



Houston, Texas



Prof. MSc.:

Luiz Sampaio Athayde Junior

Professor at School of Accounting Sciences of Federal University of Bahia (FCC/UFBA) and also Professor of Astronomy Course of Physics Institute (IF/UFBA) and the University Jorge Amado (Unijorge), ex Professor at Visconde de Cairú University (FVC) of over graduation and has experience as a Tax Analyst. A Master in Business Administration and Extension in Higher Education Methodology by the School of Administration of Federal University of Bahia (EA/UFBA), Post Graduate MBA in Financial Management and Company, Post Graduate and Research Center at Visconde de Cairú (CEPPEV/FVC). Accountant and Degree Bachelor of Accounting Sciences by Estacio University Center of Bahia (Estacio/FIB) and is certified by IAFC First Degree in International Standards of Accounting-IFRS.

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Prof. MSc.: Luiz Sampaio Athayde Junior

- His publications of Accounting area have appeared in many websites specializing in tax and international accounting standards-IFRS. He is author of the Blog www.contabeisufba.blogspot.com.br His research in the accounting area also made him the creator of New Accounting Policy, recently published in the Brazilian Journal of Accounting (RBC), the most important publication in Brazil in this area.
- In the area of Astronomy he has made presentations in numerous symposia and conferences in Brazil on the main university and Venezuela and had his research also published in Spain. He is author of the Blog www.veraodabahia.blogspot.com.br read in over 70 countries and in more than 20 languages. He is also author of the book "The Solar Zenith Theory" (in portuguese "A Teoria do Zênite Solar") published by Editors of Federal University of Bahia (EDUFBA). His research in the Astronomy area helps to create a Tropical Astronomy and new seasons for tropical zone.

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- Paradoxical Variation
of the Solar Day
Related to Kepler /
Newton System

(Found from *The Solar Zenith Theory*)

A Teoria do Zênite Solar

Book

Author: Luiz Sampaio Athayde Junior

Preface: Prof. Alberto Brum Novaes

Editors from Ufba: EDUFBA

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The cover features a central sun with a face, composed of concentric circles and a dashed outline. Dashed lines radiate from the sun, representing rays. Two palm trees with green fronds and brown trunks are positioned on either side of the sun. The background is a light yellow color. The title is centered in a reddish-brown font.

A TEORIA do ZÊNITE SOLAR

*Uma proposta para as estações do ano
nas localidades intertropicais*

LUIZ SAMPAIO ATHAYDE JÚNIOR





Paradoxical Variation of the Solar Day Related to Kepler / Newton System



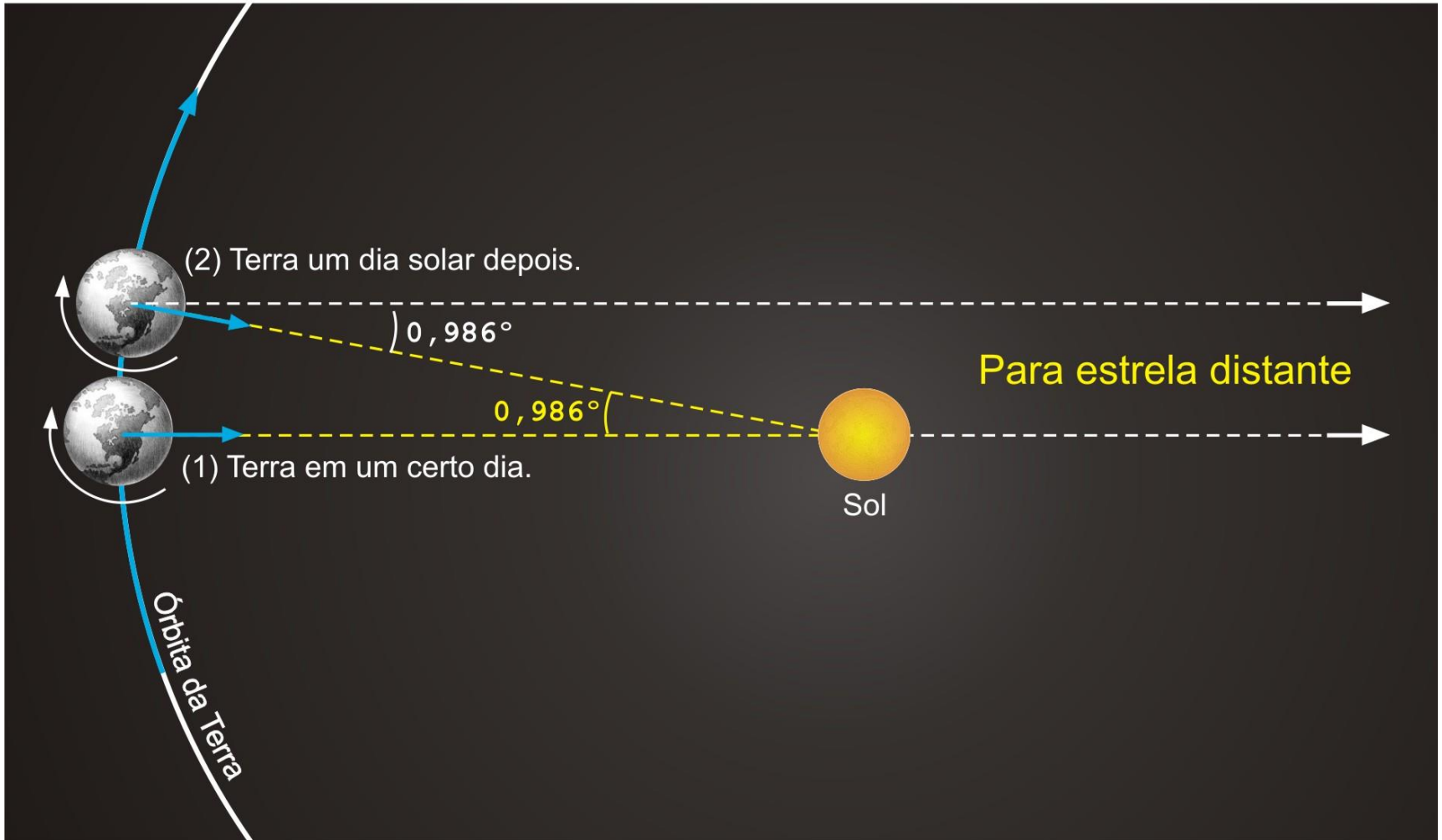
Paradoxical Variation of the Solar Day Related to Kepler / Newton System

PVSDRKNS

- Solar Day Concept:
- According to Kepler de Oliveira (UFRGS) is the interval of time between two successive passages of the Sun by the meridian of the place - two consecutive upper culminations of the Sun.

PVSDRKNS

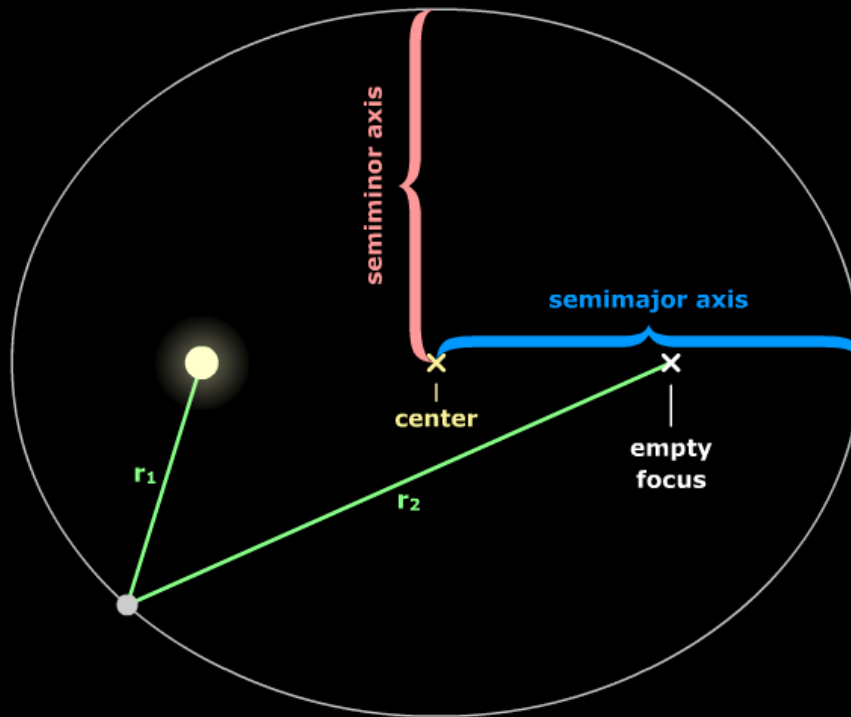
- Solar Day Concept :
- It's 3^m56^s longer than the sidereal day because the sun is moving in the opposite direction to the diurnal motion, that is, from west to east. This difference is due to the Earth translation movement around the Sun, of approximately 1 degree (4 min / Day) - $(360^\circ/\text{year}=360^\circ/(365,25 \text{ days})=0,9856^\circ/\text{day})$.



PVSDRKNS

- Simulators by University From Nebraska:
- The First Kepler's Law
- The Second Kepler's Law

(Johannes Kepler, German Astronomer – 1571/1630)



Orbit Settings

set parameters for: Mercury semimajor axis (AU) eccentricity

Animation Controls

animation rate (yrs/s)

Kepler's 1st Law

- show empty focus show semiminor axis
 show center show semimajor axis

 show radial lines

$$r_1 + r_2 = 2 \times a$$

$$0.597 \text{ AU} + 1.40 \text{ AU} = 2.00 \text{ AU}$$

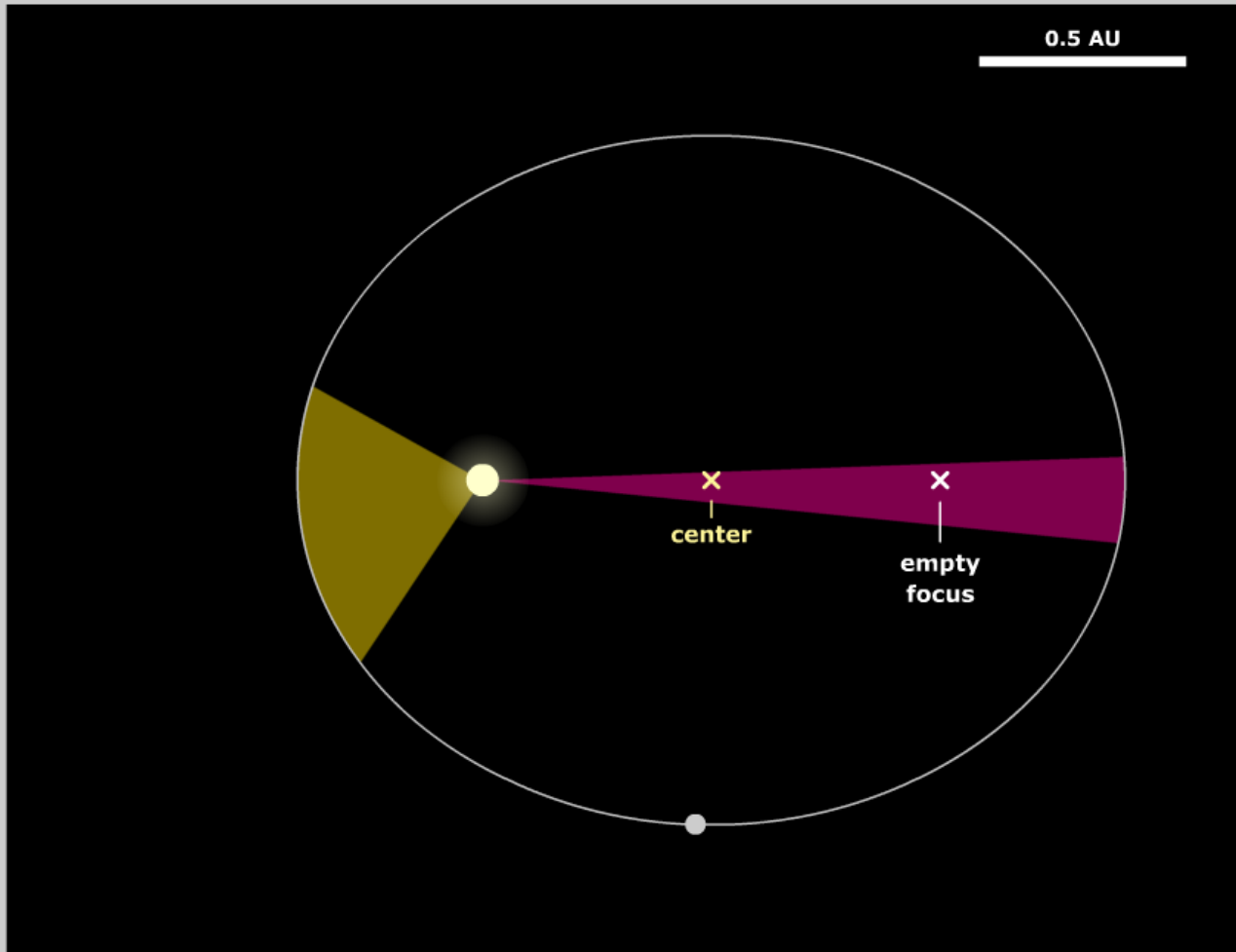
Kepler's 2nd Law

Kepler's 3rd Law

Newtonian Features

Visualization Options

- show solar system orbits
 show solar system planets
 label the solar system orbits
 show grid



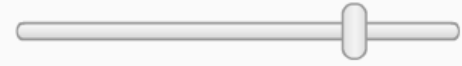
Orbit Settings

set parameters for: Mercury OK

semimajor axis (AU) 1.00



eccentricity 0.553



Animation Controls

pause animation

animation rate (yrs/s) 0.063



Visualization Options

- show solar system orbits
- show solar system planets
- label the solar system orbits
- show grid

Kepler's 1st Law

Kepler's 2nd Law

Kepler's 3rd Law

start sweeping

erase sweeps

sweep continuously

adjust size:

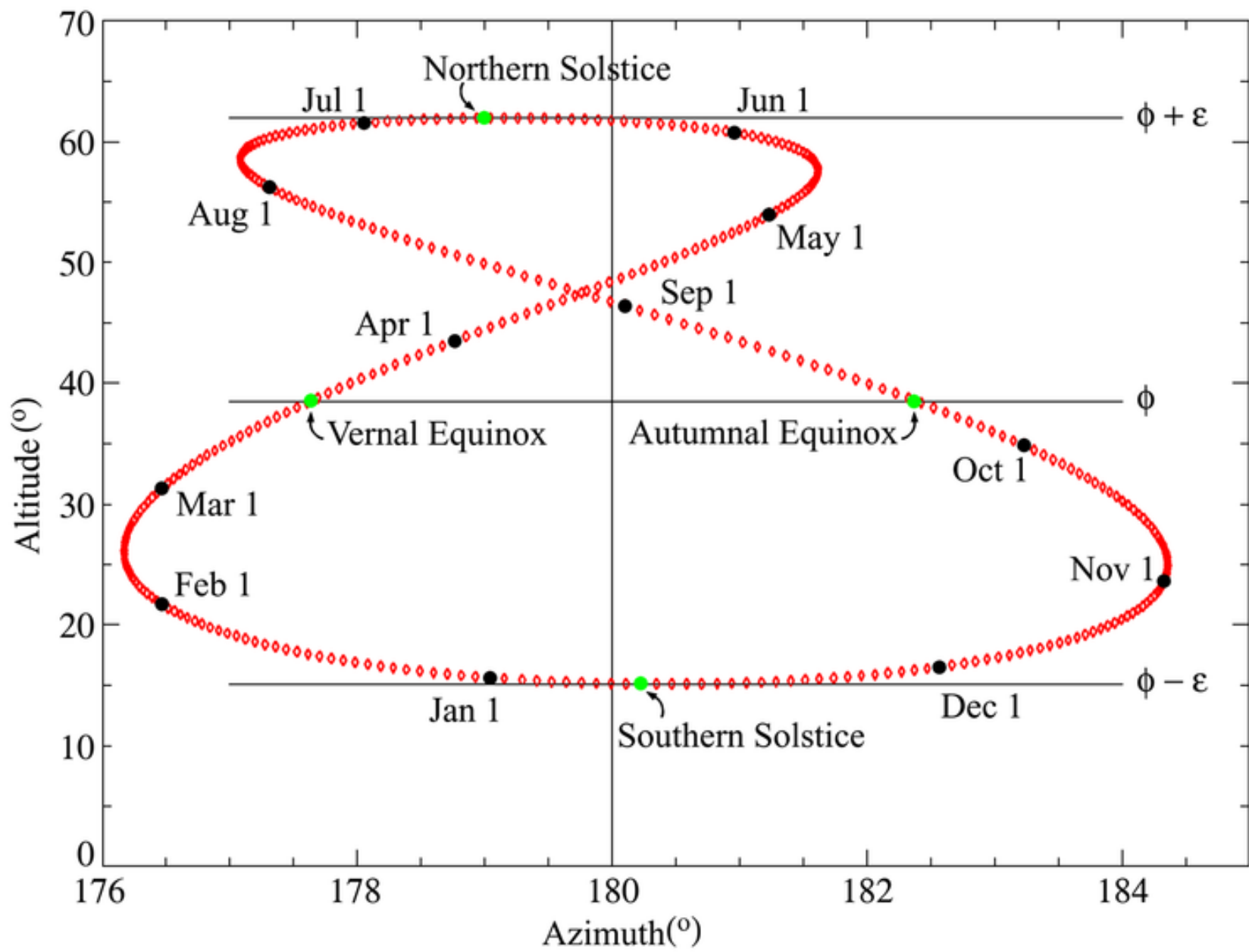
a fractional sweep size of $\frac{1}{16}$ (or 6.3%) corresponds to sweep duration of 0.0625 years

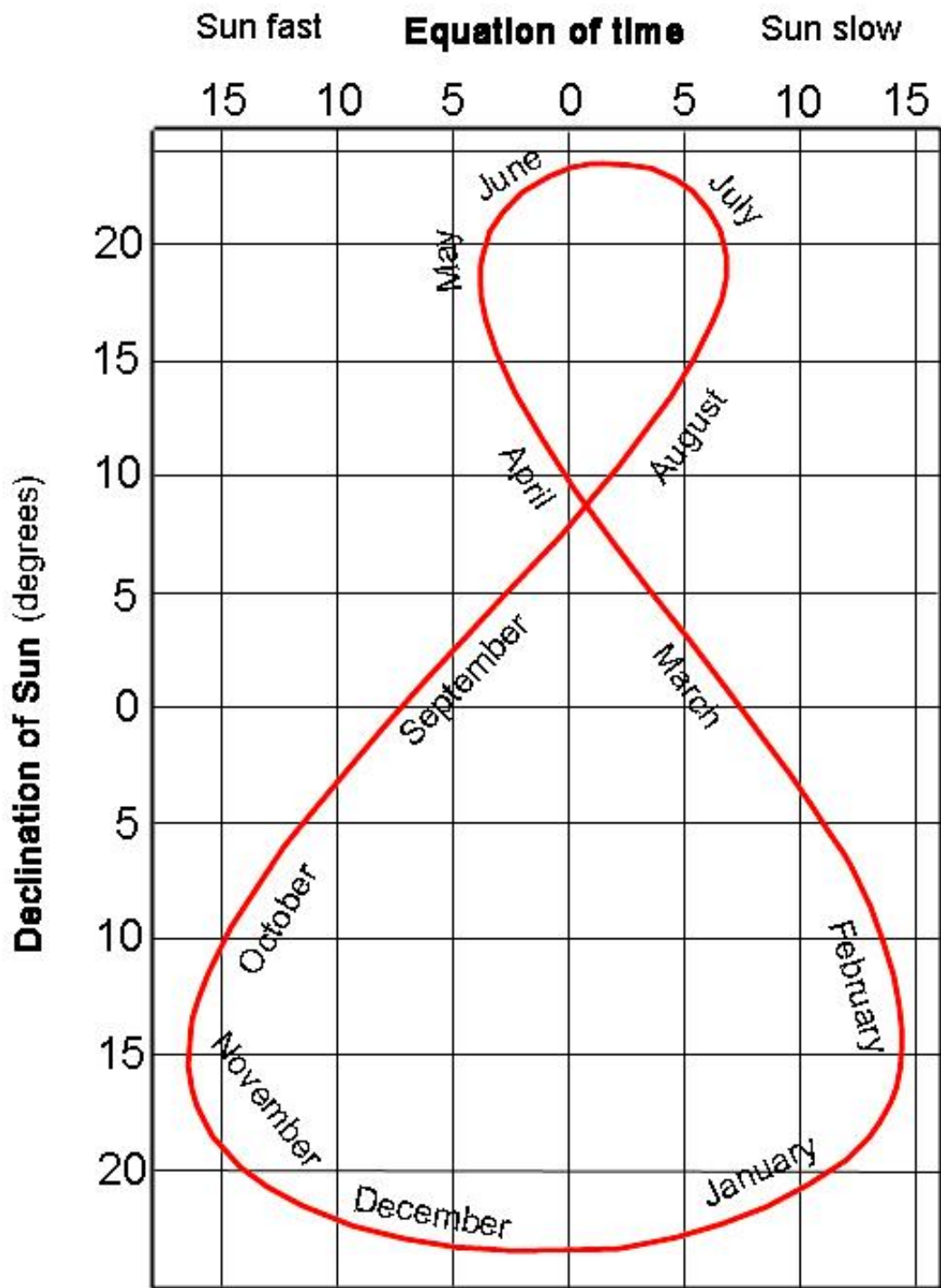
PVSDRKNS

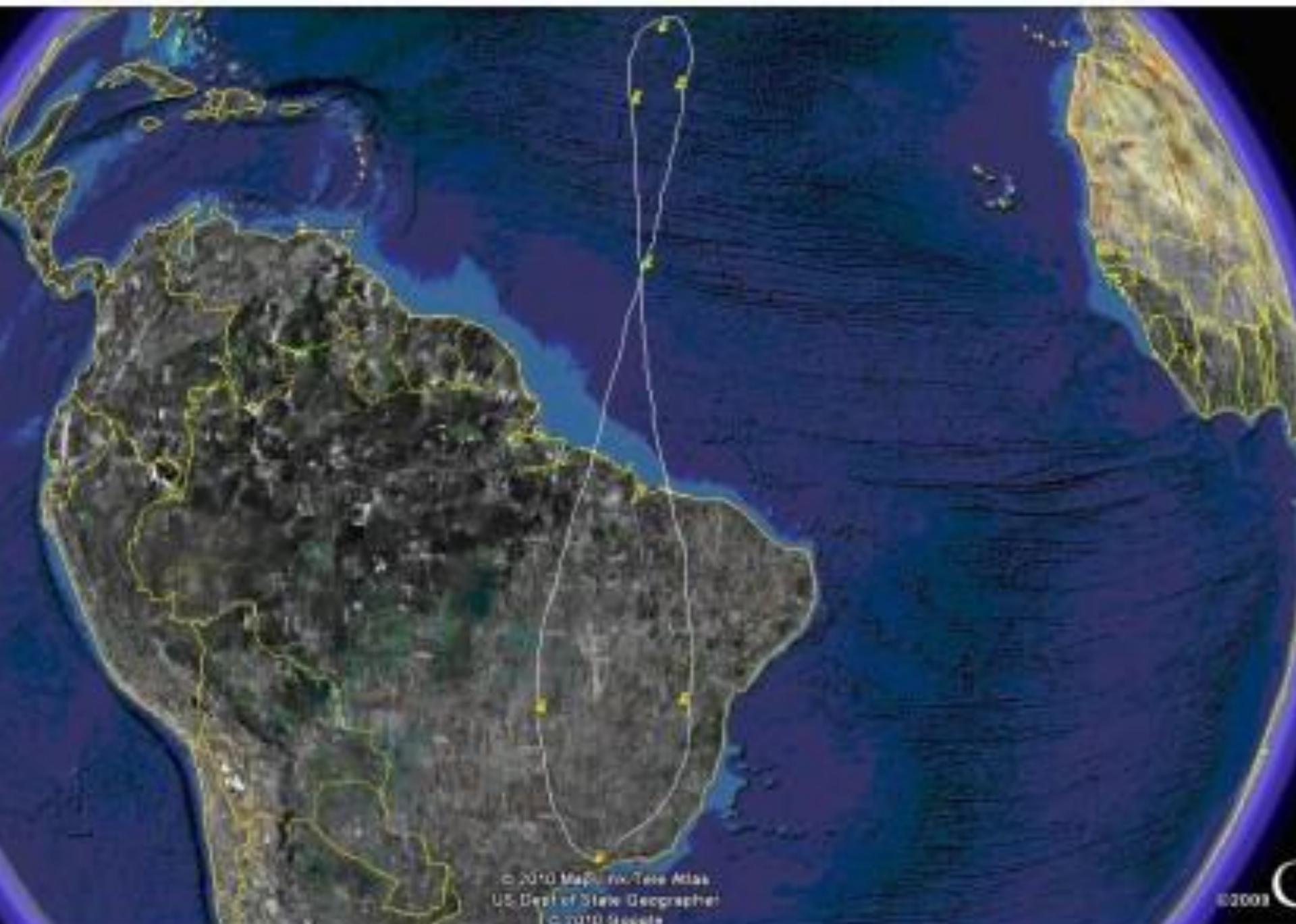
- The Sun's Analemma:
- View from earth
- View from space (*The Solar Zenith Theory*)

(Inverted Calendar)









MIGRAÇÃO DO PONTO SUBSOLAR

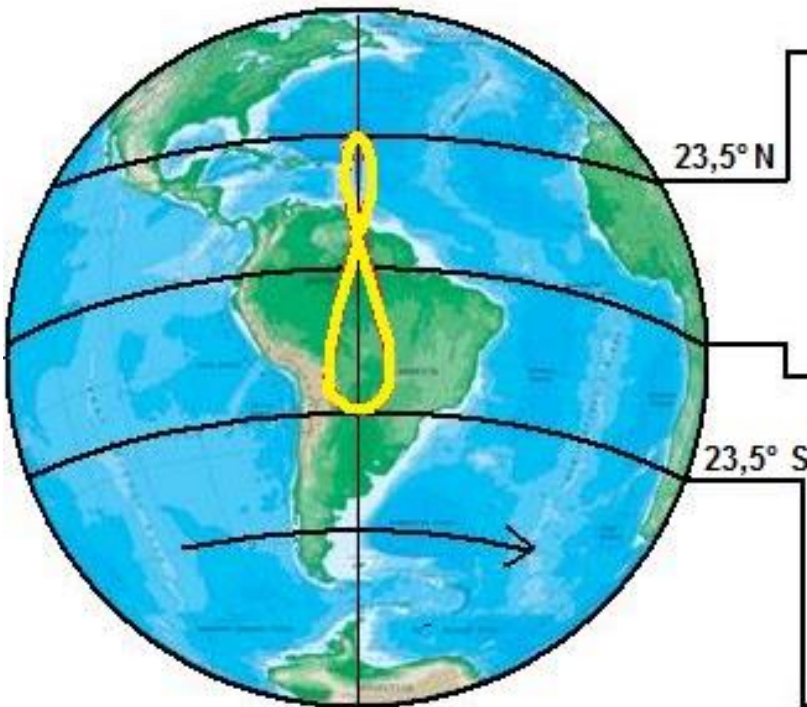
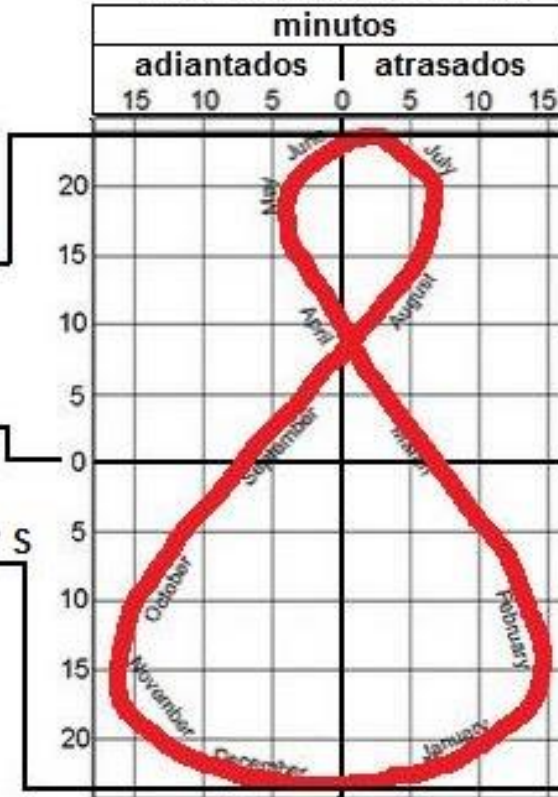
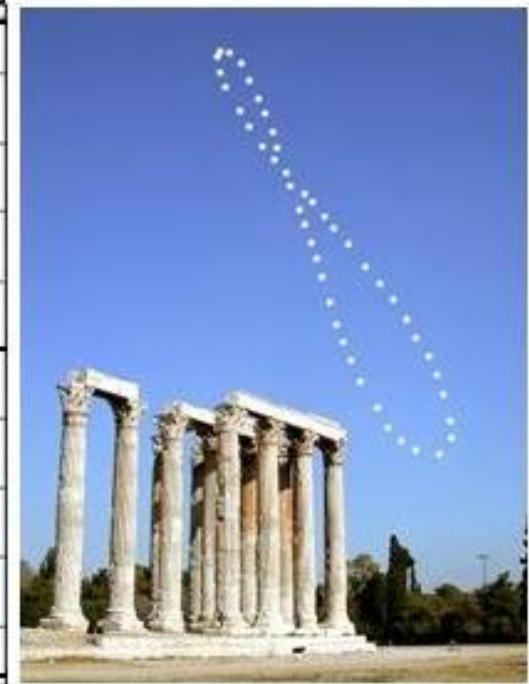


GRÁFICO ANALEMA



POSIÇÕES CELESTES DO SOL (MESMA HORA)

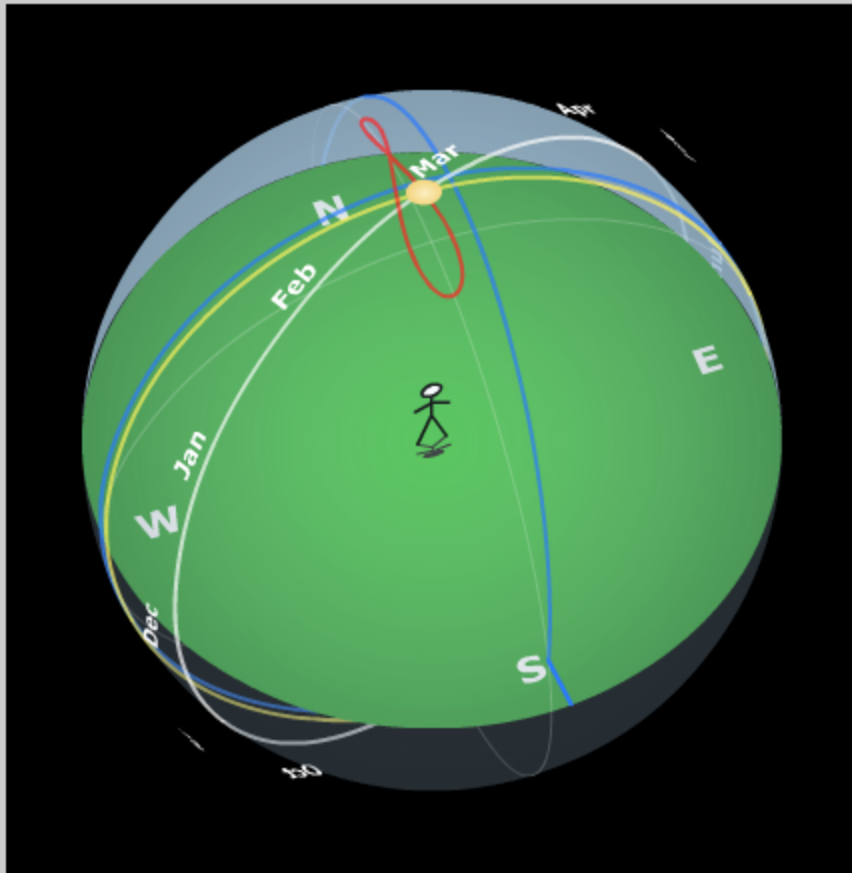


PVSDRKNS

- Simulators by University From Nebraska:
- Motions of the Sun Simulator

(Original version in English and also available in Portuguese to download at:

www.veraodabahia.blogspot.com.br)



Time and Location Controls

the day of year:

| Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |

the time of day:



the observer's latitude:



Information

The horizon diagram is shown for an observer at latitude 12.9° S on 14 March at 12:00 (12:00 PM).

advanced

sun's hour angle: -0h 9m
 sidereal time: 23h 29m
 equation of time: -9:06
 show analemma

sun's altitude: 79.1°
 sun's azimuth: 12.8°
 sun's right ascension: 23h 38m
 sun's declination: -2.3°

Animation Controls

animation mode:

continuous loop day
 step by day

animation speed: 41 days/sec



use lower quality graphics when animating to improve performance

General Settings

- show the sun's declination circle
- show the ecliptic
- show month labels
- show underside of celestial sphere
- show stickfigure and its shadow

dragging the sun's disk changes the ...

- time of day
- day of year

PVSDRKNS

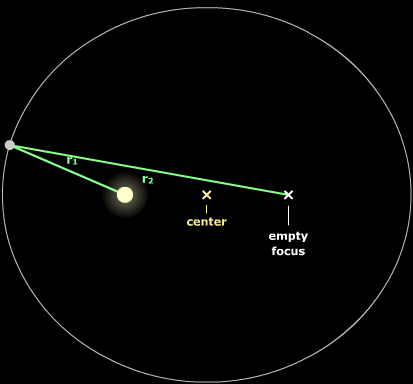
- A translation with both Simulators by University From Nebraska

Adobe Flash Player 11

Arquivo Exibir Controle Ajuda

Planetary Orbit Simulator

reset help about



0.5 AU

Orbit Settings

set parameters for: Mercury OK

semimajor axis (AU) 1.00

eccentricity 0.400

Animation Controls

start animation

animation rate (yrs/s) 0.20

Visualization Options

- show solar system orbits
- show solar system planets
- label the solar system orbits
- show grid

clear optional features

Kepler's 1st Law

Kepler's 2nd Law

Kepler's 3rd Law sweep continuously

Newtonian Features use sound effect

adjust size:

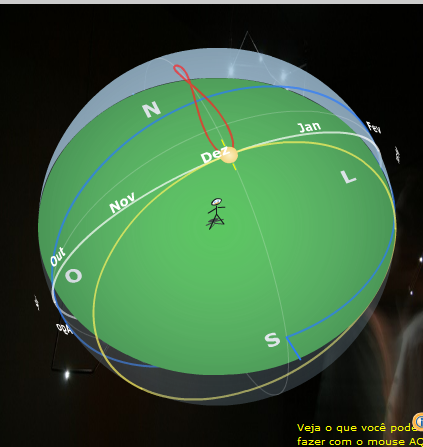
a fractional sweep size of $\frac{1}{16}$ (or 6.3%) corresponds to sweep duration of 0.0625 years and a sweep area of 0.180 sq AU

Adobe Flash Player 9

File View Control Help

Simulador dos Movimentos do Sol

reset



Controles de Localidade e Tempo

Dia do ano 21 Dezembro

Jan | Feb | Mar | Abr | Mai | Jun | Jul | Ago | Set | Out | Nov | Dez

Hora do dia: 12:00

Latitude do observador: 12.9° S

Localize sua latitude: MyGeoposition

Controles de Animação

Iniciar animação

modo animado: continuamente somente 1 dia

velocid. animação: 33 dias/sec

Use gráficos de baixa qualidade para melhor performance em animações.

Controles Gerais

- Mostrar círculo de declinação do Sol
- Mostra eclíptica
- Mostra MESES
- Mostrar parte inferior da esfera celeste
- Mostrar OBSERVADOR e sua SOMBRA

Arrastando o disco solar, altera-se: hora do dia dia do ano

Informações

O diagrama do horizonte é mostrado para um observador na latitude 12.9° S em 21 Dezembro às 12:00 (12:00 PM).

IMPORTANTES:

Ângulo horário, Sol: 0h 1m ALTITUDE solar: 79.5°
Tempo sideral: 18h 2m Azimute solar: 182.2°
Equação do tempo: 1:38 Ascensão direita do Sol: 18h 0m Declinação solar: -23.4°

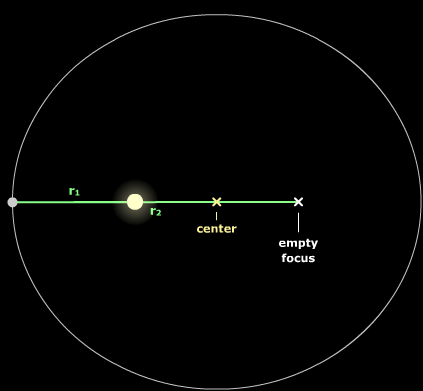
mostre analemma

Date: December 21st

Adobe Flash Player 11

Planetary Orbit Simulator

reset help about



0.5 AU

Orbit Settings

set parameters for: Mercury OK

semimajor axis (AU) 1.00

eccentricity 0.400

Animation Controls

start animation

animation rate (yrs/s) 0.20

Visualization Options

- show solar system orbits
- show solar system planets
- label the solar system orbits
- show grid

clear optional features

Kepler's 1st Law

Kepler's 2nd Law

Kepler's 3rd Law sweep continuously

Newtonian Features use sound effect

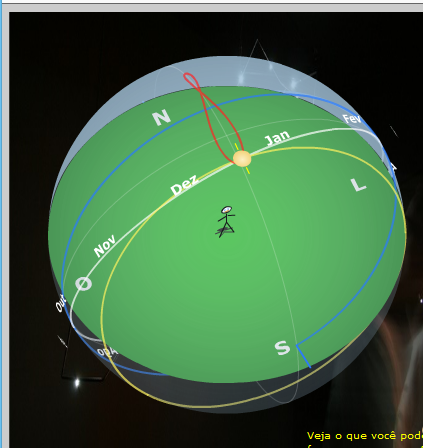
adjust size:

a fractional sweep size of $\frac{1}{16}$ (or 6.3%) corresponds to sweep duration of 0.0625 years and a sweep area of 0.180 sq AU

Adobe Flash Player 9

Simulador dos Movimentos do Sol

reset



Controles de Localidade e Tempo

Dia do ano 5 Janeiro

Jan | Feb | Mar | Abr | Mai | Jun | Jul | Ago | Set | Out | Nov | Dez |

Hora do dia: 12:00

Latitude do observador: 12.9° S

Localize sua latitude: MyGeoposition

Controles de Animação

Iniciar animação

modo animado: continuamente somente 1 dia

velocid. animação: 33 dias/sec

Use gráficos de baixa qualidade para melhor performance em animações.

Controles Gerais

- Mostrar círculo de declinação do Sol
- Mostra eclíptica
- Mostra MESES
- Mostrar parte inferior da esfera celeste
- Mostrar OBSERVADOR e sua SOMBRA

Arrastando o disco solar, altera-se:

- hora do dia
- dia do ano

Informações

O diagrama do horizonte é mostrado para um observador na latitude 12.9° S em 5 Janeiro às 12:00 (12:00 PM).

IMPORTANTES:

Ângulo horário, Sol: -0h 5m ALTITUDE solar: 80.3°
Tempo sideral: 19h 1m Azimute solar: 172.4°
Equação do tempo: -5:32 Ascensão direita do Sol: 19h 7m
Declinação solar: -22.5°

mostre analemma

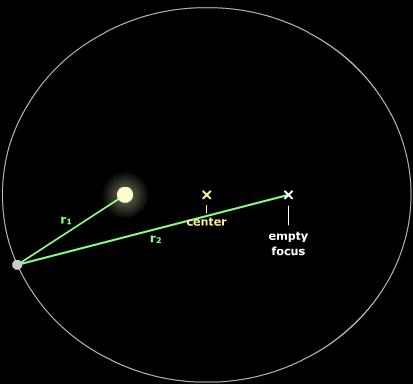
Date: January 5th

Adobe Flash Player 11

Arquivo Exibir Controle Ajuda

Planetary Orbit Simulator

reset help about



0.5 AU

Orbit Settings

set parameters for: Mercury OK

semimajor axis (AU) 1.00

eccentricity 0.400

Animation Controls

start animation

animation rate (yrs/s) 0.20

Visualization Options

- show solar system orbits
- show solar system planets
- label the solar system orbits
- show grid

clear optional features

Kepler's 1st Law

Kepler's 2nd Law

Kepler's 3rd Law sweep continuously

Newtonian Features use sound effect

adjust size:

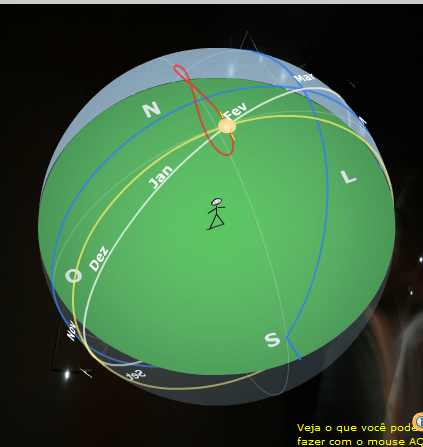
a fractional sweep size of $\frac{1}{16}$ (or 6.3%) corresponds to sweep duration of 0.0625 years and a sweep area of 0.180 sq AU

Adobe Flash Player 9

File View Control Help

Simulador dos Movimentos do Sol

reset



Controles de Localidade e Tempo

Dia do ano 12 Fevereiro

Jan | Feb | Mar | Abr | Mai | Jun | Jul | Ago | Set | Out | Nov | Dez

Hora do dia: 12:00

Latitude do observador: 12.9° S

Localize sua latitude: MyGeoposition

Controles de Animação

Iniciar animação

modo animado: continuamente somente 1 dia

velocid. animação: 33 dias/sec

Use gráficos de baixa qualidade para melhor performance em animações.

Controles Gerais

- Mostrar círculo de declinação do Sol
- Mostra eclíptica
- Mostra MESES
- Mostrar parte inferior da esfera celeste
- Mostrar OBSERVADOR e sua SOMBRA

Arrastando o disco solar, altera-se: hora do dia dia do ano

© NAAP

Informações

O diagrama do horizonte é mostrado para um observador na latitude 12.9° S em 12 Fevereiro às 12:00 (12:00 PM).

IMPORTANTES:

Ângulo horário, Sol: -0h 14m ALTITUDE solar: 86.5°
Tempo sideral: 21h 31m Azimute solar: 99.9°
Equação do tempo: -14:14 Ascensão direita do Sol: 21h 45m
 mostre analemma Declinação solar: -13.5°

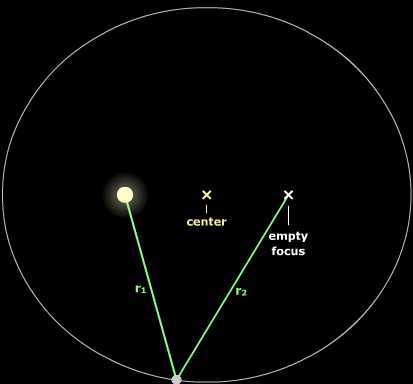
Date: February 12th

Adobe Flash Player 11

Arquivo Exibir Controle Ajuda

Planetary Orbit Simulator

reset help about



0.5 AU

Orbit Settings

set parameters for: Mercury OK

semimajor axis (AU) 1.00

eccentricity 0.400

Animation Controls

start animation

animation rate (yrs/s) 0.20

Visualization Options

show solar system orbits
 show solar system planets
 label the solar system orbits
 show grid

clear optional features

Kepler's 1st Law

Kepler's 2nd Law

Kepler's 3rd Law sweep continuously

Newtonian Features use sound effect

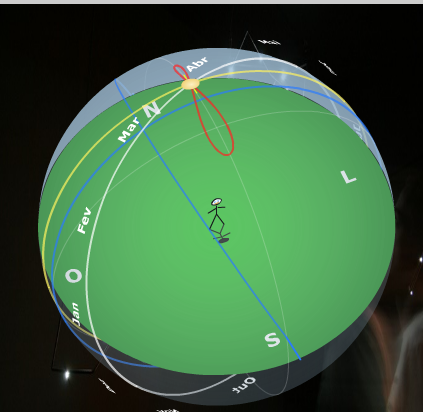
adjust size: (or 6.3%)
 corresponds to sweep duration of 0.0625 years
 and a sweep area of 0.180 sq AU

Adobe Flash Player 9

File View Control Help

Simulador dos Movimentos do Sol

reset



Controles de Localidade e Tempo

Dia do ano 12 Abril

Jan | Feb | Mar | **Apr** | Mai | Jun | Jul | Ago | Set | Out | Nov | Dez

Hora do dia: 12:00

Latitude do observador: 12.9° S

Localize sua latitude: MyGeoposition

Controles de Animação

modo animado: continuamente somente 1 dia

velocid. animação: 33 dias/sec

Use gráficos de baixa qualidade para melhor performance em animações.

Controles Gerais

Mostrar círculo de declinação do Sol
 Mostra eclíptica
 Mostra MESES
 Mostrar parte inferior da esfera celeste
 Mostrar OBSERVADOR e sua SOMBRA

Arrastando o disco solar, altera-se:
 hora do dia
 dia do ano

Informações

O diagrama do horizonte é mostrado para um observador na latitude 12.9° S em 12 Abril às 12:00 (12:00 PM).

IMPORTANTES:

Ângulo horário, Sol: -0h 0m ALTITUDE solar: 68.2°
 Tempo sideral: 1h 24m Azimute solar: 0.4°
 Equação do tempo: -0:41 Ascensão direita do Sol: 1h 25m
 Declinação solar: 8.9°

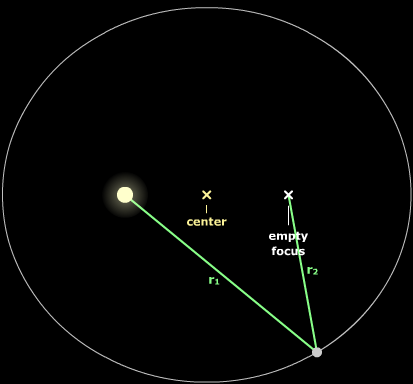
mostre analemma

Date: April 12th

Adobe Flash Player 11

Planetary Orbit Simulator

reset help about



Orbit Settings

set parameters for: Mercury OK

semimajor axis (AU) 1.00

eccentricity 0.400

Animation Controls

start animation

animation rate (yrs/s) 0.20

Visualization Options

- show solar system orbits
- show solar system planets
- label the solar system orbits
- show grid

clear optional features

Kepler's 1st Law

Kepler's 2nd Law

Kepler's 3rd Law sweep continuously

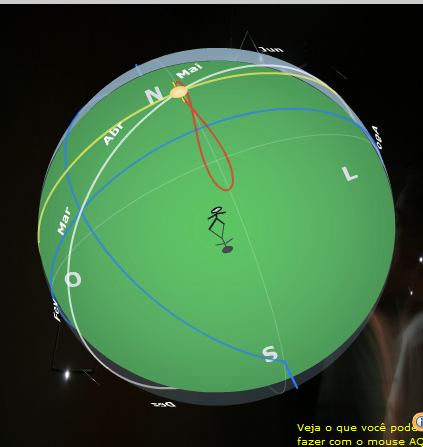
Newtonian Features use sound effect

adjust size: a fractional sweep size of $\frac{1}{16}$ (or 6.3%) corresponds to sweep duration of 0.0625 years and a sweep area of 0.180 sq AU

Adobe Flash Player 9

Simulador dos Movimentos do Sol

reset



Controles de Localidade e Tempo

Dia do ano 11 Maio

Jan | Feb | Mar | Abr | Mai | Jun | Jul | Ago | Set | Out | Nov | Dez

Hora do dia: 12:00

Latitude do observador: 12.9° S

Localize sua latitude: MyGeoposition

Controles de Animação

Iniciar animação

modo animado: continuamente somente 1 dia

velocid. animação: 33 dias/sec

Use gráficos de baixa qualidade para melhor performance em animações.

Controles Gerais

- Mostrar círculo de declinação do Sol
- Mostra eclíptica
- Mostra MESES
- Mostrar parte inferior da esfera celeste
- Mostrar OBSERVADOR e sua SOMBRA

Arrastando o disco solar, altera-se: hora do dia dia do ano

Informações

O diagrama do horizonte é mostrado para um observador na latitude 12.9° S em 11 Maio às 12:00 (12:00 PM).

IMPORTANTES:

Ângulo horário, Sol: 0h 3m ALTITUDE solar: 59.0°
Tempo sideral: 3h 18m Azimute solar: 358.3°
Equação do tempo: 3:38 Ascensão direita do Sol: 3h 15m
 mostre analemma Declinação solar: 18.1°

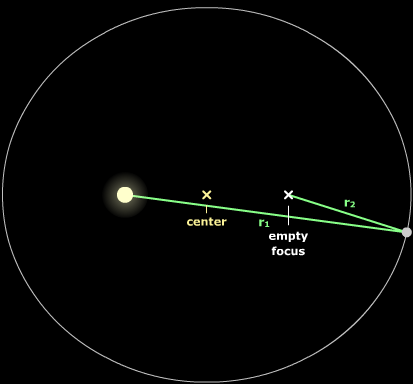
Date: May 11th

Adobe Flash Player 11

Arquivo Exibir Controle Ajuda

Planetary Orbit Simulator

reset help about



0.5 AU

Orbit Settings

set parameters for: Mercury OK

semimajor axis (AU) 1.00

eccentricity 0.400

Animation Controls

start animation

animation rate (yrs/s) 0.20

Visualization Options

show solar system orbits
 show solar system planets
 label the solar system orbits
 show grid

clear optional features

Kepler's 1st Law

Kepler's 2nd Law

Kepler's 3rd Law sweep continuously

Newtonian Features use sound effect

adjust size:

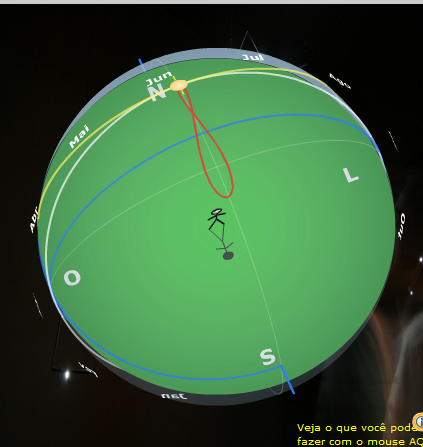
a fractional sweep size of $\frac{1}{16}$ (or 6.3%)
 corresponds to sweep duration of 0.0625 years
 and a sweep area of 0.180 sq AU

Adobe Flash Player 9

File View Control Help

Simulador dos Movimentos do Sol

reset



Controles de Localidade e Tempo

Dia do ano 21 Junho

Jan | Feb | Mar | Abr | Mai | Jun | Jul | Ago | Set | Out | Nov | Dez

Hora do dia: 12:00

Latitude do observador: 12.9° S

Localize sua latitude: MyGeoposition

Controles de Animação

Iniciar animação

modo animado: continuamente somente 1 dia dia a dia

velocid. animação: 33 dias/sec

Use gráficos de baixa qualidade para melhor performance em animações.

Controles Gerais

Mostrar círculo de declinação do Sol
 Mostra eclíptica
 Mostra MESES
 Mostrar parte inferior da esfera celeste
 Mostrar OBSERVADOR e sua SOMBRA

Arrastando o disco solar, altera-se:
 hora do dia
 dia do ano

Informações

O diagrama do horizonte é mostrado para um observador na latitude 12.9° S em 21 Junho às 12:00 (12:00 PM).

IMPORTANTES:

Ângulo horário, Sol: -0h 1m
 Tempo sideral: 6h 0m
 Equação do tempo: -1:51

ALTITUDE solar: 53.7°
 Azimute solar: 0.7°
 Ascensão direita do Sol: 6h 2m
 Declinação solar: 23.4°

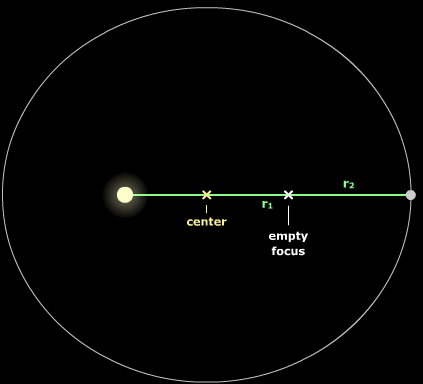
mostre analemma

Date: June 21st

Planetary Orbit Simulator

Arquivo Exibir Controle Ajuda

reset help about



Orbit Settings

set parameters for: Mercury OK

semimajor axis (AU) 1.00

eccentricity 0.400

Animation Controls

start animation

animation rate (yrs/s) 0.20

Visualization Options

- show solar system orbits
- show solar system planets
- label the solar system orbits
- show grid

clear optional features

Kepler's 1st Law

Kepler's 2nd Law

Kepler's 3rd Law sweep continuously

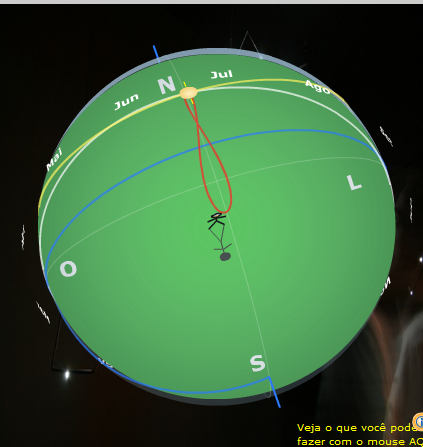
Newtonian Features use sound effect

adjust size: a fractional sweep size of $\frac{1}{16}$ (or 6.3%) corresponds to sweep duration of 0.0625 years and a sweep area of 0.180 sq AU

Simulador dos Movimentos do Sol

File View Control Help

reset



Controles de Localidade e Tempo

Dia do ano: 5 Julho

Jan | Feb | Mar | Abr | Mai | Jun | Jul | Ago | Set | Out | Nov | Dez

Hora do dia: 12:00

Latitude do observador: 12.9° S

Localize sua latitude: MyGeoposition

Controles de Animação

Iniciar animação

modo animado: continuamente somente 1 dia

velocid. animação: 33 dias/sec

Use gráficos de baixa qualidade para melhor performance em animações.

Controles Gerais

- Mostrar círculo de declinação do Sol
- Mostra eclíptica
- Mostra MESES
- Mostrar parte inferior da esfera celeste
- Mostrar OBSERVADOR e sua SOMBRA

Arrastando o disco solar, altera-se: hora do dia dia do ano

Informações

O diagrama do horizonte é mostrado para um observador na latitude 12.9° S em 5 Julho às 12:00 (12:00 PM).

IMPORTANTES:

Ângulo horário, Sol: -0h 4m ALTITUDE solar: 54.4°
Tempo sideral: 6h 55m Azimute solar: 1.8°
Equação do tempo: -4:39 Ascensão direita do Sol: 7h 0m Declinação solar: 22.7°

mostre analemma

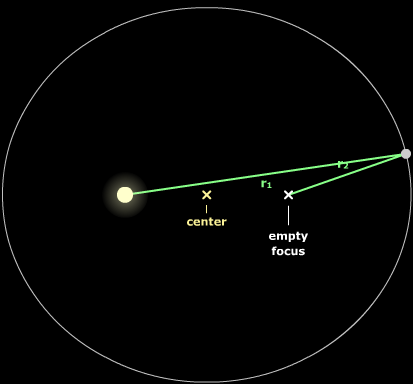
Date: July 5th

Adobe Flash Player 11

Arquivo Exibir Controle Ajuda

Planetary Orbit Simulator

reset help about



0.5 AU

center
F₁
empty focus

Orbit Settings

set parameters for: Mercury OK

semimajor axis (AU) 1.00

eccentricity 0.400

Animation Controls

start animation

animation rate (yrs/s) 0.20

Visualization Options

- show solar system orbits
- show solar system planets
- label the solar system orbits
- show grid

clear optional features

Kepler's 1st Law

start sweeping

Kepler's 2nd Law

erase sweeps

a fractional sweep size of $\frac{1}{16}$ (or 6.3%) corresponds to sweep duration of 0.0625 years and a sweep area of 0.180 sq AU

sweep continuously

use sound effect

Kepler's 3rd Law

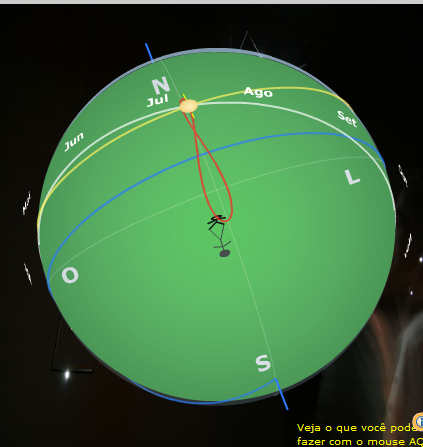
Newtonian Features

Adobe Flash Player 9

File View Control Help

Simulador dos Movimentos do Sol

reset



Jun Jul Ago Set

N L S

veja o que você pode fazer com o mouse AQU

Controles de Localidade e Tempo

Dia do ano 25 Julho

Jan | Feb | Mar | Abr | Mai | Jun | Jul | Ago | Set | Out | Nov | Dez

Hora do dia: 12:00

Latitude do observador: 12.9° S

Localize sua latitude: MyGeoposition

Controles de Animação

Iniciar animação

modo animado: continuamente somente 1 dia dia a dia

velocid. animação: 33 dias/sec

lento rápido

Use gráficos de baixa qualidade para melhor performance em animações.

Controles Gerais

- Mostrar círculo de declinação do Sol
- Mostra eclíptica
- Mostra MESES
- Mostrar parte inferior da esfera celeste
- Mostrar OBSERVADOR e sua SOMBRA

Arrastando o disco solar, altera-se:

- hora do dia
- dia do ano

© NAAP

Informações

O diagrama do horizonte é mostrado para um observador na latitude 12.9° S em 25 Julho às 12:00 (12:00 PM).

IMPORTANTES:

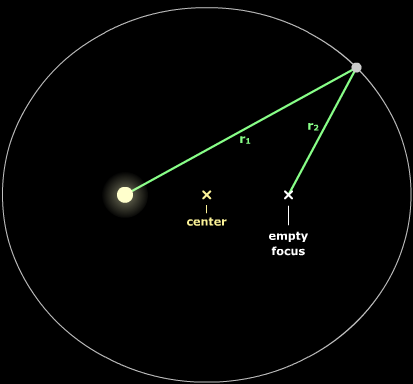
Ângulo horário, Sol: -0h 6m ALTITUDE solar: 57.6°
Tempo sideral: 8h 14m Azimute solar: 2.8°
Equação do tempo: -6:31 Ascensão direita do Sol: 8h 21m
 mostre analemma Declinação solar: 19.5°

Date: July 25th

Adobe Flash Player 11

Planetary Orbit Simulator

reset help about



Orbit Settings

set parameters for: Mercury OK

semimajor axis (AU) 1.00

eccentricity 0.400

Animation Controls

start animation

animation rate (yrs/s) 0.20

Visualization Options

- show solar system orbits
- show solar system planets
- label the solar system orbits
- show grid

clear optional features

Kepler's 1st Law

start sweeping

Kepler's 2nd Law

erase sweeps

Kepler's 3rd Law

sweep continuously

Newtonian Features

use sound effect

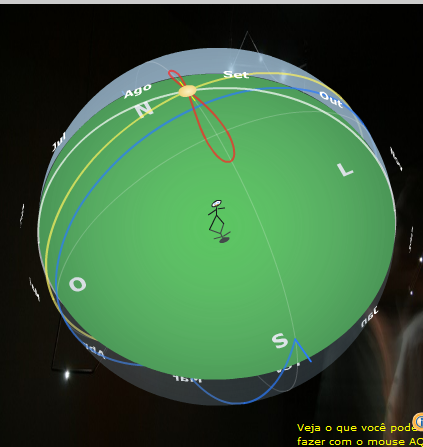
adjust size:

a fractional sweep size of $\frac{1}{16}$ (or 6.3%) corresponds to sweep duration of 0.0625 years and a sweep area of 0.180 sq AU

Adobe Flash Player 9

Simulador dos Movimentos do Sol

reset



Controles de Localidade e Tempo

Dia do ano 31 Agosto

Jan | Feb | Mar | Abr | Mai | Jun | Jul | Ago | Set | Out | Nov | Dez

Hora do dia: 12:00

Latitude do observador: 12.9° S

Localize sua latitude: MyGeoposition

Controles de Animação

Iniciar animação

modo animado: continuamente somente 1 dia dia a dia

velocid. animação: 33 dias/sec

Use gráficos de baixa qualidade para melhor performance em animações.

Controles Gerais

- Mostrar círculo de declinação do Sol
- Mostra eclíptica
- Mostra MESES
- Mostrar parte inferior da esfera celeste
- Mostrar OBSERVADOR e sua SOMBRA

Arrastando o disco solar, altera-se: hora do dia dia do ano

© NAAP

Informações

O diagrama do horizonte é mostrado para um observador na latitude 12.9° S em 31 Agosto às 12:00 (12:00 PM).

IMPORTANTES:

Ângulo horário, Sol: -0h 0m ALTITUDE solar: 68.7°
Tempo sideral: 10h 40m Azimute solar: 0.0°
Equação do tempo: -0:09 Ascensão direita do Sol: 10h 40m
Declinação solar: 8.4°

mostre analemma

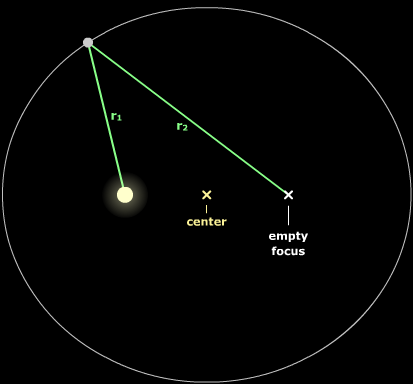
Date: August 31st

Adobe Flash Player 11

Arquivo Exibir Controle Ajuda

Planetary Orbit Simulator

reset help about



0.5 AU

Orbit Settings

set parameters for: Mercury OK

semimajor axis (AU) 1.00

eccentricity 0.400

Animation Controls

start animation

animation rate (yrs/s) 0.20

Visualization Options

- show solar system orbits
- show solar system planets
- label the solar system orbits
- show grid

clear optional features

Kepler's 1st Law

Kepler's 2nd Law

Kepler's 3rd Law sweep continuously

Newtonian Features use sound effect

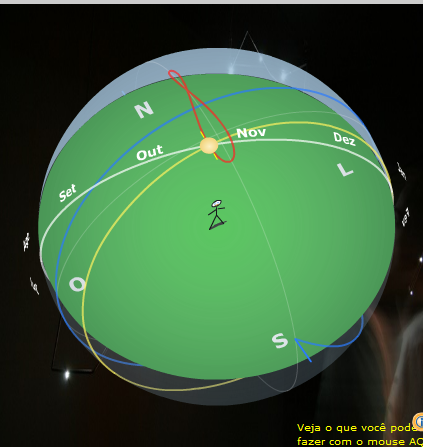
adjust size: a fractional sweep size of $\frac{1}{16}$ (or 6.3%) corresponds to sweep duration of 0.0625 years and a sweep area of 0.180 sq AU

Adobe Flash Player 9

File View Control Help

Simulador dos Movimentos do Sol

reset



Controles de Localidade e Tempo

Dia do ano 3 Novembro

Jan | Feb | Mar | Abr | Mai | Jun | Jul | Ago | Set | Out | Nov | Dez

Hora do dia: 12:00

Latitude do observador: 12.9° S

Localize sua latitude: MyGeoposition

Controles de Animação

Iniciar animação

modo animado: continuamente somente 1 dia

velocid. animação: 33 dias/sec

Use gráficos de baixa qualidade para melhor performance em animações.

Controles Gerais

- Mostrar círculo de declinação do Sol
- Mostra eclíptica
- Mostra MESES
- Mostrar parte inferior da esfera celeste
- Mostrar OBSERVADOR e sua SOMBRA

Arrastando o disco solar, altera-se: hora do dia dia do ano

© NAAP

Informações

O diagrama do horizonte é mostrado para um observador na latitude 12.9° S em 3 Novembro às 12:00 (12:00 PM).

IMPORTANTES:

Ângulo horário, Sol: 0h 16m ALTITUDE solar: 85.3°
Tempo sideral: 14h 53m Azimute solar: 238.5°
Equação do tempo: 16:26 Ascensão direita do Sol: 14h 36m
Declinação solar: -15.3°

mostre analemma

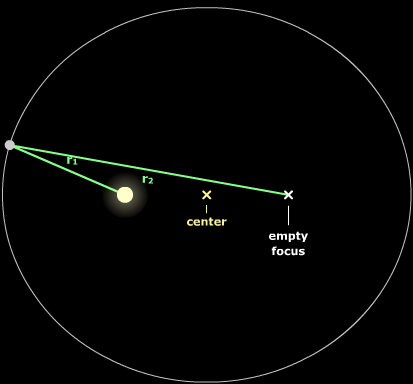
Date: November 3rd

Adobe Flash Player 11

Arquivo Exibir Controle Ajuda

Planetary Orbit Simulator

reset help about



0.5 AU

Orbit Settings

set parameters for: Mercury OK

semimajor axis (AU) 1.00

eccentricity 0.400

Animation Controls

start animation

animation rate (yrs/s) 0.20

Visualization Options

show solar system orbits
 show solar system planets
 label the solar system orbits
 show grid

clear optional features

Kepler's 1st Law

Kepler's 2nd Law

Kepler's 3rd Law sweep continuously

Newtonian Features use sound effect

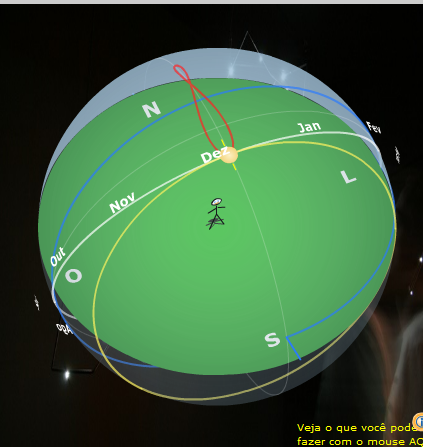
adjust size: a fractional sweep size of $\frac{1}{16}$ (or 6.3%) corresponds to sweep duration of 0.0625 years and a sweep area of 0.180 sq AU

Adobe Flash Player 9

File View Control Help

Simulador dos Movimentos do Sol

reset



Controles de Localidade e Tempo

Dia do ano 21 Dezembro

Jan | Feb | Mar | Abr | Mai | Jun | Jul | Ago | Set | Out | Nov | Dez

Hora do dia: 12:00

Latitude do observador: 12.9° S

Localize sua latitude: MyGeoposition

Controles de Animação

Iniciar animação

modo animado: continuamente somente 1 dia

velocid. animação: 33 dias/sec

Use gráficos de baixa qualidade para melhor performance em animações.

Controles Gerais

Mostrar círculo de declinação do Sol
 Mostra eclíptica
 Mostra MESES
 Mostrar parte inferior da esfera celeste
 Mostrar OBSERVADOR e sua SOMBRA

Arrastando o disco solar, altera-se:
 hora do dia
 dia do ano

Informações

O diagrama do horizonte é mostrado para um observador na latitude 12.9° S em 21 Dezembro às 12:00 (12:00 PM).

IMPORTANTES:

Ângulo horário, Sol: 0h 1m
 Tempo sideral: 18h 2m
 Equação do tempo: 1:38

ALTITUDE solar: 79.5°
 Azimute solar: 182.2°
 Ascensão direita do Sol: 18h 0m
 Declinação solar: -23.4°

mostre analemma

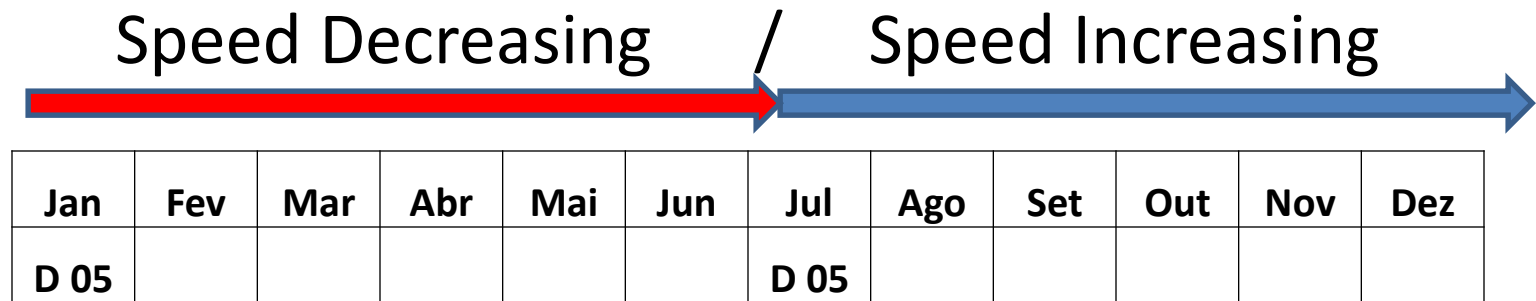
Date: December 21st / Back

PVSDRKNS

- End of Translation
- But... Where is the paradoxical variation?

PVSDRKNS

- Earth:



PVSDRKNS

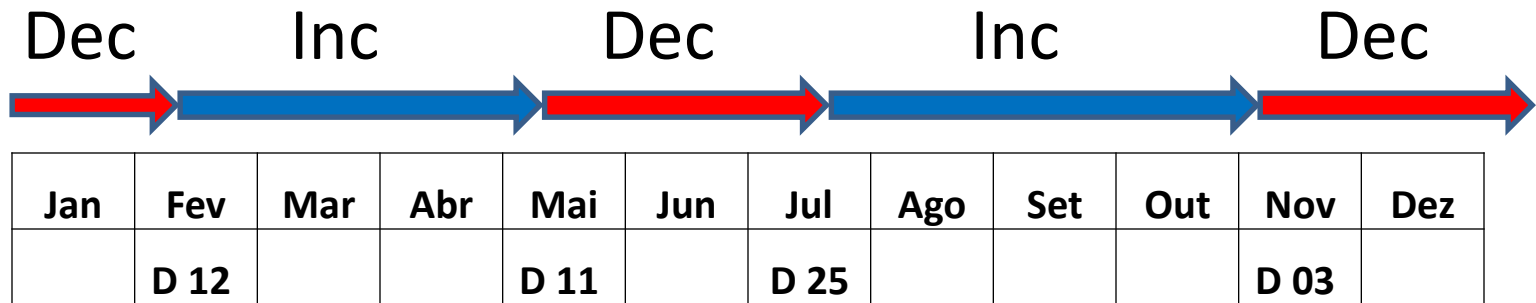
- Before The Solar Day Approach:
- We need a allowance of the Phycisist
- Solar day has no speed
- About solar day we must say “period”

PVSDRKNS

- Before The Solar Day Approach:
- When the solar day has increased its period, we will say its “speed” decreased
- When the solar day has decreased its period, we will say its “speed” increased

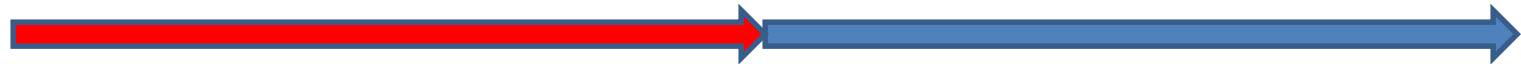
PVSDRKNS

- Solar Day “Speed” (Opposite of period):



PVSDRKNS

- Earth Speed:



Jan	Fev	Mar	Abr	Mai	Jun	Jul	Ago	Set	Out	Nov	Dez
D 05						D 05					

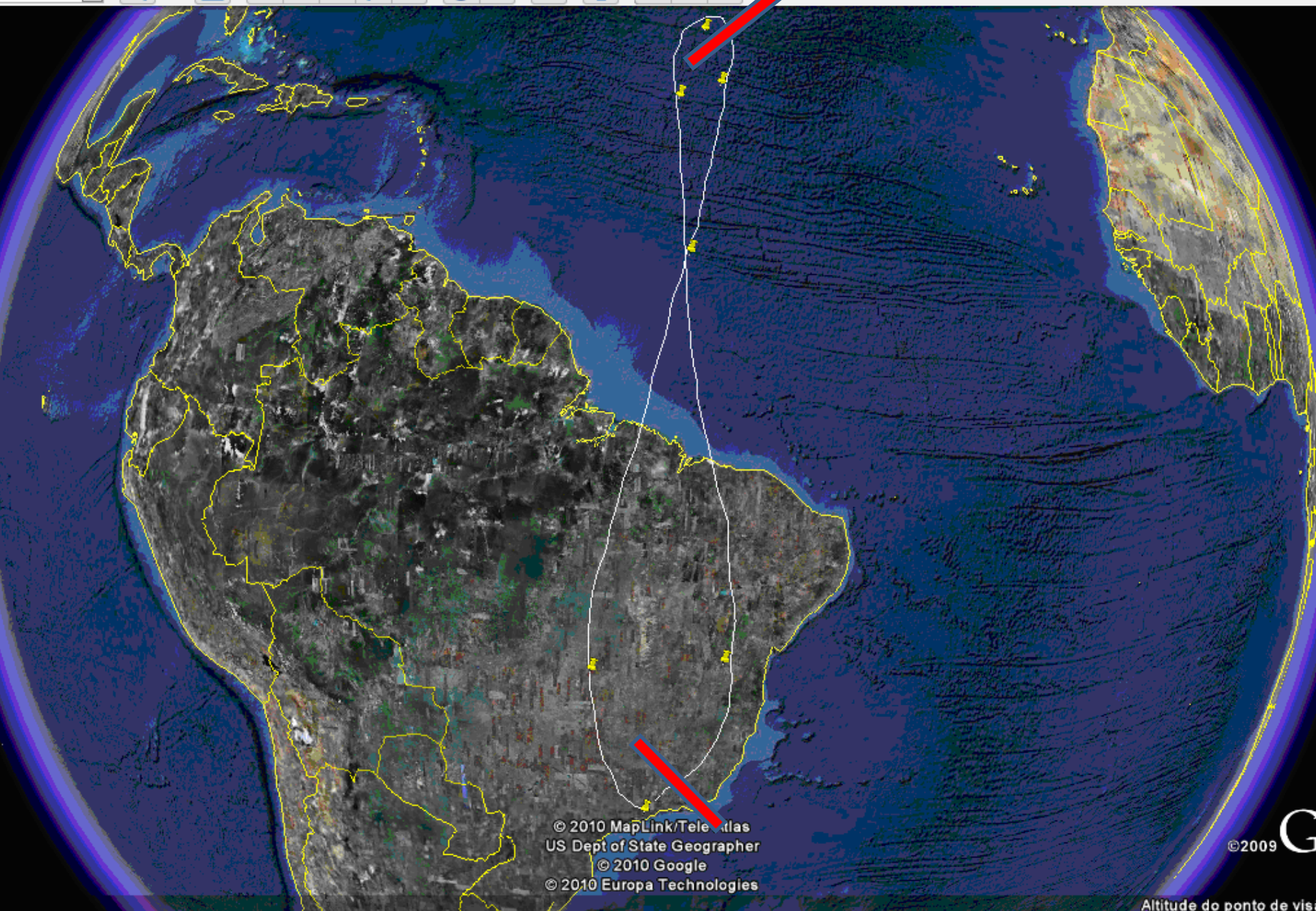
- Solar Day “Speed”:



Jan	Fev	Mar	Abr	Mai	Jun	Jul	Ago	Set	Out	Nov	Dez
	D 12			D 11		D 25				D 03	

PVSDRKNS

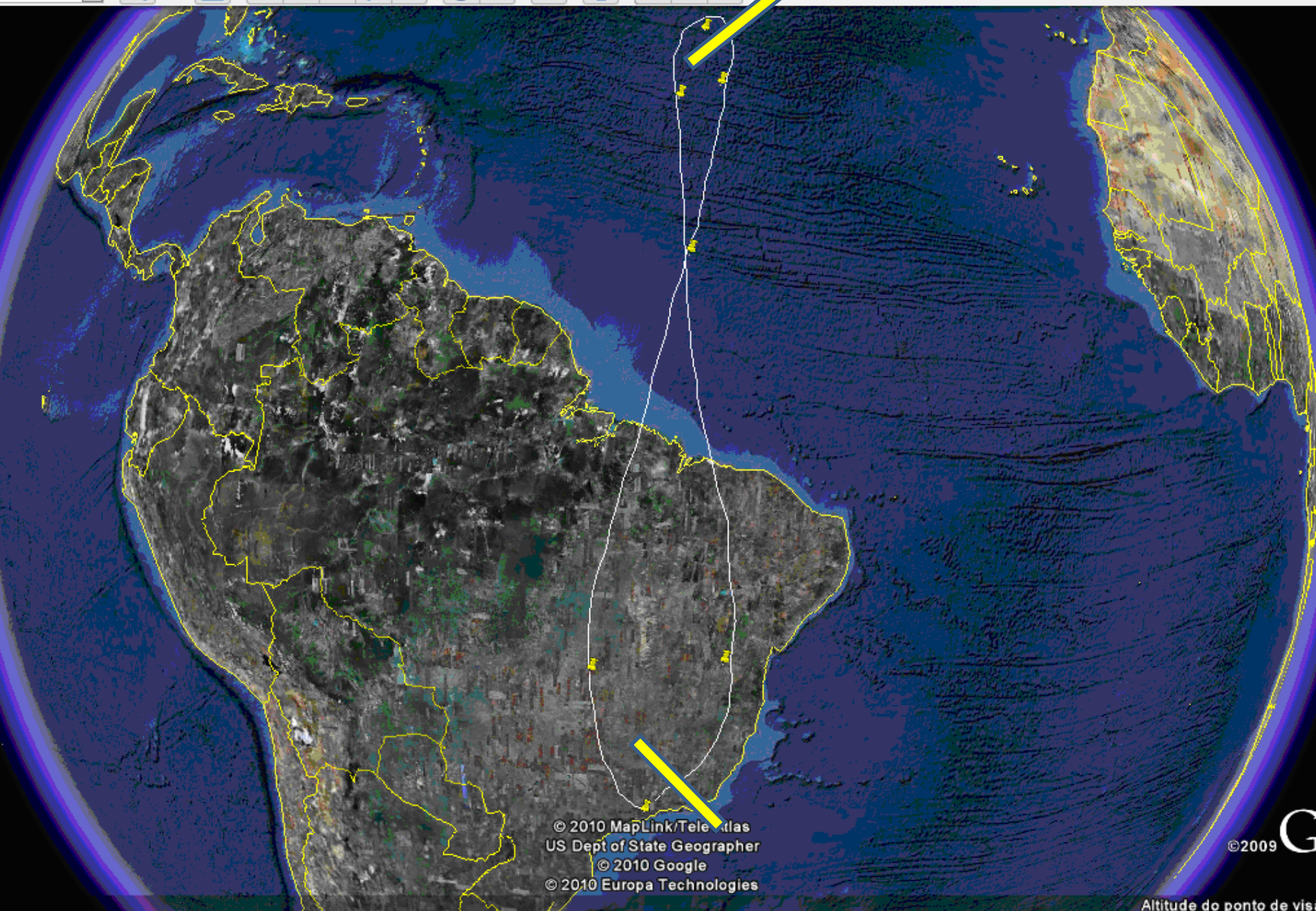
- Special Points From Analemma:



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US Dept of State Geographer
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© 2010 Europa Technologies

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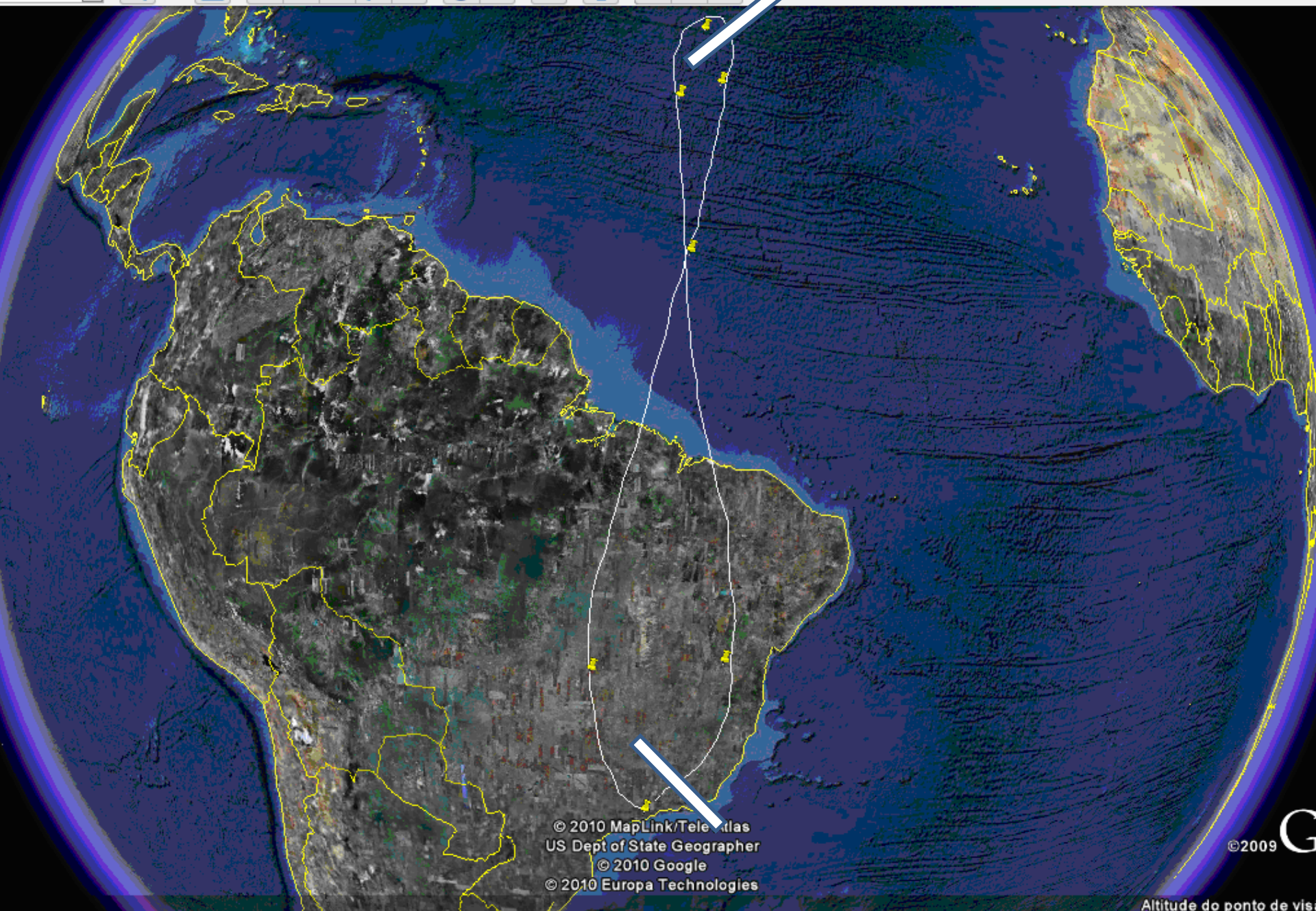
Altitude do ponto de vis



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US Dept of State Geographer
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Altitude do ponto de vis



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US Dept of State Geographer
© 2010 Google
© 2010 Europa Technologies

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Altitude do ponto de vis

PVSDRKNS

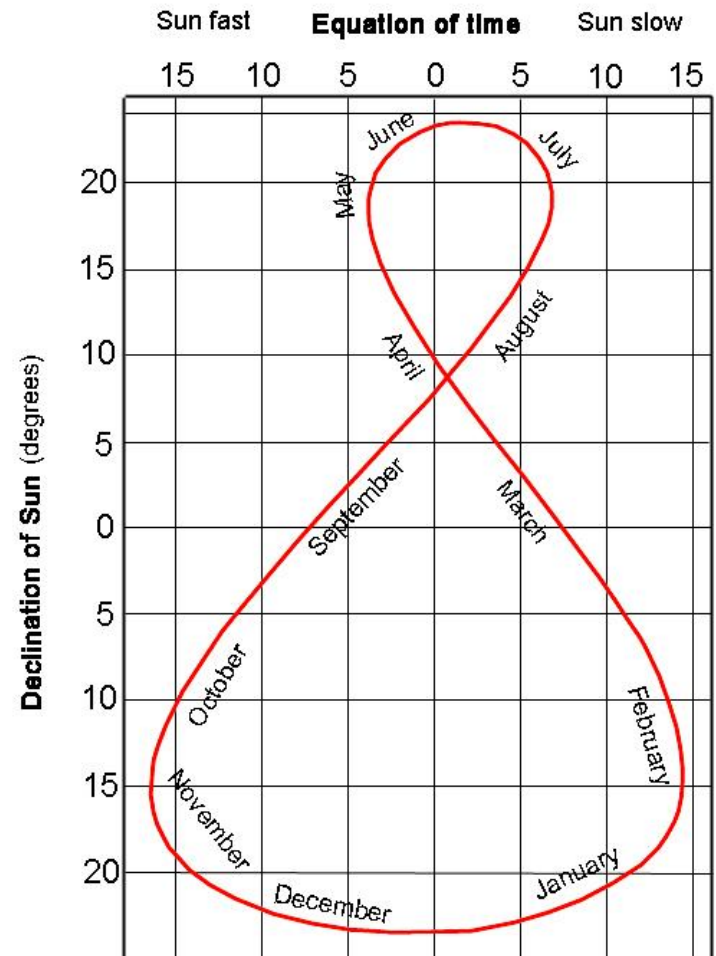
- Measurements in video on You Tube:
- <https://www.youtube.com/user/luizsampaioathayde>
- “Velocidade do Dia Solar” (In Portuguese)

PVSDRKNS

- Measurements / Results:
- July 12th and 13th/2012 – 1437 min
- August 27th and 28th/2012 – 1440 min (Three videos)
- October 08th and 09th/2012 – 1441 min
- October 29th and 30th/2012 – 1442 min
- December 03rd and 04th/2012 – 1441 min
- January 07th and 08th/2013 – 1439 min

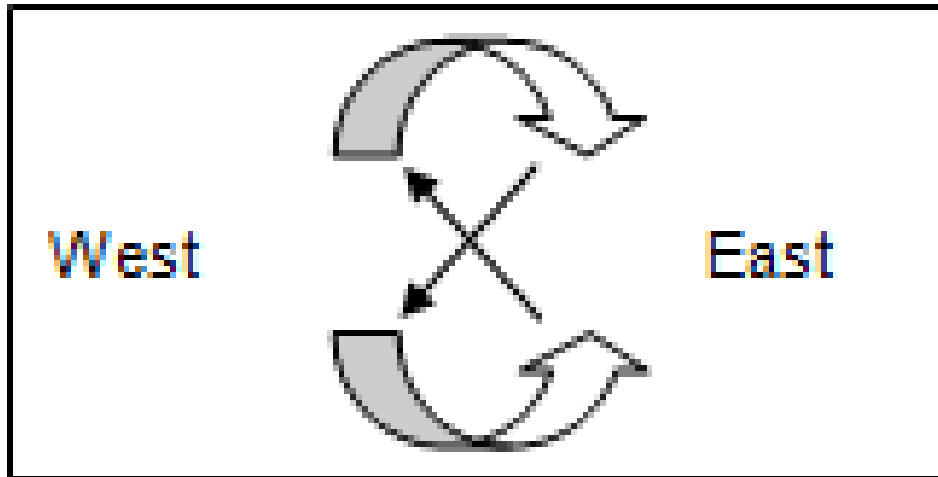
PVSDRKNS

- Measurements / Results:
- Jul 12th and 13th/2012 – 1437 min
- Aug 27th and 28th/2012 – 1440 min
- Oct 08th and 09th/2012 – 1441 min
- Oct 29th and 30th/2012 – 1442 min
- Dec 03rd and 04th/2012 – 1441 min
- Jan 07th and 08th/2013 – 1439 min



PVSDRKNS

- Analemma Elements:



Lines: Period
increases /
Decreases
“speed”

Curves: Period
decreases /
Increases
“speed”

PVSDRKNS

- Conclusions:
- Increasing or decreasing variations in the periods of the solar day length do not always occur at the same time the planet accelerates or decelerates. There are times when this occurs synchronously and at other times does not occur

PVSDRKNS

- Conclusions:
- The increasing or decreasing of the “speed variation” in the solar day duration periods are four each year, while the acceleration or deceleration of the planet occur only twice in the same time

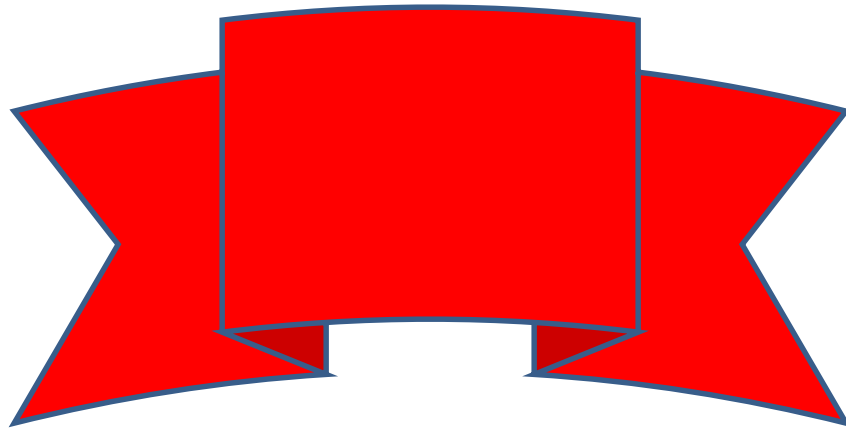
PVSDRKNS

- Conclusions:
- The analemma is caused by the inclination of the imaginary axis of the planet and the eccentricity of orbit around the sun. Usually we study its causes. This study shows that it shows a different solar day variation of the planetary speed variation system

PVSDRKNS

- Conclusions:
- A curiosity is that if we score the dates aphelion and perihelion in analemma, we see that they occur almost perfectly about fourteen days after the two solstices.
North solstice ~june 21st / aphelion ~july 05th
South solstice ~dec 21st / perihelion ~jan 05th

PVSDRKNS



References:

- ATHAYDE JUNIOR, Luiz Sampaio. **A Teoria do Zênite Solar**: uma proposta para estações do ano nas localidades intertropicais. Edufba. Salvador: 2014
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- <http://earth.google.com/intl/pt>
- <http://www.usno.navy.mil/USNO/astronomical-applications/data-services/earthview>

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- <http://astro.unl.edu/classaction/animations/renaissance/kepler.html>
- <http://www.konstanta.lt/2012/09/analema/>
- http://timpanosgeograficos.blogspot.com.br/2011_02_01_archive.html

**Thank You
Very Much!**