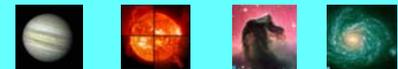


COSIS: em busca do passado do SOL ... na ajuda ao futuro

João Fernandes

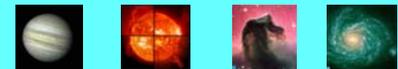
Departamento de Matemática da FCTUC
Observatório Astronómico da UC

www.mat.uc.pt/~jmfernan

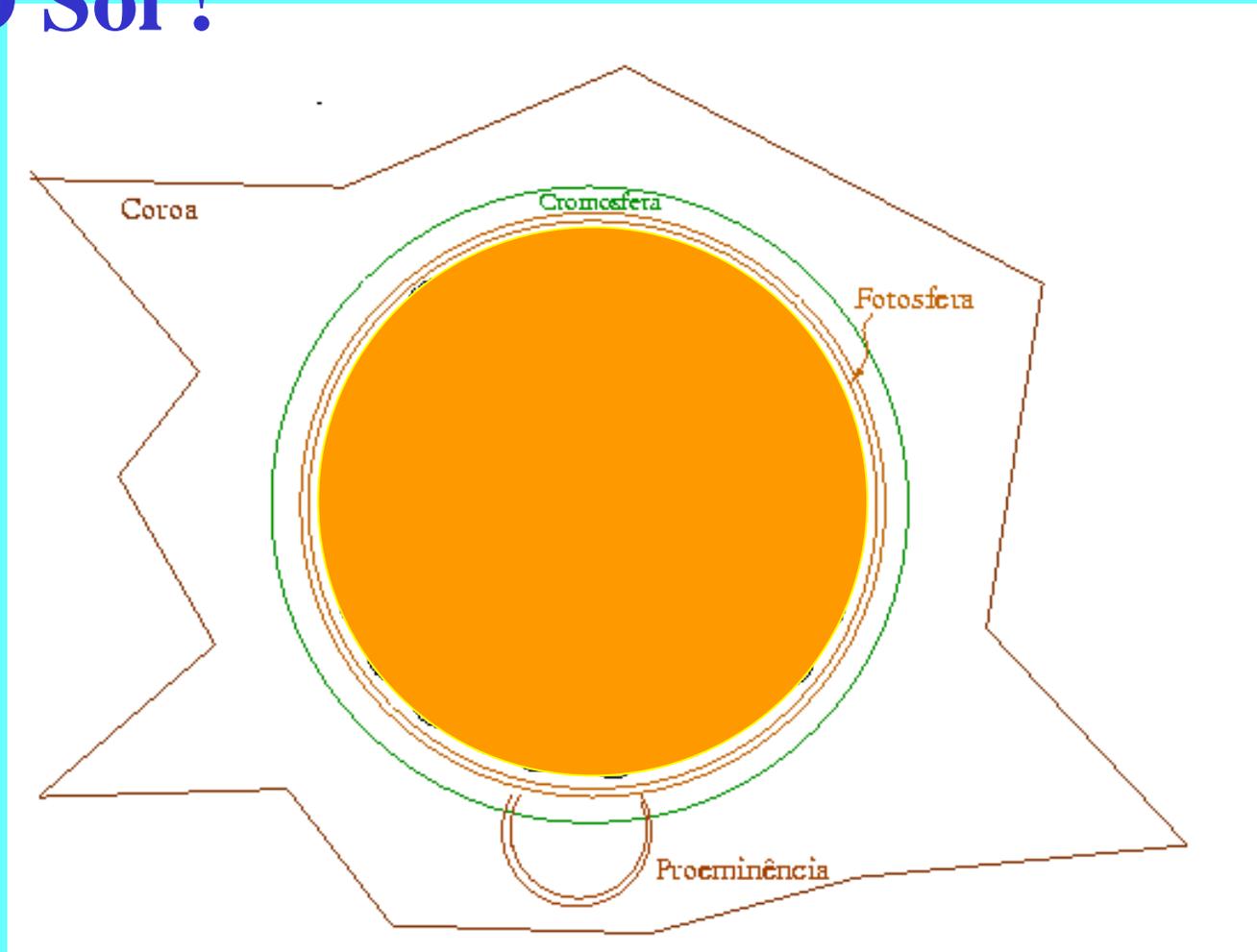


RESUMO

- O personagem principal: o SOL
- A história recente do Sol: a matéria prima
- COSIS: um projecto interdisciplinar
 - E depois ?



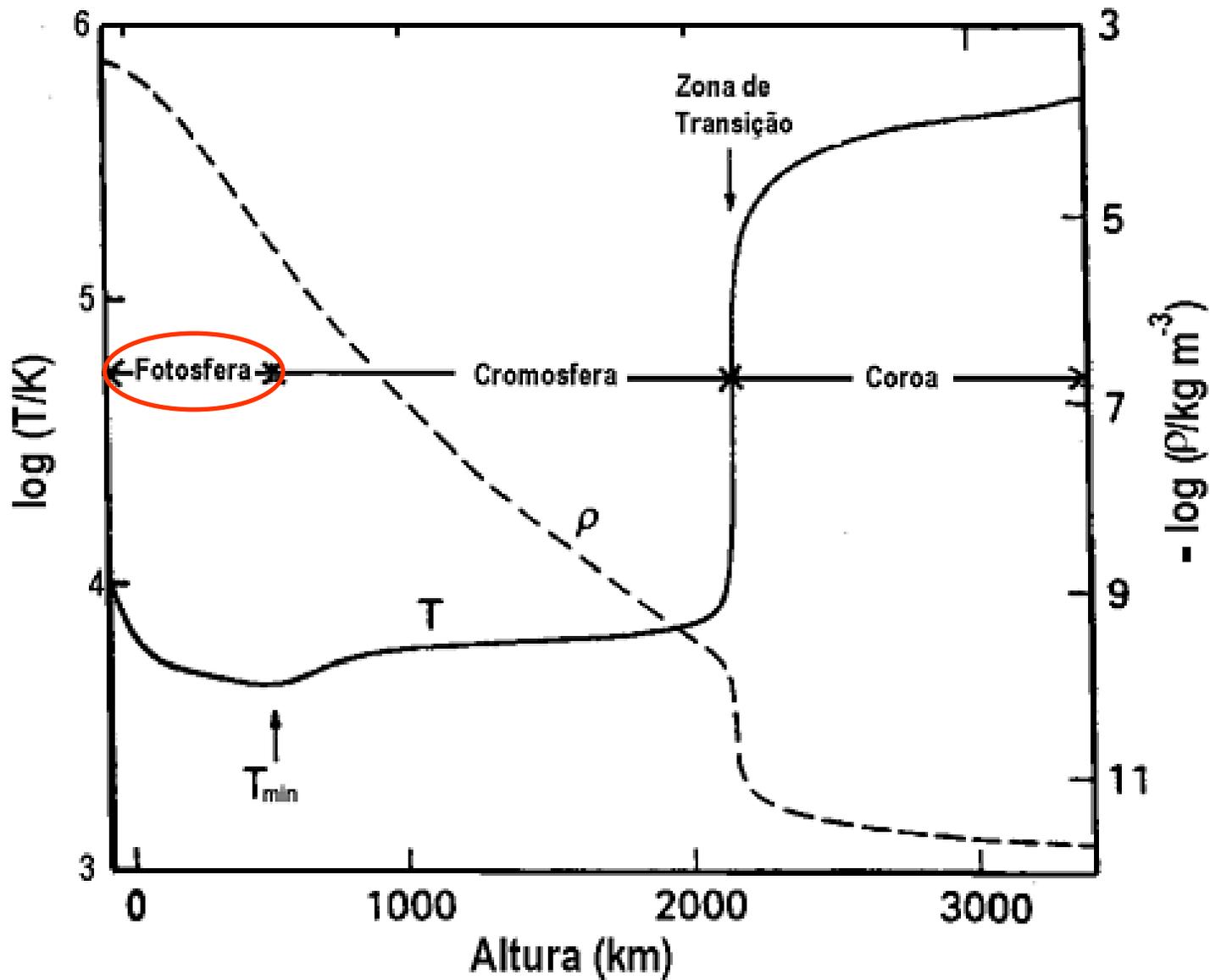
O Sol !



Crédito: Kepler et al.

O reino do campo magnético



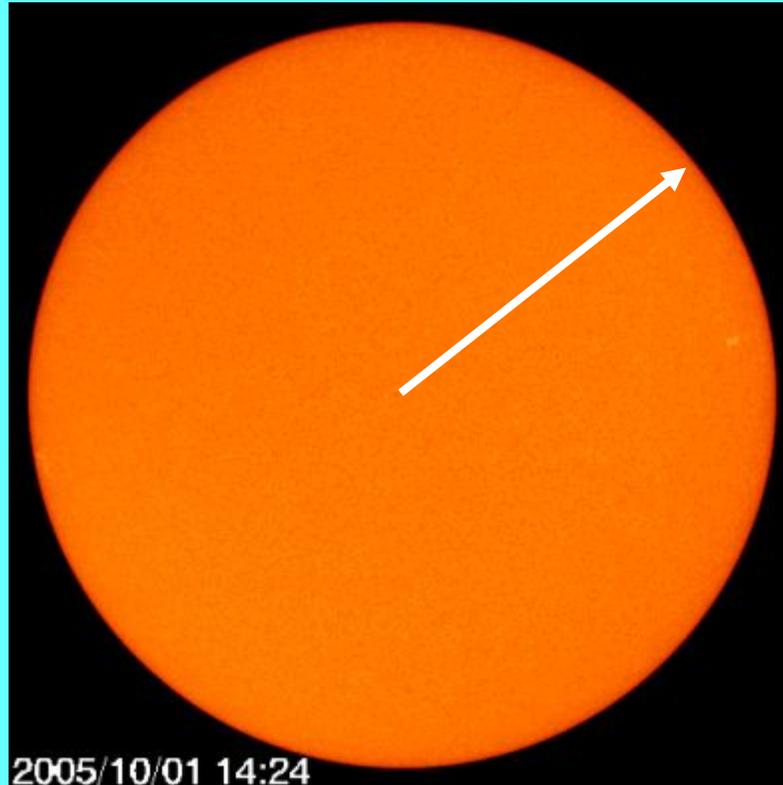


km

1



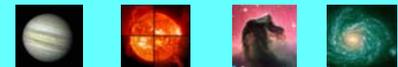
A Fotosfera



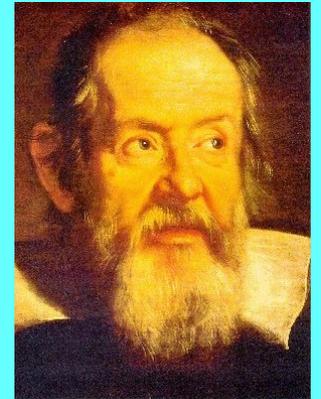
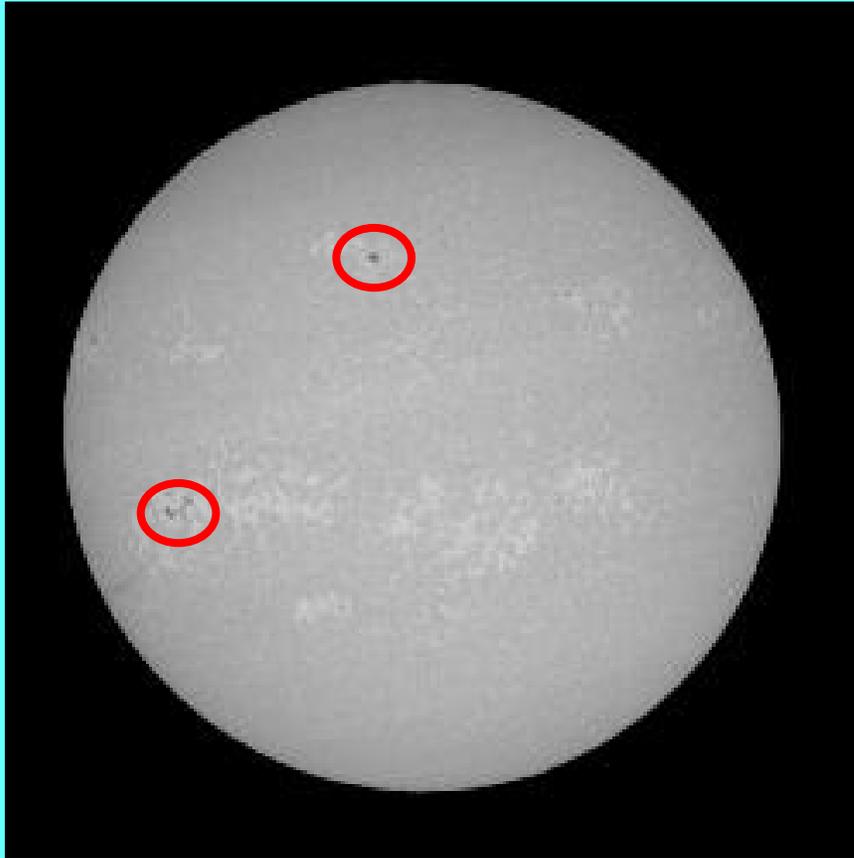
Raio = 690 000 km



Crédito: SOHO/NASA

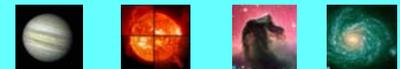


A Fotosfera

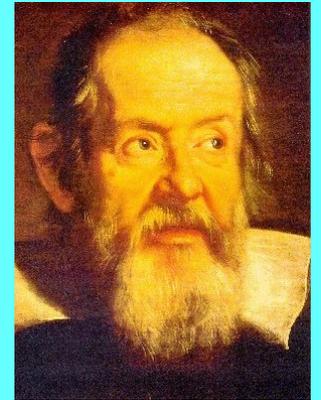
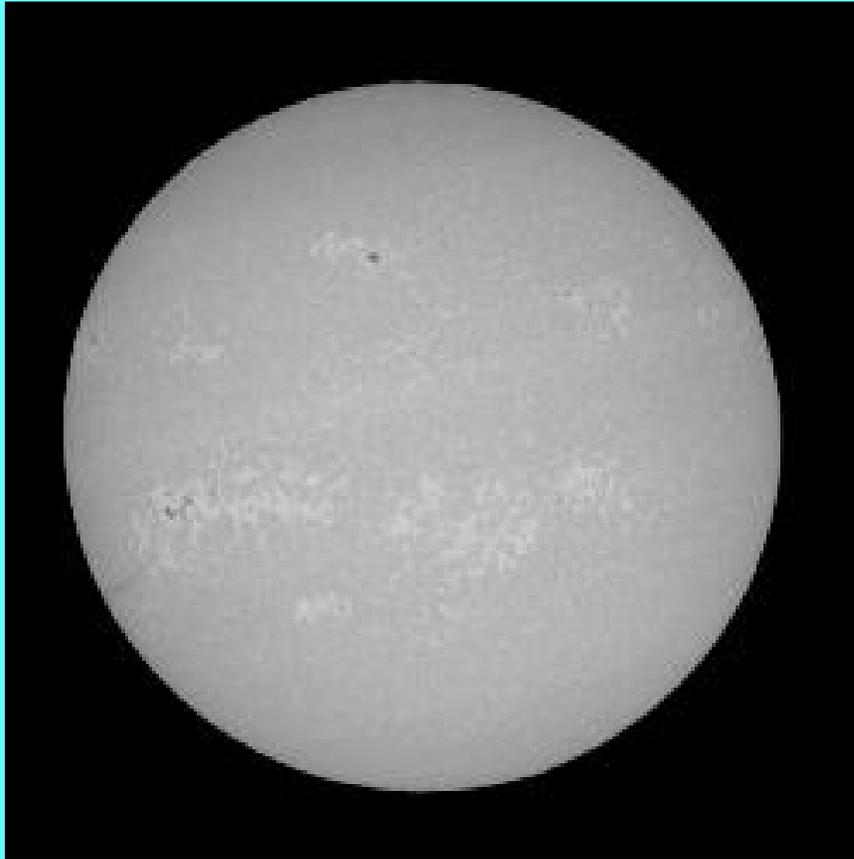


Manchas solares

Crédito: Garcia
(OAUC)



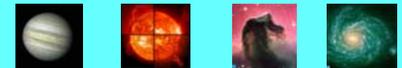
A Fotosfera



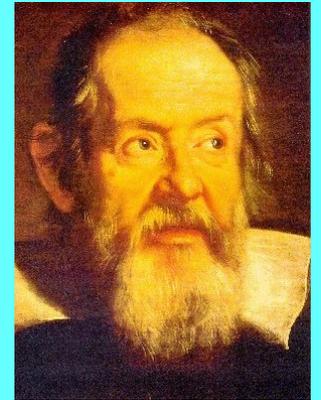
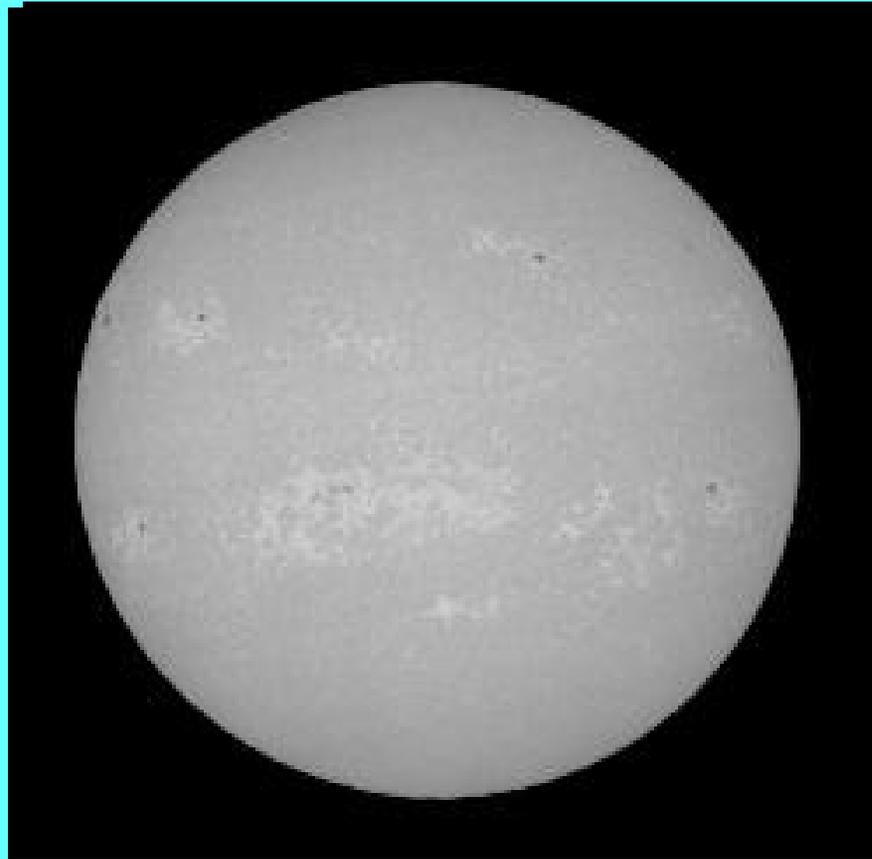
12 Jan 2000

Crédito: Garcia
(OAUC)

Manchas solares



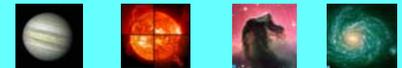
A Fotosfera



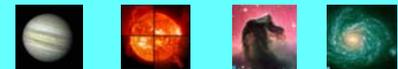
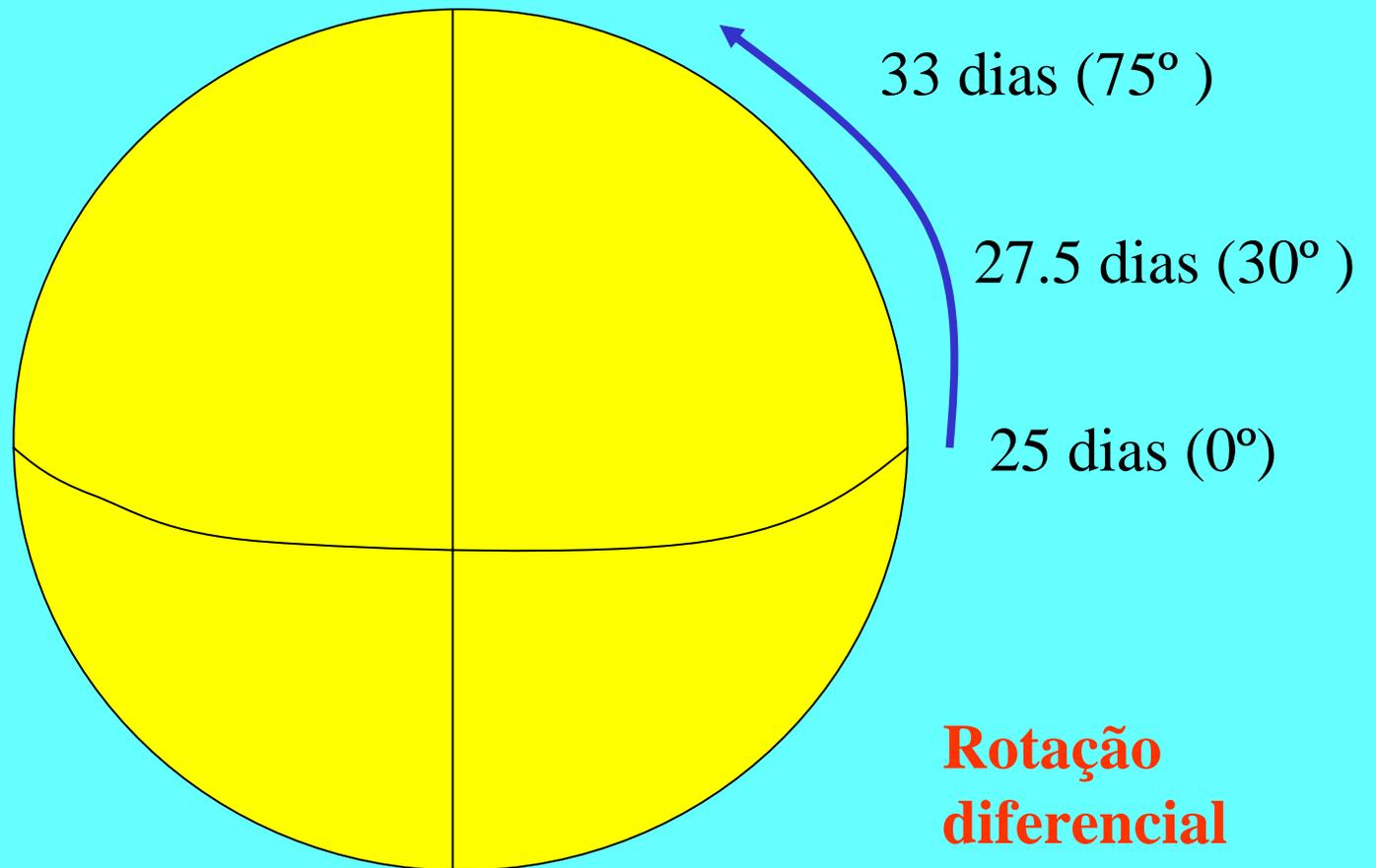
14 Jan 2000

Crédito: Garcia
(OAUC)

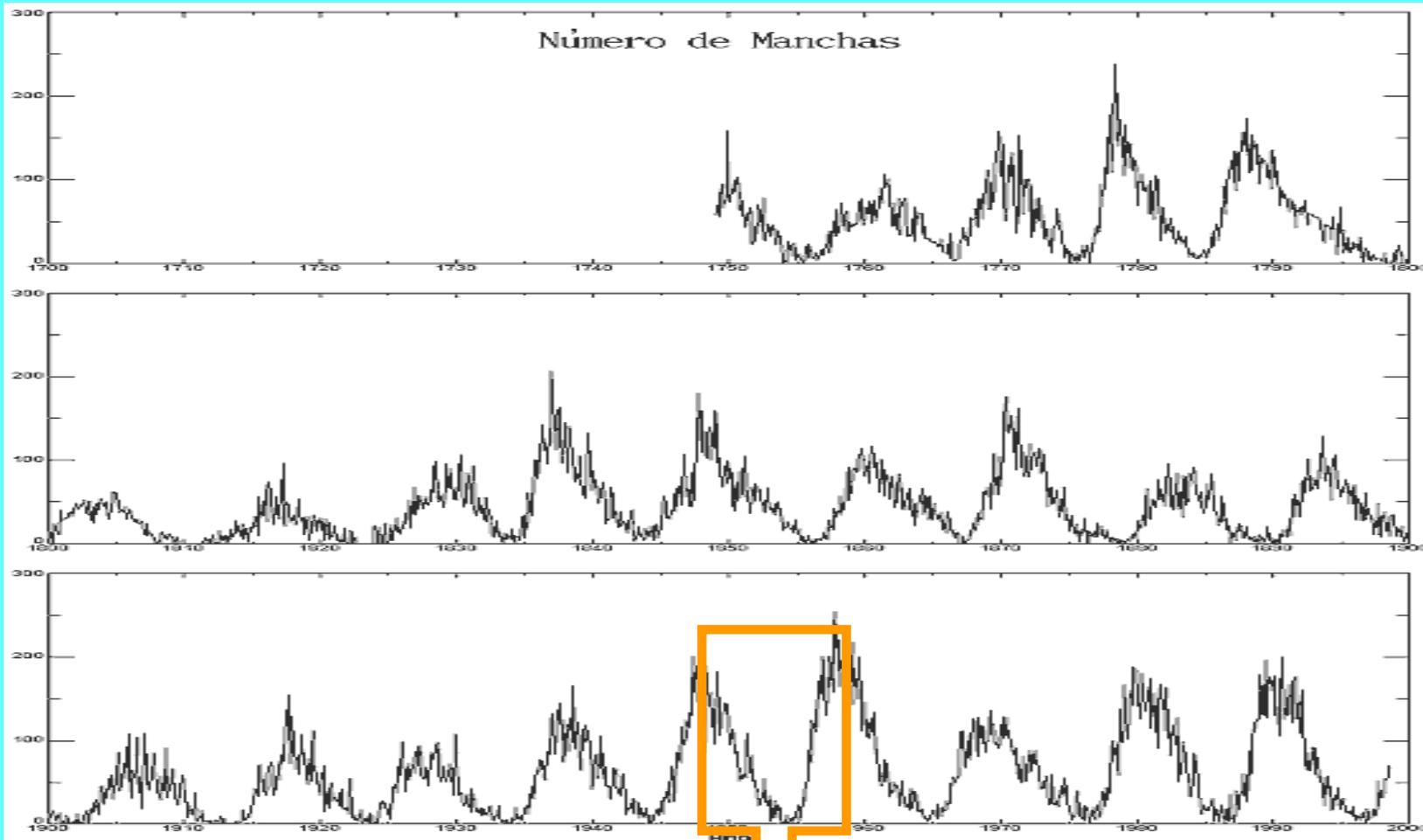
Manchas solares



A Fotosfera

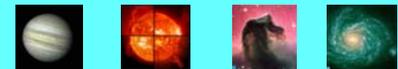


A Fotosfera

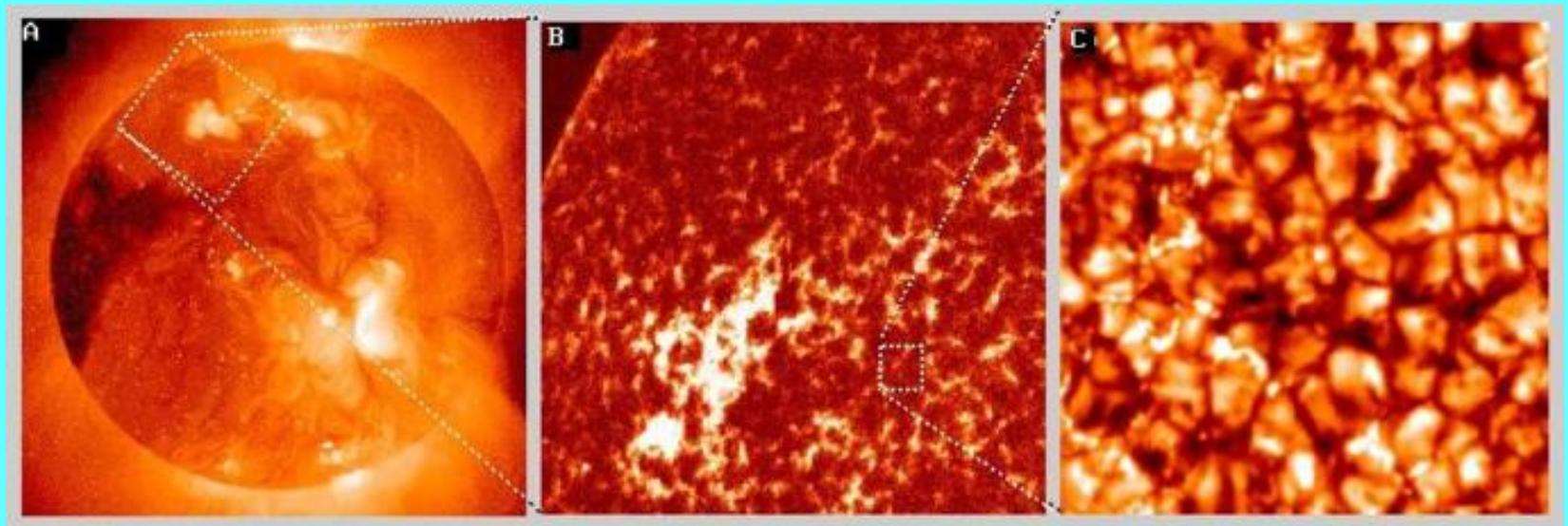


Crédito: Kepler et al.

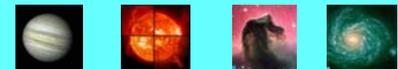
11 anos

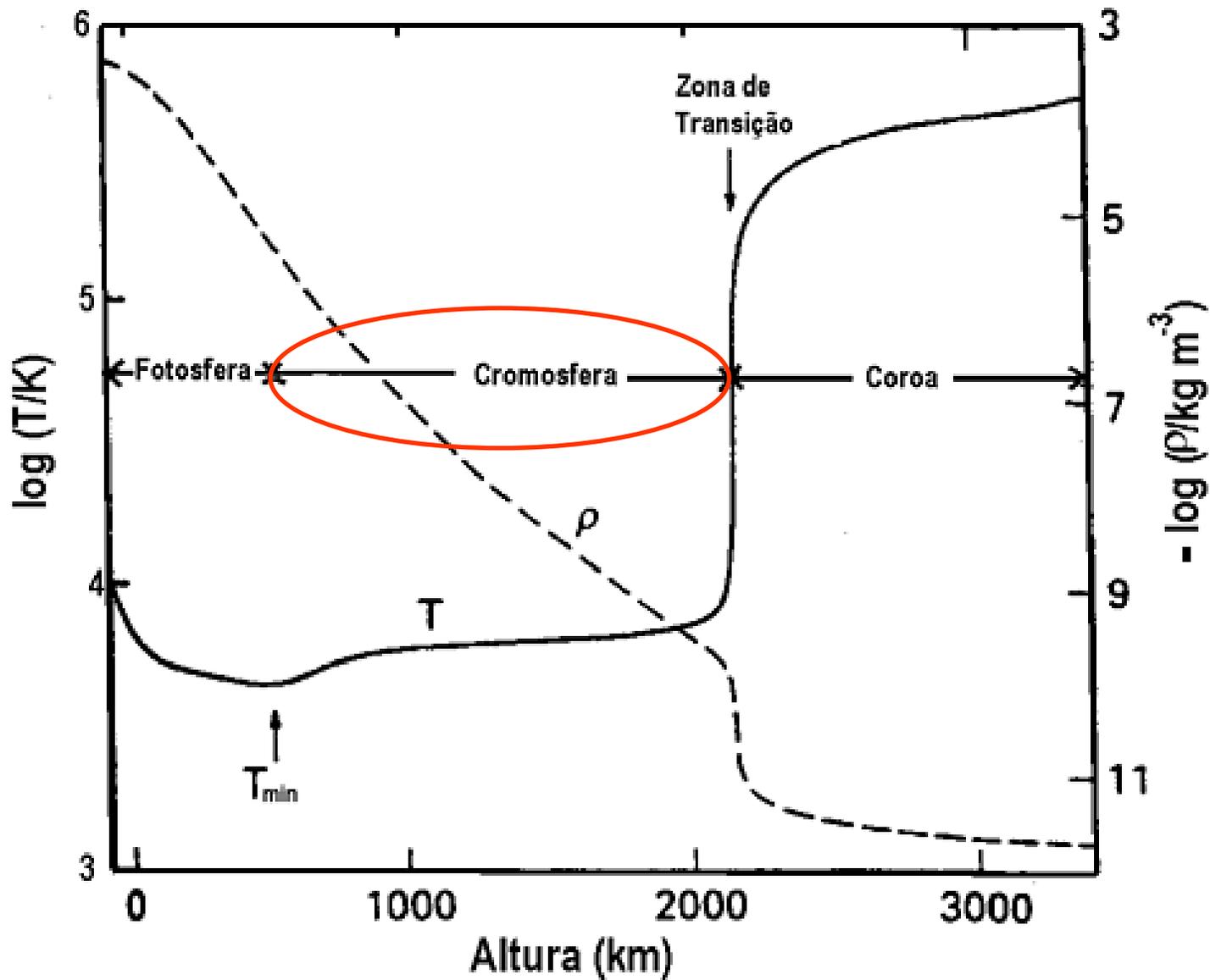


A Fotosfera



Crédito: Kepler et al.



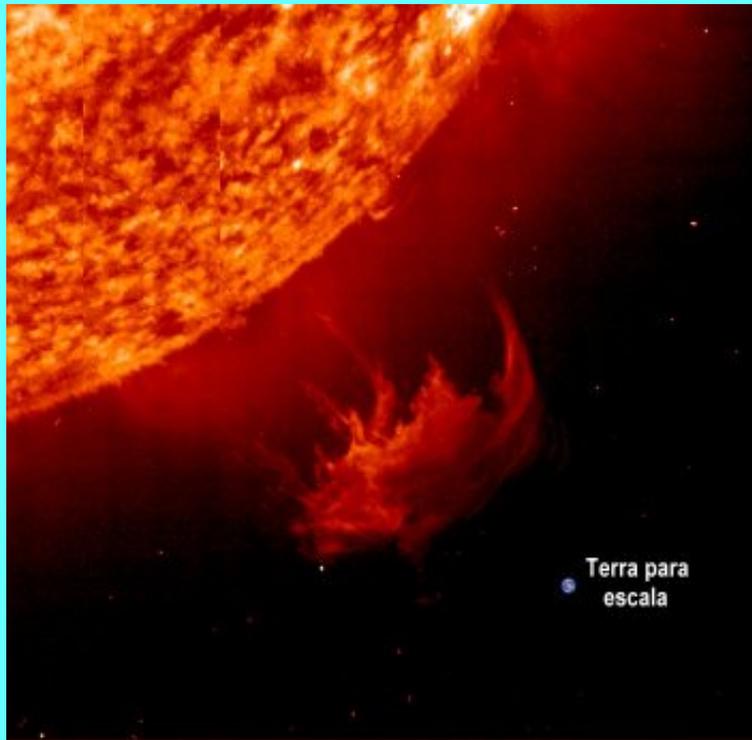


km

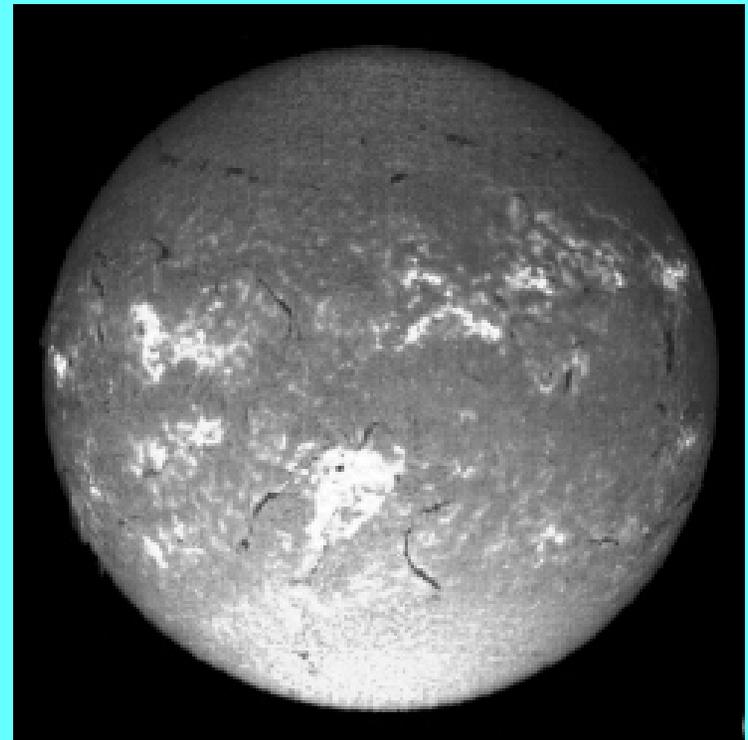
m



A Cromosfera

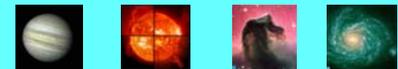


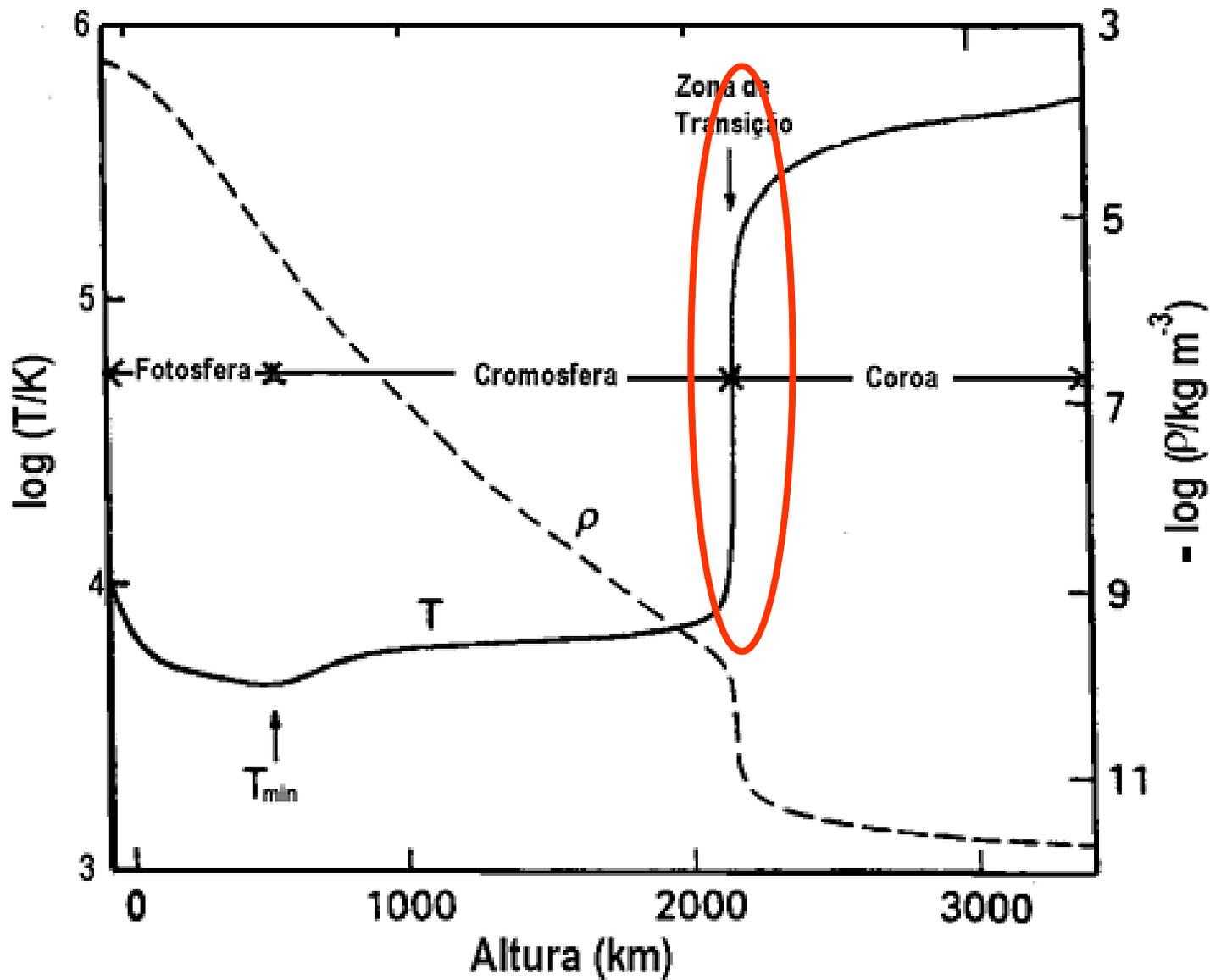
Crédito: NASA



19 Set 2000

Crédito: Garcia
(OAUC)





km

km



A Coroa

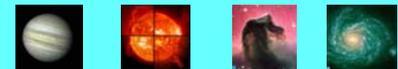
$T \sim 2000000 \text{ }^\circ\text{C}$

100000 km



$T \sim 40000 \text{ }^\circ\text{C}$

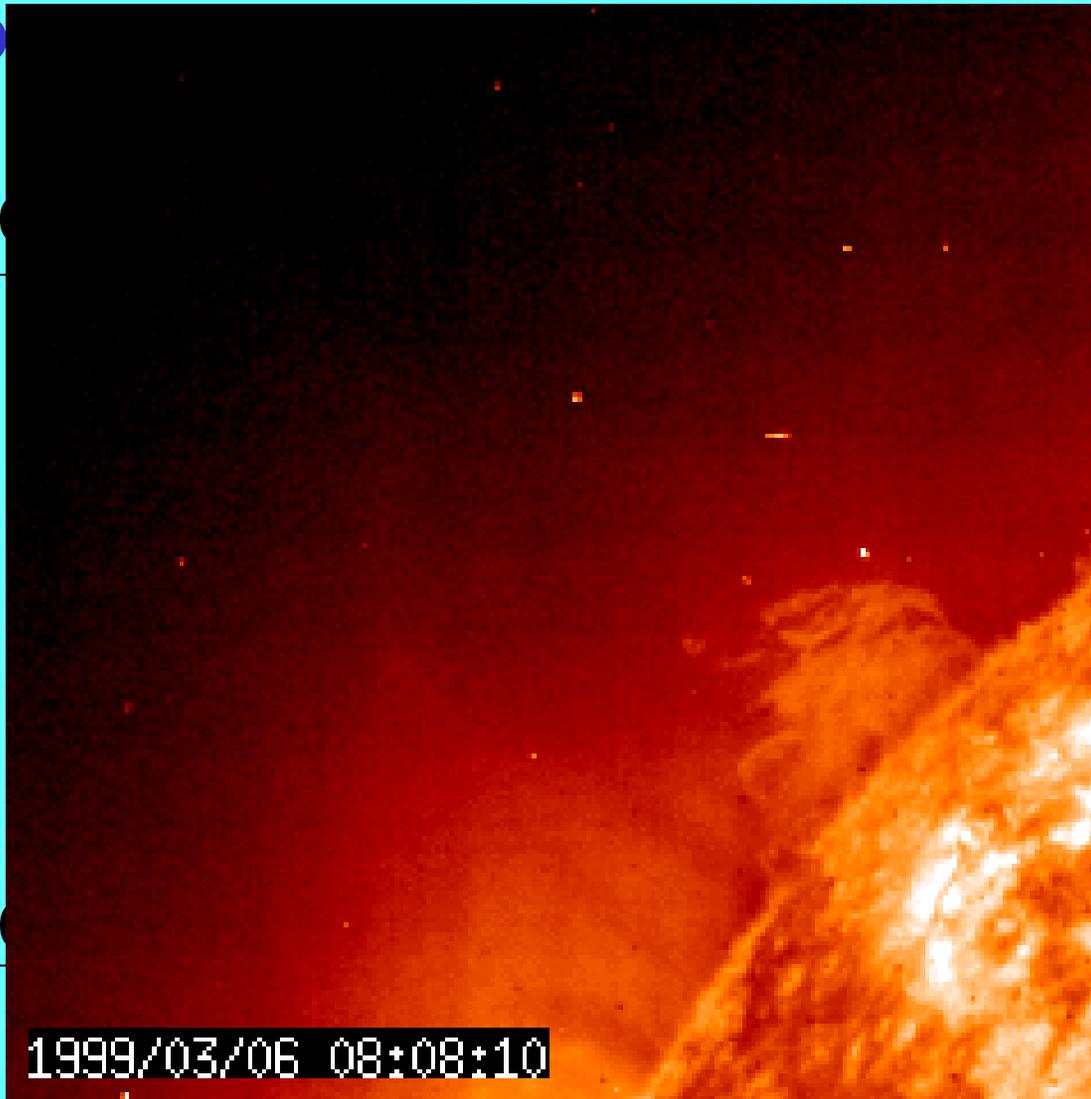
2000 km



A Co

T ~ 200

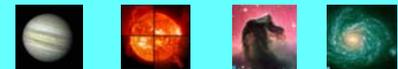
T ~ 400



100000 km

2000 km

1999/03/06 08:08:10



A Coroa

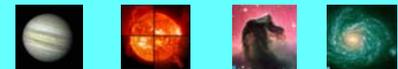
$T \sim 1000000 \text{ }^\circ\text{C}$

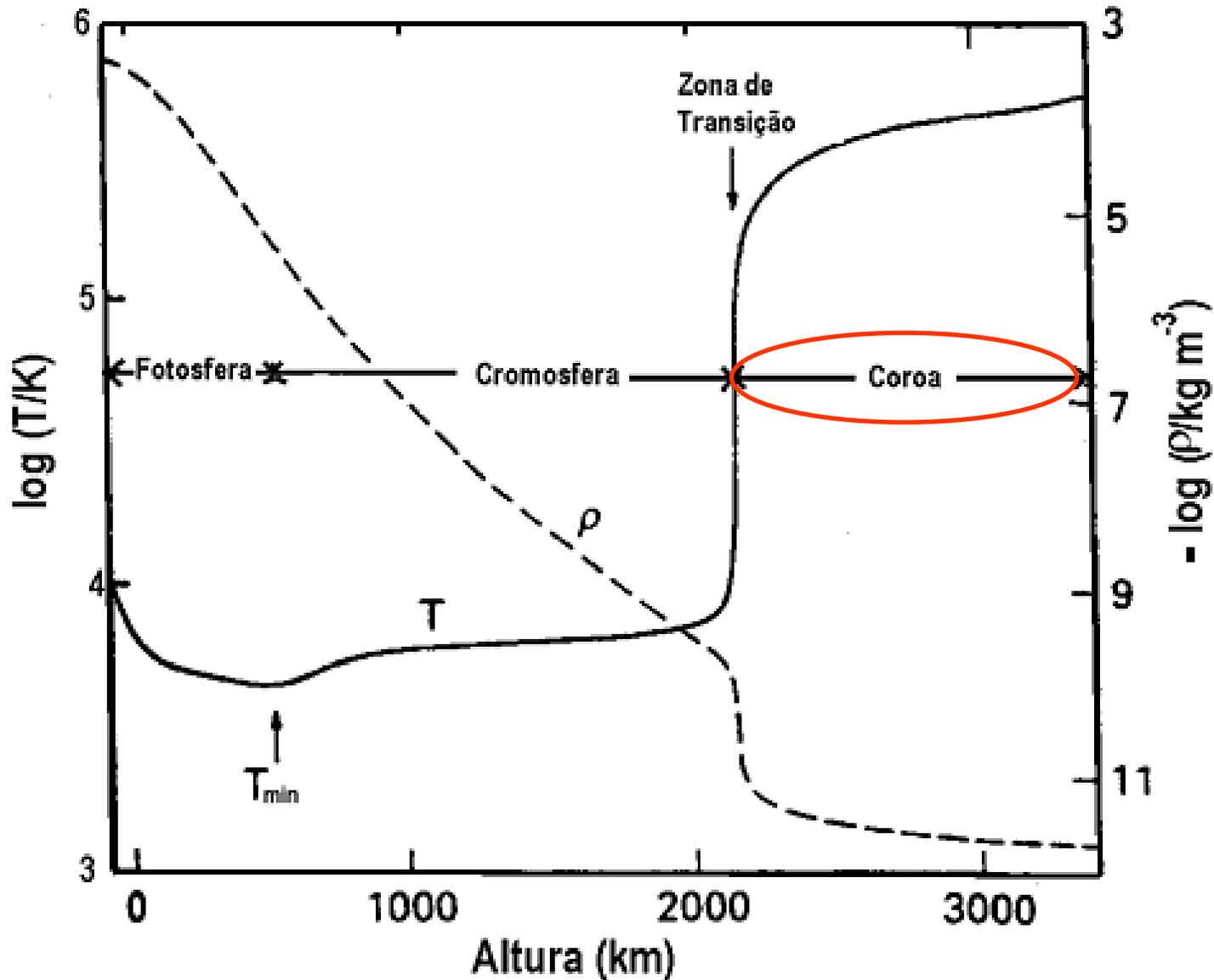
100000 km



$T \sim 4000 \text{ }^\circ\text{C}$

2000 km





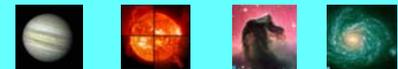
km

km

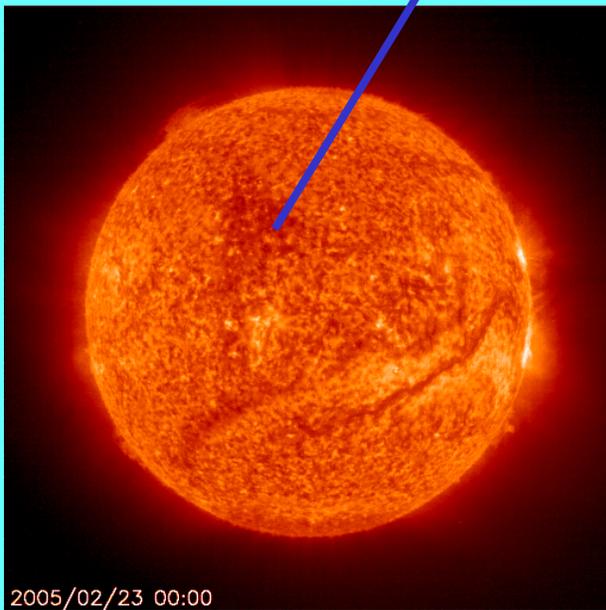
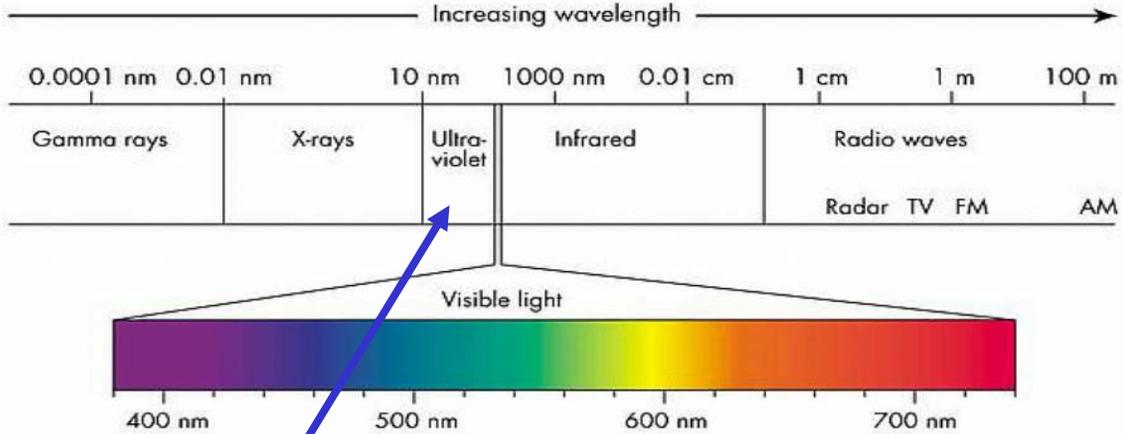
Crédito: Kepler et al.



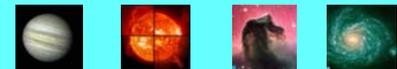
O Sol às cores



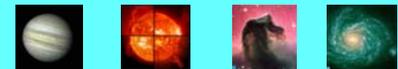
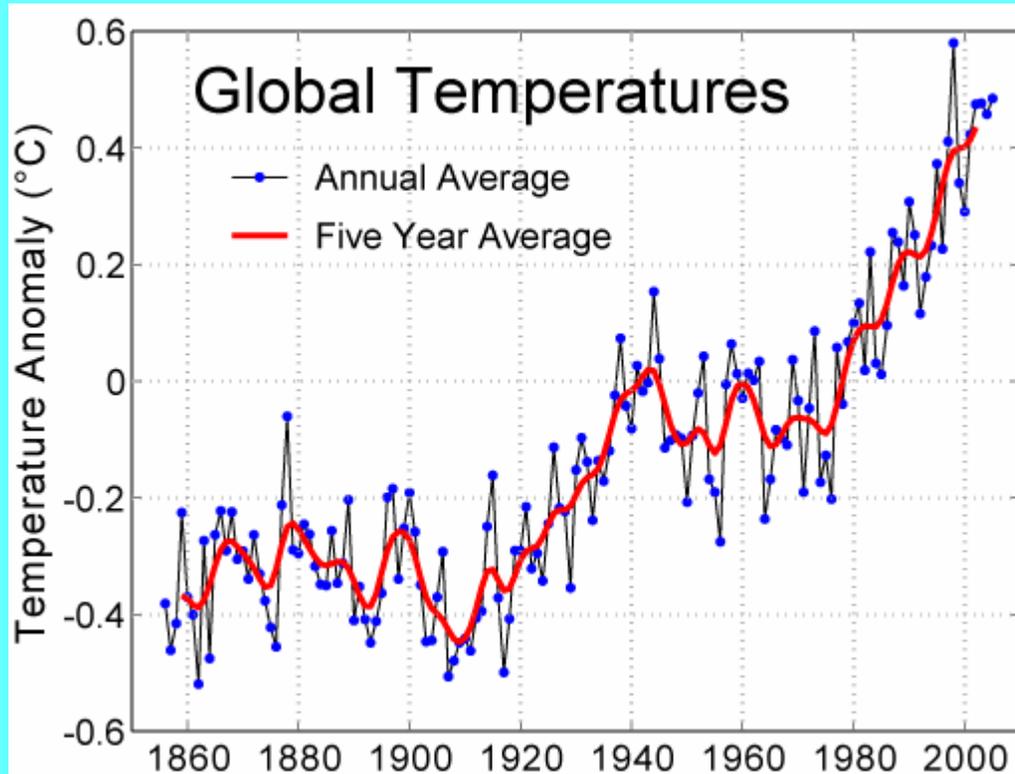
O Sc



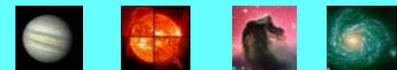
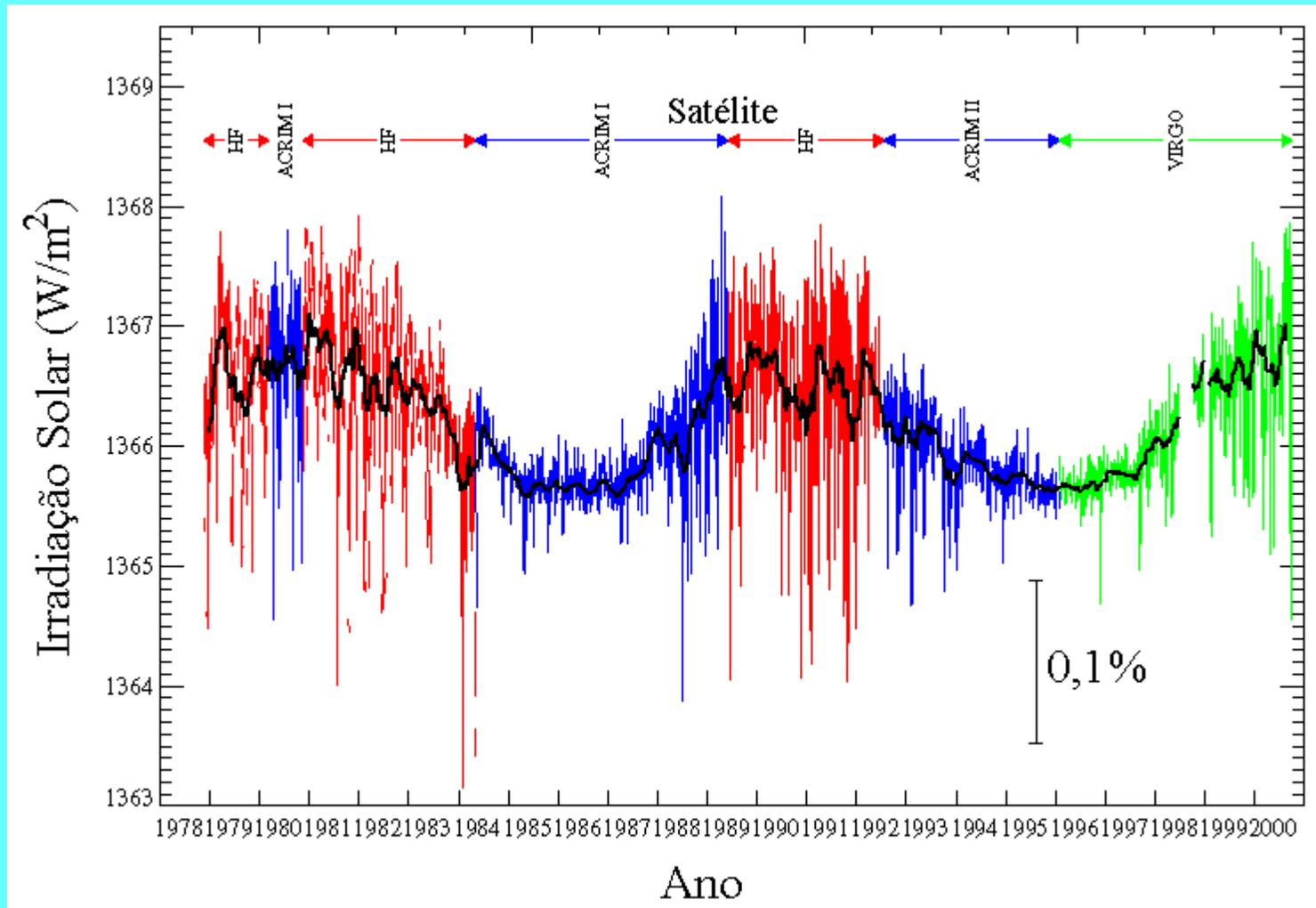
ESA/SOHO



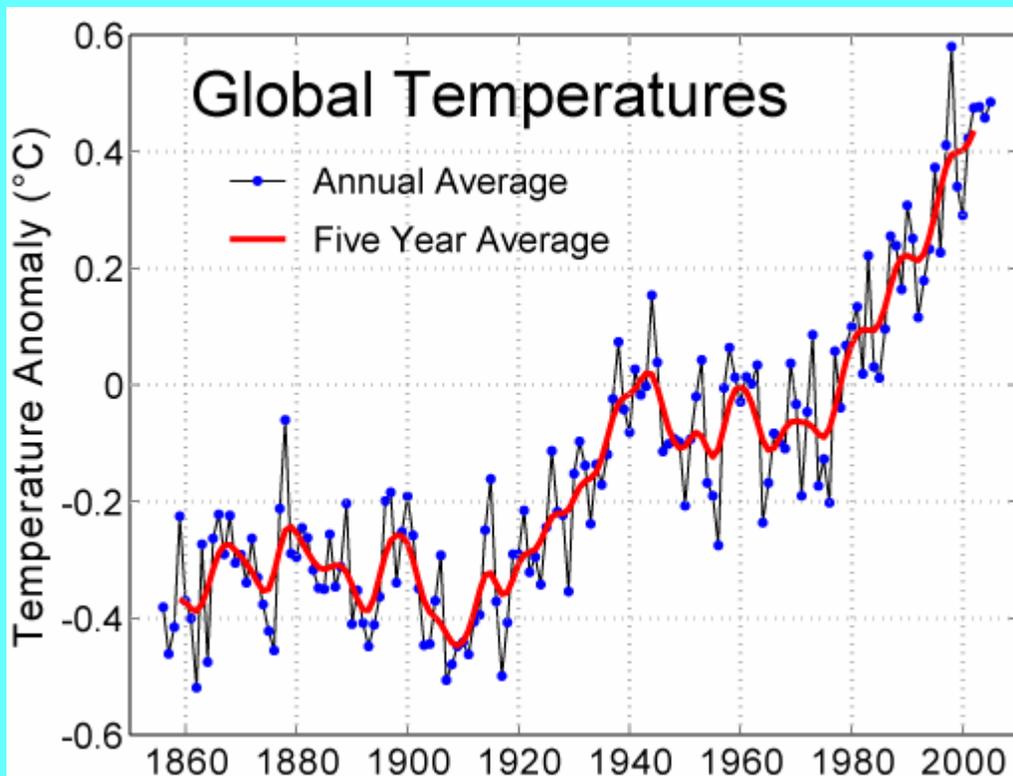
E a Terra ?



E a Terra ?



E a Terra ?

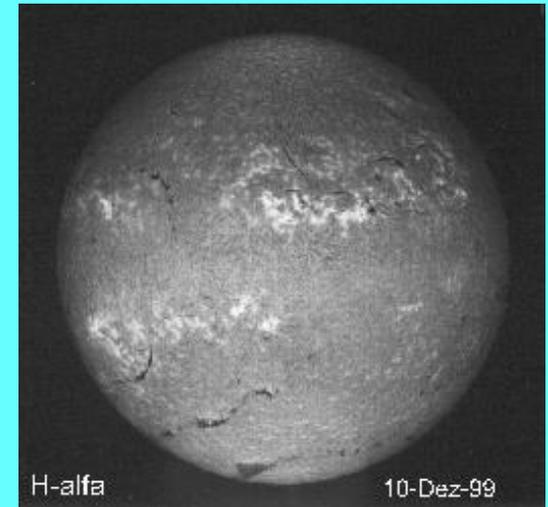
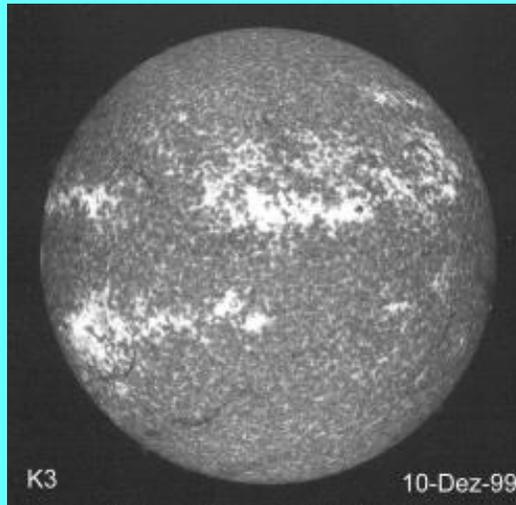
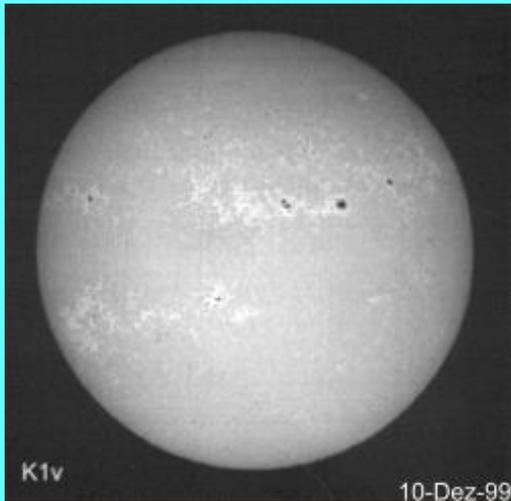


A contribuição do Sol para o problema do aquecimento global da Terra

(3 de Março 2007 – Semana Cultural)



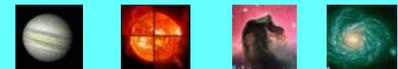
A matéria prima !



Crédito: Garcia (OAC)

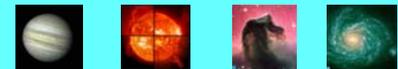


30000 imagens
deste 1926



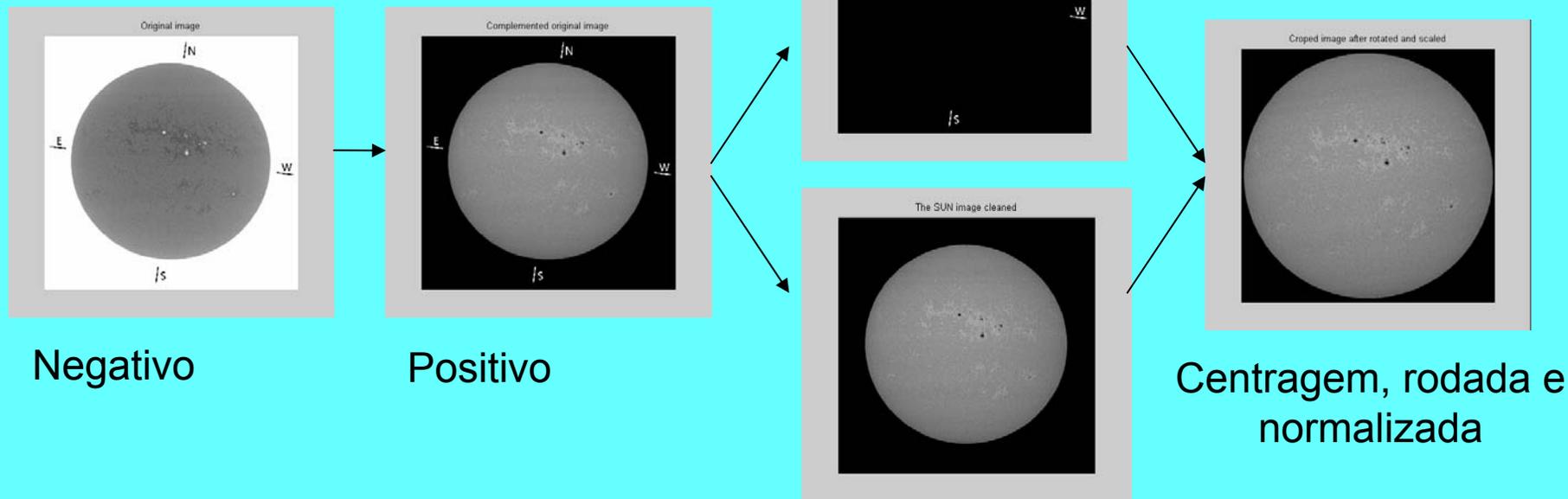
A base de dados !

<http://tangerine.mat.uc.pt/novo/observatorio/site/index.html>



Coimbra Solar Information System

Exemplo para detecção

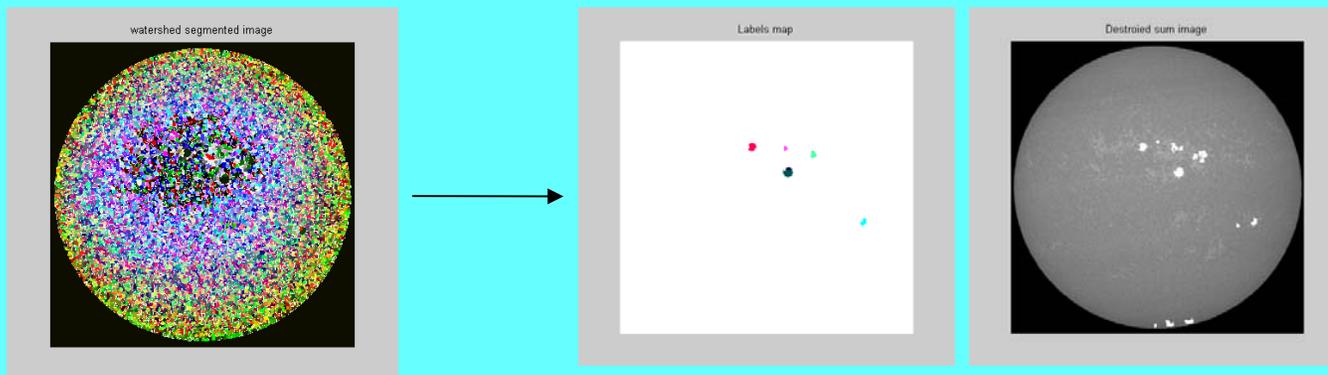


Negativo

Positivo

Centragem, rodada e normalizada

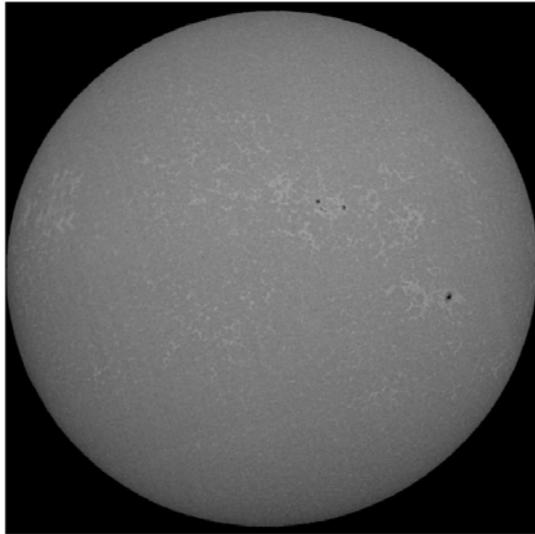
Separação: eixos imagem



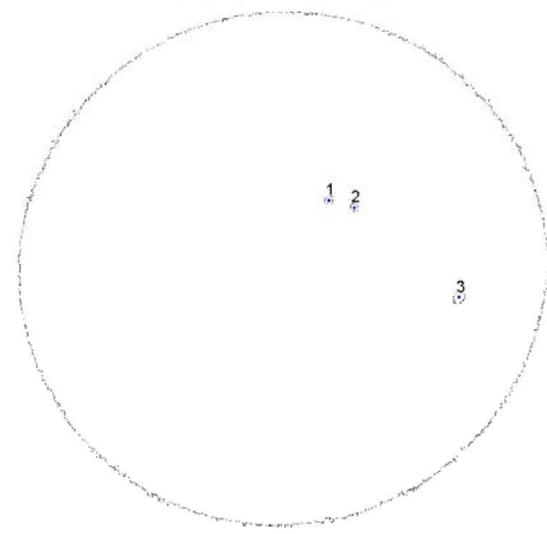
“Watershed segmentation”

Detecção de grupos de manchas

Original Image



Sunspots plus Centroids Image



02-06-1981

Interface COSIS/Página WEB

Cosis . Coimbra Observatory Solar Information System

About

Initial Date:

dd-mm-yyyy or dd/mm/yyyy

Initial Hour:

UT

End Date:

dd-mm-yyyy or dd/mm/yyyy

End Hour:

UT

Number of sunspots:

X coordinates:

Image Area Selection

Y coordinates:

Image Area Selection

Area of sunspot:

Default Pixels



from

to

from

to

from

to

from

to

Pixels

*Millionths of the solar hemisphere

Reset

Search

OBSERVATÓRIO ASTRONÓMICO
DA UNIVERSIDADE DE COIMBRA

CA³

Soft Computing and Informatics Agents

Sponsored By:



A finalizar em Dezembro de 2006

Coimbra Solar Information System

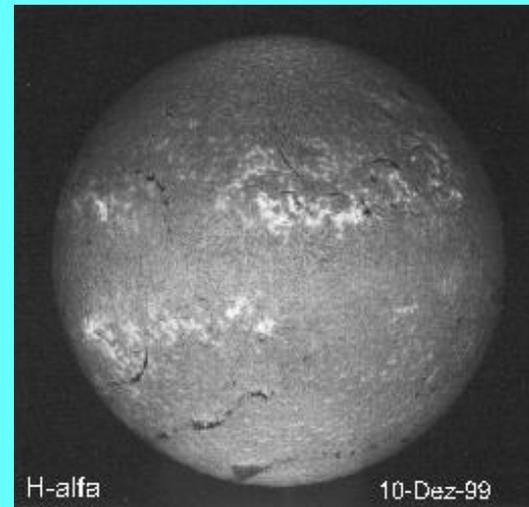
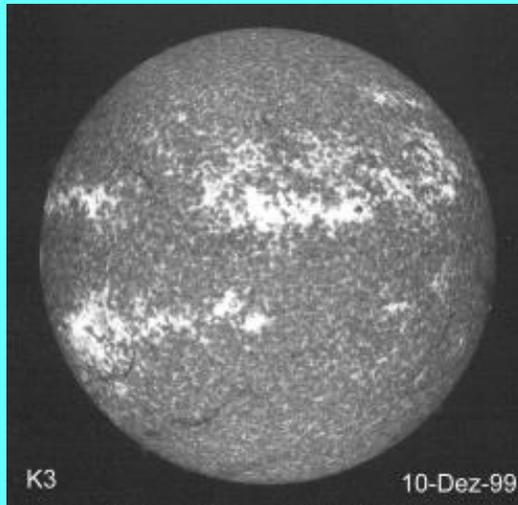
(POCI/CTE/-AST/58333/2004)

Uma colaboração entre Observatório de Coimbra , Santa Clara, and UNINOVA-CA3, Campus FCT-UNL

- João Fernandes, OAUC, Coimbra
- Rita Almeida Ribeiro, UNINOVA, Caparica
- José Manuel Fonseca, UNINOVA, Caparica
- Ivan Dorotovič, OAUC, Coimbra and UNINOVA, Caparica;
SCO, Hurbanovo, Eslováquia

COSIS: e depois ...

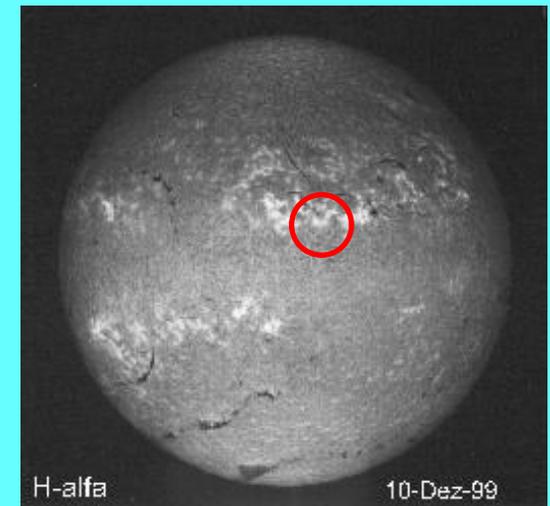
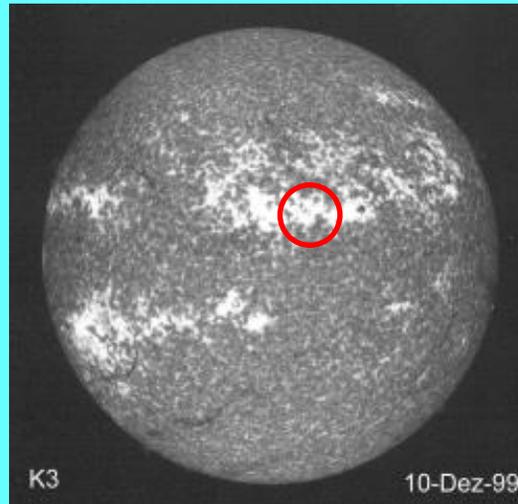
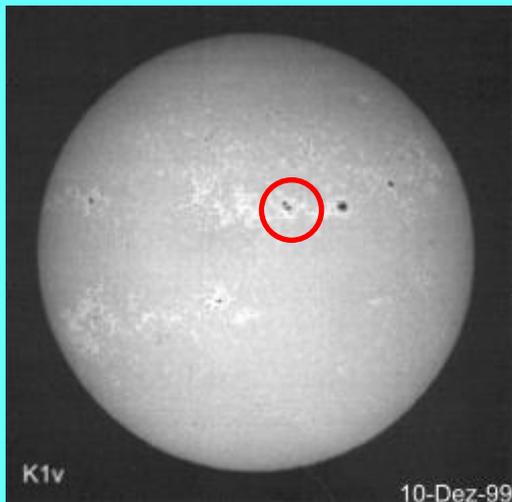
... + imagens (K3 e H-alpha)



... + outras bases de dados mundiais

- Observatório de Paris (Paris)
- Solar Web Browser (Bélgica)

COSIS: e depois ... (o grande desafio !)



SISTEMA DE INFORMAÇÃO ... HELIOGRÁFICA

Para saber mais

Site oficial do COSIS

http://www2.uninova.pt/ca3/en/project_COSIS.htm

Reportagem no euronews

Física Solar, Universe

Para perguntas e interesse jmfern@mat.uc.pt