



O que é Clima Espacial ?

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Instituto Nacional de Pesquisas Espaciais

Segunda-Feira
13 Dezembro 2010
11:25:21 AM

Previsão de Tempo

BRÁSILIA-DF

Favoritos | Imprimir | RSS

Definir cidade padrão

Condições Atuais

Parcialmente Nublado
25°C TEMPERATURA
65% UMIDADE RELATIVA
26°C SENSAÇÃO TÉRMICA
NO 11km/h DIR. E INTENSIDADE DO VENTO
1011hPa PRESSÃO ATMOSFÉRICA *

Fonte: RedeMet Dados de Aeroportos Atualizado: 13/12/2010 09:00 ND-Não disponível *Pressão Reduzida ao Nível Médio do Mar

| Previsão de Tempo | Previsão Estendida |
|---|--|
| Temperaturas Estimadas pelos Meteorologistas do CPTEC | |
| Segunda-feira - 13.12.2010 Pancadas de Chuva TEMP. MÍNIMA: 18°C TEMP. MÁXIMA: 26°C PROB. DE CHUVA: 90 % NASCER DO SOL: 05:34:13 PÔR DO SOL: 18:37:34 UV MÁXIMO: 4 (Sem Nuvem) | Chuva de curta duração e pode ser acompanhada de trovoadas a qualquer hora do dia. |
| Terça-feira - 14.12.2010 Pancadas de Chuva TEMP. MÍNIMA: 18°C TEMP. MÁXIMA: 25°C PROB. DE CHUVA: 90 % NASCER DO SOL: 05:34:36 PÔR DO SOL: 18:38:07 UV MÁXIMO: 4 (Sem Nuvem) | Chuva de curta duração e pode ser acompanhada de trovoadas a qualquer hora do dia. |
| Quarta-feira - 15.12.2010 Nublado e Panc. de Chuva TEMP. MÍNIMA: 18°C TEMP. MÁXIMA: 25°C PROB. DE CHUVA: 90 % NASCER DO SOL: 05:35:00 PÔR DO SOL: 18:38:40 UV MÁXIMO: 3 (Sem Nuvem) | Muitas nuvens com curtos períodos de sol e pancadas de chuva com trovoadas. |
| Quinta-feira - 16.12.2010 Pancadas de Chuva TEMP. MÍNIMA: 18°C TEMP. MÁXIMA: 24°C PROB. DE CHUVA: 90 % NASCER DO SOL: 05:35:25 PÔR DO SOL: 18:39:13 UV MÁXIMO: 3 (Sem Nuvem) | Chuva de curta duração e pode ser acompanhada de trovoadas a qualquer hora do dia. |
| Sexta-feira - 17.12.2010 Pancadas de Chuva TEMP. MÍNIMA: 17°C TEMP. MÁXIMA: 23°C PROB. DE CHUVA: 80 % NASCER DO SOL: 05:35:51 PÔR DO SOL: 18:39:45 UV MÁXIMO: 3 (Sem Nuvem) | Chuva de curta duração e pode ser acompanhada de trovoadas a qualquer hora do dia. |
| Sábado - 18.12.2010 Pancadas de Chuva TEMP. MÍNIMA: 15°C TEMP. MÁXIMA: 29°C PROB. DE CHUVA: 80 % NASCER DO SOL: 05:36:17 PÔR DO SOL: 18:40:17 UV MÁXIMO: 3 (Sem Nuvem) | Chuva de curta duração e pode ser acompanhada de trovoadas a qualquer hora do dia. |
| Domíngo - 19.12.2010 Parcialmente Nublado TEMP. MÍNIMA: 15°C TEMP. MÁXIMA: 29°C PROB. DE CHUVA: 5 % NASCER DO SOL: 05:36:45 PÔR DO SOL: 18:40:49 UV MÁXIMO: 3 (Sem Nuvem) | Sol entre poucas nuvens. |

Obs: As horas apresentadas não são corrigidas para o horário de verão. Fonte: INPE/CPTEC Copyright ©CPTEC/INPE 1995-2010. Comentários e/ou sugestões:





Previsão do Clima Espacial

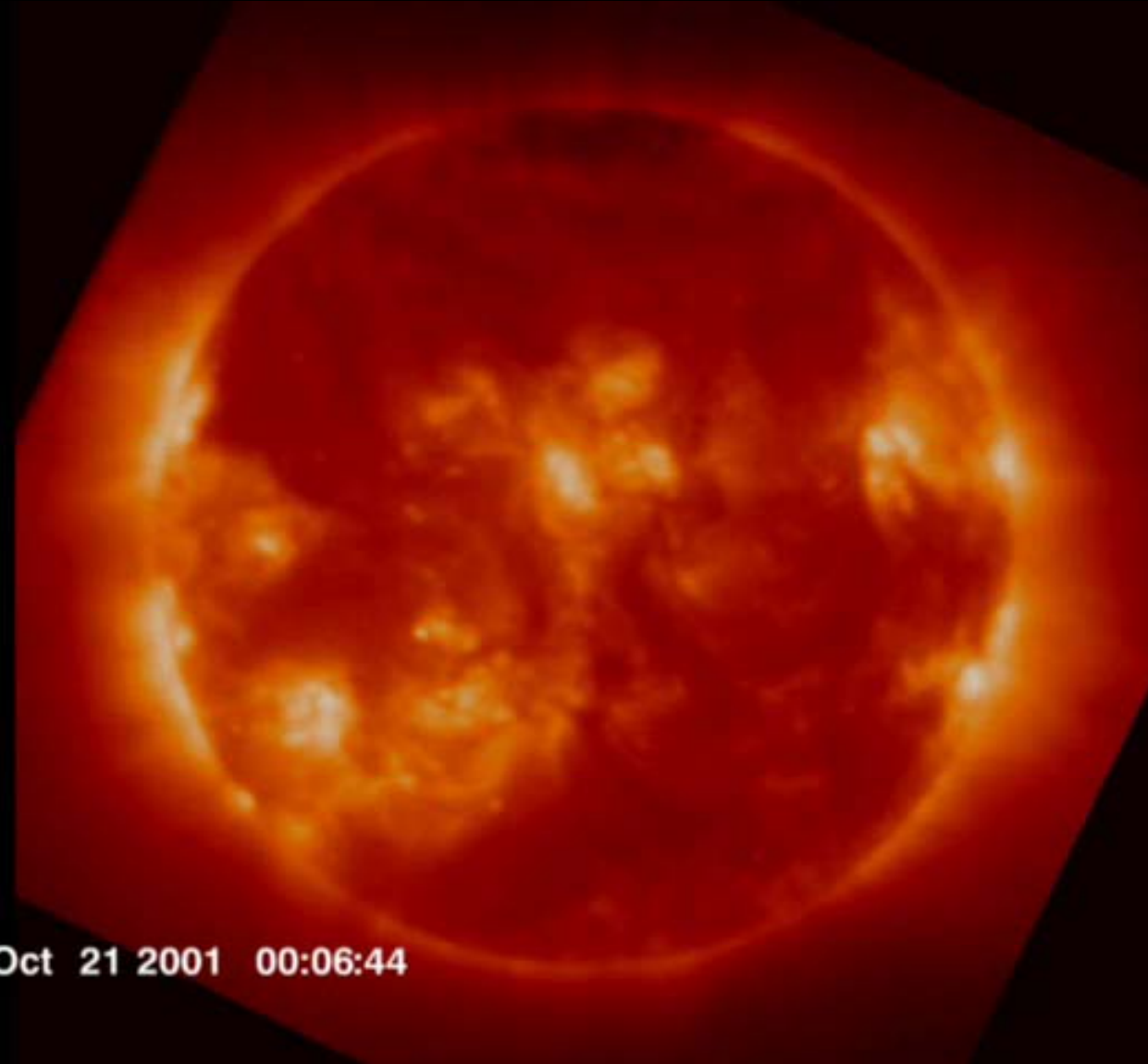




O Sol visto em Raios-X



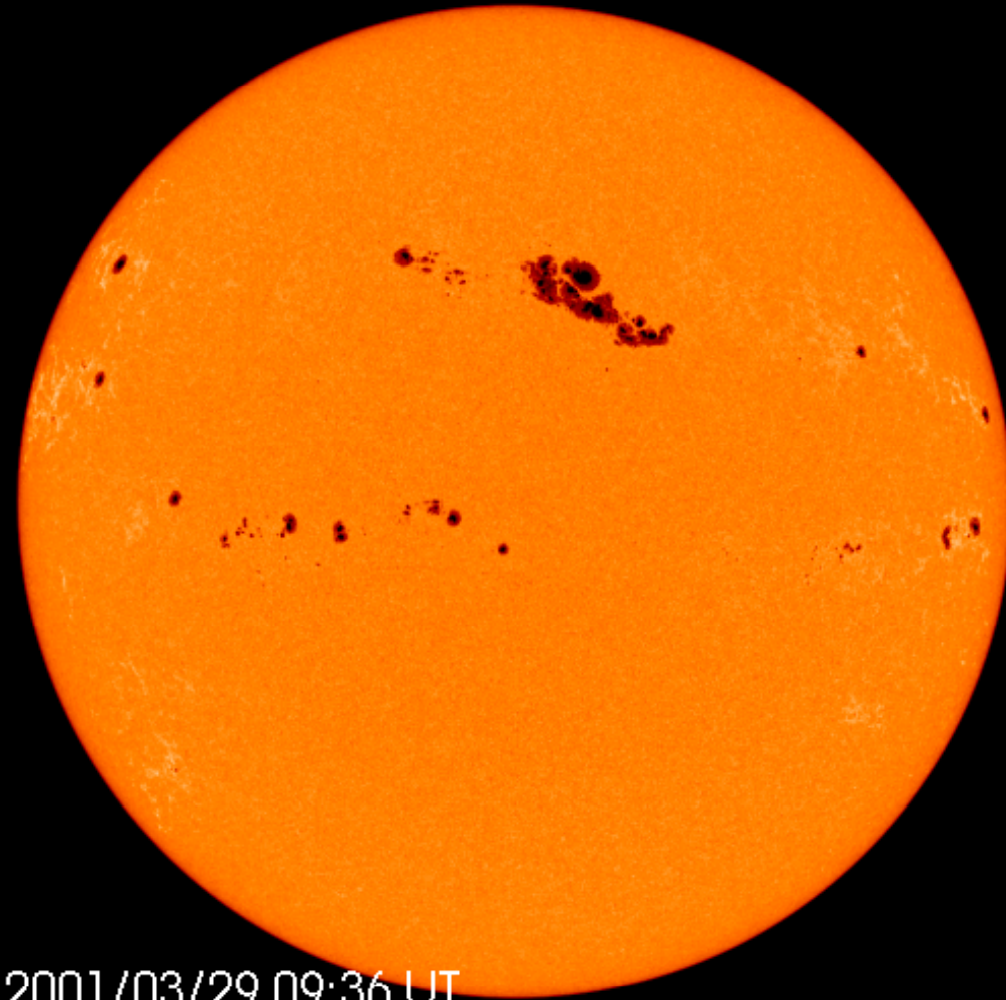
O Solar X-Ray Imager (SXI), GOES-12, em 0.6-6.0 nm



Oct 21 2001 00:06:44



Manchas Solares

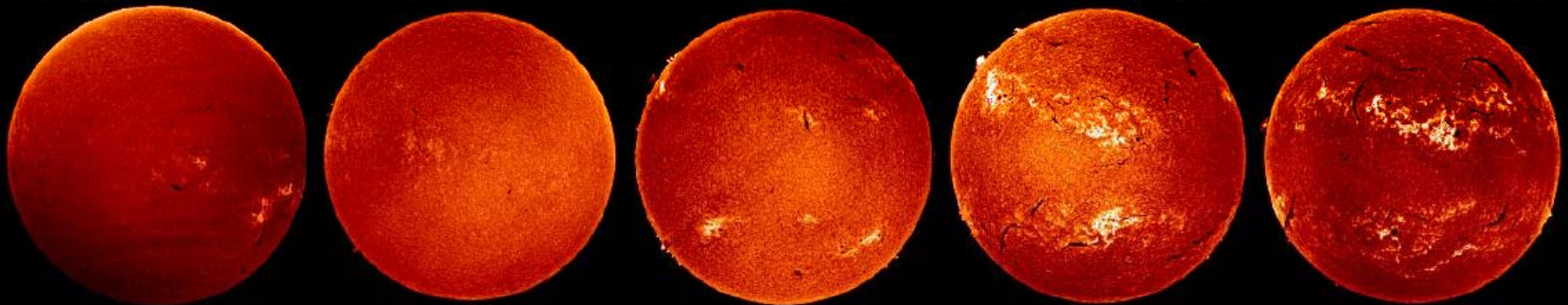
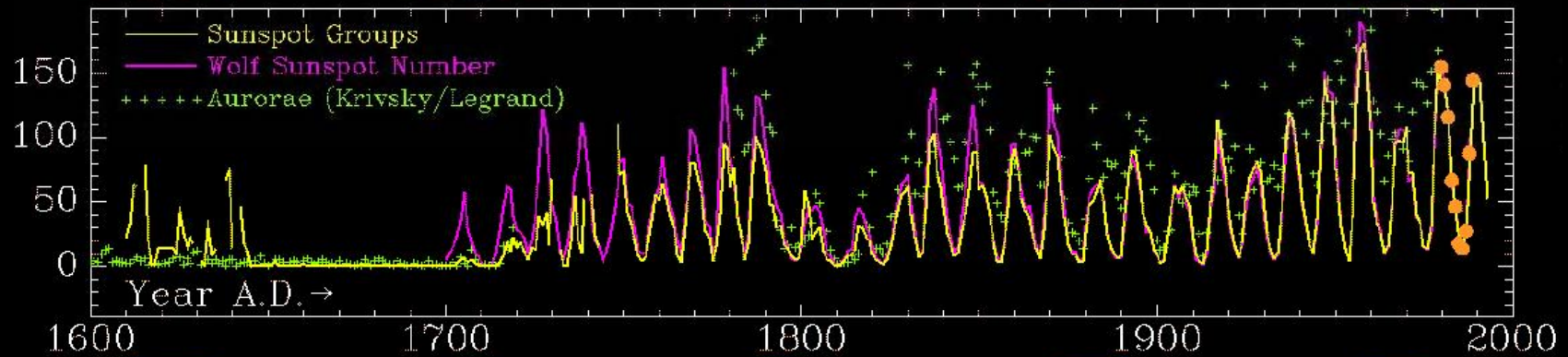


2001/03/29 09:36 UT

NASA - Goddard Space Flight Center Scientific Visualization Studio
<http://svs.gsfc.nasa.gov>



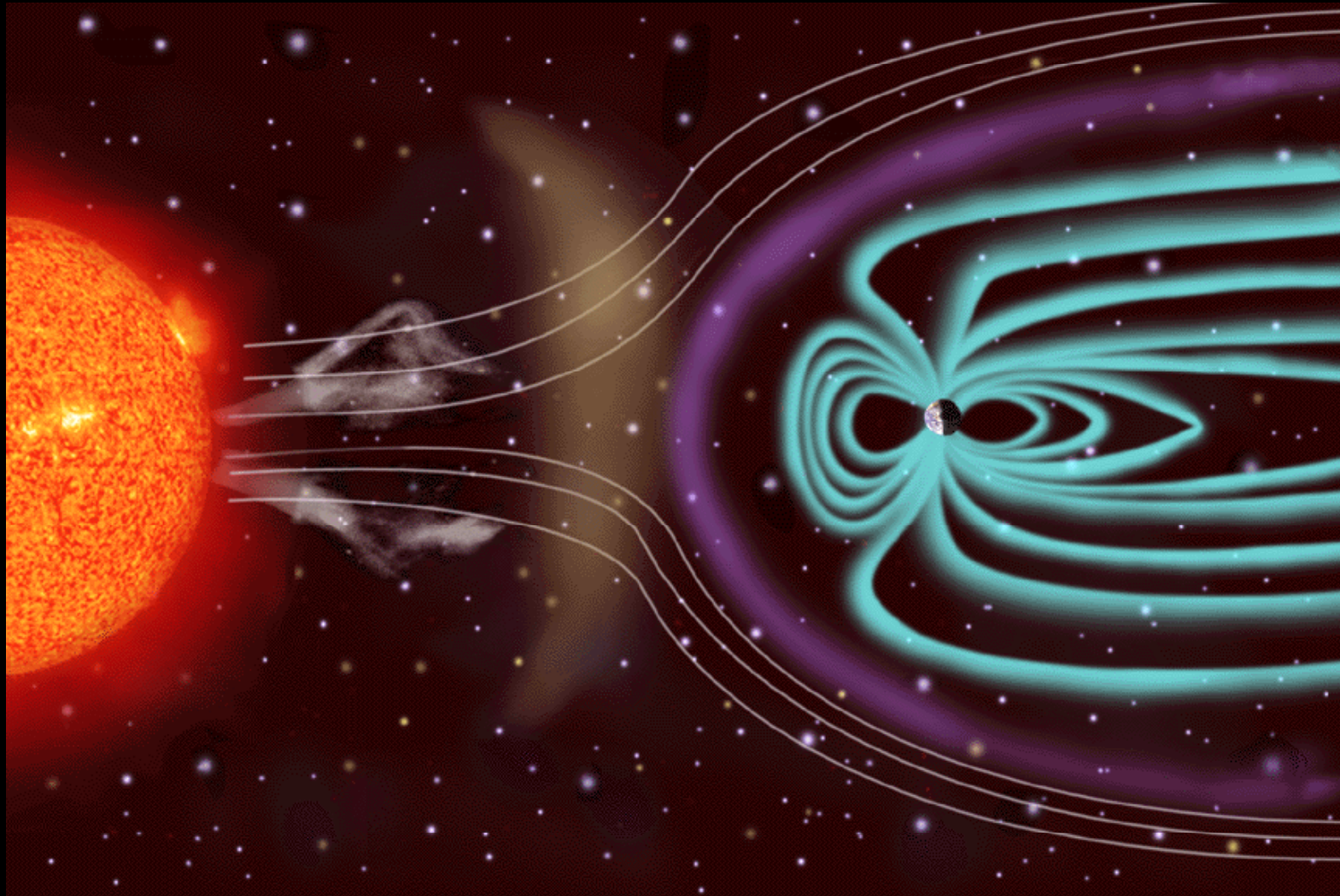
A Atividade Solar



Source: NOAA+Zürich+RDC (D.V. Hoyt)+CNRS/INSU (J.-P. Legrand)+Ondrejov Obs. (K. Krivsky) HAO A-017 ;



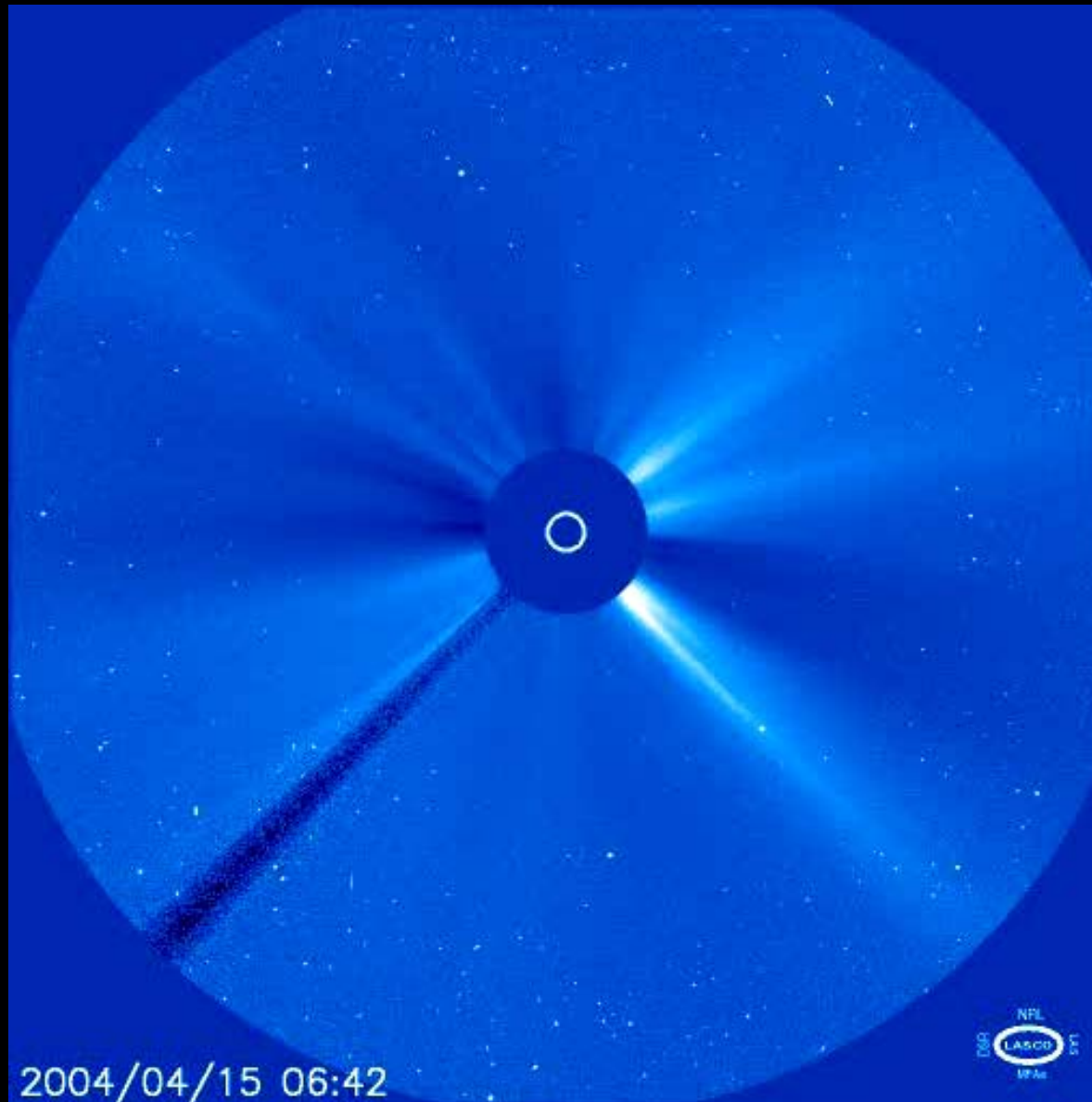
O Vento Solar



<http://solar-center.stanford.edu/images/>



Evidência do Vento Solar



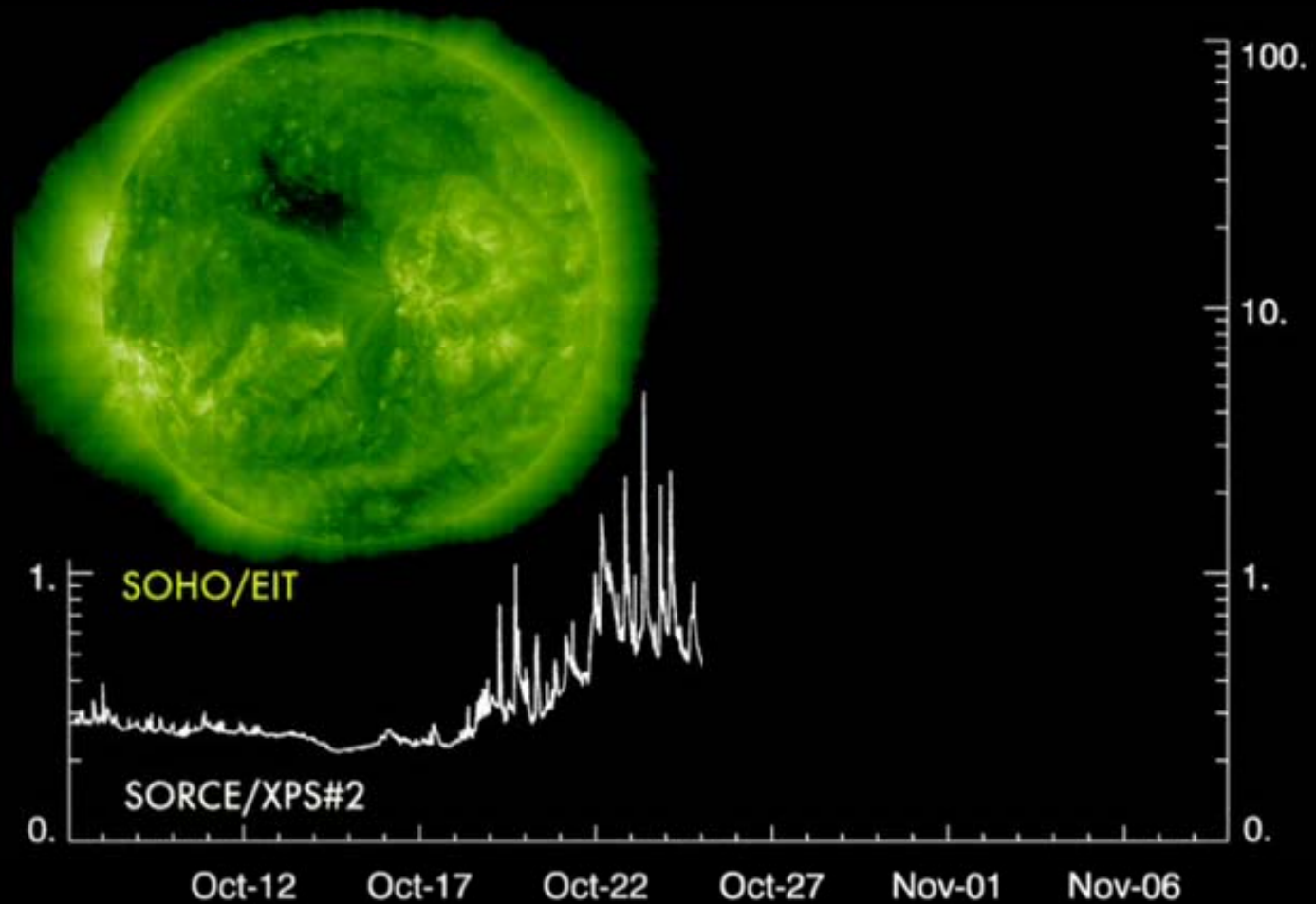
Imagens obtidas
pelo satélite
LASCO, 15-24
Abril 2004.



Explosões Solares



Imagens obtidas
pelo satélite
SOHO/EIT,
out/2003.

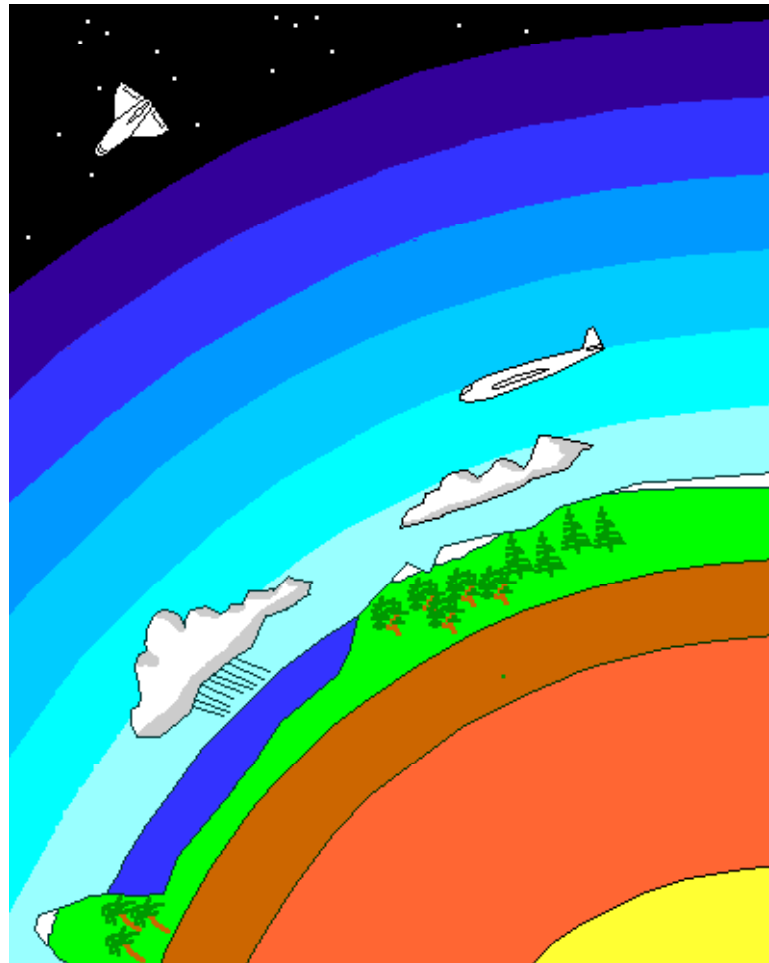


Fotômetro de
Raio-X a bordo
do SORCE,
out/2003.

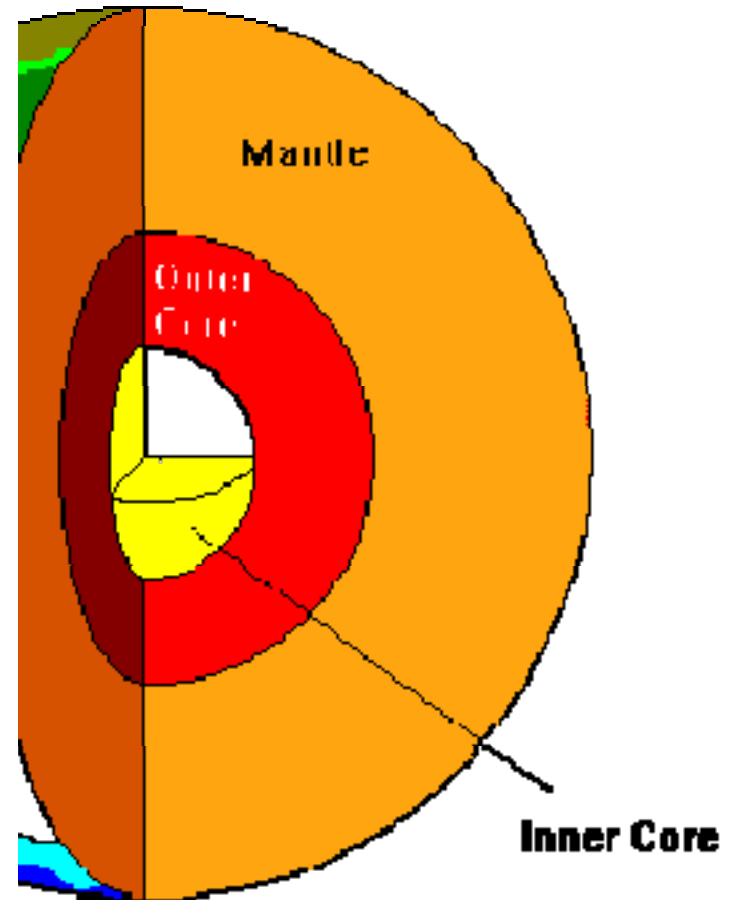
A Terra



A Estrutura da Terra e Suas Camadas

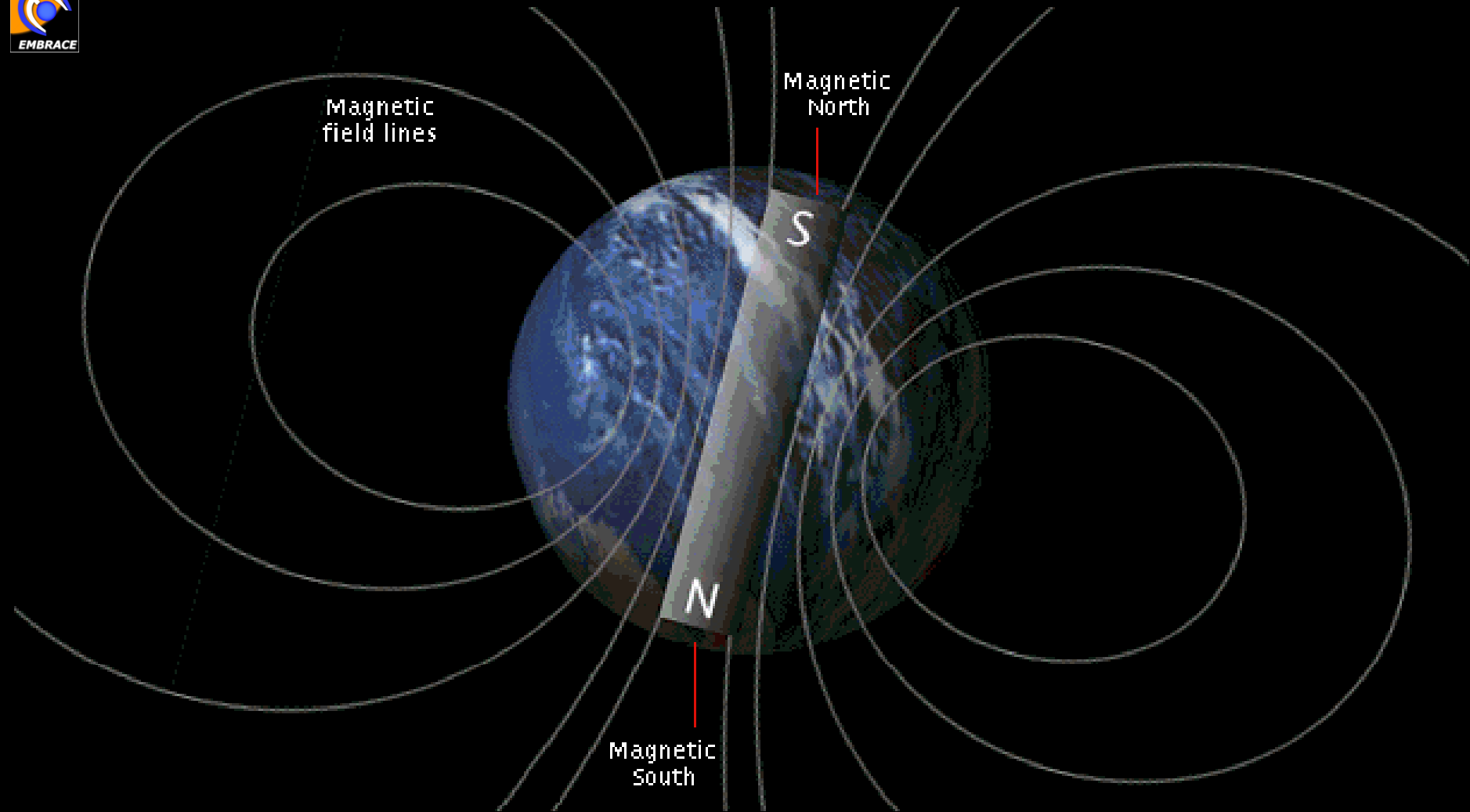


Thermosphere
Ionosphere
Mesosphere
Ozone Layer
Stratosphere
Troposphere
Cryosphere
Hydrosphere
Biosphere
Lithosphere
Mantle
Core



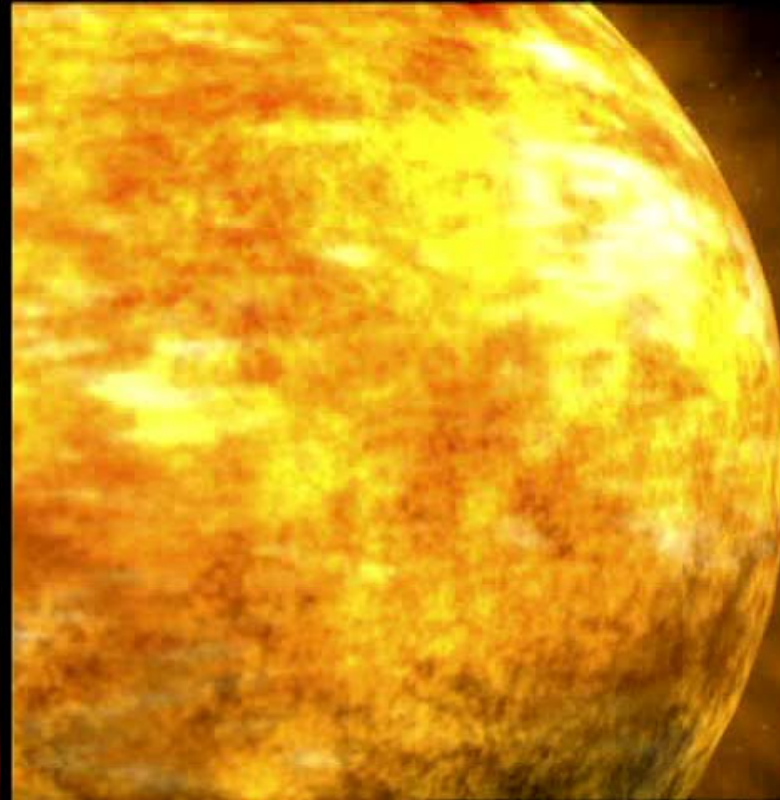


Campo Magnético da Terra





Ejeção de Massa Coronal



NASA - Goddard Space Flight Center Scientific Visualization Studio
<http://svs.gsfc.nasa.gov>



As Auroras

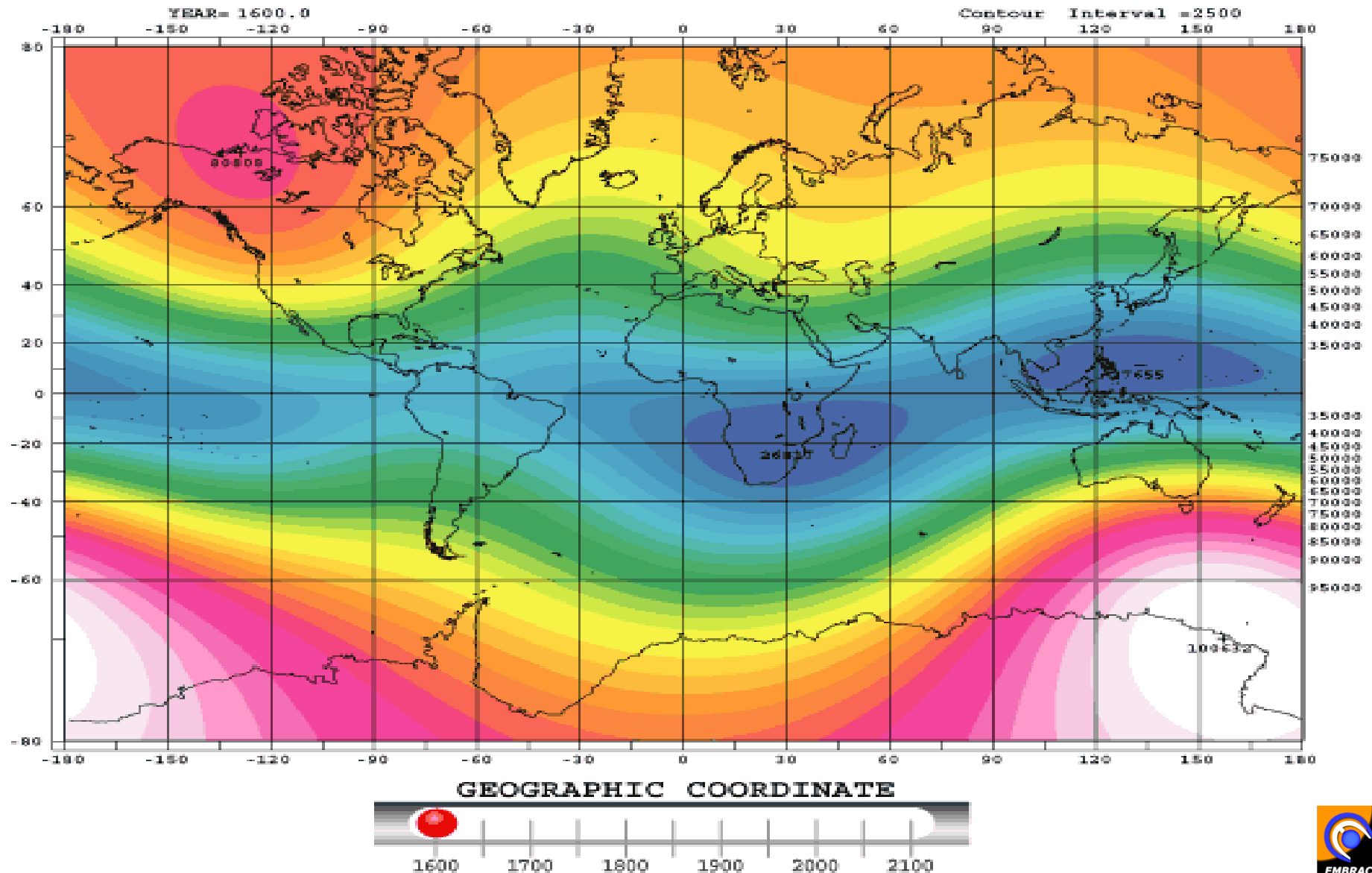


NASA - Goddard Space Flight Center Scientific Visualization Studio
<http://svs.gsfc.nasa.gov>

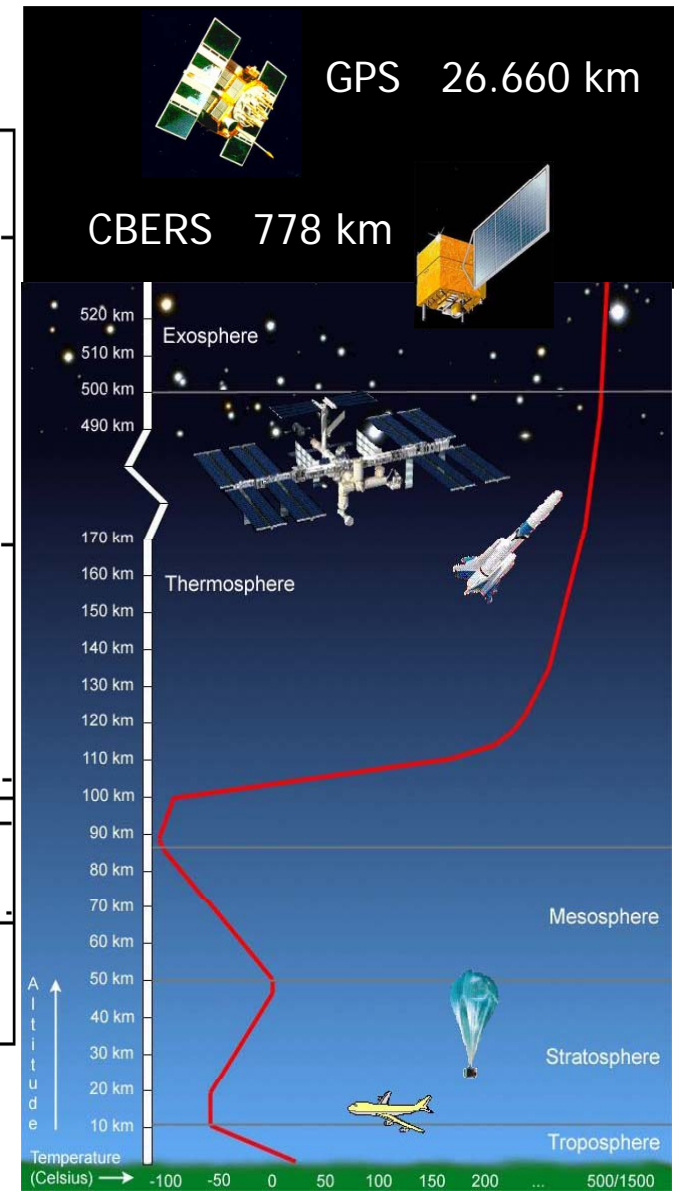
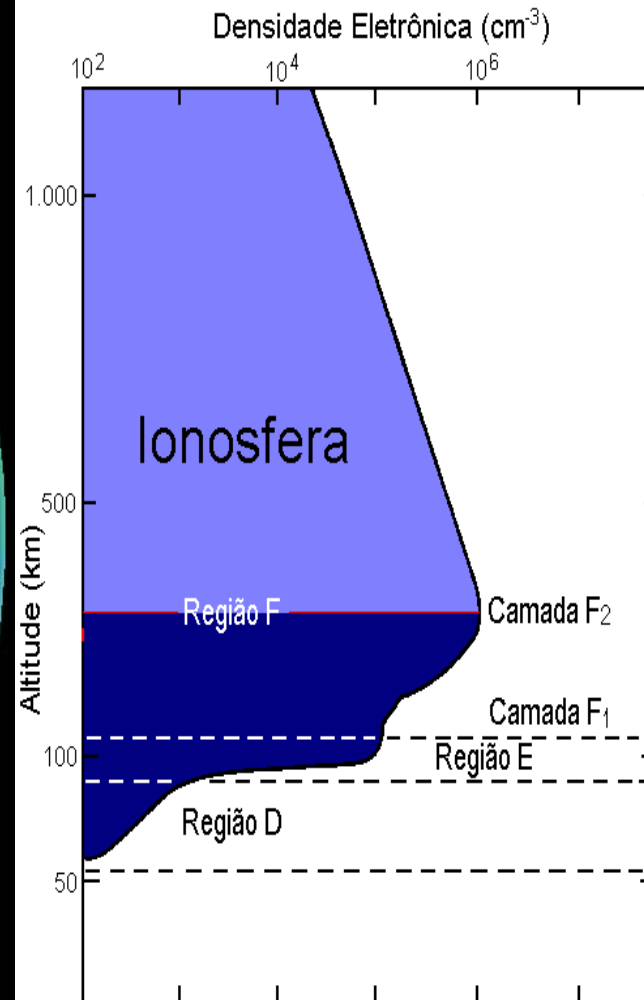
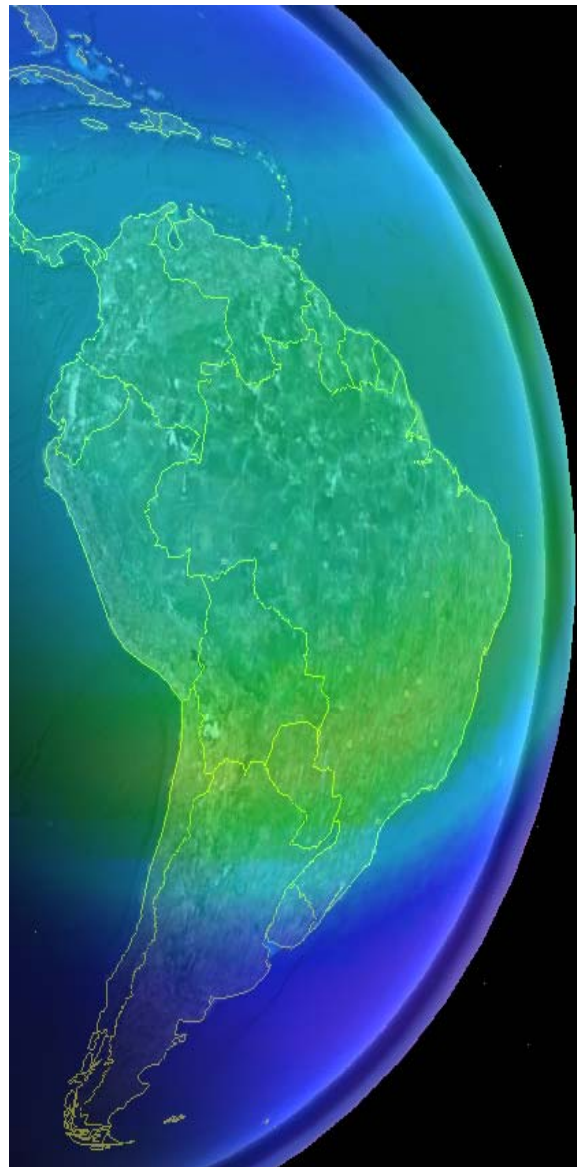
<http://www.windows.ucar.edu/>



A Variabilidade do Campo



A Atmosfera Ionizada

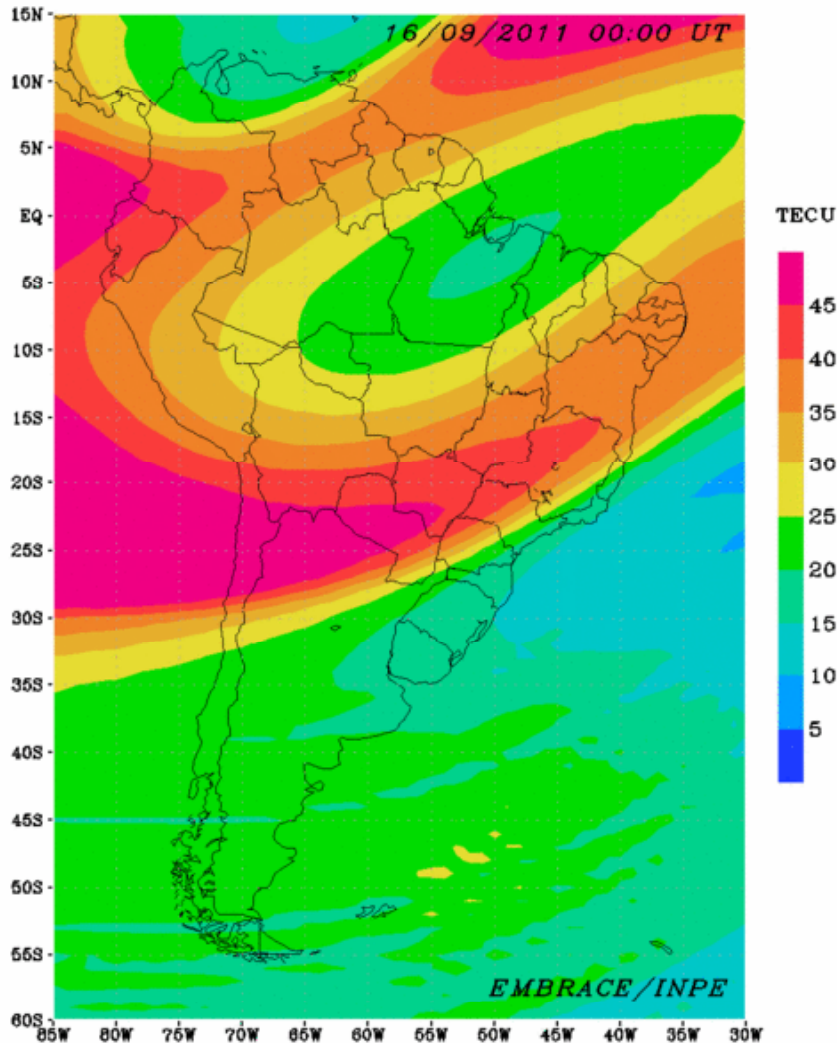




A Ionosfera depende do Sol



Conteúdo Eletrônico Total

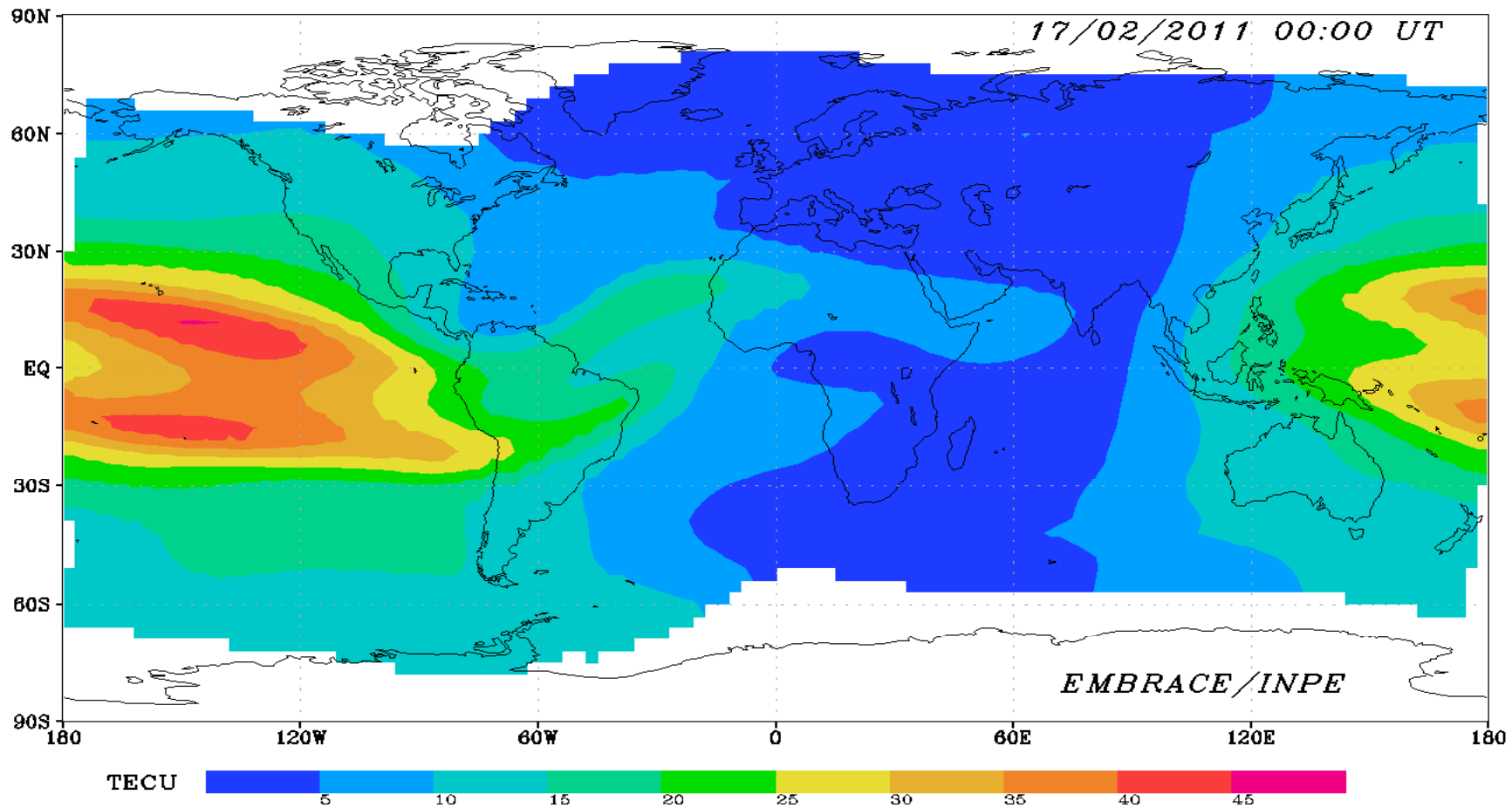


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This simulation were obtained from the SUPIM, a co-development of the Aeronomy Division of the CEA/INPE with the University of Sheffield and with the computational improvements by the Computer Lab for Space Weather at the SSO/INPE and by the Computer Lab for Mathematical and Science at the ETE/INPE.

SUPIM is a physics-based model that describes the distribution of ionization within the Earth's mid to equatorial-latitude ionosphere and plasmasphere. In the model, time-dependent equations of continuity, momentum, and energy balance for the O^+ , H^+ , He^+ , N_2^+ , O_2^+ and NO^+ ions, and the electrons, are solved along closed magnetic field lines for the ion and electron concentrations, field-aligned velocities, and temperatures. The magnetic field is taken to be an eccentric-dipole representation of the Earth's magnetic field, the offset between the magnetic and geographic poles being determined from the usual spherical harmonic expansion of the geomagnetic scalar potential used in the International Geomagnetic Reference Field (IGRF). Particularly cases of the eccentric dipole are the tilted-centered dipole and the axial-centered dipole.

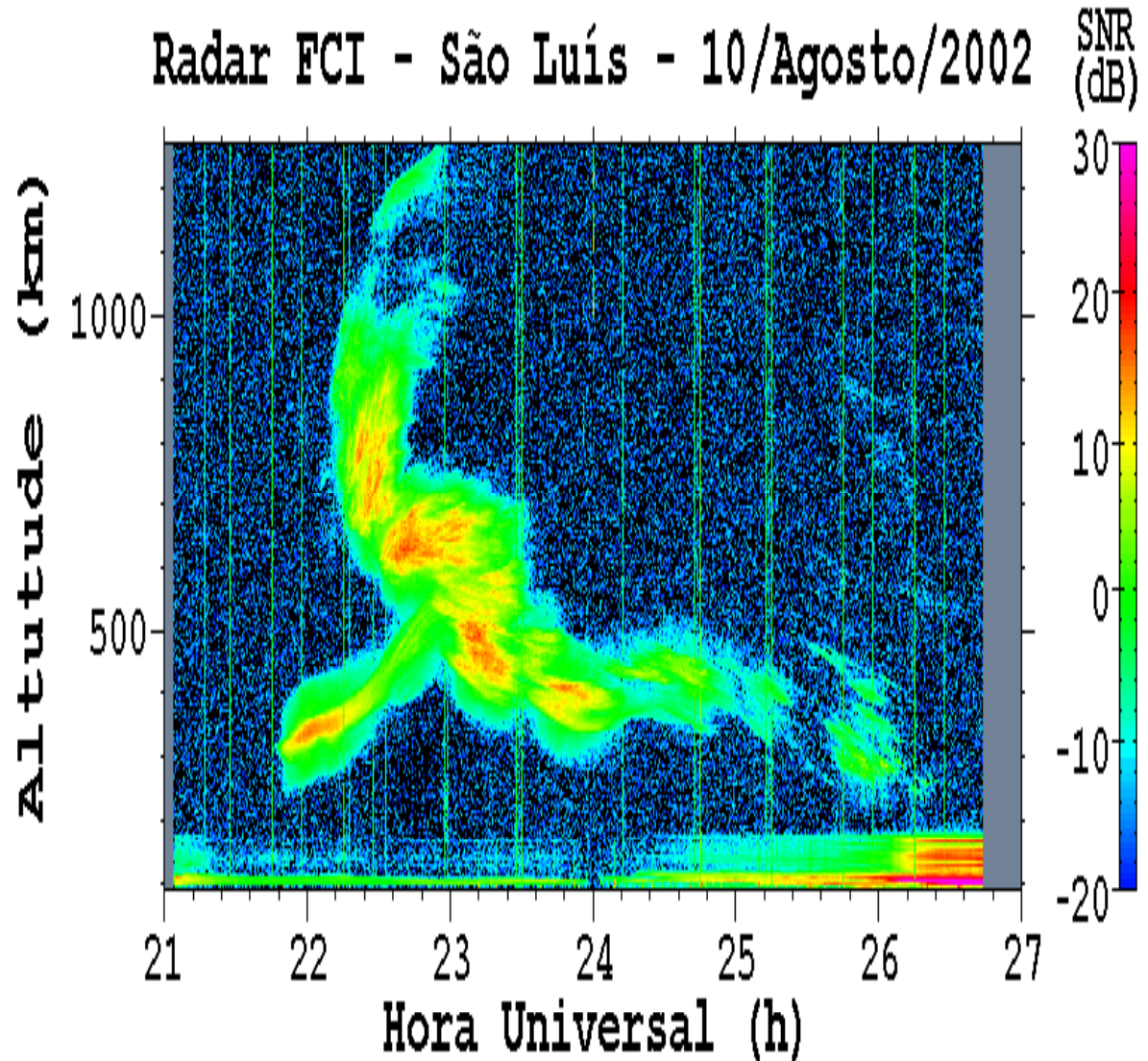
CONTEÚDO ELECTRÔNICO TOTAL



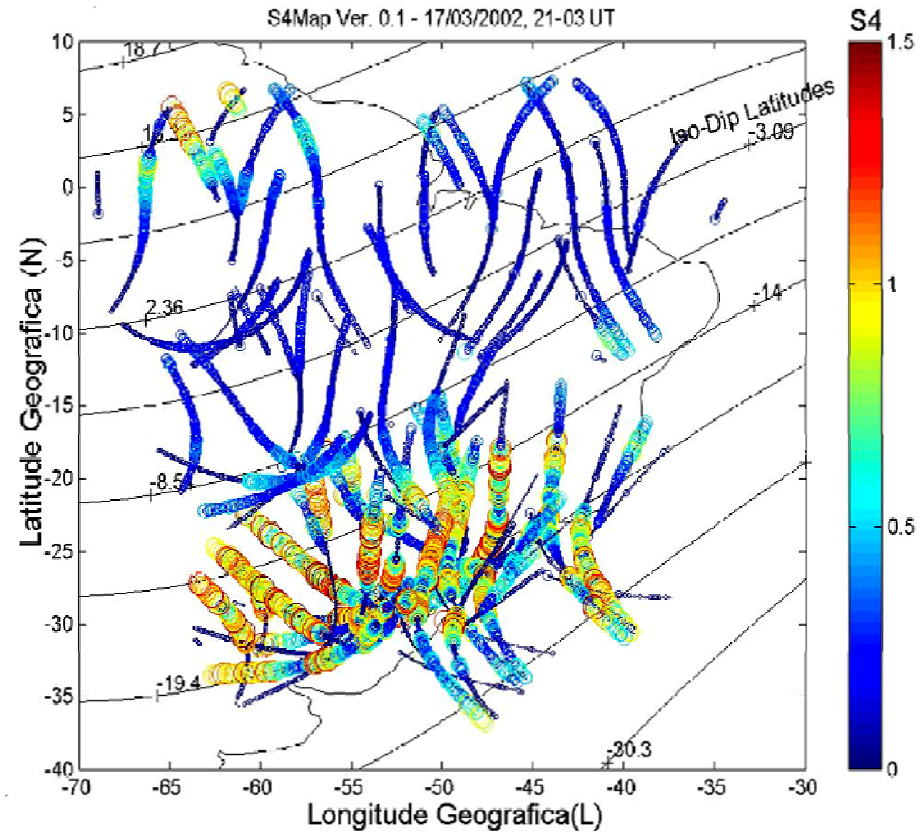
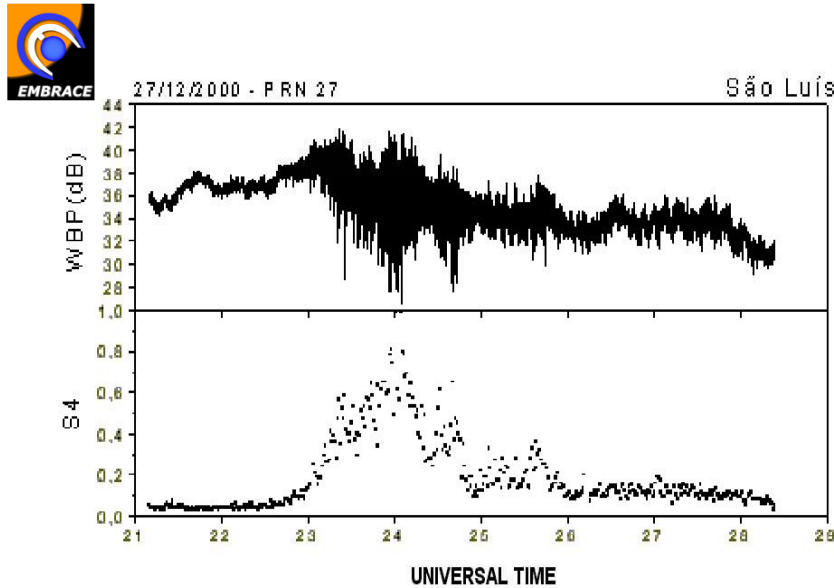
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Radar FCI - São Luís - 10/Agosto/2002



O que as Bolhas Causam ?



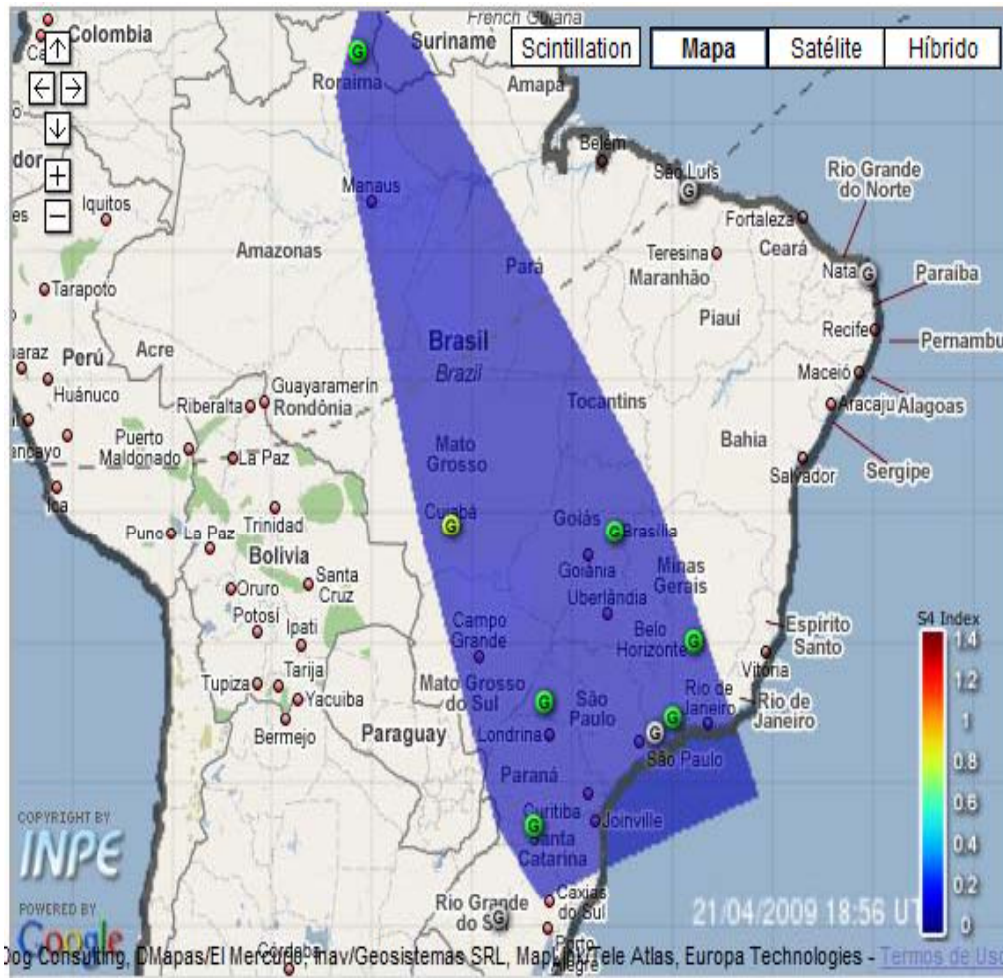
Conteúdo Eletrônico Total (TEC)

$$\Delta(\delta t) = \frac{40,3 \times TEC}{c} \left(\frac{f_{L1}^2 - f_{L2}^2}{f_{L1}^2 f_{L2}^2} \right)$$

$$f_{L1} = 1.2 \text{ GHz} \quad f_{L2} = 1.6 \text{ GHz}$$

Cintilação Ionosférica

$$S_4^2 = \frac{\langle I^2 \rangle - \langle I \rangle^2}{\langle I \rangle^2}$$



Network Status: 64% | Scintillation Map: On

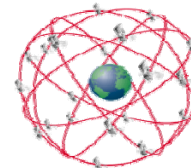
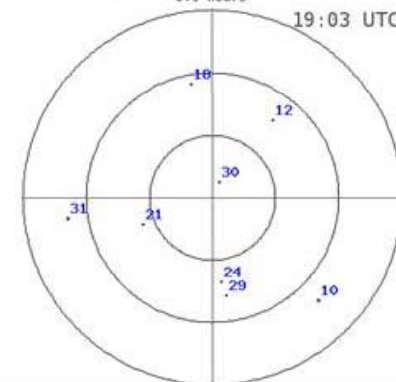
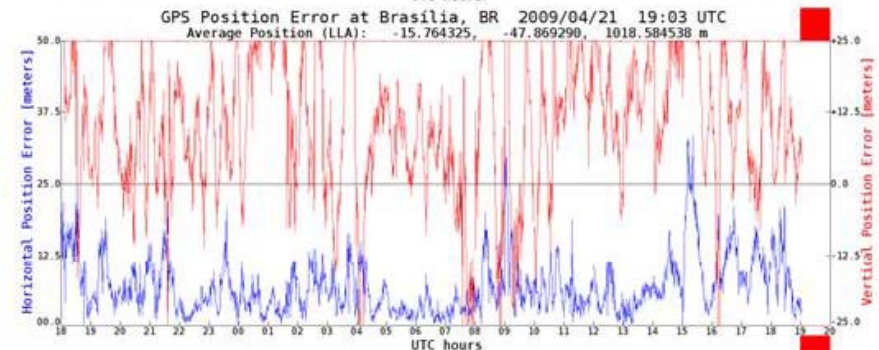
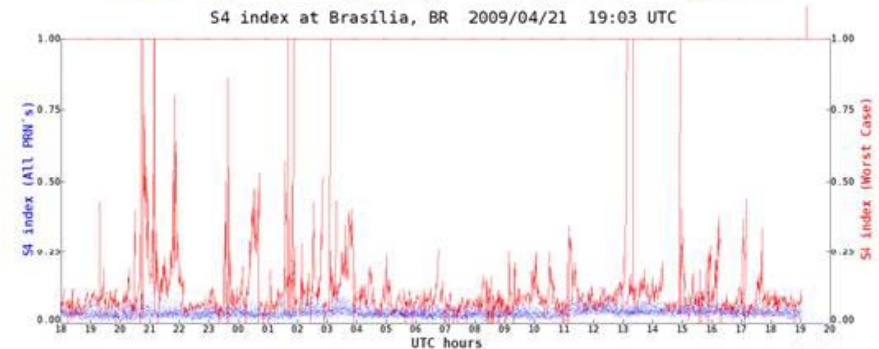
Larger scintillation: 0.13 in the satellite 10 from Presidente Prudente, BR.

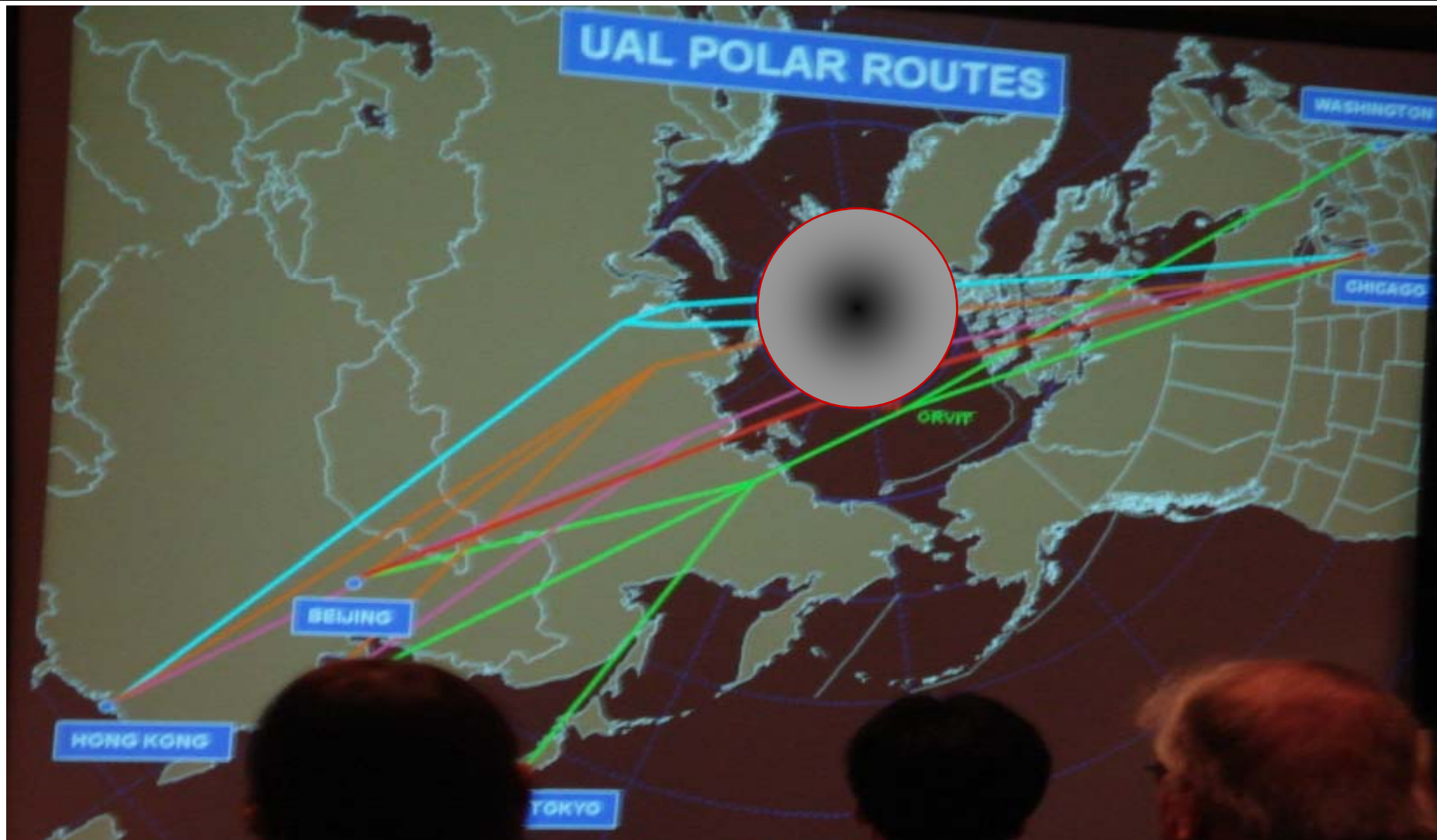
Put the mouse over the stations to get more informations or click to get scintillation plots, errors, azimuth and elevation angle.

| CAPTION | |
|---------|---------|
| | > 3min |
| | > 6min |
| | Offline |
| | > 1min |

Real Time Ionospheric Scintillation - BRASIL

Current GPS S4 Data Display - Brasília, DF - Station A





Mike Stills (United Airlines), "Polar Aviation Operation and Space Weather",
Space Weather Workshop 2009 held in Boulder, April 28, 2009



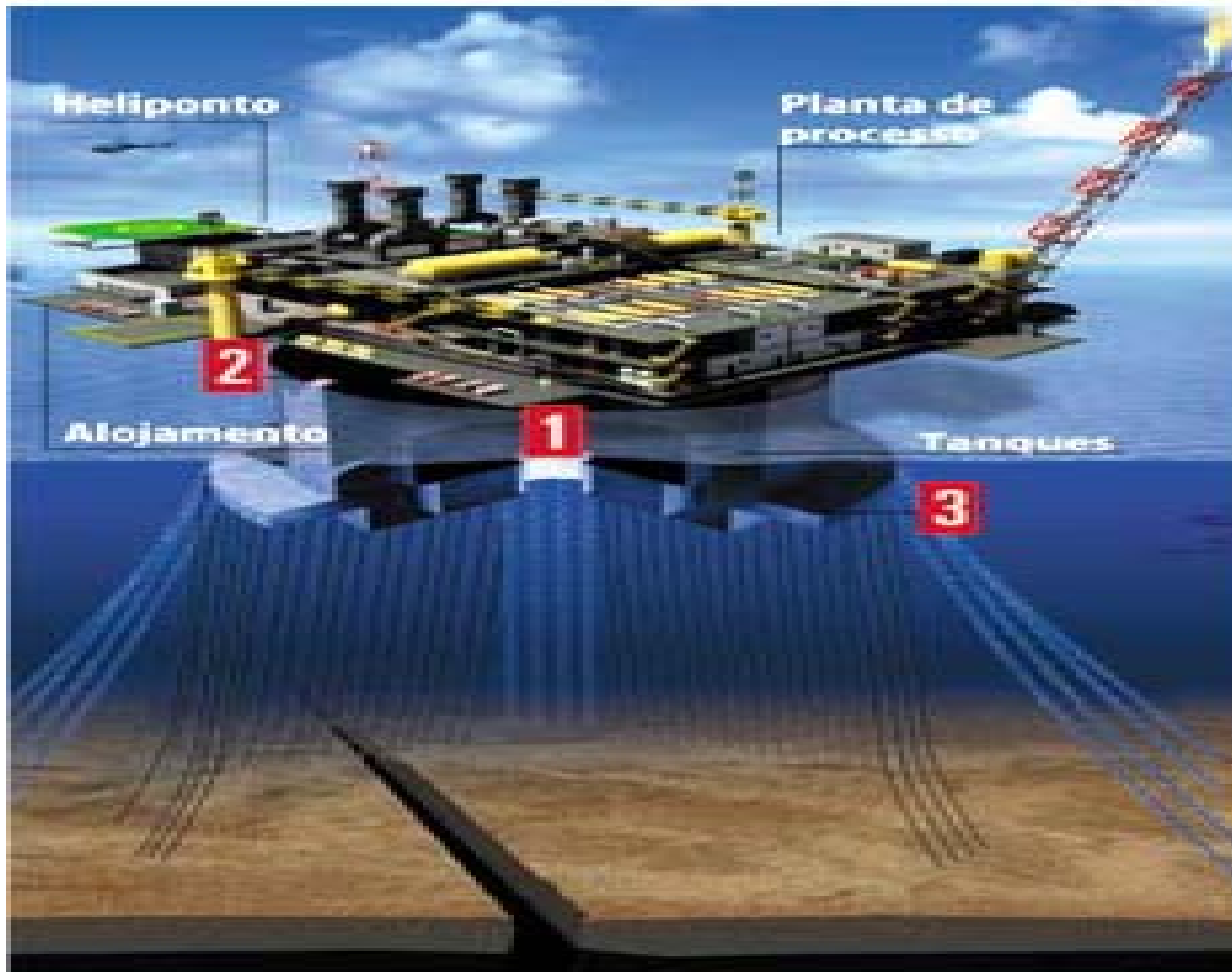
Atividade Agrícola



REVISTA VEJA, "A civilização do campo", Edição 1873 de 29 de setembro de 2004.



Atividade Petrolífera





Sistemas de Energia

Itaipu Hydroelectric Power Plant and Gas/Oil Pipelines



GIC Monitoring is Important for
Maintenance / Lifetime of Equipment

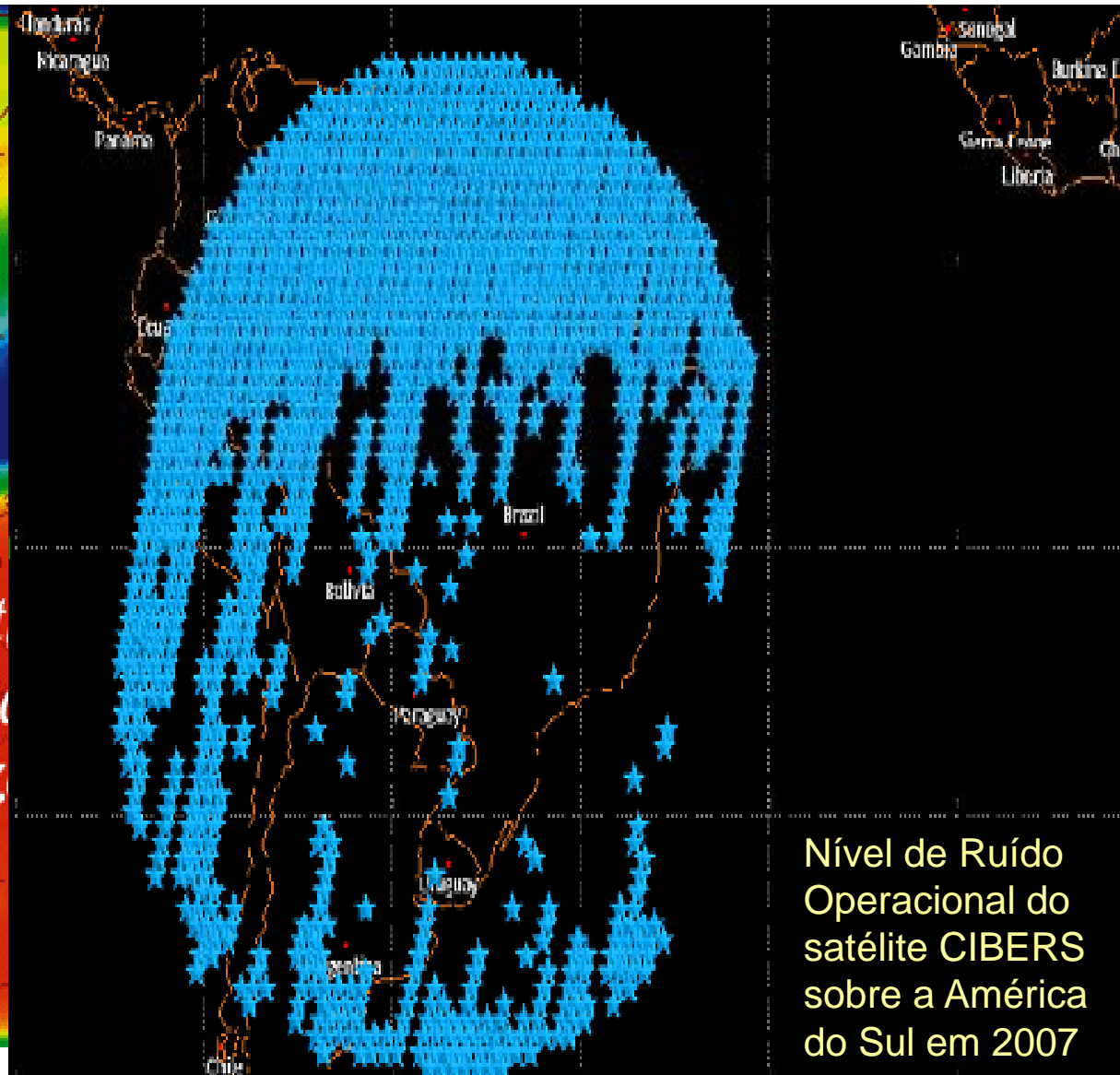
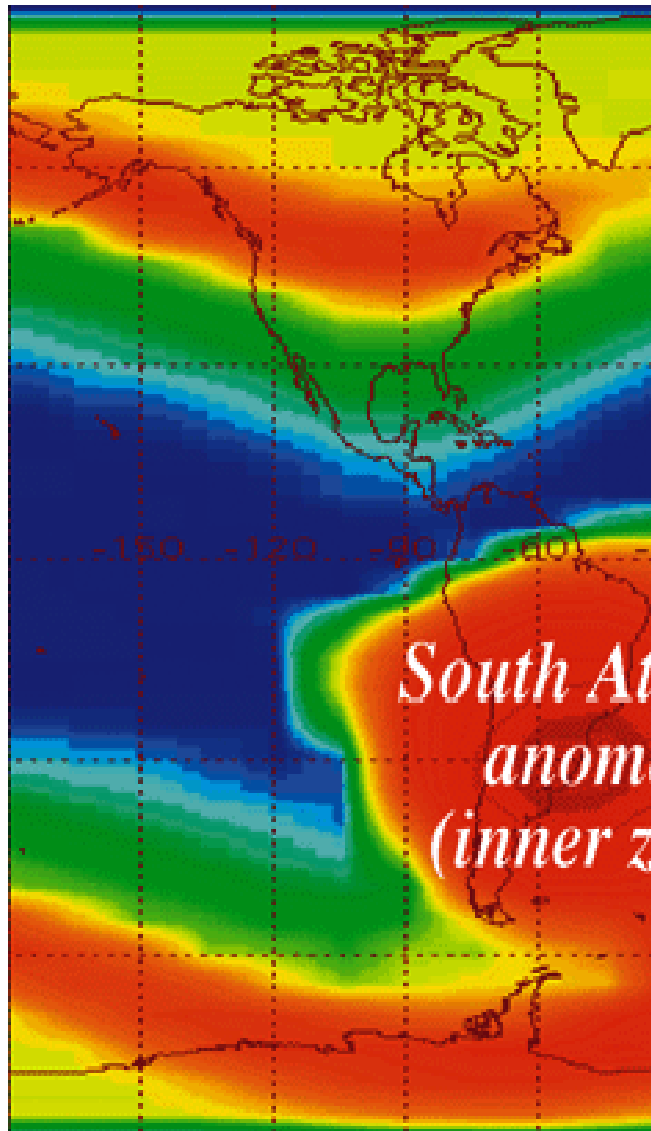
Super high voltage power lines and
Gas and Oil Pipelines





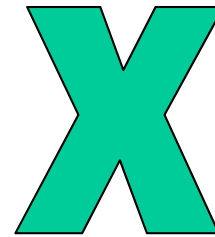
Space environment
information is
important for
satellite operation,
rocket launches
and space
assurances.



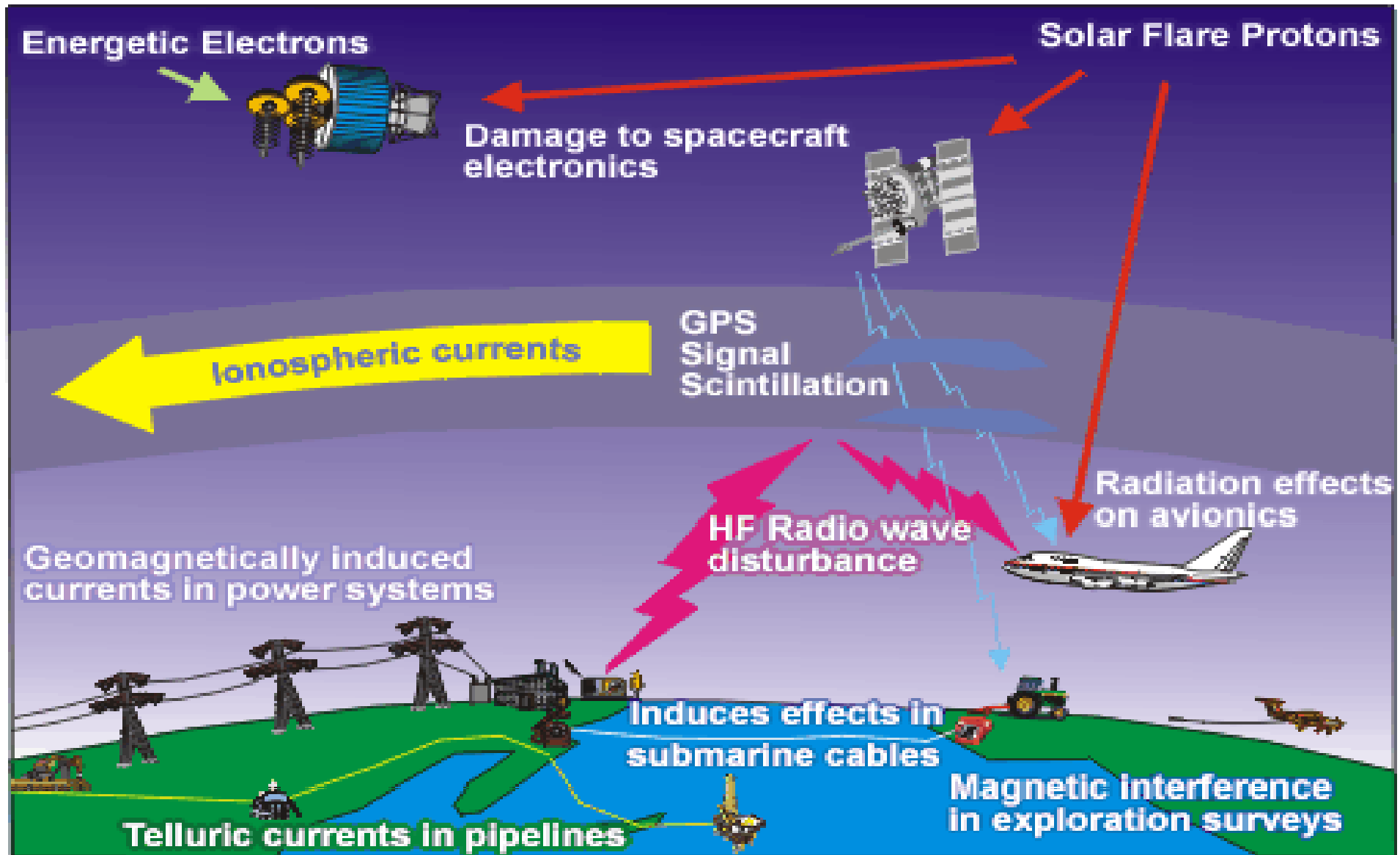




Em que isso me afeta ?



129.500 ruas !





Programa EMBRACE



PROGRAMA DE

ESTUDO E

MONITORAMENTO

BRASILEIRO DO

CLIMA

ESPACIAL

www.inpe.br/climaespacial