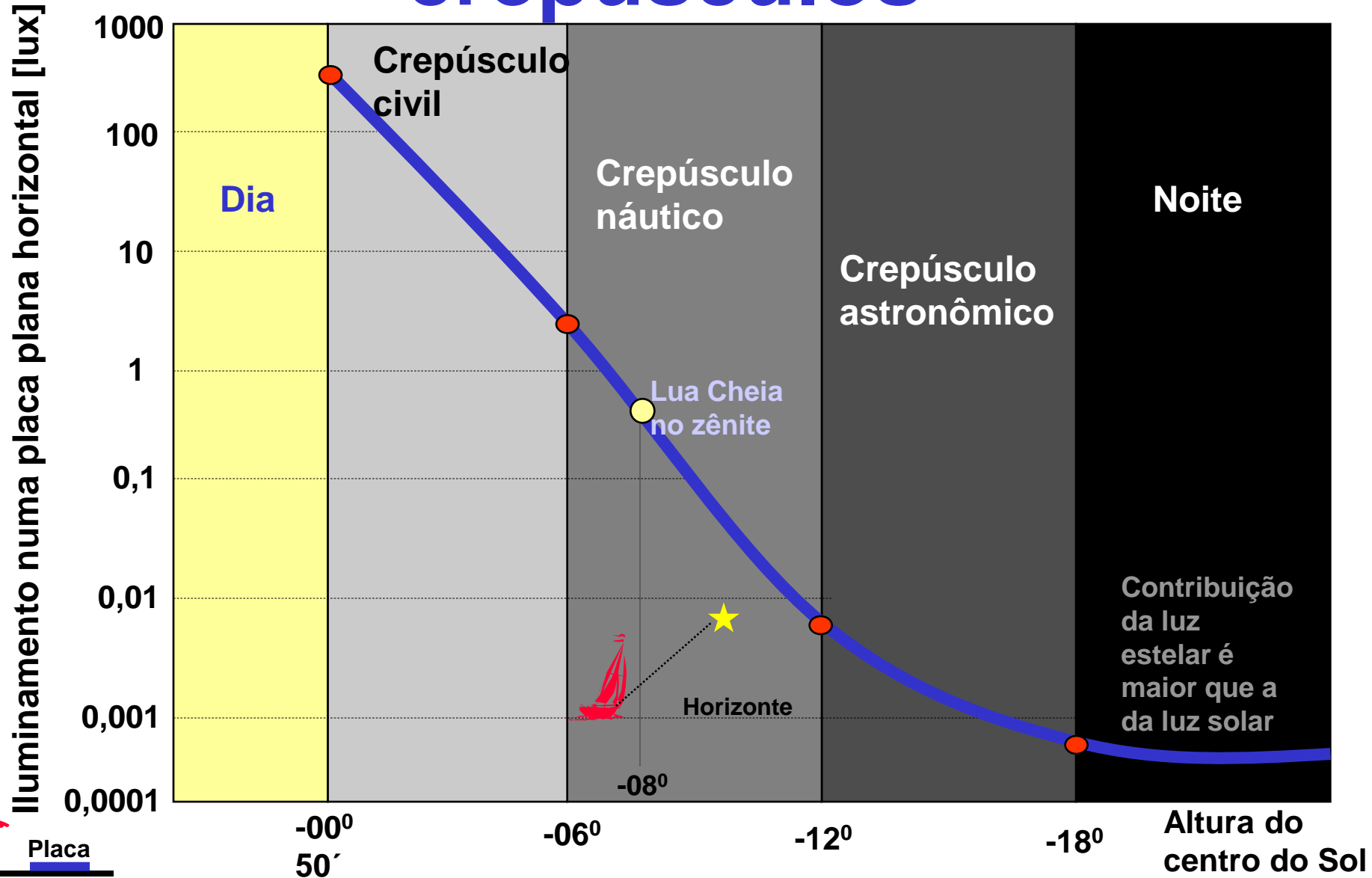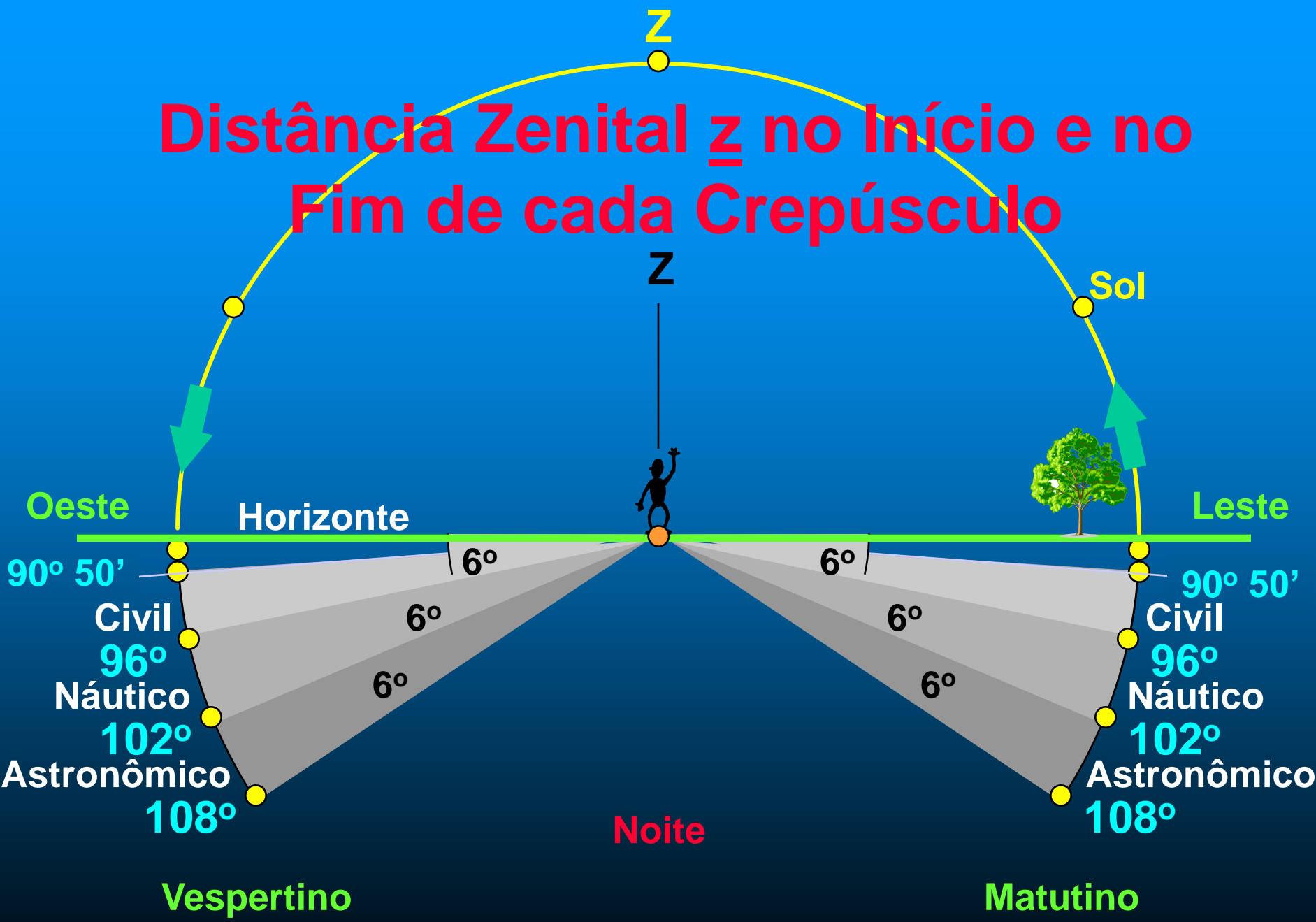
Nascer, Passagem Meridiana e Ocaso do Sol

— Nascer
— Passagem Meridiana
— Ocaso

Data: 2007

Sao Paulo
Lat : -23 32 36
Long: 46 37 59

00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 Horas

Jan
10
20
Fev
10
20
Mar
10
20
Abr
10
20
Mai
10
20
Jun
10
20
Jul
10
20
Ago
10
20
Set
10
20
Out
10
20
Nov
10
20
Dez
10
20
31

[I] Crep Ast:	Nascer :	[F] Crep Civ:
[I] Crep Nau:	Pas Mer:	[F] Crep Nau:
[I] Crep Civ:	Ocaso :	[F] Crep Ast:

Ferramentas para a observação
https://www.eso.org/sci/observing/tools/calendar.html

Calendars and Calculators

The tools and information linked from this page will be useful for all the aspects of observations that are related to the position of the target: their visibility, sun- and moon-rise and -set, ephemerides for Solar System minor bodies, etc.

Ephemerides

- Calculation of Site Sky Ephemerides

  This tool produces a nightime calendar of phenomena for a single site.
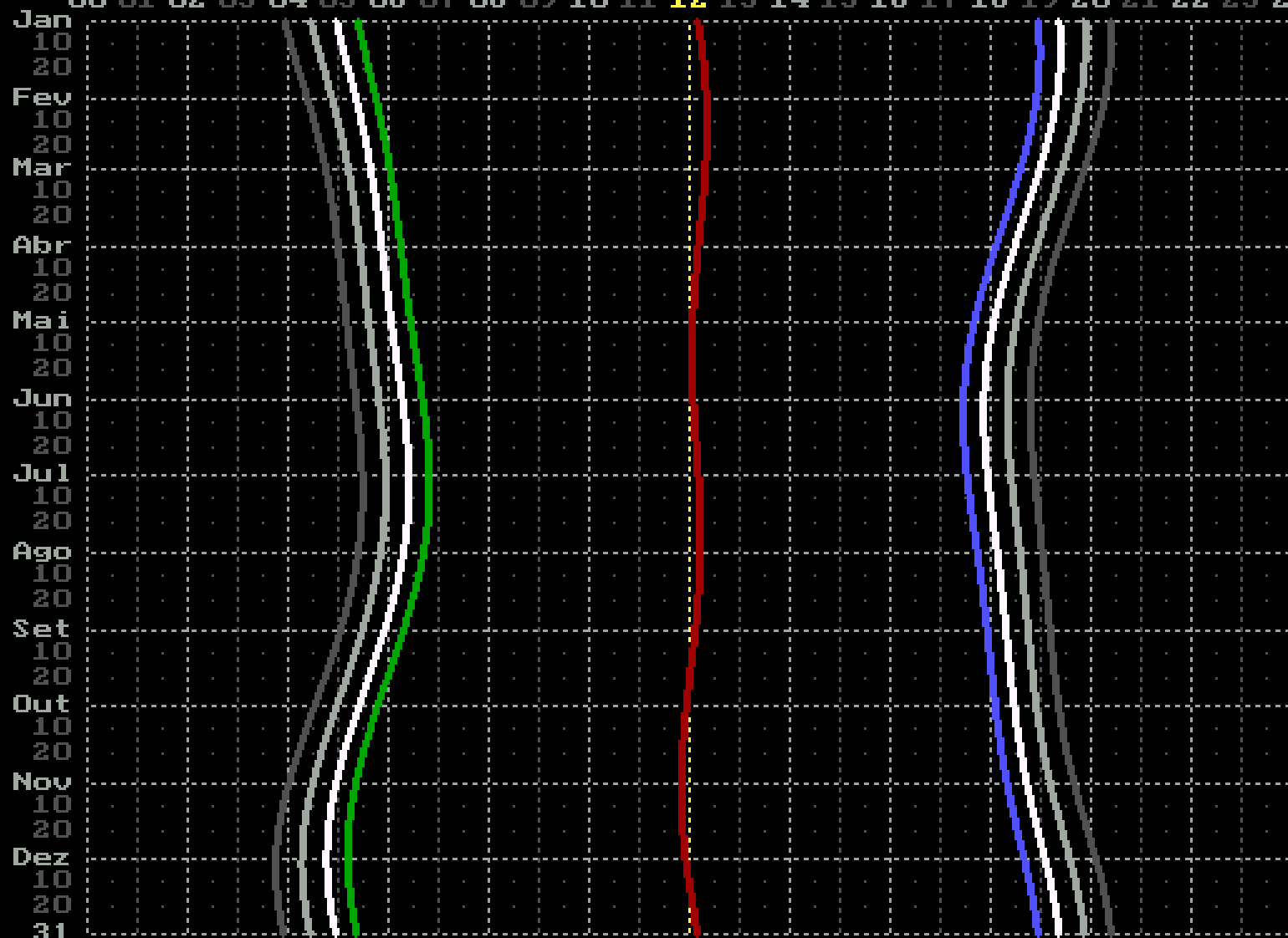
- Solar System Ephemerides

  The JPL HORIZONS on-line solar system data and ephemeris computation service provides access to key solar system data and flexible production of highly accurate ephemerides for solar system objects.

- Object Observability

  This tool provides object observability tables based on site, object coordinates and observing period.

- Daily Almanac

  This tool produces almanac data for a single site and for a single date. Provided by courtesy of J. Thorstensen and B. Casey.

- JD converter: Converts civil date to julian date and reverse

Position, Airmass, Extinction

- Airmasses Calculator

  This tool provides hourly airmasses based on site, date, and object coordinates information. Additionally, it will compute the parallactic angle as well as heliocentric-barycentric corrections.

    - Plots: draw the airmass curves for a list of objects, for a given night
    - Extinction coefficients for La Silla (old danish 1.54m page)

- Differential athmospheric refraction table for the La Silla and Paranal sites.

  The differential atmospheric refraction is calculated in arcseconds, at an altitude of 2 km, as function of wavelength and airmass. A new calculator is being worked on and will go into the infrared.

- Paralactic angle calculator

  While this tool has specific features for the DFOSC instrument on the 1.54m Danish telescope, it will compute the paralactic angle for any observations.

https://www.eso.org/sci/observing/tools/calendar/skycalc.html

Sky Ephemerides

See also: Object Observability - Airmasses - Daily Almanac - Sky Calendar

This tool produces a nightime calendar of phenomena for a single site. The listing includes

- Sun rise and set times
- Astronomical twilights, both in civil time and LST
- Moon rise and set times and phase for eachnight in the month

All times are given for the local time, including daylight savingtimes when applicable.

Select site, month and year, then press **Compute**.

More detailed information is provided is a separate document Notes for Skycalc by John Thorstensen.

Site: ESO La Silla: 4 42 55 (hms) -29 15.4 (dm) -4h UT ▾

Year: 2014 ▾ **From:** Mar ▾ **To:** Mar ▾

Compute

Calendar for ESO La Silla, west longitude (h.m.s) =   4 42 55, latitude (d.m) = -29 15.4
Note that each line lists events of one night, spanning two calendar dates. Rise/set times are given
in Chilean time (4 hr W), for 2347 m above surroundings, DAYLIGHT time used, * shows night clocks are reset.
Moon coords. and illum. are for local midnight, even if moon is down. Program: John Thorstensen, Dartmouth College.

Date (eve/morn)	JDmid	LMSTmidn	---------- Sun: ---------				LST twilight:		------------ Moon: --------------			
(2014 at start)	(-2450000)		set	twi.end	twi.beg	rise	eve	morn	rise	set	%illum	RA	Dec
Sat Mar 01/Sun Mar 02	6718.6	8 56 24	20 23	21 37	6 14	7 28	6 33	15 11	.....	20 31	1	23 24.8	0 17
Sun Mar 02/Mon Mar 03	6719.6	9 00 21	20 22	21 36	6 15	7 29	6 35	15 16	.....	21 13	4	0 19.1	4 56
Mon Mar 03/Tue Mar 04	6720.6	9 04 17	20 21	21 34	6 16	7 29	6 38	15 21	.....	21 54	10	1 12.6	9 13
Tue Mar 04/Wed Mar 05	6721.6	9 08 14	20 19	21 33	6 16	7 30	6 41	15 26	.....	22 37	17	2 05.7	12 56
Wed Mar 05/Thu Mar 06	6722.6	9 12 11	20 18	21 32	6 17	7 31	6 44	15 30	.....	23 20	26	2 58.5	15 55
Thu Mar 06/Fri Mar 07	6723.6	9 16 07	20 17	21 31	6 18	7 31	6 46	15 35	.....	0 05	35	3 51.1	18 03
Fri Mar 07/Sat Mar 08	6724.6	9 20 04	20 16	21 29	6 19	7 32	6 49	15 40	.....	0 51	45	4 43.3	19 18
Sat Mar 08/Sun Mar 09*	6725.6	9 24 00	20 15	21 28	5 19	6 33	6 52	15 44	.....	1 40	55	5 34.9	19 38
Sun Mar 09/Mon Mar 10	6726.7	10 28 07	19 14	20 27	5 20	6 33	6 54	15 49	.....	1 29	65	6 27.3	19 00
Mon Mar 10/Tue Mar 11	6727.7	10 32 03	19 13	20 25	5 21	6 34	6 57	15 54	.....	2 20	73	7 17.1	17 37
Tue Mar 11/Wed Mar 12	6728.7	10 36 00	19 12	20 24	5 22	6 34	7 00	15 59	.....	3 11	81	8 05.9	15 30
Wed Mar 12/Thu Mar 13	6729.7	10 39 56	19 10	20 23	5 22	6 35	7 02	16 03	.....	4 03	88	8 53.9	12 44
Thu Mar 13/Fri Mar 14	6730.7	10 43 53	19 09	20 22	5 23	6 36	7 05	16 08	17 01	4 55	94	9 41.3	9 25
Fri Mar 14/Sat Mar 15	6731.7	10 47 49	19 08	20 20	5 24	6 36	7 08	16 13	17 37	5 48	98	10 28.3	5 42
Sat Mar 15/Sun Mar 16	6732.7	10 51 46	19 07	20 19	5 24	6 37	7 10	16 17	18 11	6 42	100	11 15.6	1 42
Sun Mar 16/Mon Mar 17	6733.7	10 55 42	19 06	20 18	5 25	6 37	7 13	16 22	18 46	.....	100	12 03.4	- 2 25
Mon Mar 17/Tue Mar 18	6734.7	10 59 39	19 05	20 17	5 26	6 38	7 16	16 26	19 22	.....	98	12 52.3	- 6 28
Tue Mar 18/Wed Mar 19	6735.7	11 03 36	19 03	20 15	5 27	6 39	7 18	16 31	20 00	.....	94	13 42.9	-10 15
Wed Mar 19/Thu Mar 20	6736.7	11 07 32	19 02	20 14	5 27	6 39	7 21	16 36	20 41	.....	88	14 35.3	-13 33
Thu Mar 20/Fri Mar 21	6737.7	11 11 29	19 01	20 13	5 28	6 40	7 24	16 40	21 25	.....	80	15 29.8	-16 09
Fri Mar 21/Sat Mar 22	6738.7	11 15 25	19 00	20 12	5 28	6 40	7 27	16 45	22 14	.....	70	16 26.3	-17 52
Sat Mar 22/Sun Mar 23	6739.7	11 19 22	18 59	20 10	5 29	6 41	7 29	16 49	23 08	.....	59	17 24.3	-18 32
Sun Mar 23/Mon Mar 24	6740.7	11 23 18	18 57	20 09	5 30	6 42	7 32	16 54	0 06	.....	48	18 23.1	-18 03
Mon Mar 24/Tue Mar 25	6741.7	11 27 15	18 56	20 08	5 30	6 42	7 35	16 58	1 08	.....	37	19 21.8	-16 25
Tue Mar 25/Wed Mar 26	6742.7	11 31 11	18 55	20 07	5 31	6 43	7 37	17 03	2 12	.....	26	20 19.8	-13 45
Wed Mar 26/Thu Mar 27	6743.7	11 35 08	18 54	20 06	5 32	6 43	7 40	17 08	3 17	.....	17	21 16.6	-10 12
Thu Mar 27/Fri Mar 28	6744.7	11 39 05	18 53	20 04	5 32	6 44	7 43	17 12	4 22	16 40	9	22 12.2	- 6 01
Fri Mar 28/Sat Mar 29	6745.7	11 43 01	18 52	20 03	5 33	6 44	7 46	17 17	5 26	17 23	3	23 06.8	- 1 28
Sat Mar 29/Sun Mar 30	6746.7	11 46 58	18 50	20 02	5 33	6 45	7 48	17 21	6 30	18 04	1	0 00.6	3 08
Sun Mar 30/Mon Mar 31	6747.7	11 50 54	18 49	20 01	5 34	6 46	7 51	17 26	.....	18 46	0	0 54.0	7 31
Mon Mar 31/Tue Apr 01	6748.7	11 54 51	18 48	20 00	5 34	6 46	7 54	17 30	.....	19 28	2	1 47.2	11 27

Astronomical Sky Calendar

http://www.briancasey.org/artifacts/astro/skycalendar.cgi

Astronomical Sky Calendar
by **Brian Casey** , using **Skycalendar** by **John Thorstensen**

[Get Calendar]

Year: 2014 **Start Month:** March **End Month:** March

Observatory: Other

If "Other" enter:

West Longitude(h m s) 03 02 20

North Latitude (d m s) -22 32 04

Site name OPD

Standard Time zone, hours West 3

Time zone name

Hours from Midnight to print Moon rise/set 7.5

☐ Enable daylight time

24

```
***** 2014 MARCH *****

Calendar for OPD, west longitude (h.m.s) =   3 02 20, latitude (d.m) = -22 32.1
Note that each line lists events of one night, spanning two calendar dates.  Rise/set times are given
in Unknown Zone time (  3 hr W), uncorrected for elevation, in standard time all year.
Moon coords. and illum. are for local midnight, even if moon is down.  Program: John Thorstensen, Dartmouth College.

  Date (eve/morn)       JDmid    LMSTmidn   ---------- Sun: ---------   LST twilight:  ------------- Moon: -------------
   (2014 at start)     (-2450000)           set   twi.end twi.beg rise    eve     morn    rise    set   %illum    RA      Dec

Sat Mar 01/Sun Mar 02   6718.6   10 36 59   18 31  19 47   4 43  5 59    6 23   15 21    7 08  18 40      1   23 26.2    0 10

Sun Mar 02/Mon Mar 03   6719.6   10 40 56   18 30  19 46   4 43  5 59    6 26   15 25    .....  19 24      4    0 20.2    4 48
Mon Mar 03/Tue Mar 04   6720.6   10 44 52   18 29  19 45   4 44  6 00    6 29   15 30    .....  20 09     10    1 13.5    9 04
Tue Mar 04/Wed Mar 05   6721.6   10 48 49   18 28  19 44   4 44  6 00    6 32   15 34    .....  20 53     17    2 06.3   12 46
Wed Mar 05/Thu Mar 06   6722.6   10 52 46   18 27  19 43   4 45  6 01    6 35   15 39    .....  21 38     26    2 58.8   15 43
Thu Mar 06/Fri Mar 07   6723.6   10 56 42   18 26  19 42   4 46  6 01    6 38   15 43    .....  22 24     35    3 51.0   17 51
Fri Mar 07/Sat Mar 08   6724.6   11 00 39   18 25  19 41   4 46  6 01    6 41   15 47    .....  23 11     45    4 42.9   19 05
Sat Mar 08/Sun Mar 09   6725.6   11 04 35   18 24  19 40   4 47  6 02    6 44   15 52    .....  24 00     55    5 34.2   19 26

Sun Mar 09/Mon Mar 10   6726.6   11 08 32   18 23  19 39   4 47  6 02    6 47   15 56    .....   0 49     64    6 24.8   18 55
Mon Mar 10/Tue Mar 11   6727.6   11 12 28   18 23  19 38   4 47  6 03    6 49   16 01    .....   1 39     73    7 14.5   17 34
Tue Mar 11/Wed Mar 12   6728.6   11 16 25   18 22  19 37   4 48  6 03    6 52   16 05    .....   2 29     81    8 03.3   15 29
Wed Mar 12/Thu Mar 13   6729.6   11 20 21   18 21  19 36   4 48  6 03    6 55   16 10    .....   3 19     88    8 51.3   12 45
Thu Mar 13/Fri Mar 14   6730.6   11 24 18   18 20  19 35   4 49  6 04    6 58   16 14    .....   4 09     93    9 38.7    9 28
Fri Mar 14/Sat Mar 15   6731.6   11 28 15   18 19  19 34   4 49  6 04    7 01   16 18   16 57   4 59     97   10 25.8    5 46
Sat Mar 15/Sun Mar 16   6732.6   11 32 11   18 18  19 33   4 50  6 05    7 04   16 23   17 34   5 50    100   11 13.0    1 46

Sun Mar 16/Mon Mar 17   6733.6   11 36 08   18 17  19 32   4 50  6 05    7 07   16 27   18 11   6 42    100   12 00.8 - 2 21
Mon Mar 17/Tue Mar 18   6734.6   11 40 04   18 16  19 31   4 51  6 05    7 10   16 31   18 50   .....    98   12 49.8 - 6 25
Tue Mar 18/Wed Mar 19   6735.6   11 44 01   18 15  19 30   4 51  6 06    7 13   16 36   19 30   .....    94   13 40.3 -10 13
Wed Mar 19/Thu Mar 20   6736.6   11 47 57   18 14  19 29   4 51  6 06    7 16   16 40   20 13   .....    88   14 32.8 -13 33
Thu Mar 20/Fri Mar 21   6737.6   11 51 54   18 13  19 28   4 52  6 06    7 19   16 45   20 59   .....    80   15 27.4 -16 12
Fri Mar 21/Sat Mar 22   6738.6   11 55 50   18 12  19 27   4 52  6 07    7 22   16 49   21 49   .....    70   16 23.9 -17 58
Sat Mar 22/Sun Mar 23   6739.6   11 59 47   18 11  19 26   4 53  6 07    7 25   16 53   22 43   .....    60   17 22.0 -18 40

Sun Mar 23/Mon Mar 24   6740.6   12 03 44   18 10  19 25   4 53  6 07    7 28   16 58   23 41   .....    49   18 20.9 -18 14
Mon Mar 24/Tue Mar 25   6741.6   12 07 40   18 09  19 24   4 53  6 08    7 31   17 02    0 42   .....    37   19 19.8 -16 39
Tue Mar 25/Wed Mar 26   6742.6   12 11 37   18 08  19 23   4 54  6 08    7 34   17 06    1 44   .....    27   20 17.9 -14 00
Wed Mar 26/Thu Mar 27   6743.6   12 15 33   18 07  19 22   4 54  6 09    7 37   17 10    2 46   .....    17   21 14.9 -10 28
Thu Mar 27/Fri Mar 28   6744.6   12 19 30   18 07  19 21   4 54  6 09    7 40   17 15    3 48   .....     9   22 10.6 - 6 18
Fri Mar 28/Sat Mar 29   6745.6   12 23 26   18 06  19 20   4 55  6 09    7 43   17 19    4 49  16 30      4   23 05.2 - 1 46
Sat Mar 29/Sun Mar 30   6746.6   12 27 23   18 05  19 19   4 55  6 10    7 46   17 23    5 50  17 14      1   23 59.0    2 50

Sun Mar 30/Mon Mar 31   6747.6   12 31 19   18 04  19 18   4 55  6 10    7 49   17 28    6 50  17 58      0    0 52.3    7 14
Mon Mar 31/Tue Apr 01   6748.6   12 35 16   18 03  19 17   4 56  6 10    7 52   17 32    .....  18 43      2    1 45.5   11 10
```

Object visibility

http://catserver.ing.iac.es/staralt/

Object Visibility

Staralt is a program that shows the observability of objects in various ways: either you can plot altitude against time for a particular night (**Staralt**), or plot the path of your objects across the sky for a particular night (**Startrack**), or plot how altitude changes over a year (**Starobs**), or get a table with the best observing date for each object (**Starmult**). For further information, click on the "help" button at the bottom of the page.

Mode	Staralt ▾
Date	28 ▾ April ▾ 2012 ▾ (Staralt,Startrack)
Observatory	ESO (La Silla, Chile) ▾ or specify own site: "East_Longitude(deg) Latitude(deg) [Altitude(m)]"
Coordinates	Available formats: [name] hh mm ss ±dd mm ss ; [name] hh:mm:ss ±dd:mm:ss ; [name] ddd.ddd dd.ddd. [name] must be a single word. `08 49 12.53044 +03 29 05.1266` and/or specify a file containing the coordinates Browse...

Altitudes, ESO La Silla, 289.270E −29.2567, 2347 m above sea level

Airmass = sec z = 1/cos z
z : distância zenital

Altura

Airmass

Mean Solar Zone Time, starting night 28 04 2012

Processed on 2012/04/12 at 17:50:34 UT
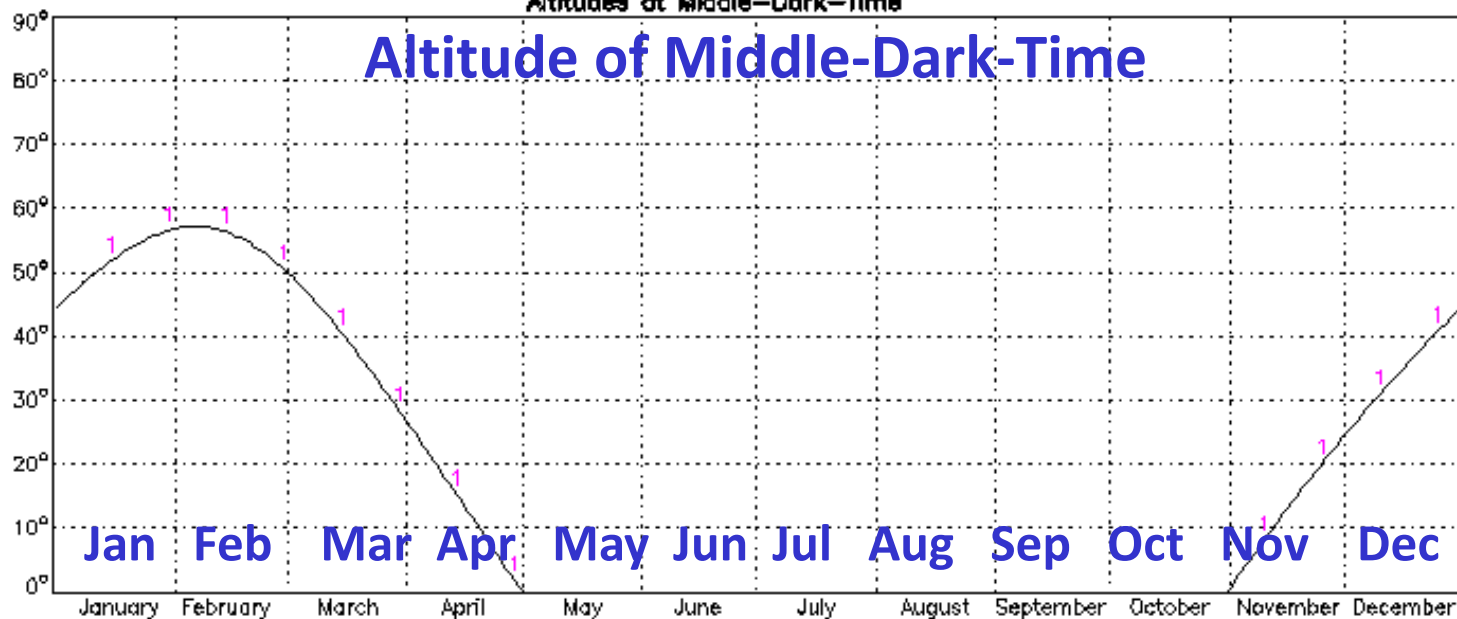
Limites do 1.6m do OPD

distância zenital > 60
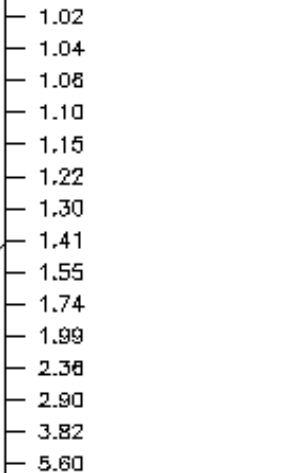
(pode ser maior, mas tomar cuidado)

Optimum observing time, ESO La Silla, 289.270E −29.2567, year 2012

Altitude of Middle-Dark-Time

Altitude above horizon

Airmass

Useful hours

List of objects

1 Object 8ʰ49ᵐ + 3°29'
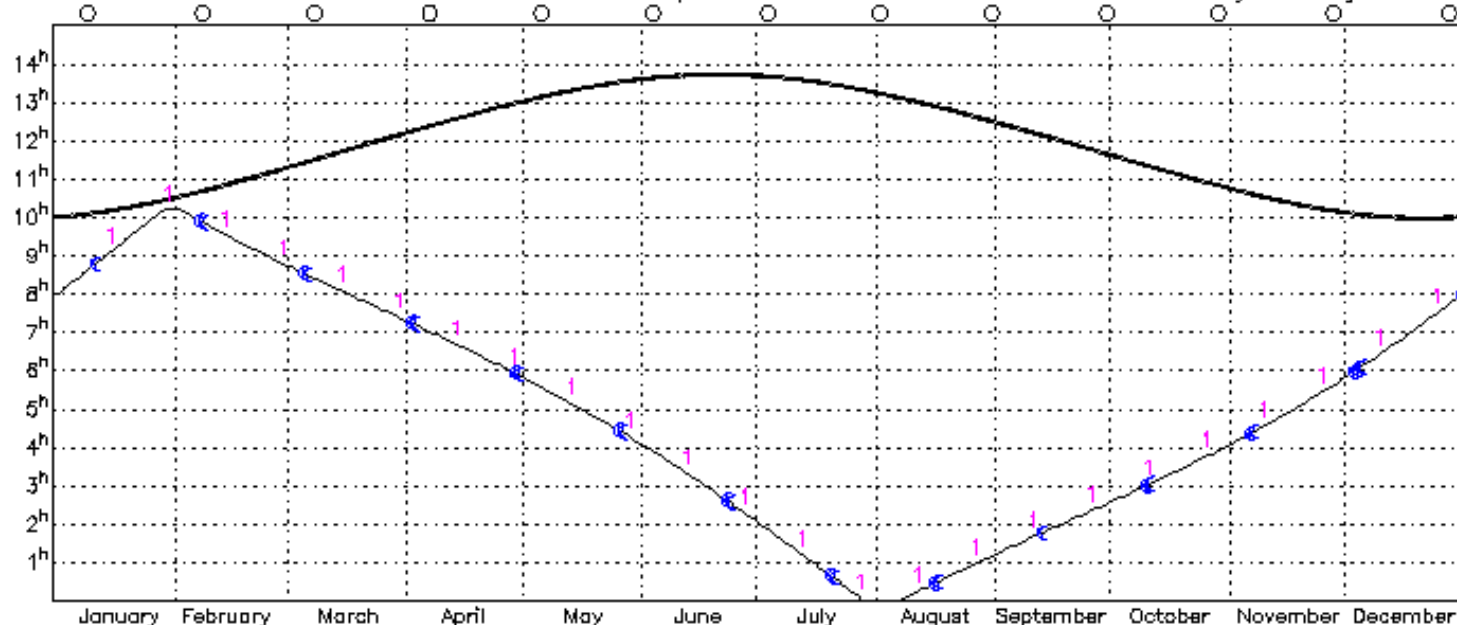
Comments

Finding charts: importantes para objetos fracos ou crowded fields

http://catserver.ing.iac.es/dss1/
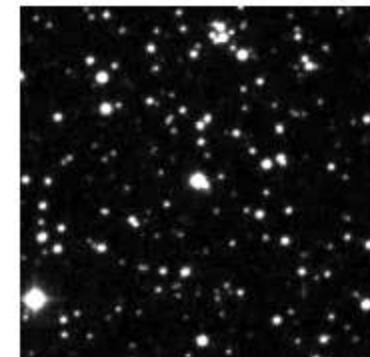
What about moving objects?
http://ssd.jpl.nasa.gov/horizons.cgi

Jet Propulsion Laboratory
California Institute of Technology

+ View the NASA Portal
+ Near-Earth Object (NEO) Program

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Solar System Dynamics

BODIES	ORBITS	EPHEMERIDES	TOOLS	PHYSICAL DATA	DISCOVERY	FAQ	SITE MAP

HORIZONS Web-Interface

This tool provides a web-based *limited* interface to JPL's HORIZONS system which can be used to generate ephemerides for solar-system bodies. Full access to HORIZONS features is available via the primary telnet interface. HORIZONS system news shows recent changes and improvements. A web-interface tutorial is available to assist new users.

Current Settings

Ephemeris Type [change] : **OBSERVER**
Target Body [change] : **Mars** [499]
Observer Location [change] : **Geocentric** [500]
Time Span [change] : Start=**2014-02-19**, Stop=**2014-03-21**, Step=**1 d**
Table Settings [change] : *defaults*
Display/Output [change] : *default* (formatted HTML)

Generate Ephemeris

Asteroid Ceres
La Silla
1 – 10 agosto 2014
a cada hora

HORIZONS Web-Interface

This tool provides a web-based *limited* interface to JPL's HORIZONS system which can be used to generate ephemerides for solar-system bodies. Full access to HORIZONS features is available via the primary telnet interface. HORIZONS system news shows recent changes and improvements. A web-interface tutorial is available to assist new users.

Current Settings

Ephemeris Type [change] : **OBSERVER**
Target Body [change] : **Asteroid 1 Ceres**
Observer Location [change] : **La Silla**--TRAPPIST [I40] (289°15'38.2"E, 29°15'16.6"S, 2317.7 m)
Time Span [change] : Start=**2014-08-01**, Stop=**2014-08-10**, Step=**1 h**
Table Settings [change] : *defaults*
Display/Output [change] : *default* (formatted HTML)

Generate Ephemeris

```
 *************************************************************************************************
  Date__(UT)__HR:MN     R.A._(ICRF/J2000.0)_DEC  APmag  S-brt          delta      deldot    S-O-T /r    S-T-O
 *************************************************************************************************
 $$SOE
  2014-Aug-01 00:00   m  13 51 51.07 -05 40 24.0   8.75   6.88 2.69659783113561  23.4420144  79.5639 /T  21.6645
  2014-Aug-01 01:00   m  13 51 53.46 -05 40 47.4   8.75   6.86 2.69716297621785  23.5234405  79.5355 /T  21.6623
  2014-Aug-01 02:00   m  13 51 55.86 -05 41 10.8   8.75   6.90 2.69772985300150  23.5850881  79.5070 /T  21.6600
  2014-Aug-01 03:00      13 51 58.27 -05 41 34.2   8.75   6.93 2.69829793034298  23.6226251  79.4784 /T  21.6576
  2014-Aug-01 04:00      13 52 00.69 -05 41 57.6   8.75   6.91 2.69886659220453  23.6333687  79.4499 /T  21.6552
  2014-Aug-01 05:00      13 52 03.13 -05 42 21.0   8.75   6.86 2.69943517980341  23.6164696  79.4213 /T  21.6527
  2014-Aug-01 06:00      13 52 05.59 -05 42 44.4   8.75   6.87 2.70000303668333  23.5729694  79.3928 /T  21.6502
  2014-Aug-01 07:00      13 52 08.05 -05 43 07.8   8.75   6.92 2.70056955362375  23.5057295  79.3645 /T  21.6476
  2014-Aug-01 08:00      13 52 10.53 -05 43 31.2   8.75   6.93 2.70113421031404  23.4192353  79.3362 /T  21.6450
  2014-Aug-01 09:00      13 52 13.01 -05 43 54.7   8.75   6.88 2.70169661094210  23.3192888  79.3081 /T  21.6424
  2014-Aug-01 10:00      13 52 15.50 -05 44 18.1   8.75   6.86 2.70225651126281  23.2126122  79.2802 /T  21.6397
  2014-Aug-01 11:00 N    13 52 17.99 -05 44 41.6   8.75   6.90 2.70281383529554  23.1063873  79.2523 /T  21.6370
  2014-Aug-01 12:00 *    13 52 20.48 -05 45 05.1   8.75   6.93 2.70336868050913  23.0077646  79.2247 /T  21.6343
  2014-Aug-01 13:00 *    13 52 22.96 -05 45 28.7   8.75   6.91 2.70392131113982  22.9233738  79.1971 /T  21.6317
  2014-Aug-01 14:00 *    13 52 25.43 -05 45 52.2   8.75   6.86 2.70447214009964  22.8588704  79.1697 /T  21.6290
  2014-Aug-01 15:00 *m   13 52 27.89 -05 46 15.8   8.75   6.87 2.70502170071254  22.8185488  79.1423 /T  21.6264
  2014-Aug-01 16:00 *m   13 52 30.35 -05 46 39.3   8.75   6.92 2.70557061021228  22.8050482  79.1149 /T  21.6239
  2014-Aug-01 17:00 *m   13 52 32.79 -05 47 02.9   8.75   6.93 2.70611952749793  22.8191721  79.0875 /T  21.6213
  2014-Aug-01 18:00 *m   13 52 35.22 -05 47 26.4   8.75   6.88 2.70666910803849  22.8598336  79.0600 /T  21.6189
  2014-Aug-01 19:00 *m   13 52 37.63 -05 47 50.0   8.75   6.86 2.70721995901124  22.9241293  79.0325 /T  21.6164
  2014-Aug-01 20:00 *m   13 52 40.05 -05 48 13.5   8.75   6.89 2.70777259774426  23.0075382  79.0048 /T  21.6140
  2014-Aug-01 21:00 *m   13 52 42.45 -05 48 37.0   8.76   6.93 2.70832741630737  23.1042310  78.9770 /T  21.6117
  2014-Aug-01 22:00 *m   13 52 44.86 -05 49 00.5   8.76   6.91 2.70888465467489  23.2074692  78.9491 /T  21.6093
  2014-Aug-01 23:00 Nm   13 52 47.26 -05 49 24.0   8.76   6.86 2.70944438429779  23.3100661  78.9210 /T  21.6069
  2014-Aug-02 00:00   m  13 52 49.67 -05 49 47.5   8.76   6.87 2.71000650320908  23.4048787  78.8928 /T  21.6046
  2014-Aug-02 01:00   m  13 52 52.09 -05 50 10.9   8.76   6.92 2.71057074299777  23.4852964  78.8645 /T  21.6022
  2014-Aug-02 02:00   m  13 52 54.52 -05 50 34.4   8.76   6.93 2.71113668717321  23.5456938  78.8361 /T  21.5997
  2014-Aug-02 03:00   m  13 52 56.97 -05 50 57.8   8.76   6.89 2.71170379966245  23.5818151  78.8076 /T  21.5973
  2014-Aug-02 04:00      13 52 59.42 -05 51 21.2   8.76   6.86 2.71227146148920  23.5910657  78.7792 /T  21.5947
  2014-Aug-02 05:00      13 53 01.89 -05 51 44.6   8.76   6.89 2.71283901312374  23.5726892  78.7508 /T  21.5921
  2014-Aug-02 06:00      13 53 04.38 -05 52 08.1   8.76   6.93 2.71340579960484  23.5278195  78.7224 /T  21.5895
  2014-Aug-02 07:00      13 53 06.87 -05 52 31.5   8.76   6.91 2.71397121534616  23.4594026  78.6941 /T  21.5868
  2014-Aug-02 08:00      13 53 09.38 -05 52 55.0   8.76   6.87 2.71453474556133  23.3719953  78.6660 /T  21.5841
  2014-Aug-02 09:00      13 53 11.90 -05 53 18.5   8.76   6.86 2.71509600147407  23.2714532  78.6380 /T  21.5813
  2014-Aug-02 10:00      13 53 14.41 -05 53 42.0   8.76   6.91 2.71565474690504  23.1645300  78.6101 /T  21.5785
  2014-Aug-02 11:00 N    13 53 16.93 -05 54 05.5   8.76   6.93 2.71621091441760  23.0584154  78.5824 /T  21.5757
  2014-Aug-02 12:00 *    13 53 19.45 -05 54 29.0   8.76   6.89 2.71676460991821  22.9602433  78.5549 /T  21.5729
  2014-Aug-02 13:00 *    13 53 21.96 -05 54 52.6   8.76   6.86 2.71731610539757  22.8766036  78.5274 /T  21.5701
  2014-Aug-02 14:00 *    13 53 24.46 -05 55 16.2   8.76   6.88 2.71786582030896  22.8130914  78.5000 /T  21.5673
  2014-Aug-02 15:00 *    13 53 26.96 -05 55 39.8   8.76   6.93 2.71841429285769  22.7739242  78.4727 /T  21.5646
  2014-Aug-02 16:00 *m   13 53 29.44 -05 56 03.4   8.76   6.92 2.71896214316566  22.7616534  78.4455 /T  21.5619
  2014-Aug-02 17:00 *m   13 53 31.91 -05 56 26.9   8.76   6.87 2.71951003083050  22.7769895  78.4182 /T  21.5593
```

Hora sideral
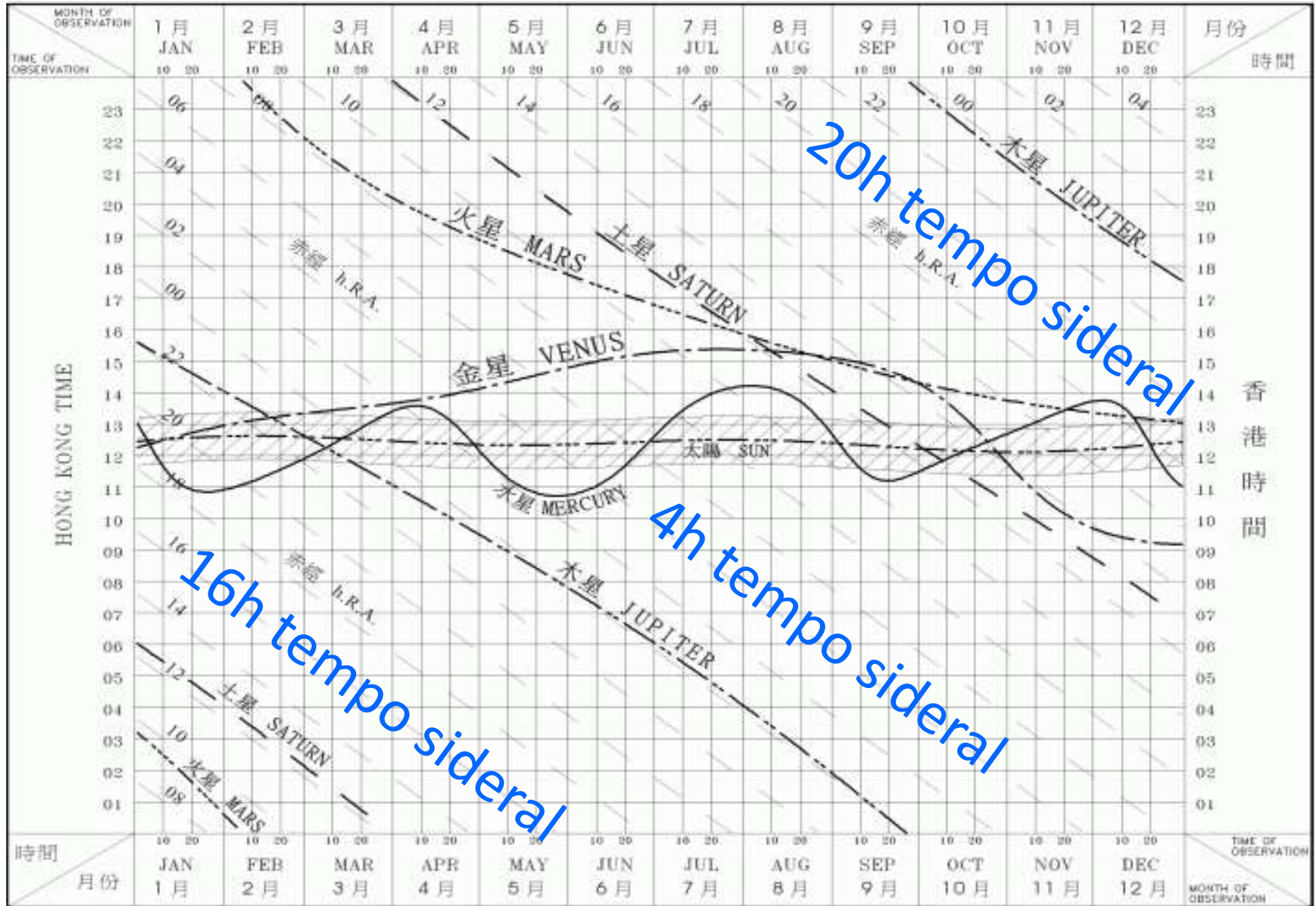
Treinamento no OPD?

- Excursão didáctica: LNA/OPD 12 e 13 de abril (sab e dom), voltando no 14 de abril (2af). Ainda não confirmada pelo LNA.

- Outras opções: 3-4 mar (already filled, Lucas, Paulo, Fabricio)

- 7, 8 ou 9 (6af – dom) de março: Elielson, …???

- Excursões didácticas canceladas pelo IAG (sem transporte)

http://www.viacaosantacruz.com.br/

São Paulo 09:30 → Itajuba 13:20, R$46,25

Itajuba 09:45 Itajuba → São Paulo 14:05, R$45,35

A principio o LNA cobrirá o transporte Itajuba → OPD → Itajuba (a confirmar)