

Taille de la Terre → 

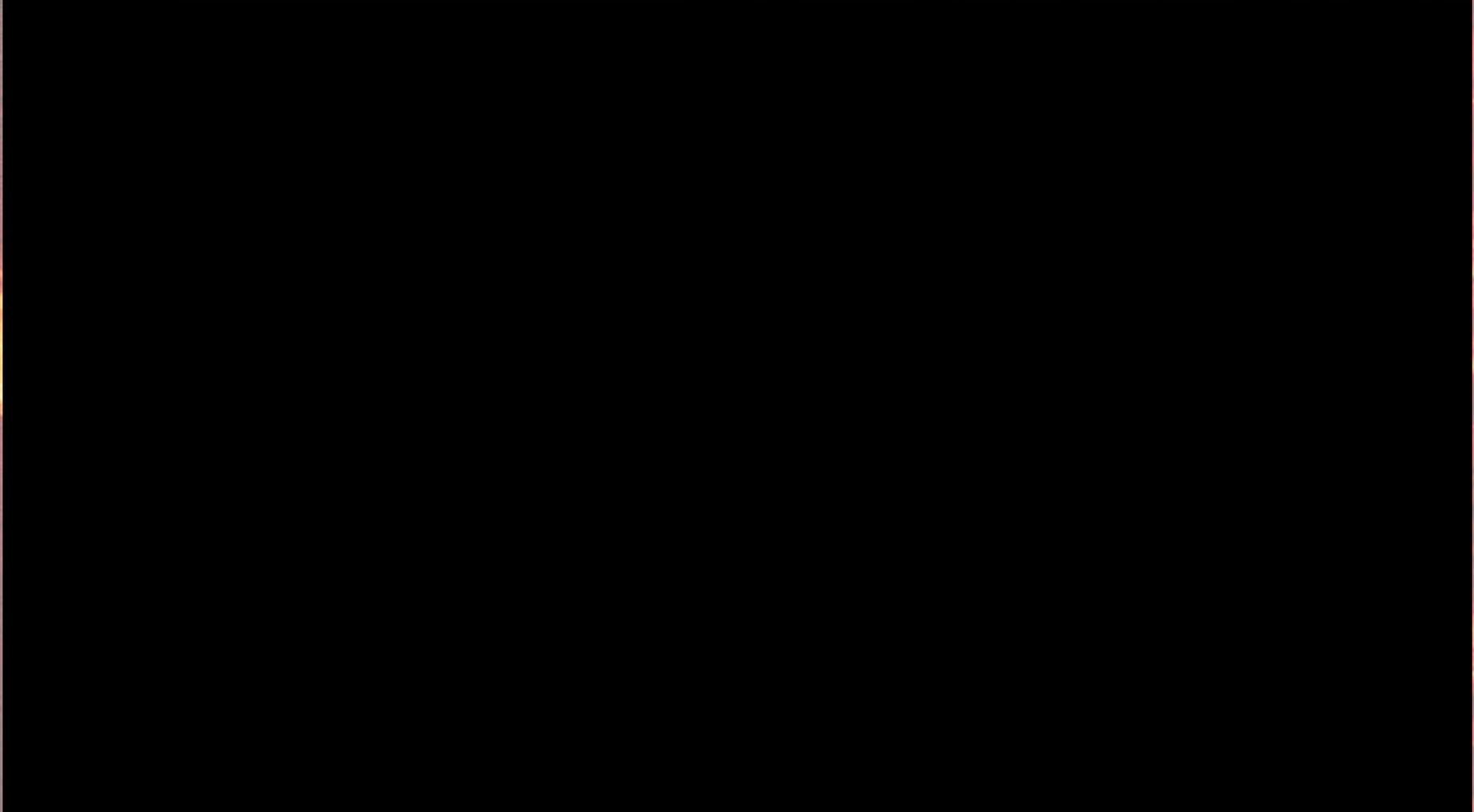


**LE SOLEIL
VU COMME
JAMAIS !**

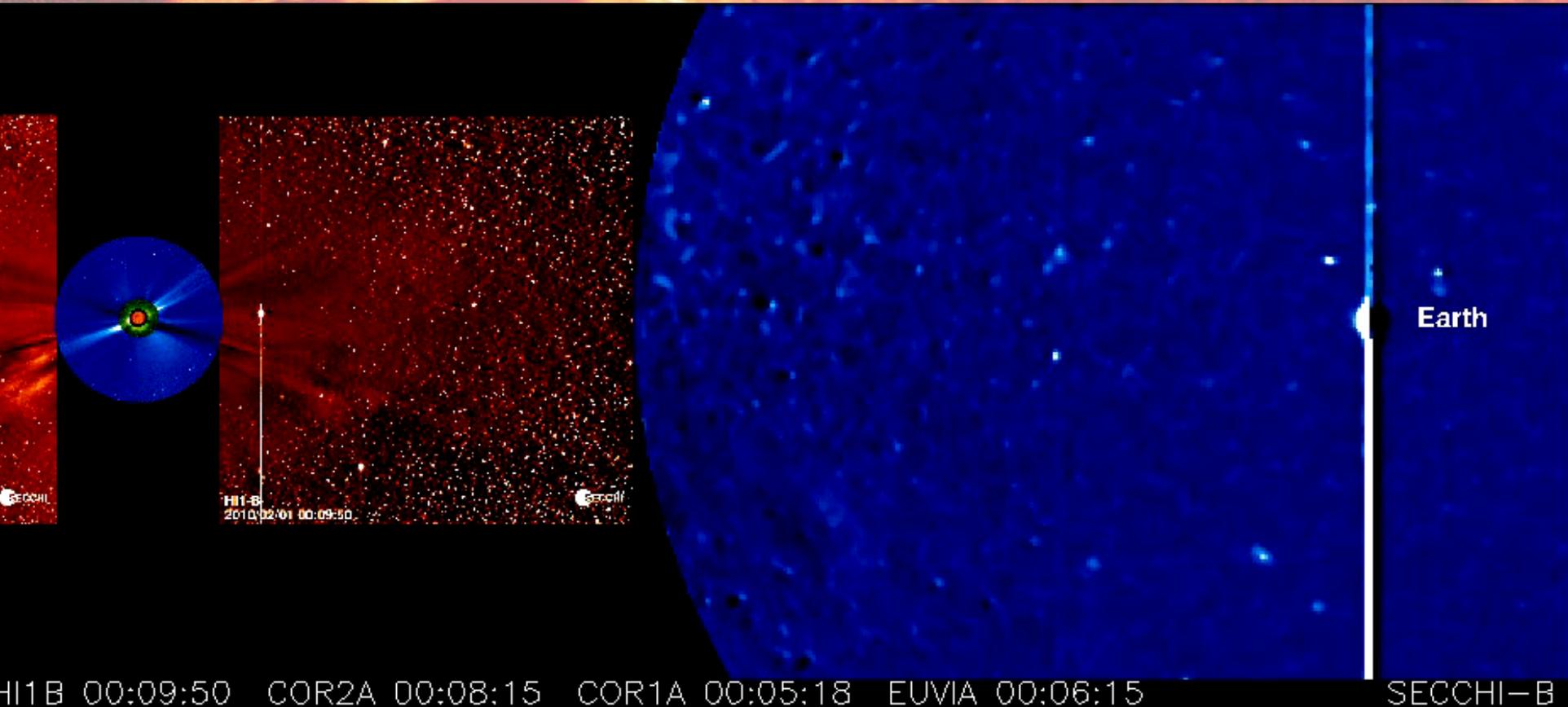
Etienne PARIAT

Une éruption solaire vue par le **Solar Dynamic observatory (SDO)**

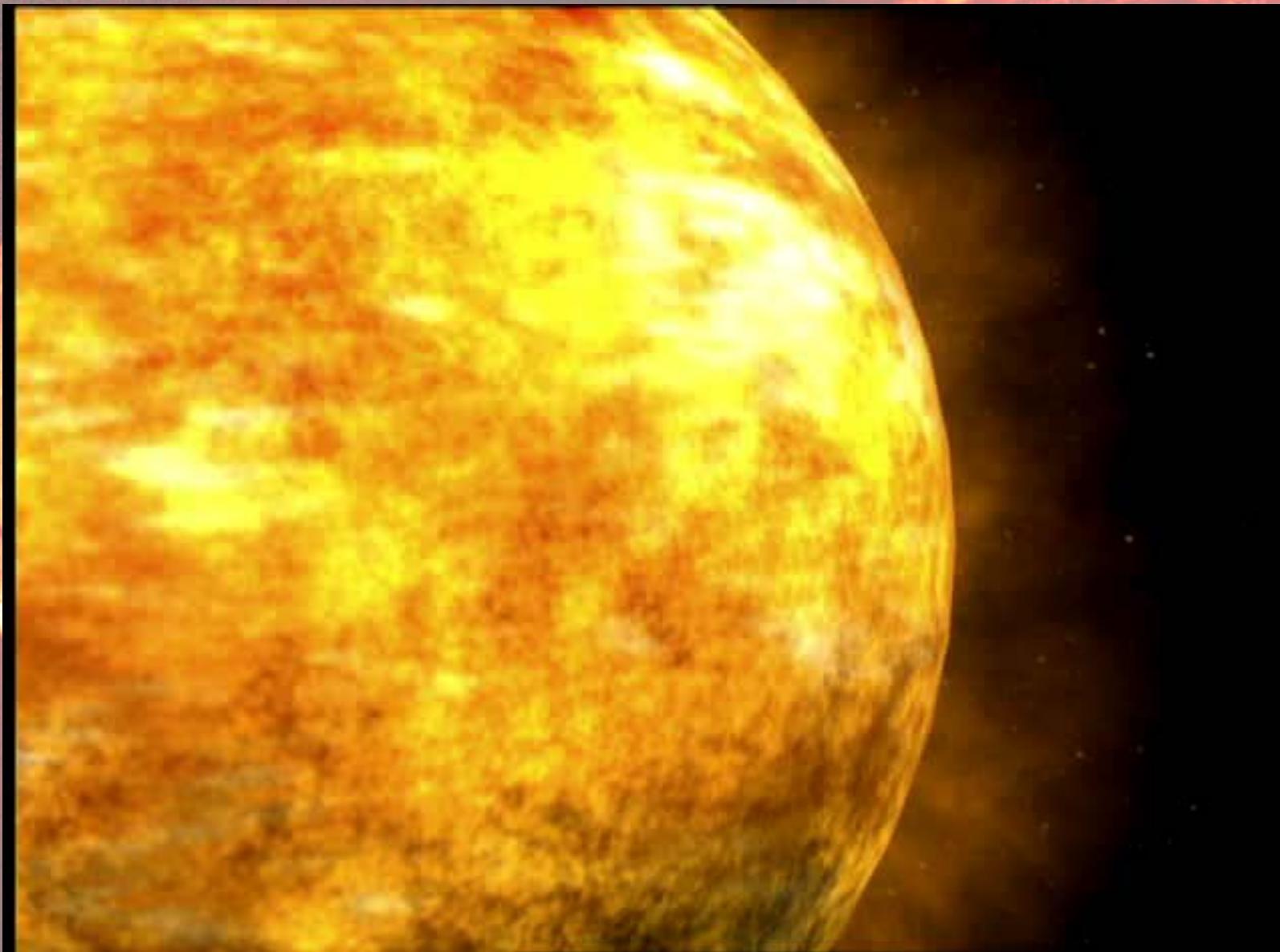
Taille de la Terre → 



La propagation des Ejections de Masse Coronales dans le système solaire observée par **STEREO**



Crédits: NASA



Crédits: NASA SVS

20 Juin 2010 – Fête du Soleil – Observatoire de Meudon

Les conséquences

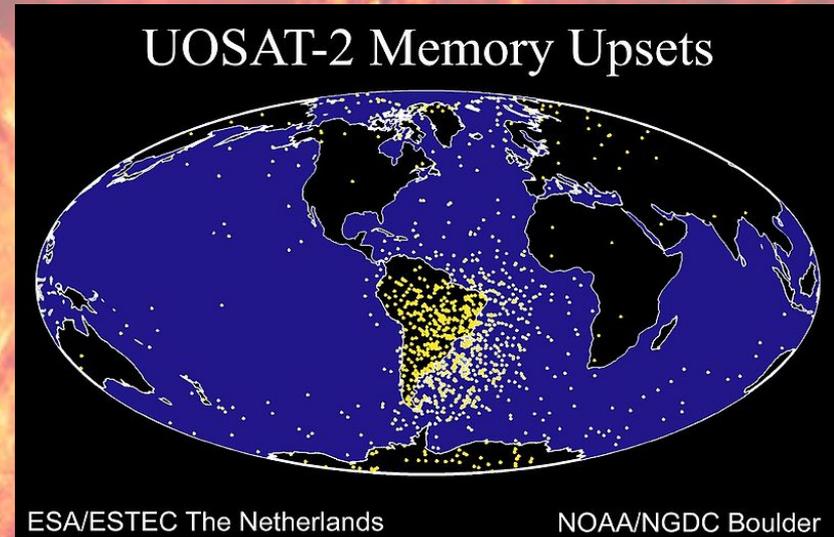


20 Juin 2010 – Fête du Soleil – Observatoire de Meudon

Crédits: NASA

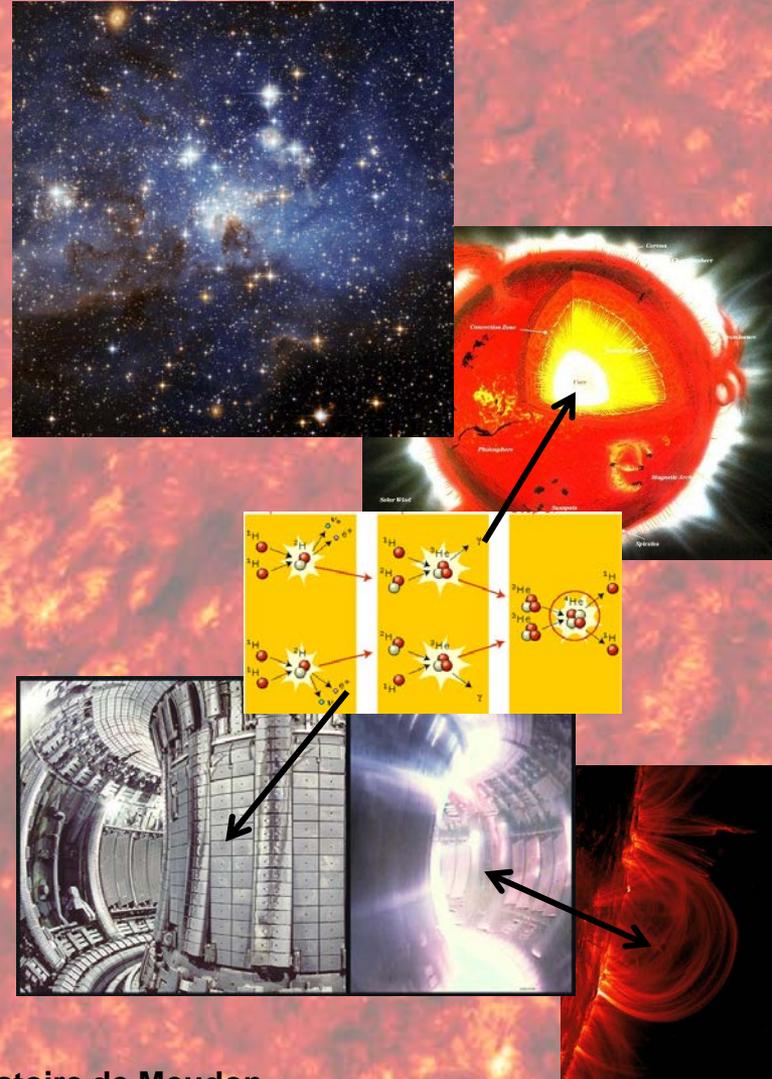
Les conséquences

- Dommages sur les satellites artificiels
- Coupure globale de courant électrique
- Perturbations des communications radio, du GPS
- Risque létal pour les astronautes

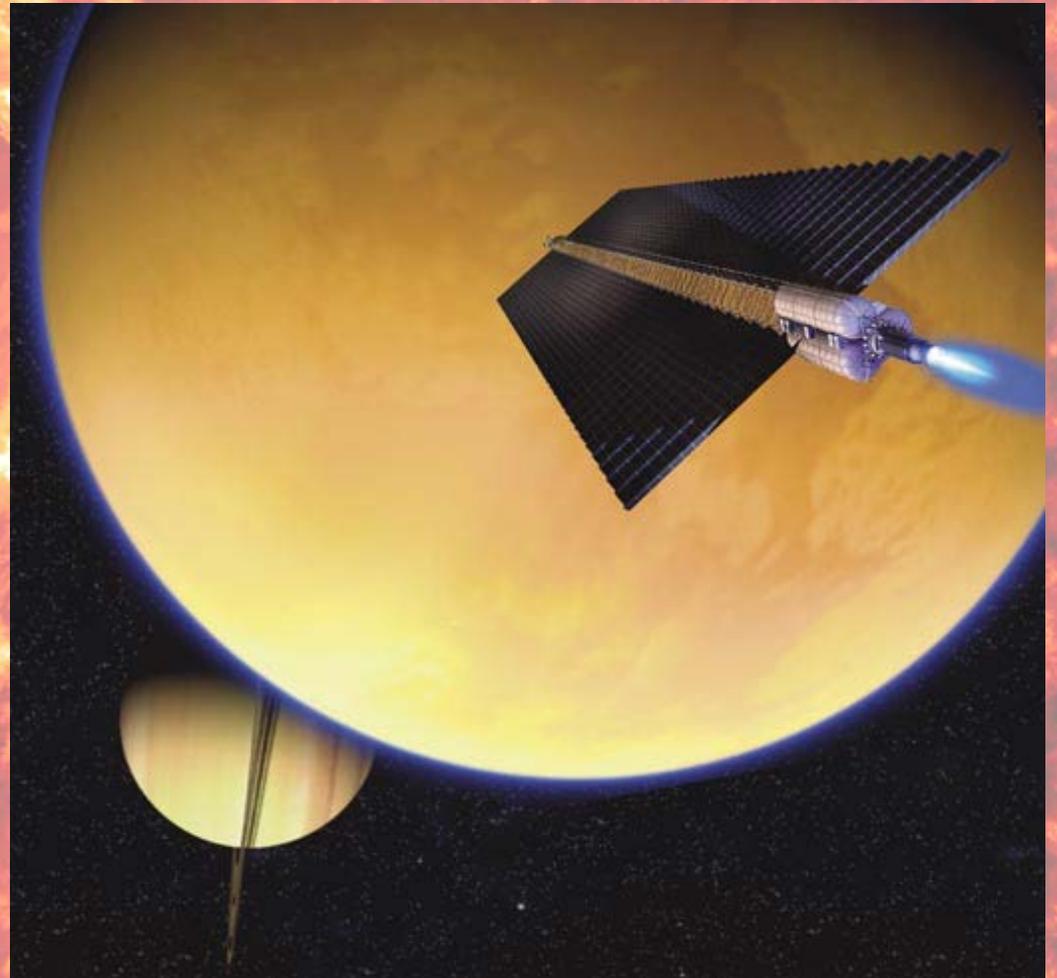
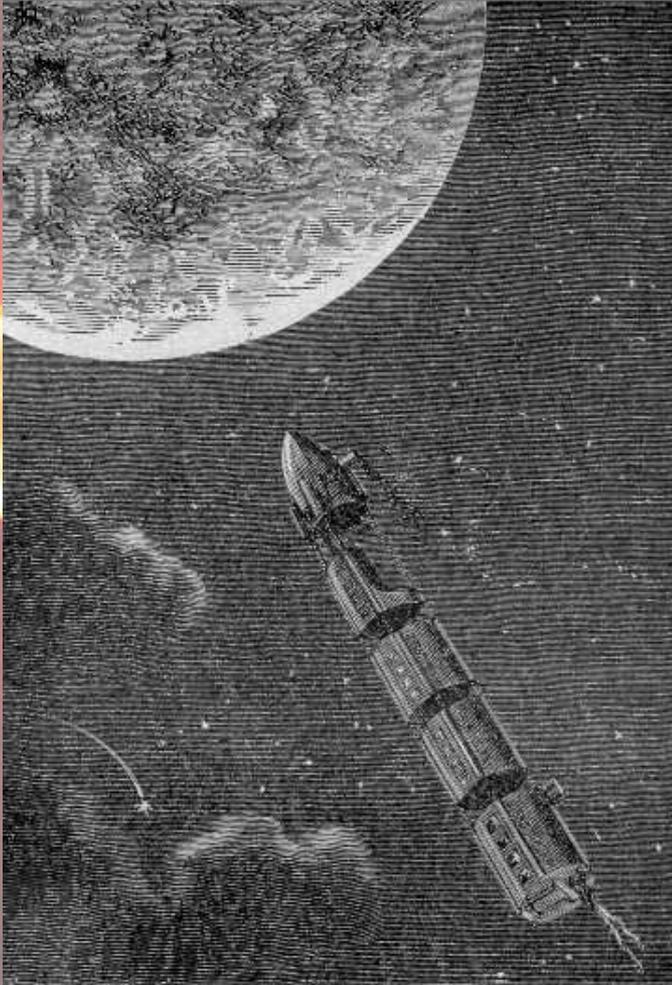


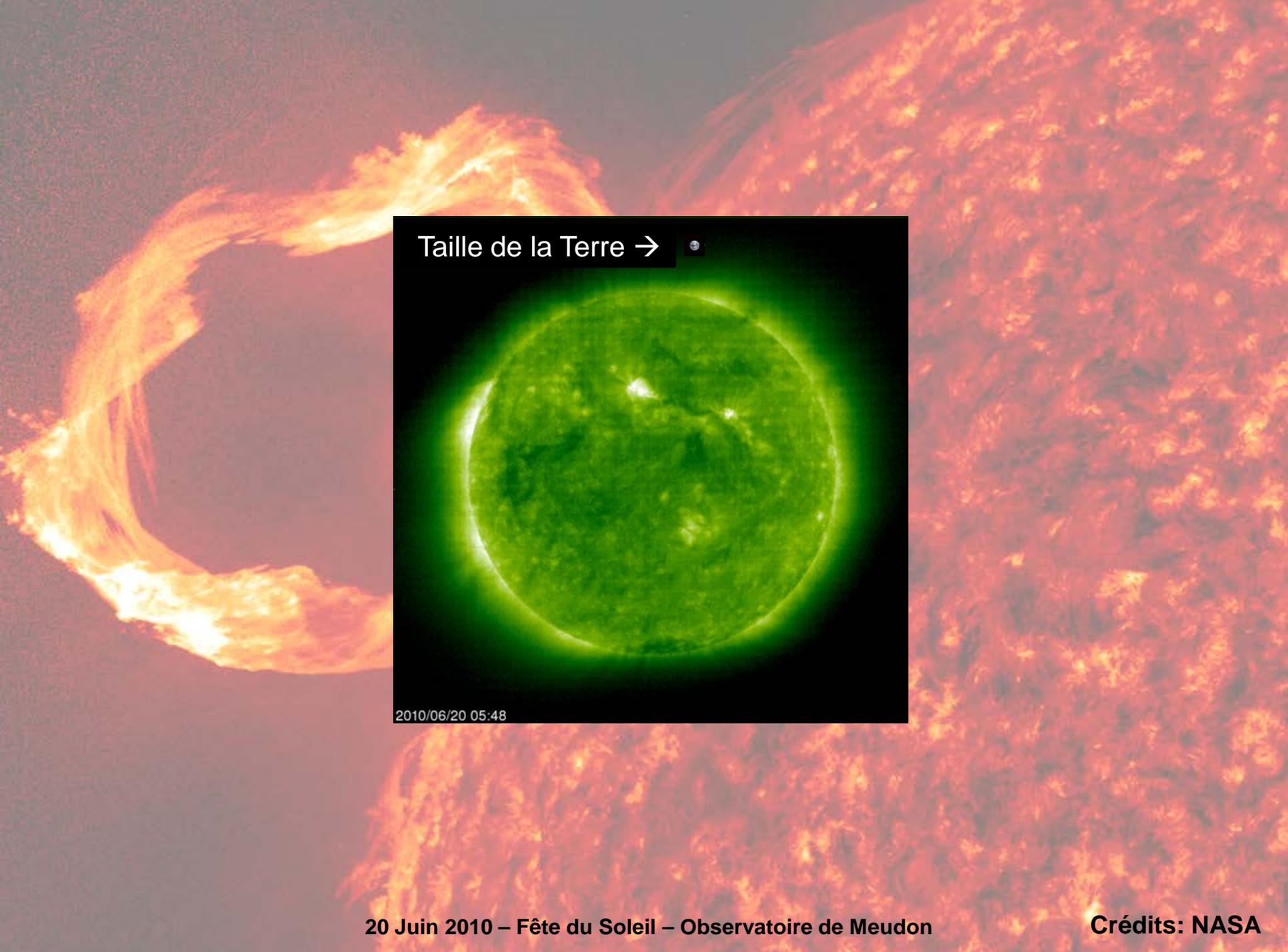
Les intérêts de l'étude du Soleil

- Meilleure connaissance de notre Univers
 - Etoile facilement observable
- Technologies de l'avenir
 - Soleil : milieu atypique qui ne peut pas (encore !) être reproduit sur terre
 - Fusion nucléaire
 - Confinement magnétique
- Comprendre le climat
- Prévoir son impact sur l'activité humaine



Un peu de fiction scientifique

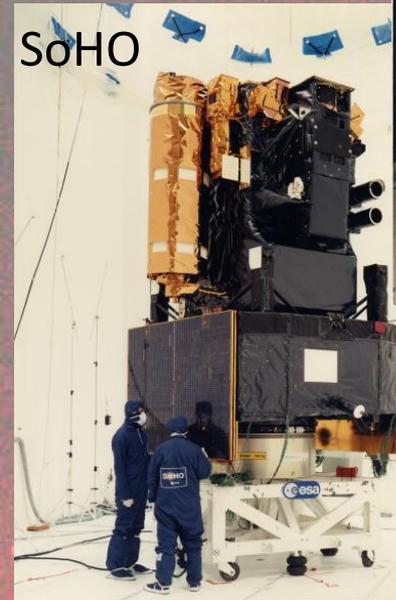




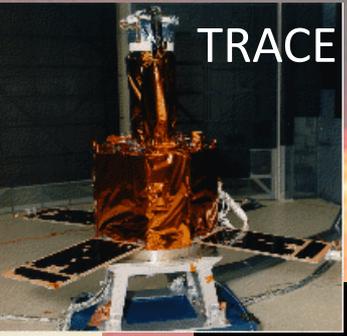
Taille de la Terre →



2010/06/20 05:48



SoHO



TRACE



RHessi



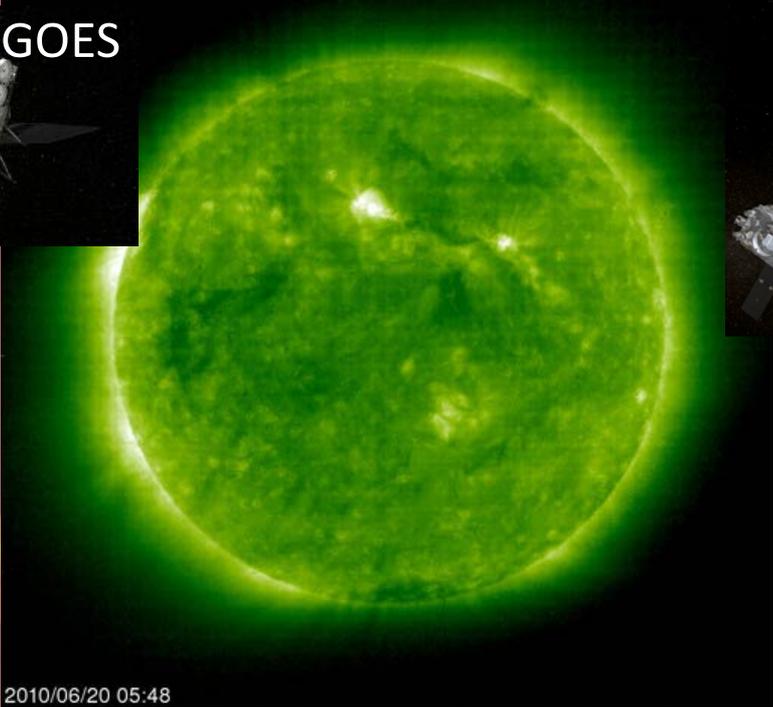
Hinode



SDO



GOES



2010/06/20 05:48



STEREO

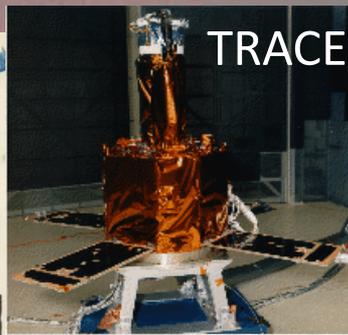


PICARD





SoHO



TRACE



RHessi



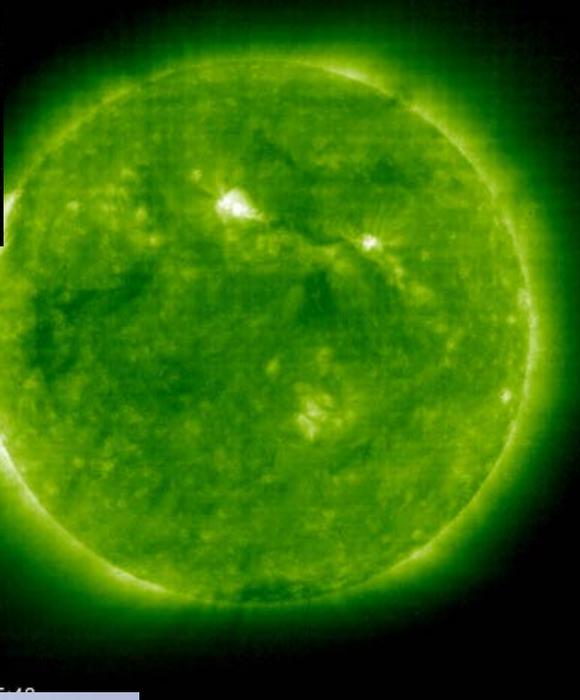
Hinode



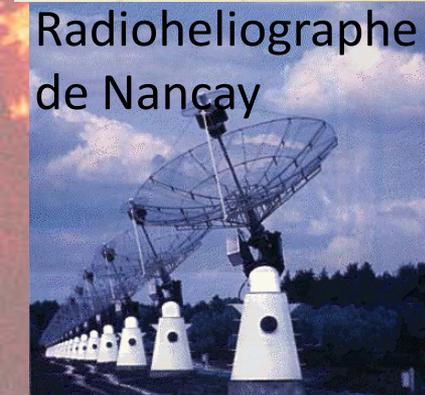
SDO



GOES



STEREO



Radioheliographe de Nancay



Observatoire de Meudon



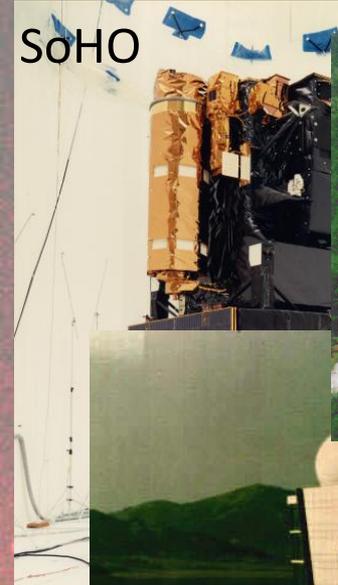
Observatoire du pic du midi



PICARD



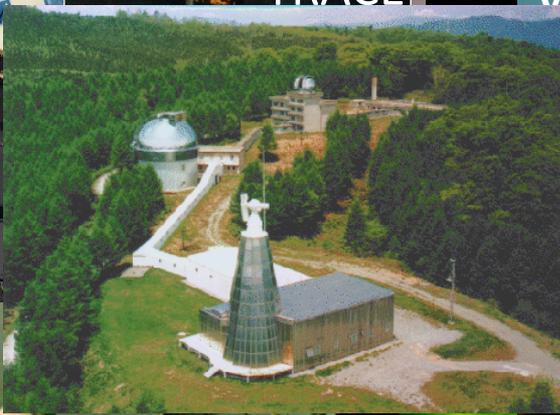
THEMIS (Canaries)



SoHO



TRACE

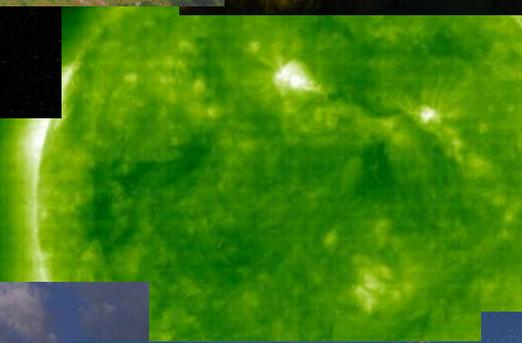


VTT & Gregor (Canaries)



SDO

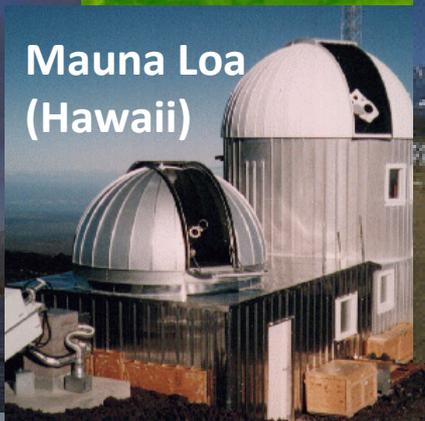
Ra
de



DOT
(Canaries)



Big Bear
(USA)



Mauna Loa
(Hawaii)

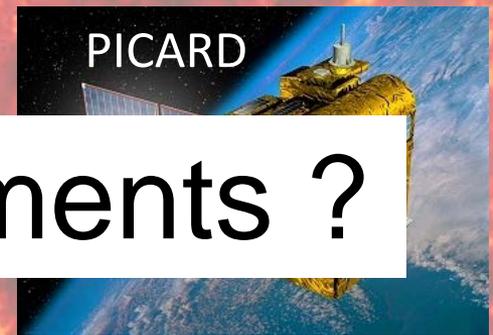
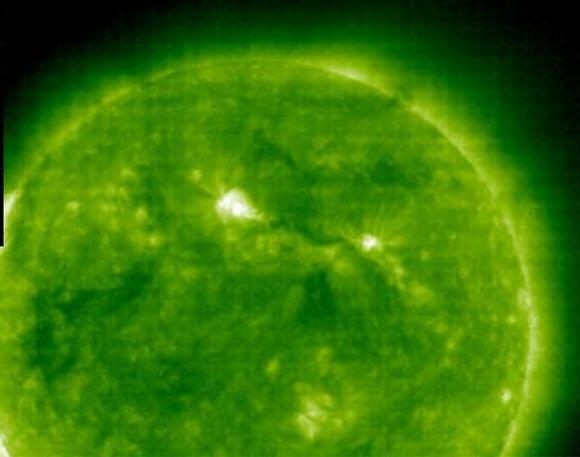
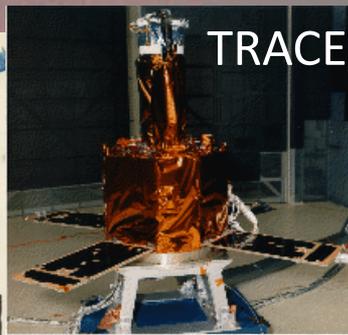


Nobeyama
(Japon)



Ob
Me

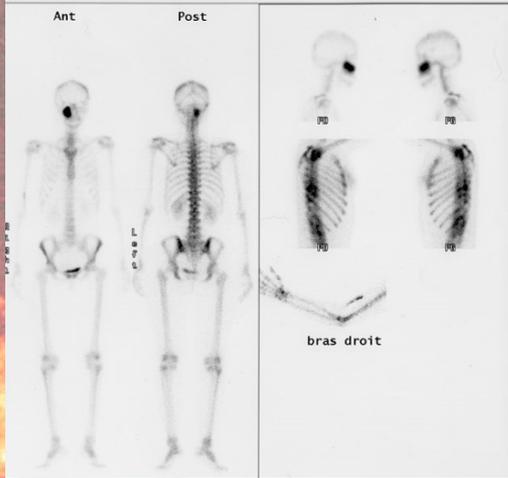




Pourquoi autant d'instruments ?



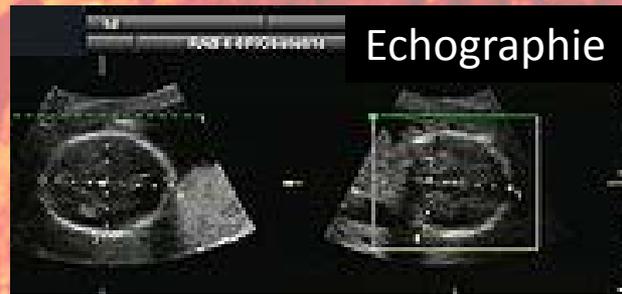
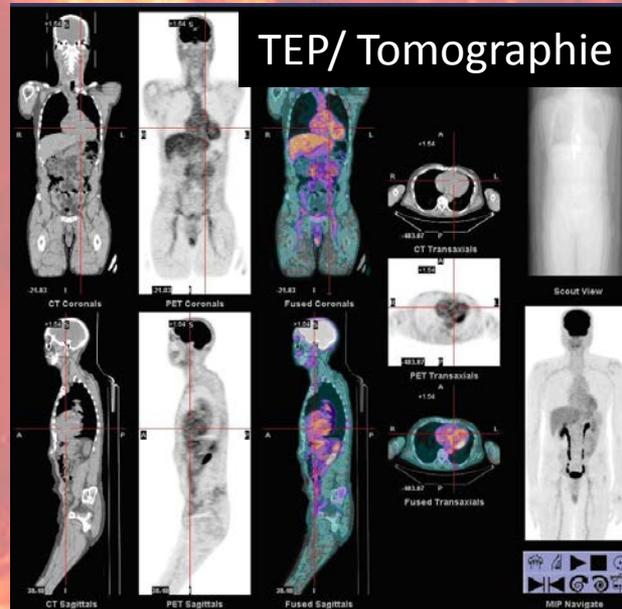
Obtenir un diagnostic complet



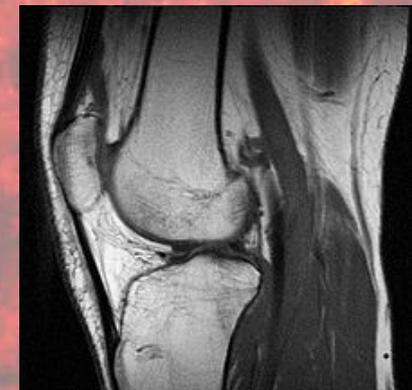
Scintigraphie γ



Scanographie



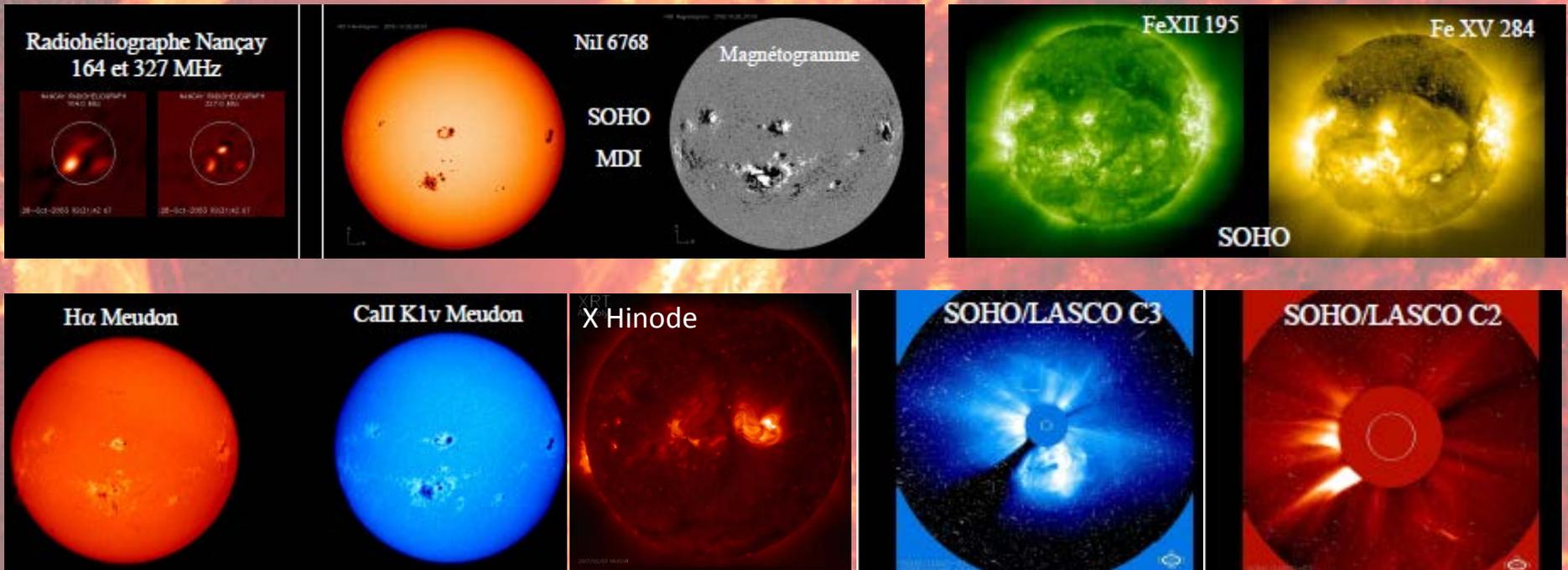
Radiographie X



IRM

... sans “toucher” l’objet d’étude

Obtenir un diagnostic complet



... sans "toucher" l'objet d'étude

Le spectre lumineux

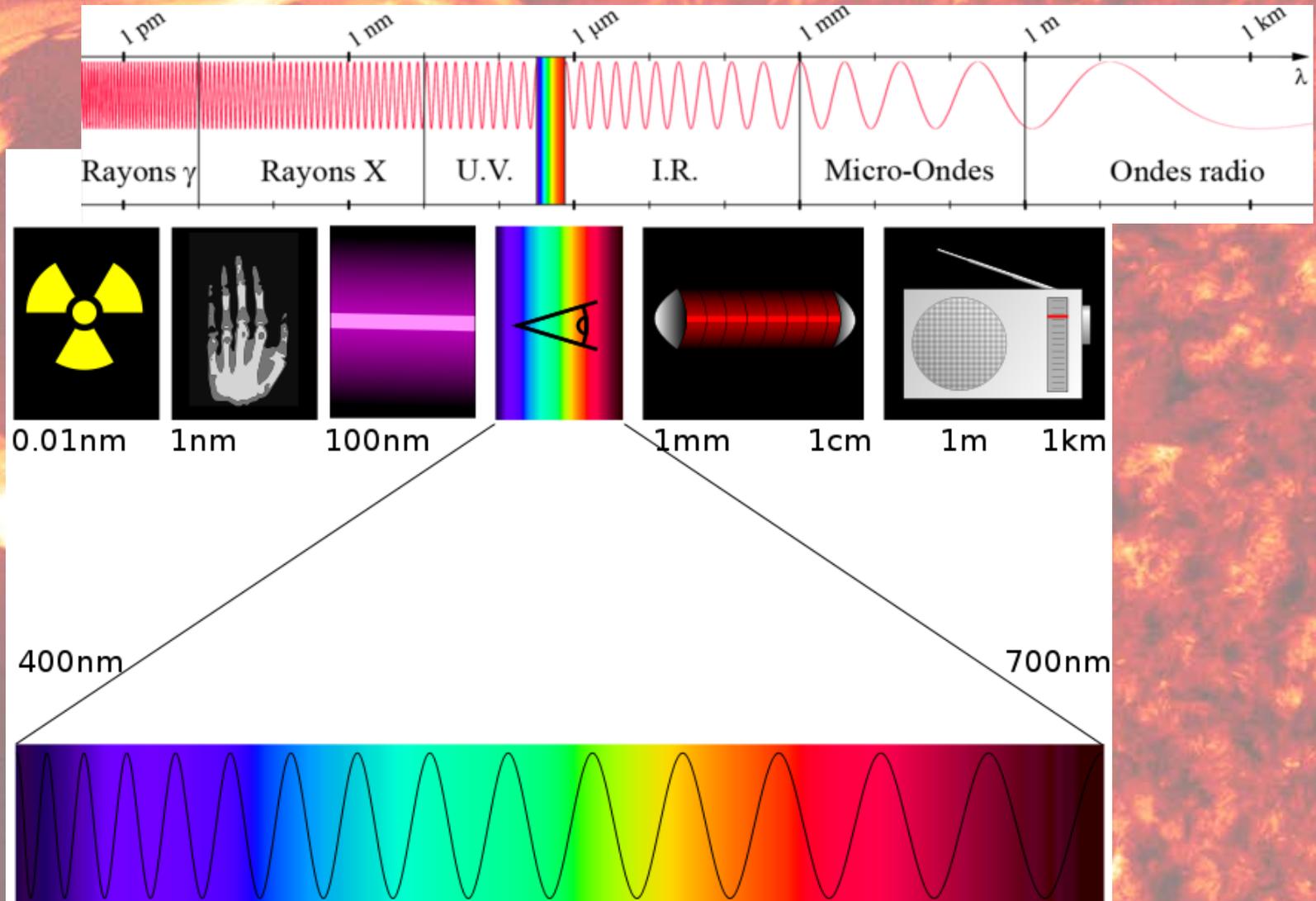
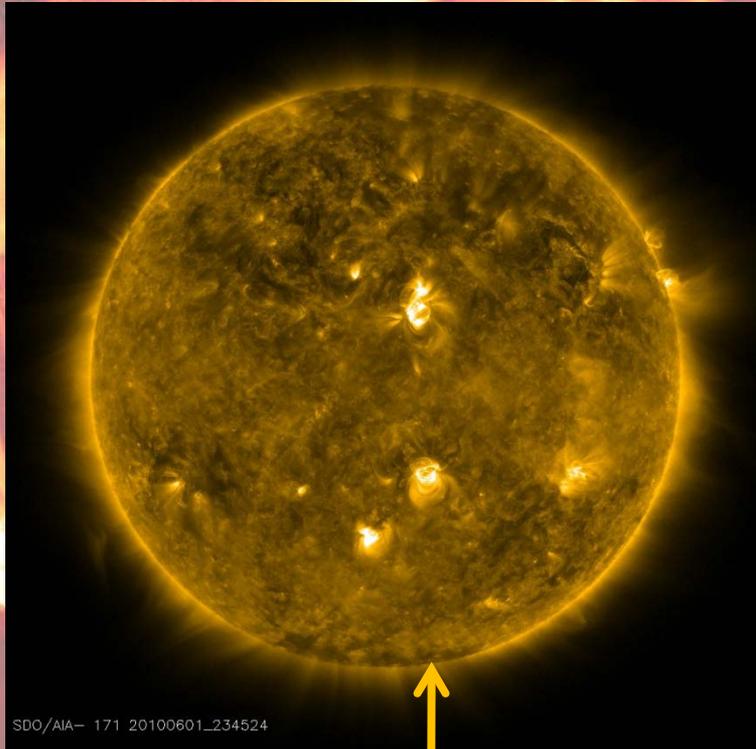
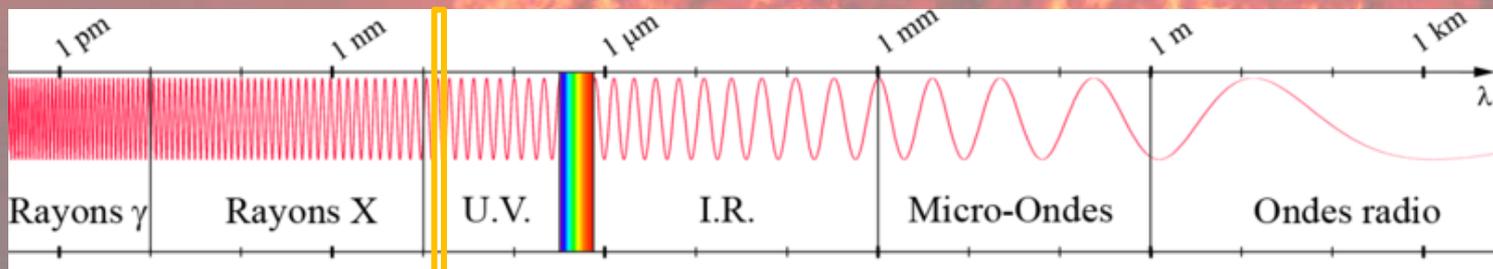


Image « monochromatique »



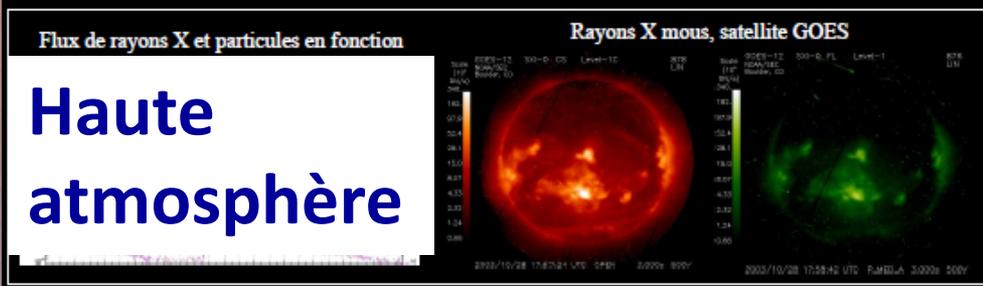
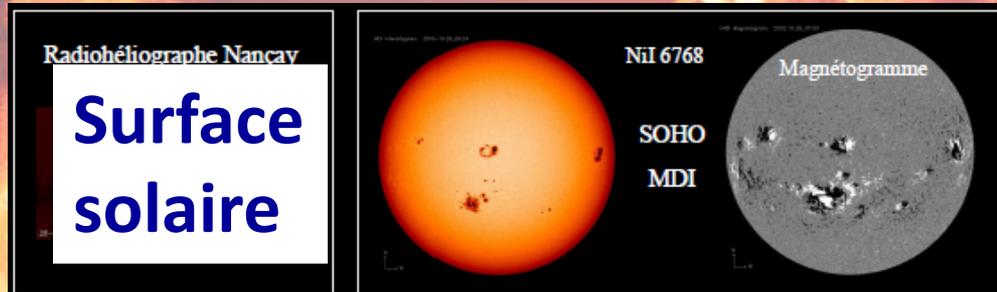
SDO/AIA- 171 20100601_234524

- Image prise dans une seule « couleur »
- Utilisation fausse couleur
 - Esthétisme
 - Signes distinctifs



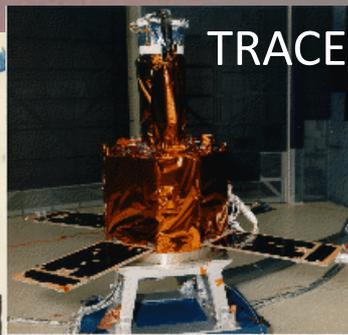
Les observations solaires

“une couleur = une température = une couche de l’atmosphère”





SoHO



TRACE



RHessi



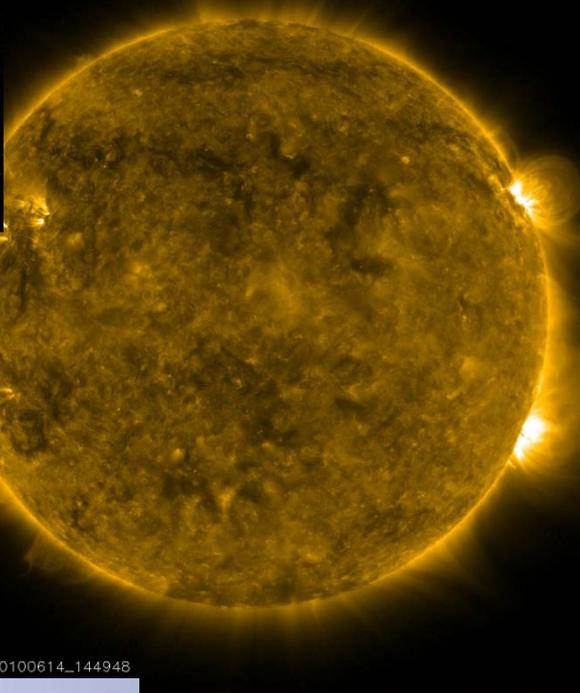
Hinode



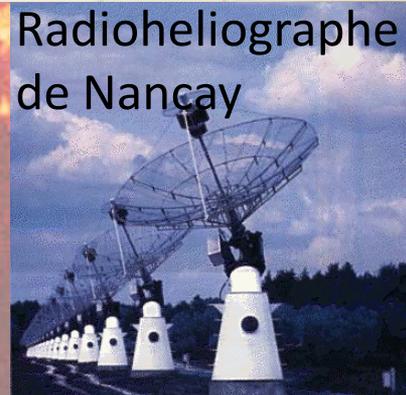
SDO



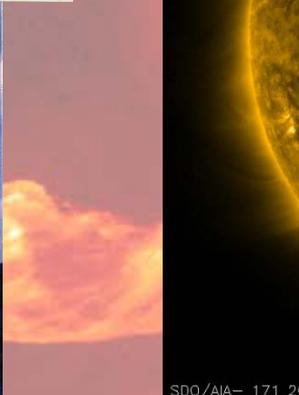
GOES



STEREO



Radioheliographe de Nancay



SDO/AIA- 171 20100614_144948



Observatoire de Meudon



Observatoire du pic du midi



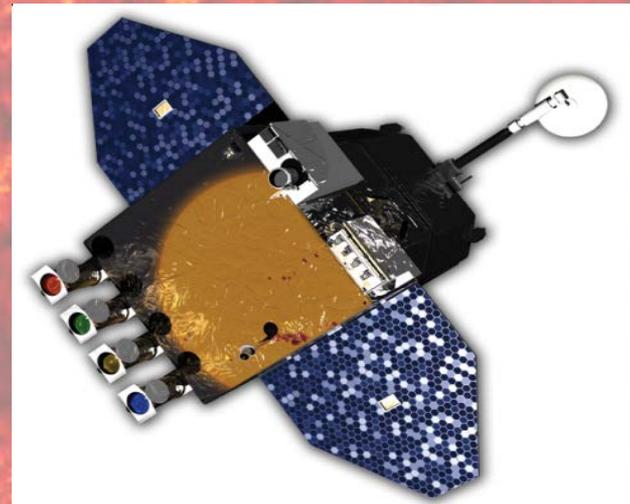
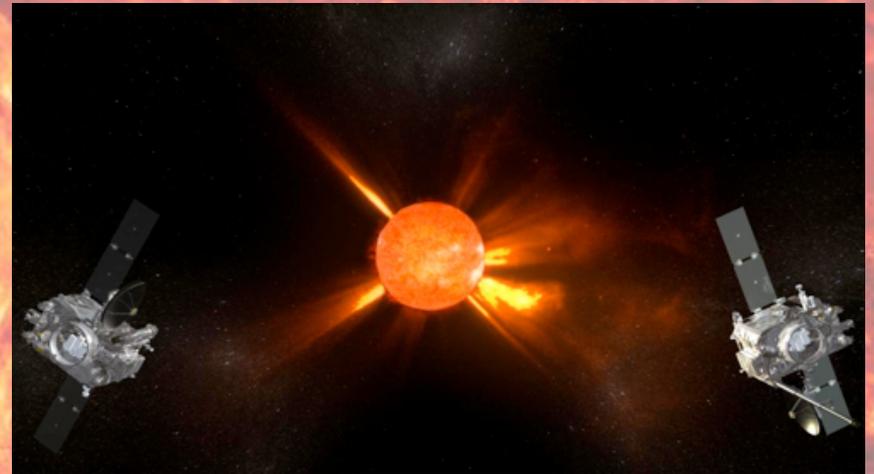
PICARD



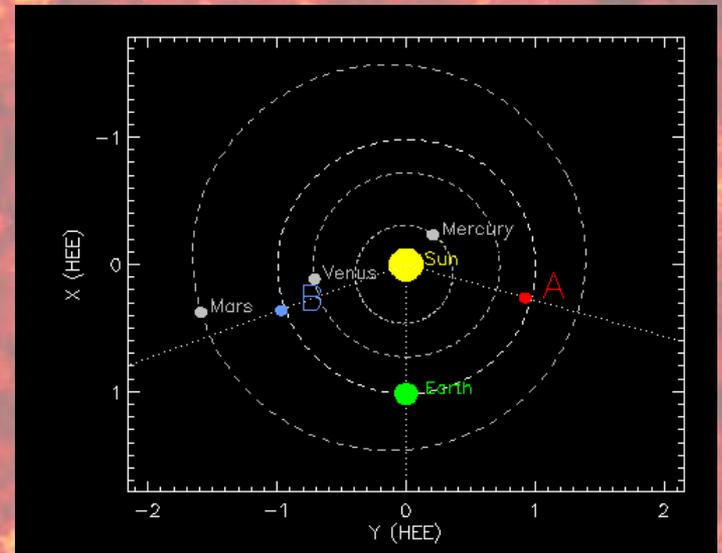
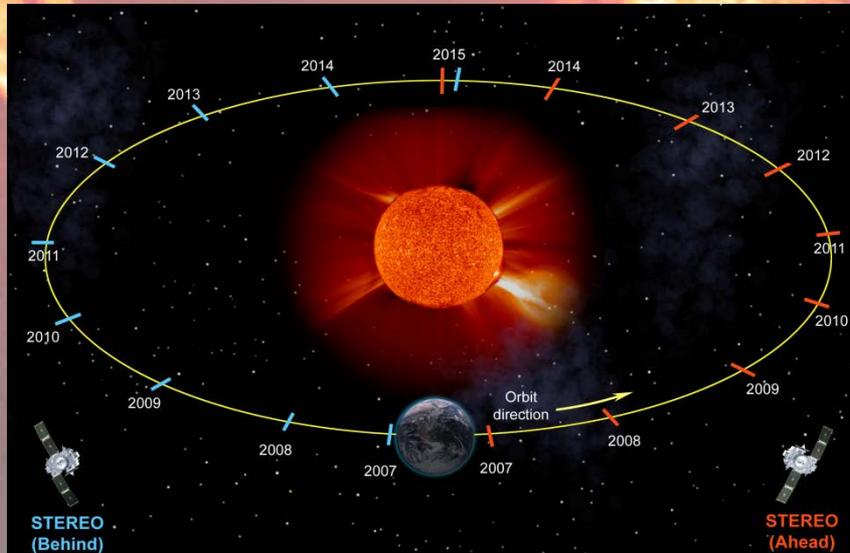
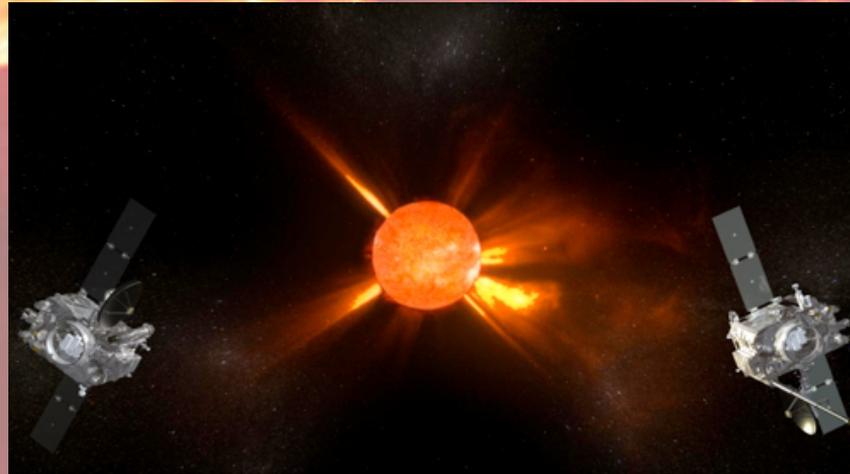
THEMIS (Canaries)

Quoi de neuf ?

- **STEREO:**
 - Le soleil en trois dimension
- **Solar Dynamic Observatory :**
 - Le soleil plus grand, plus précis et plus souvent.

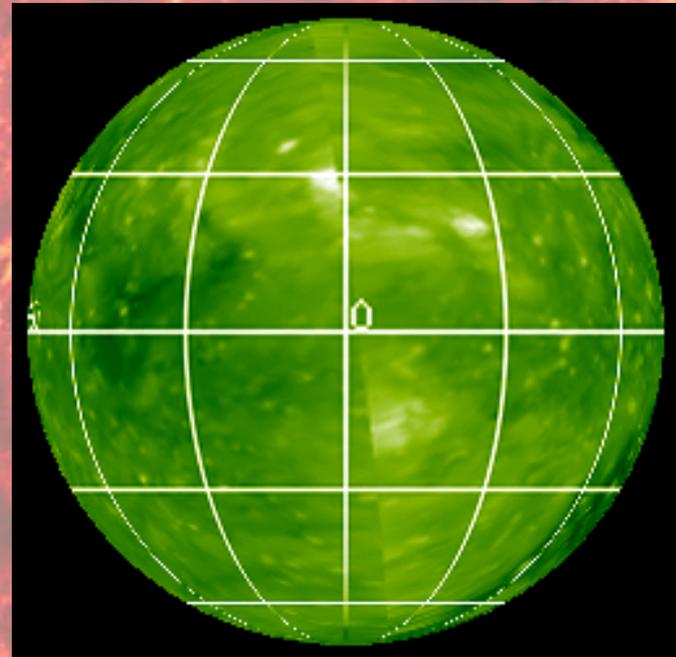
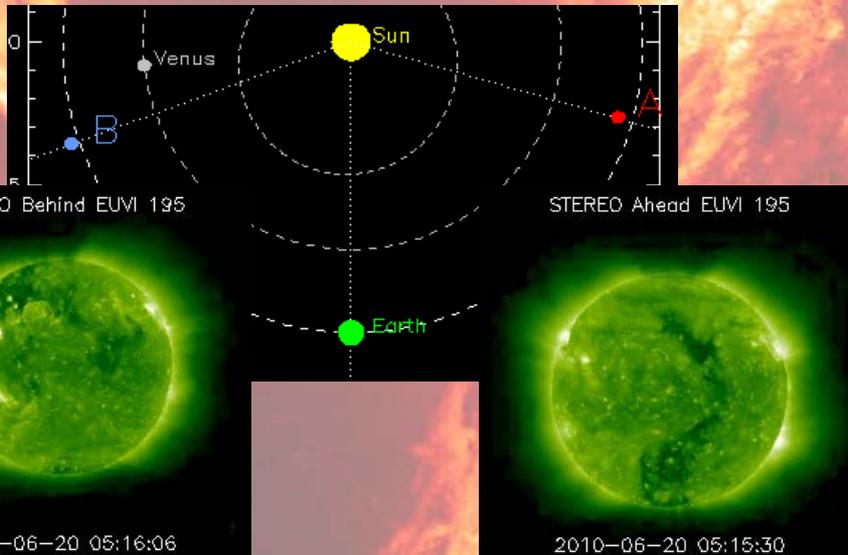
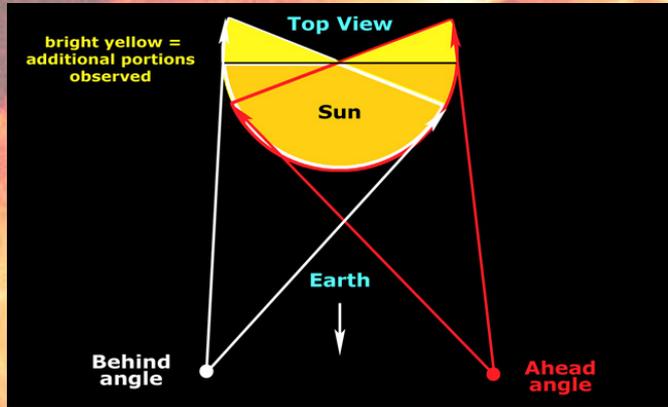


STEREO

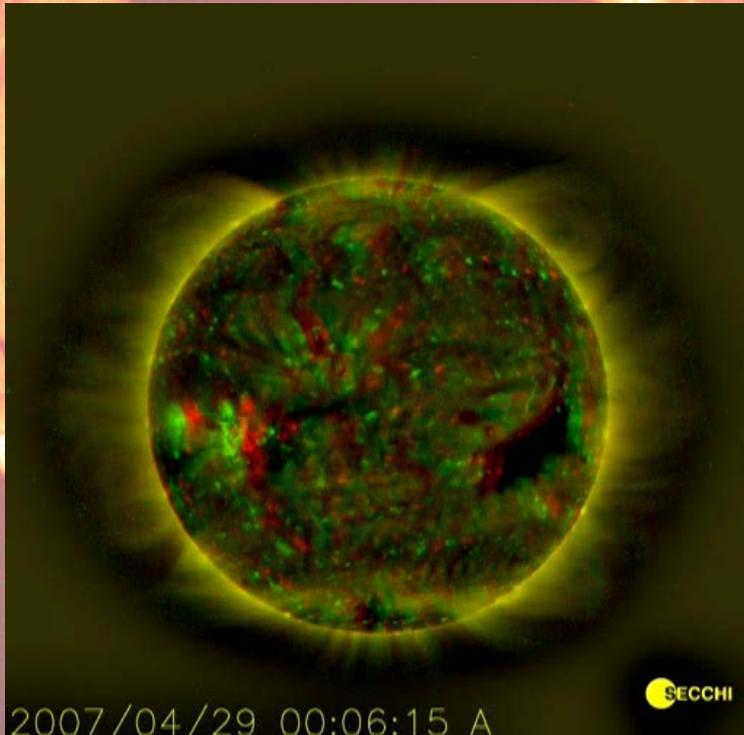


Les faces du Soleil

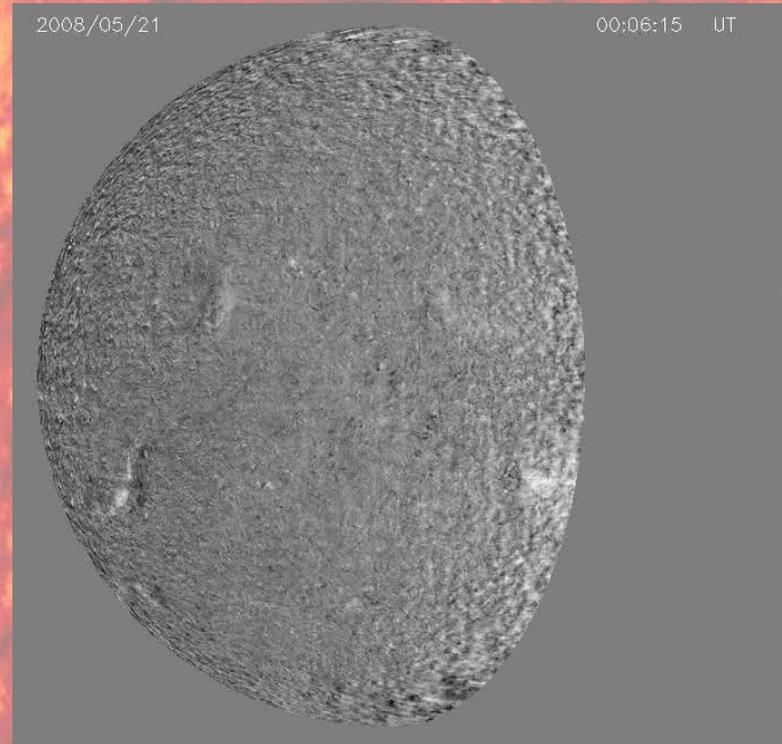
- Toute la surface du Soleil enfin visible (ou presque) !



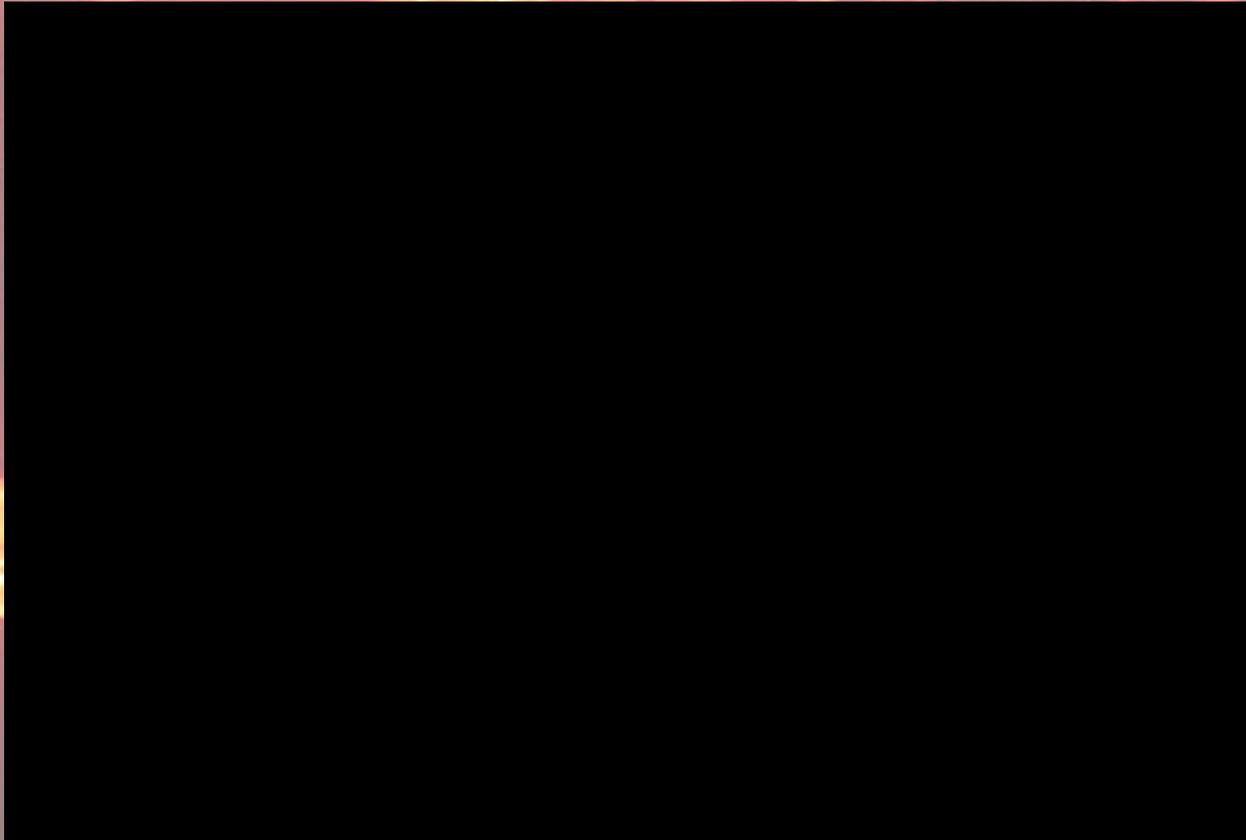
Le Soleil en 3D



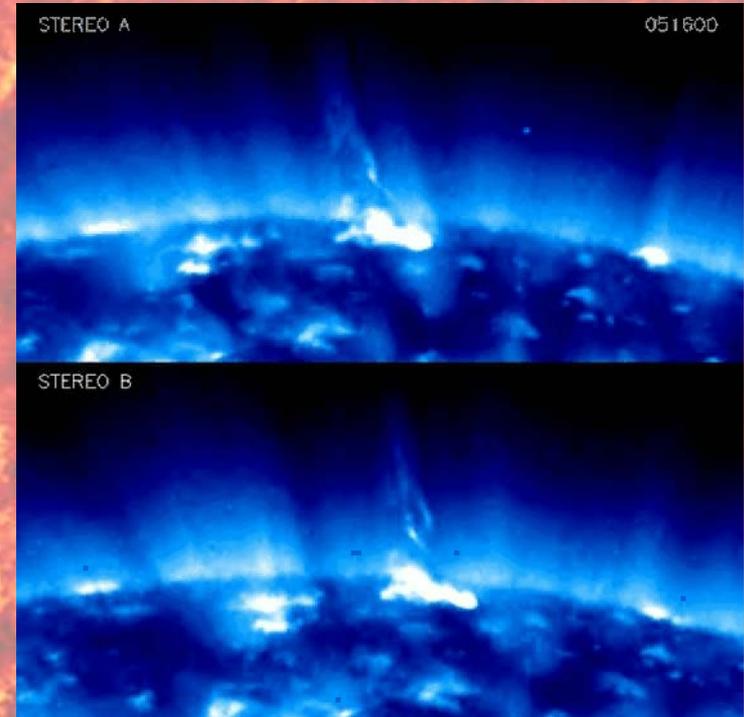
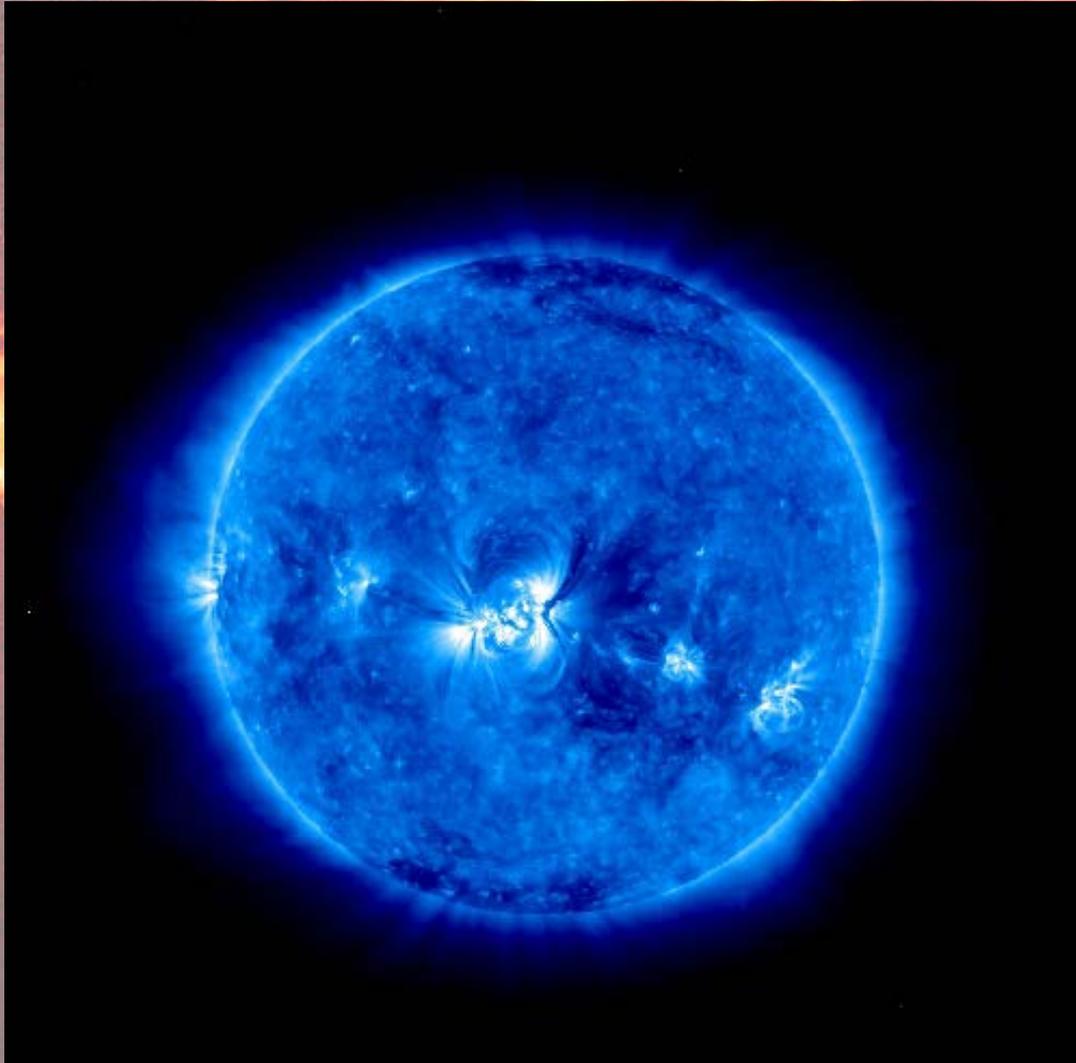
Taille de la Terre →



Les éjections de masses en 3D



Géométrie des jets solaires

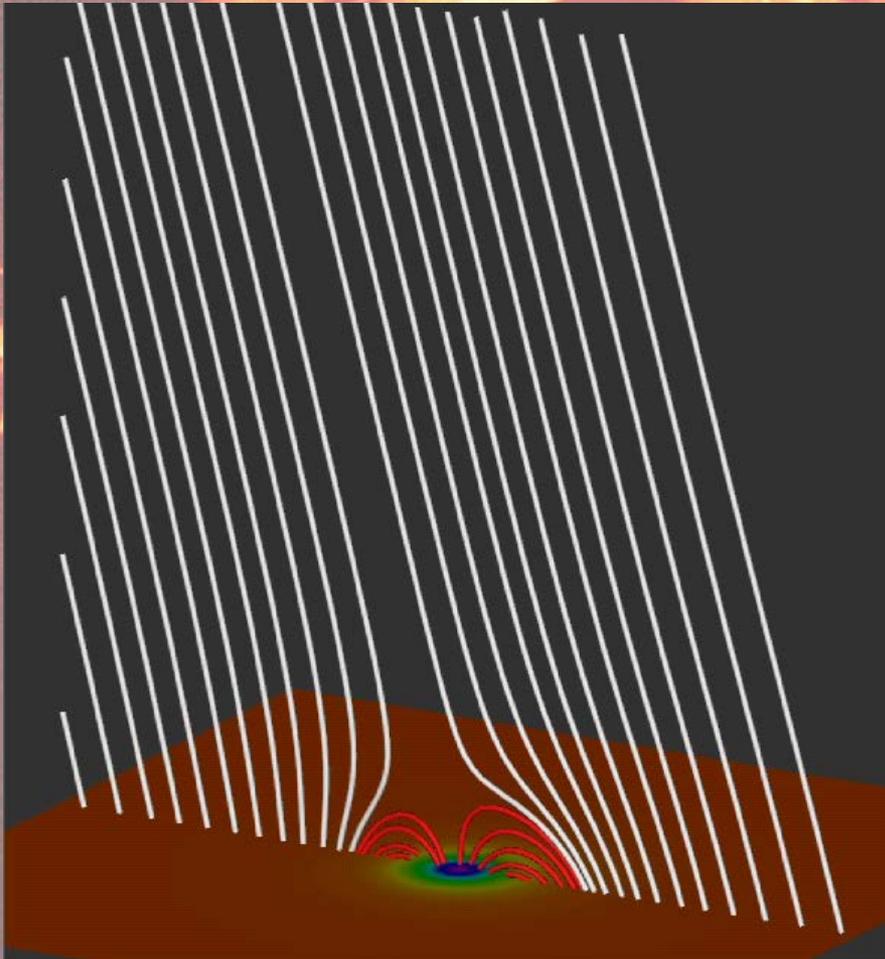


Taille de la Terre → 

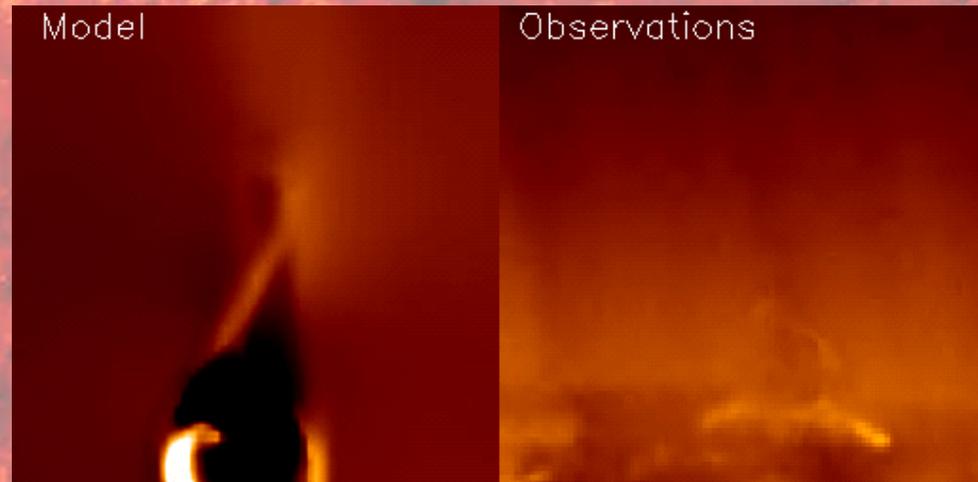
- Les jets sont de forme hélicoïdale

Modélisation 3D des jets

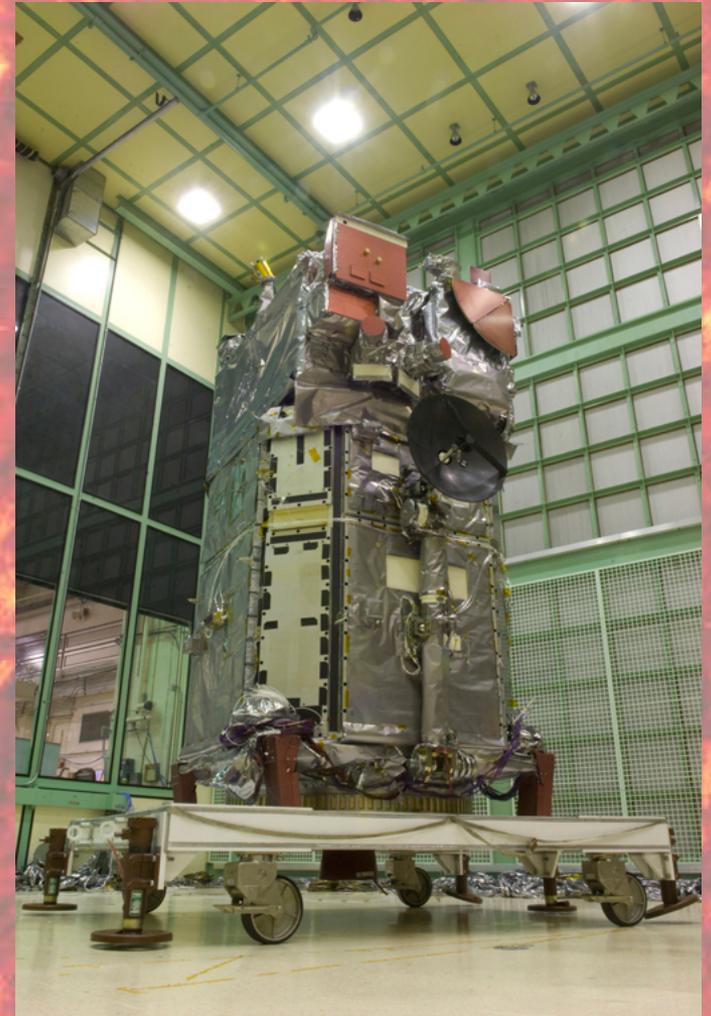
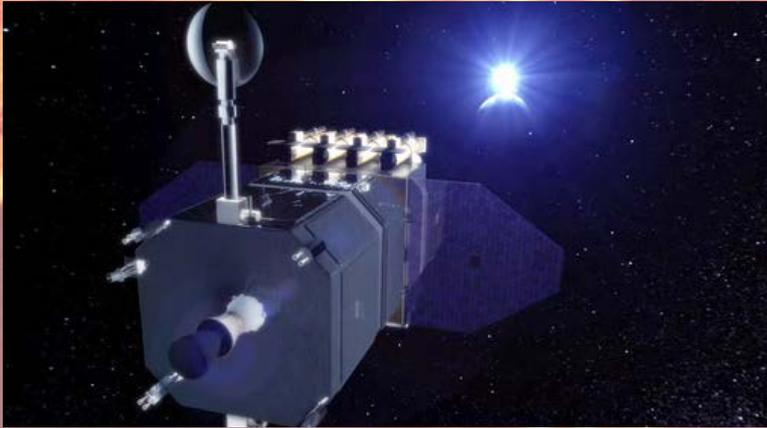
- Mieux comprendre comment les jets sont grâce à « l'expérimentation virtuelle »



En Bleu: le jet



Solar Dynamic Observatory



- Lancement: Février 2010
- 1ères images: Mai 2010
- Données disponible: cette semaine
- Observation des moindres soubresauts du Soleil
 - Plus de données
 - Plus précis
 - Plus large
 - Plus souvent

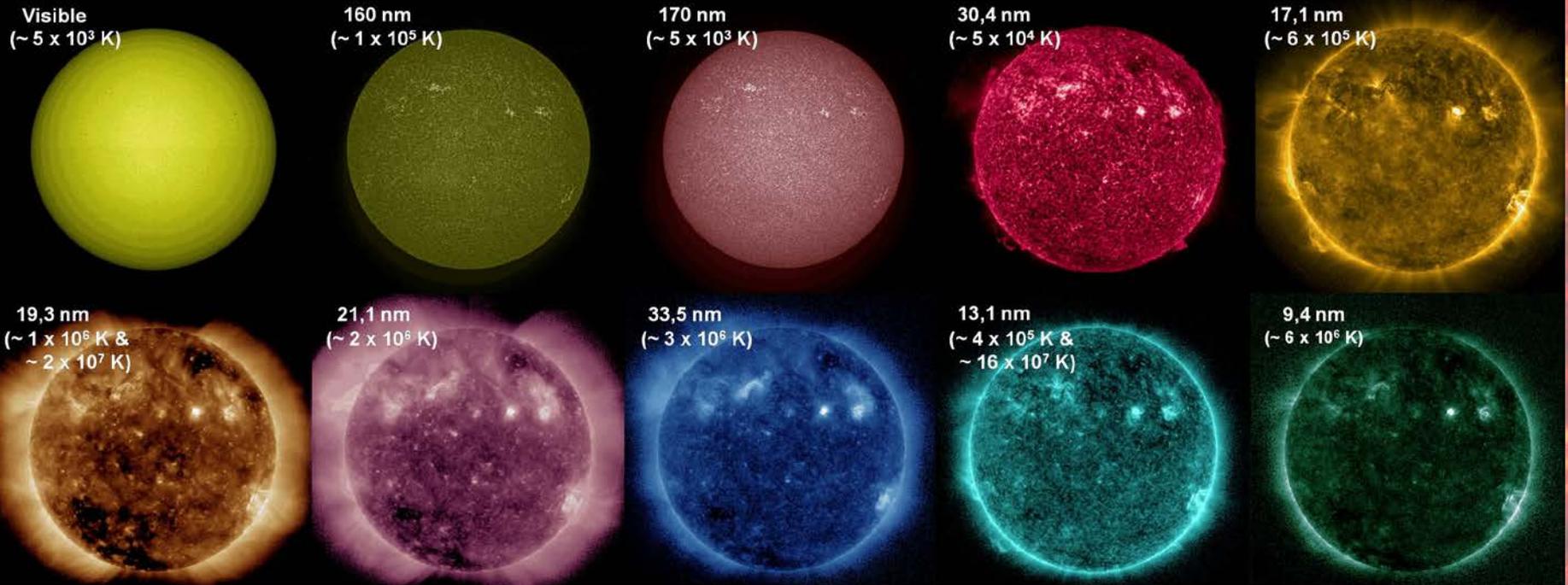
Plus de données = meilleurs diagnostics

“une couleur = une température = une couche de l’atmosphère”

Surface

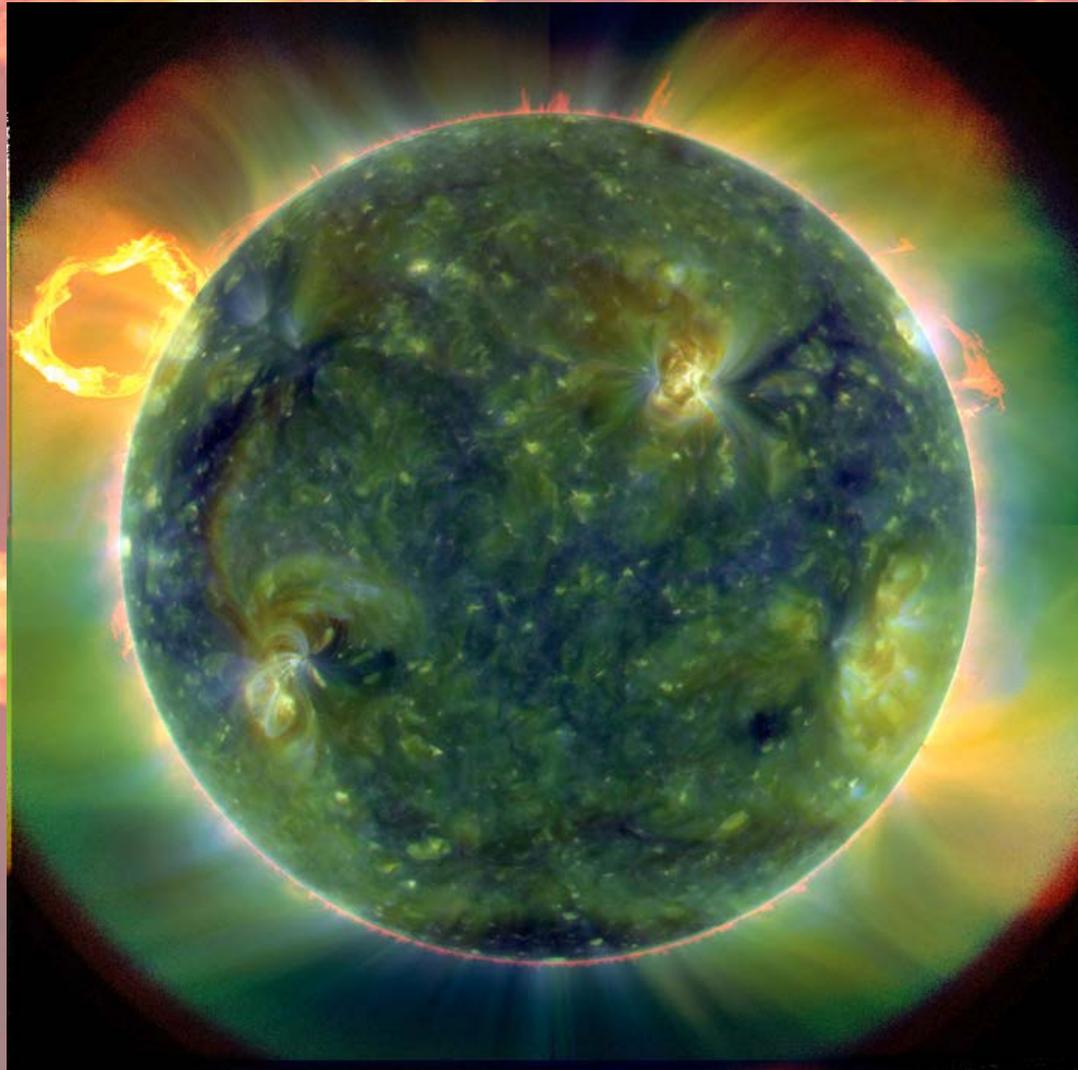
Basse atmosphère

Haute
atmosphère



Haute atmosphère

Image « trichromatique »



20 Juin 2010 – Fête du Soleil – Observatoire de Meudon

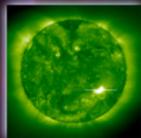


Plus grand et plus précis

Résolution d'image



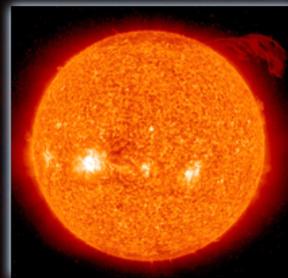
480 Standard
Definition TV



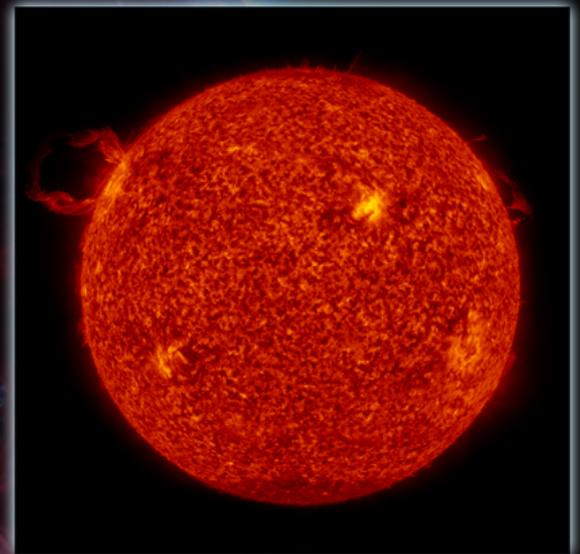
SOHO



1080 High Definition TV



STEREO

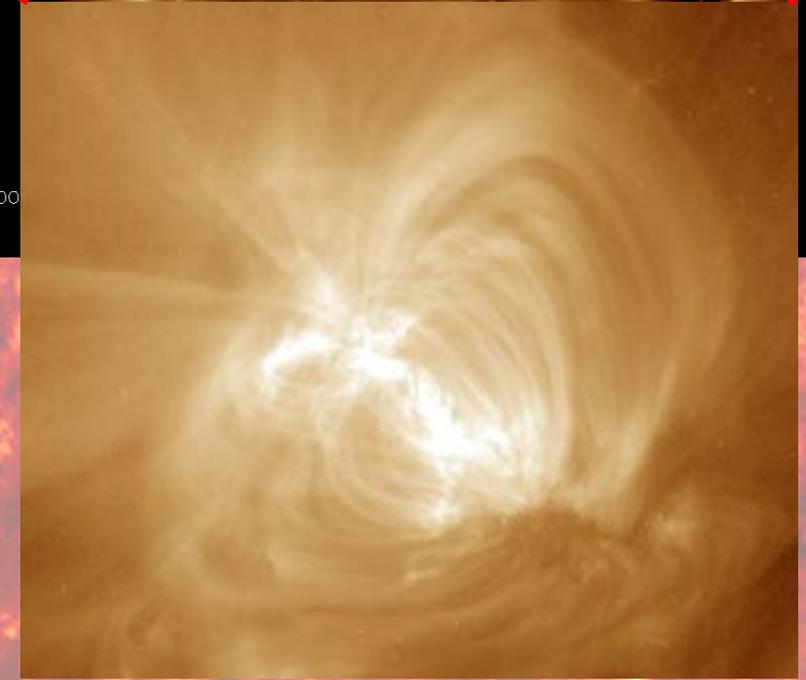
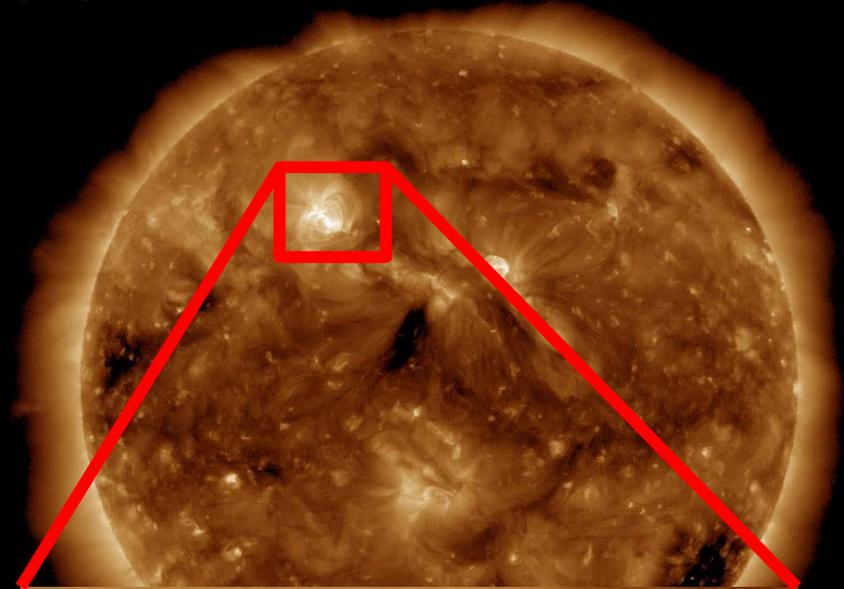
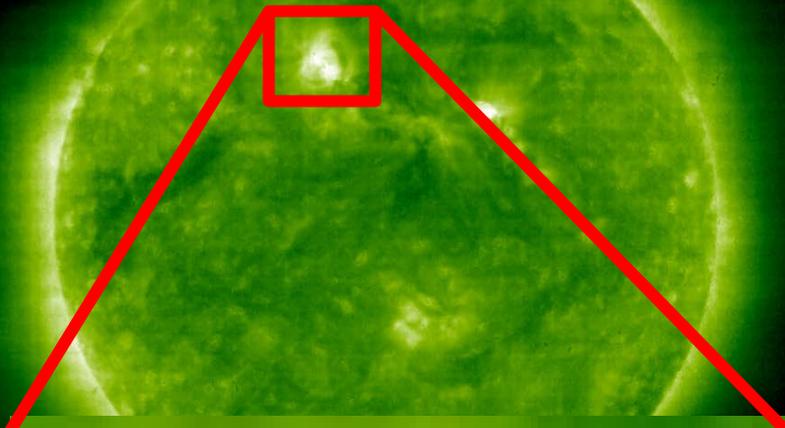


SDO

Détail sur le Soleil : 700 km = épaisseur d'un cheveu humain tenu à 10 mètres

SOHO

SDO



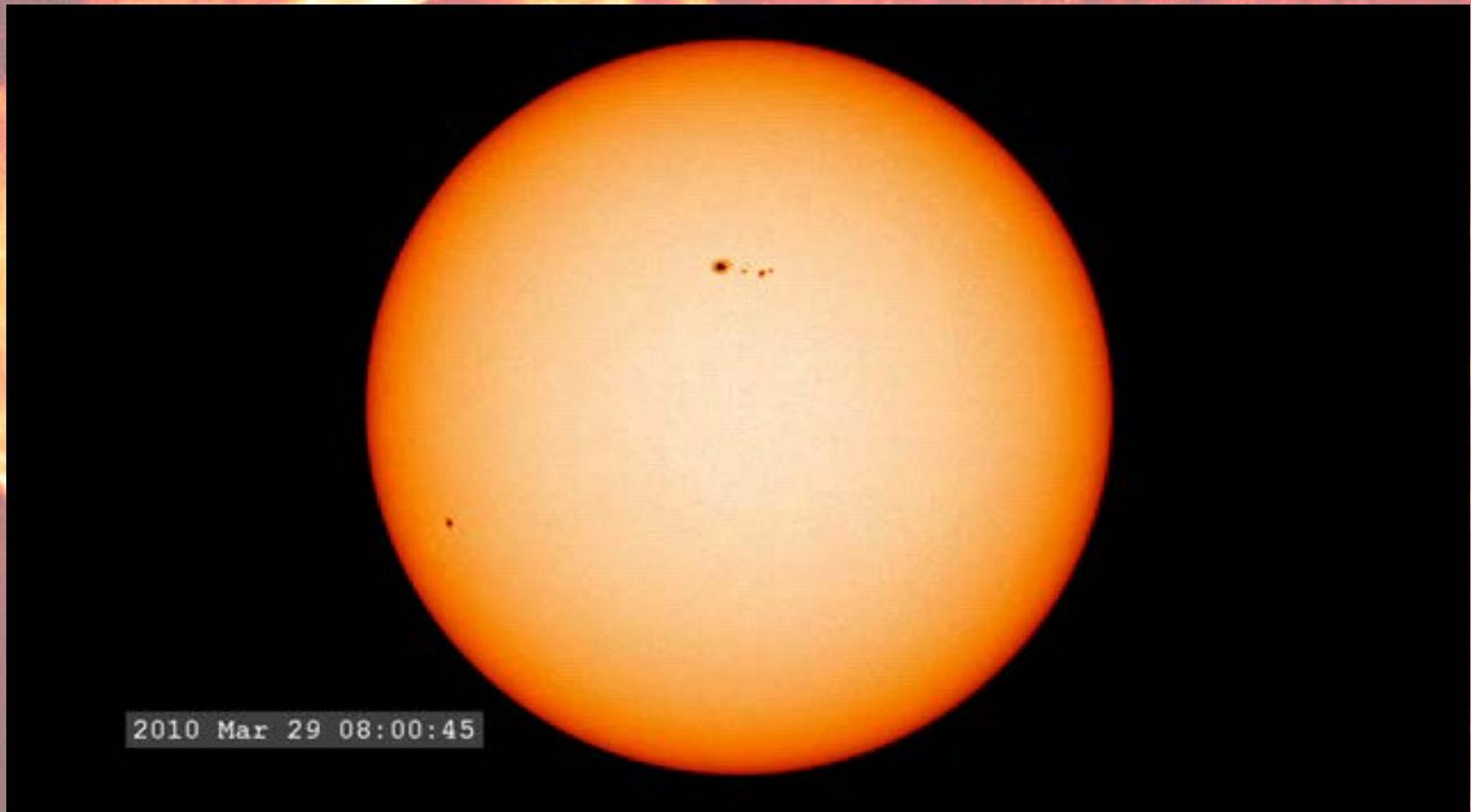
2010/06

SDO

Taille de la Terre →



Balade dans l'atmosphère solaire



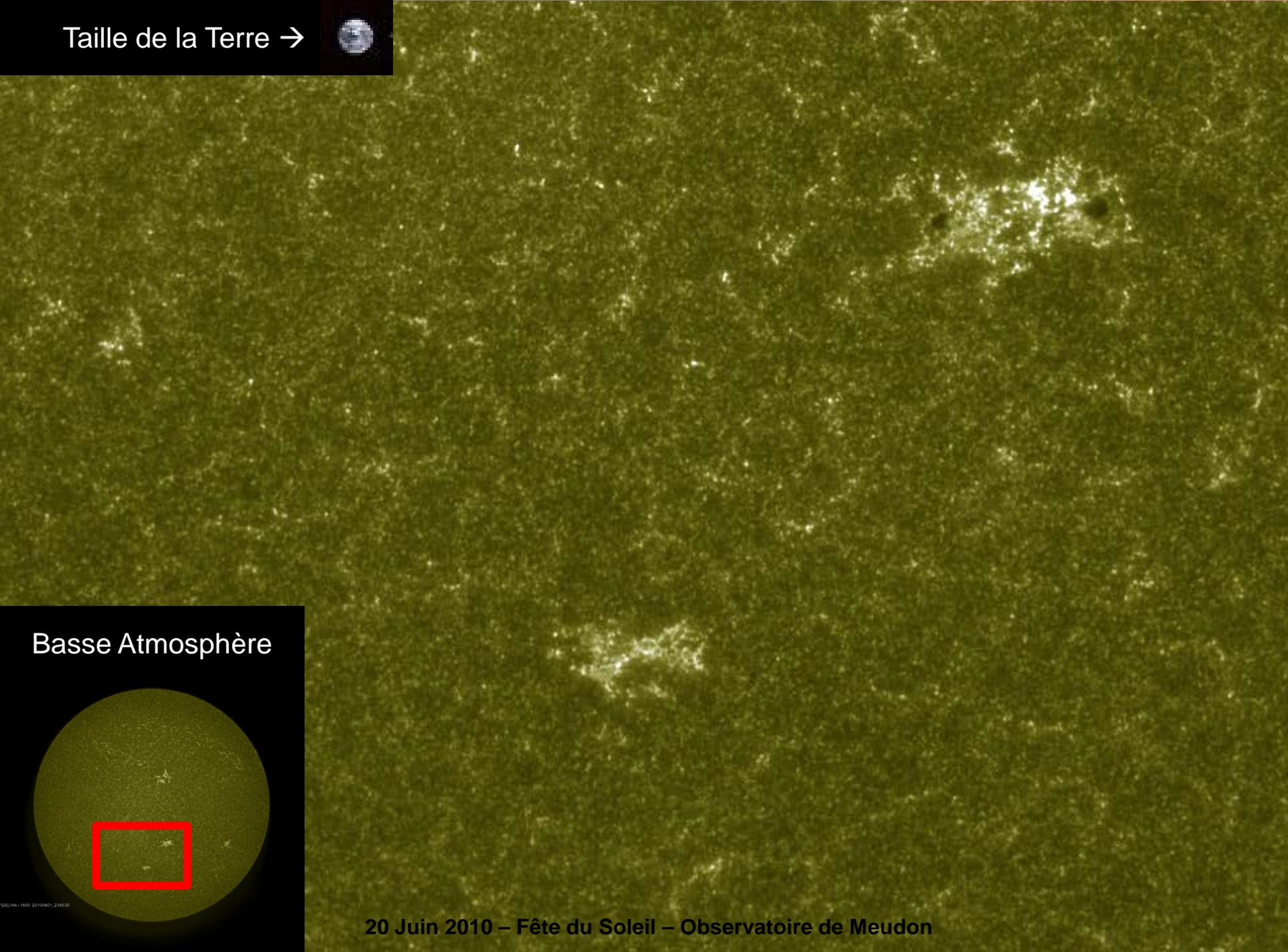
Taille de la Terre →



Surface



Taille de la Terre →

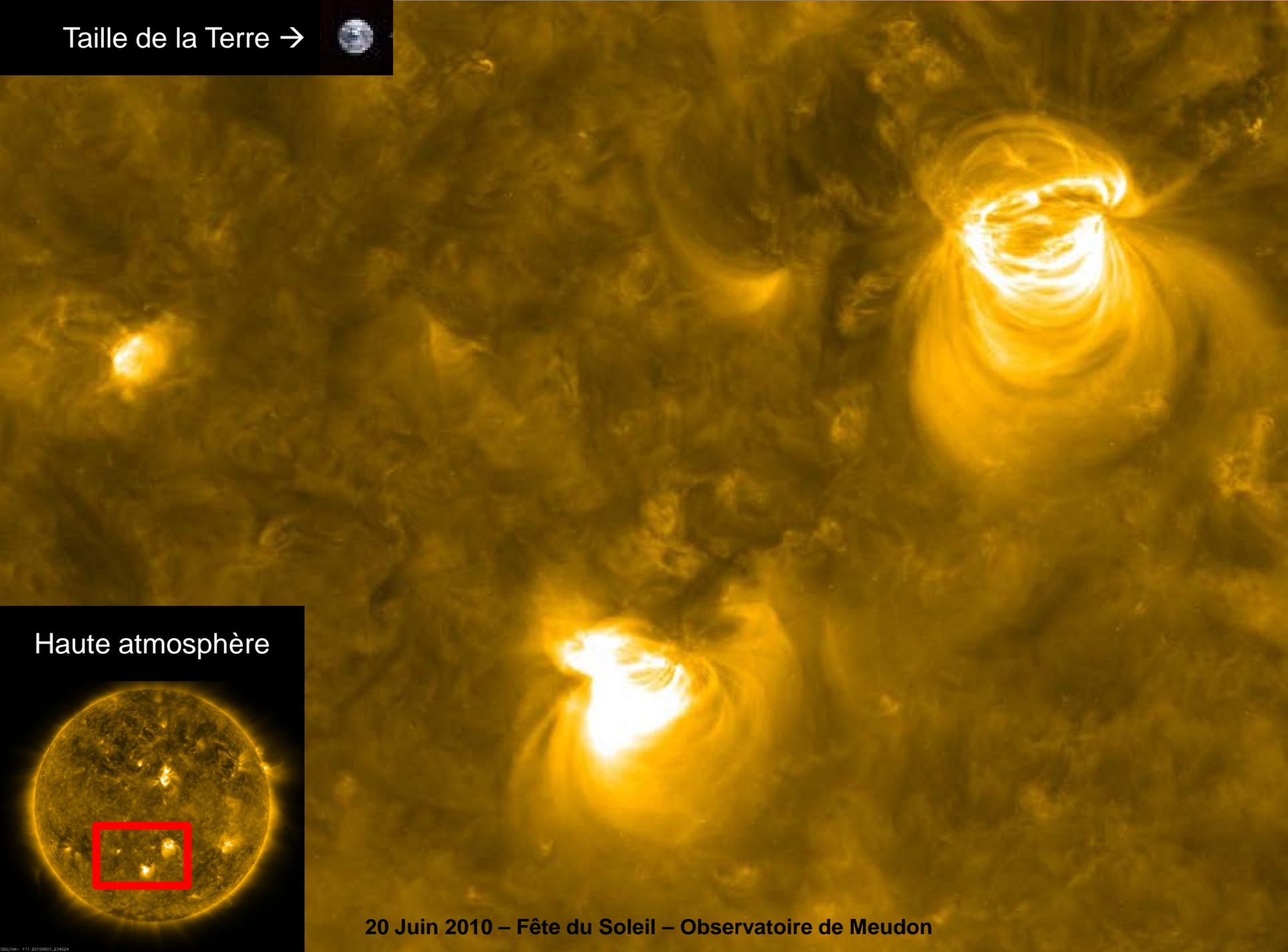


Basse Atmosphère

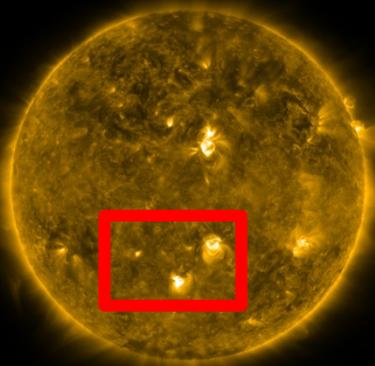


20 Juin 2010 – Fête du Soleil – Observatoire de Meudon

Taille de la Terre →

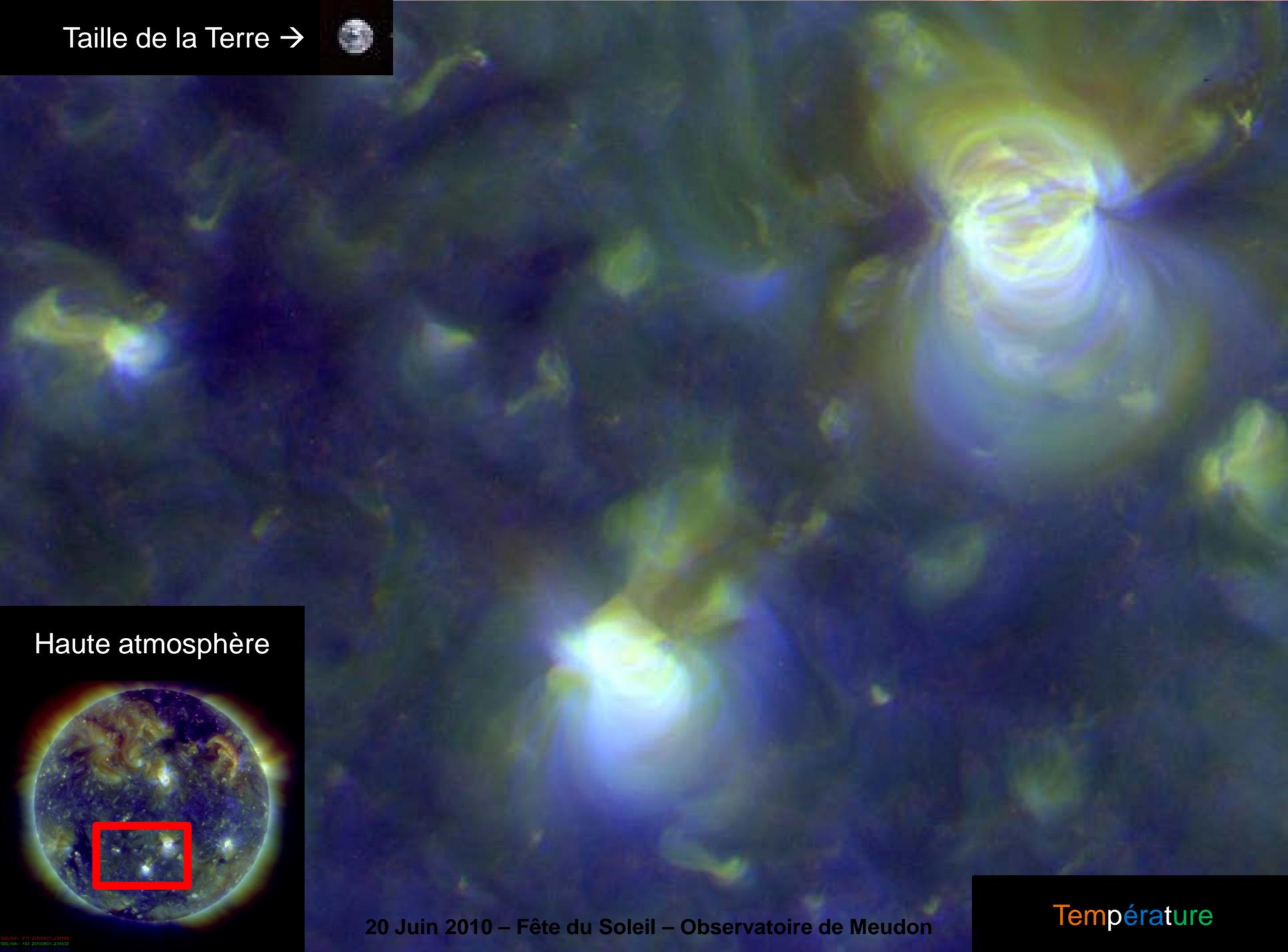


Haute atmosphère

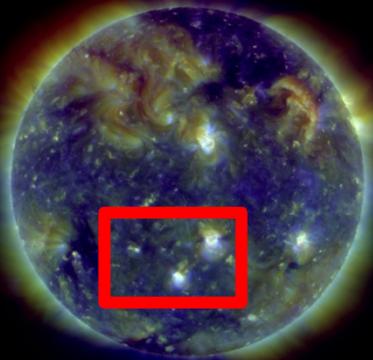


20 Juin 2010 – Fête du Soleil – Observatoire de Meudon

Taille de la Terre →



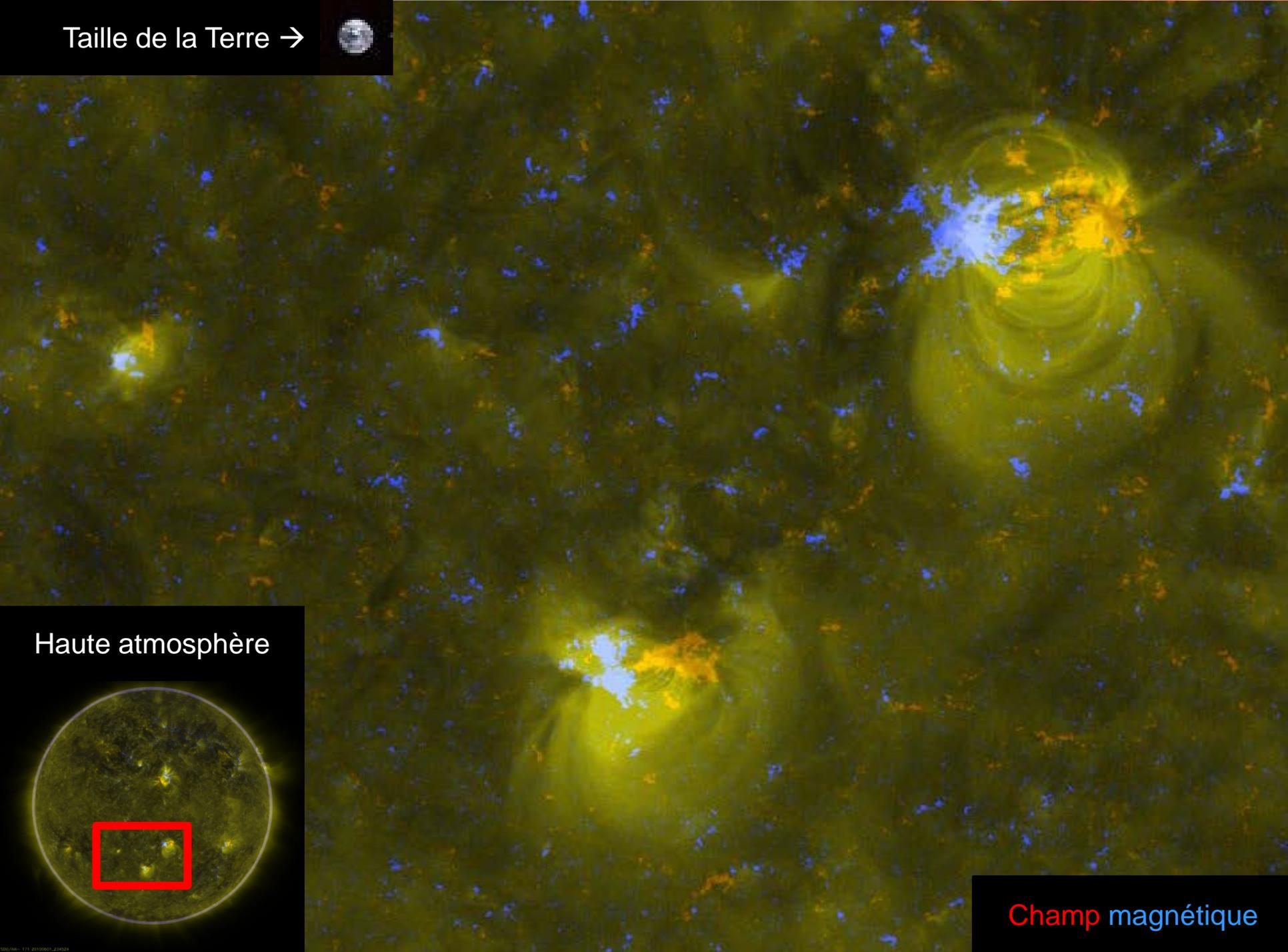
Haute atmosphère



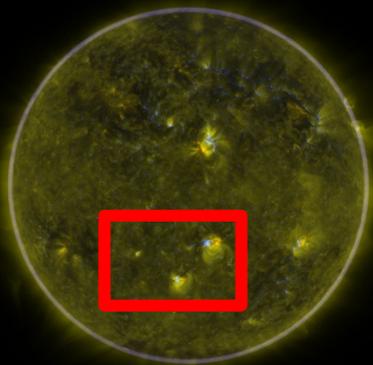
20 Juin 2010 – Fête du Soleil – Observatoire de Meudon

Température

Taille de la Terre →

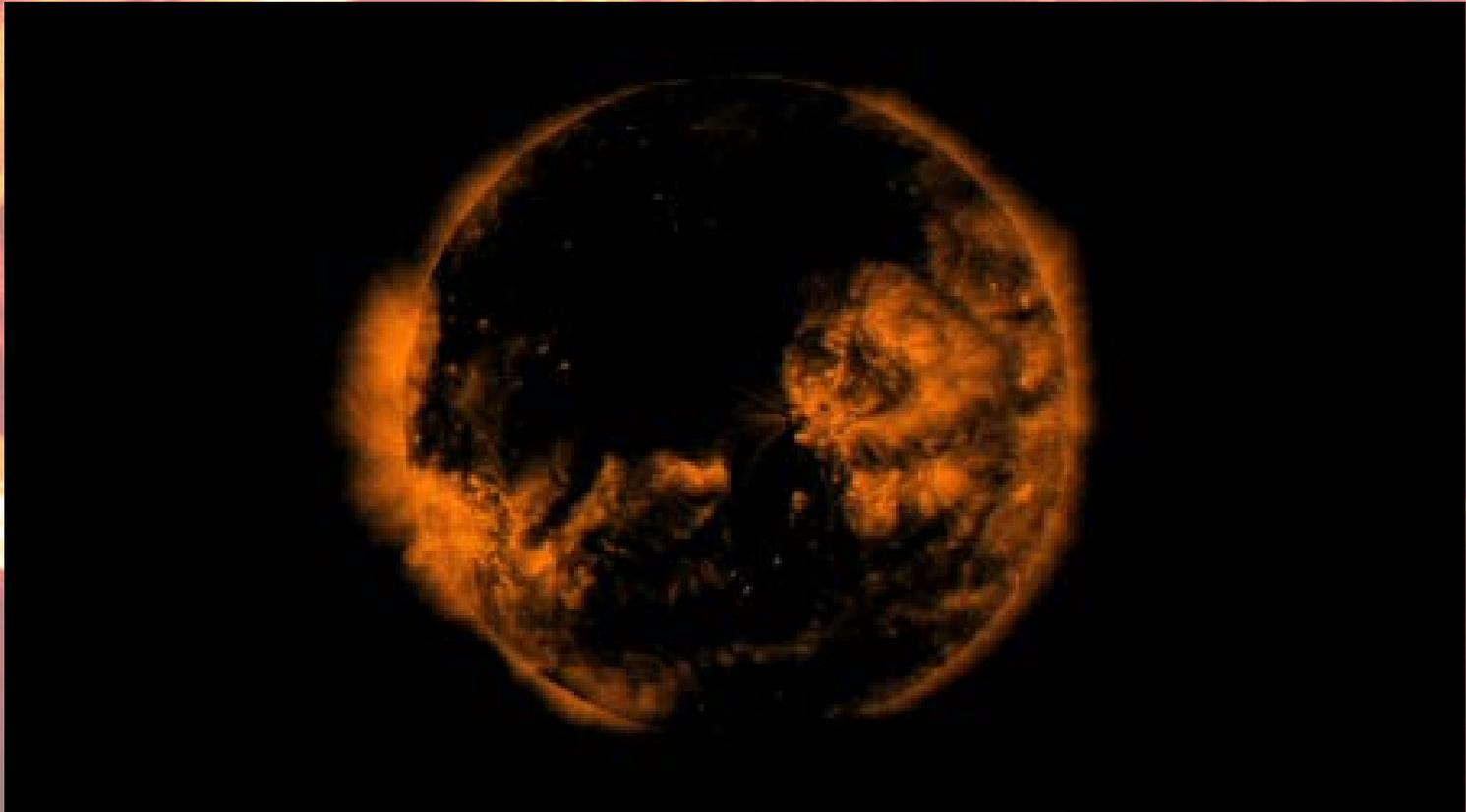


Haute atmosphère

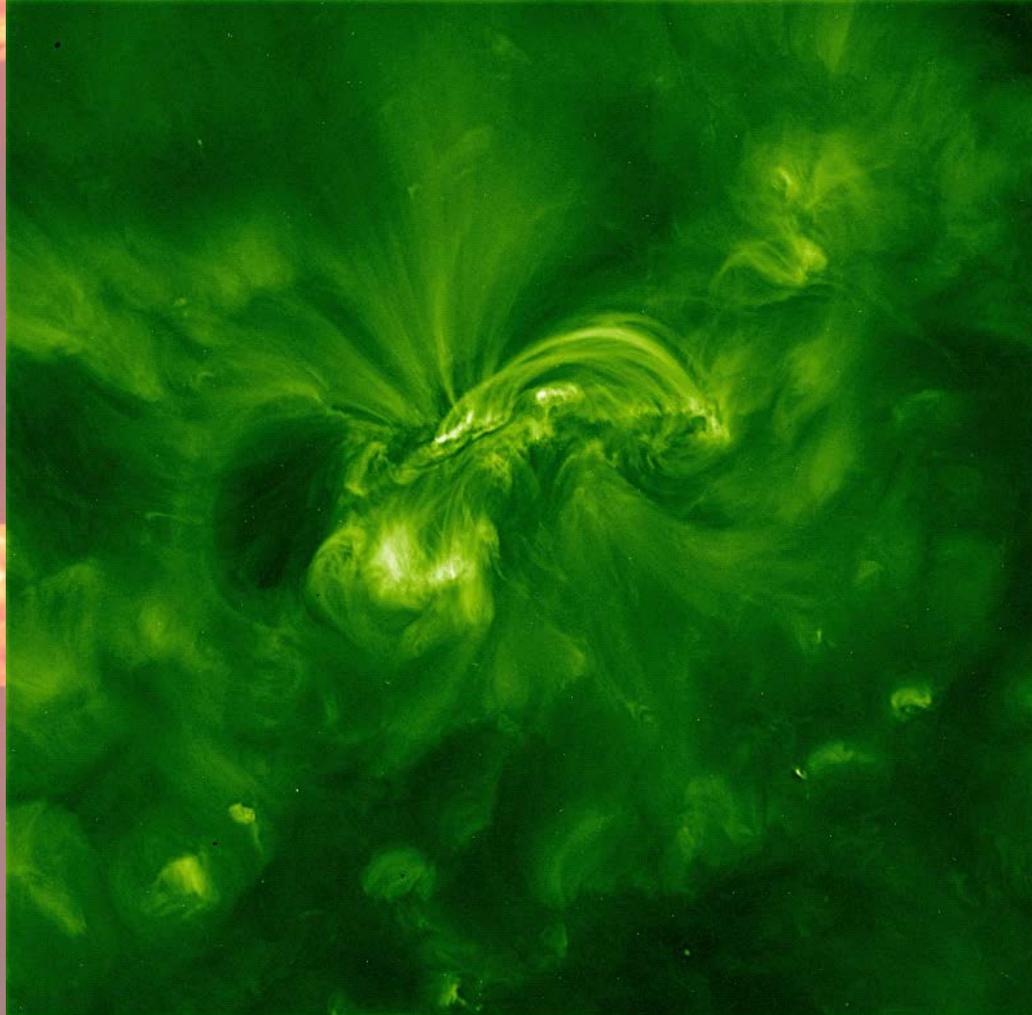


Champ magnétique

Plus souvent



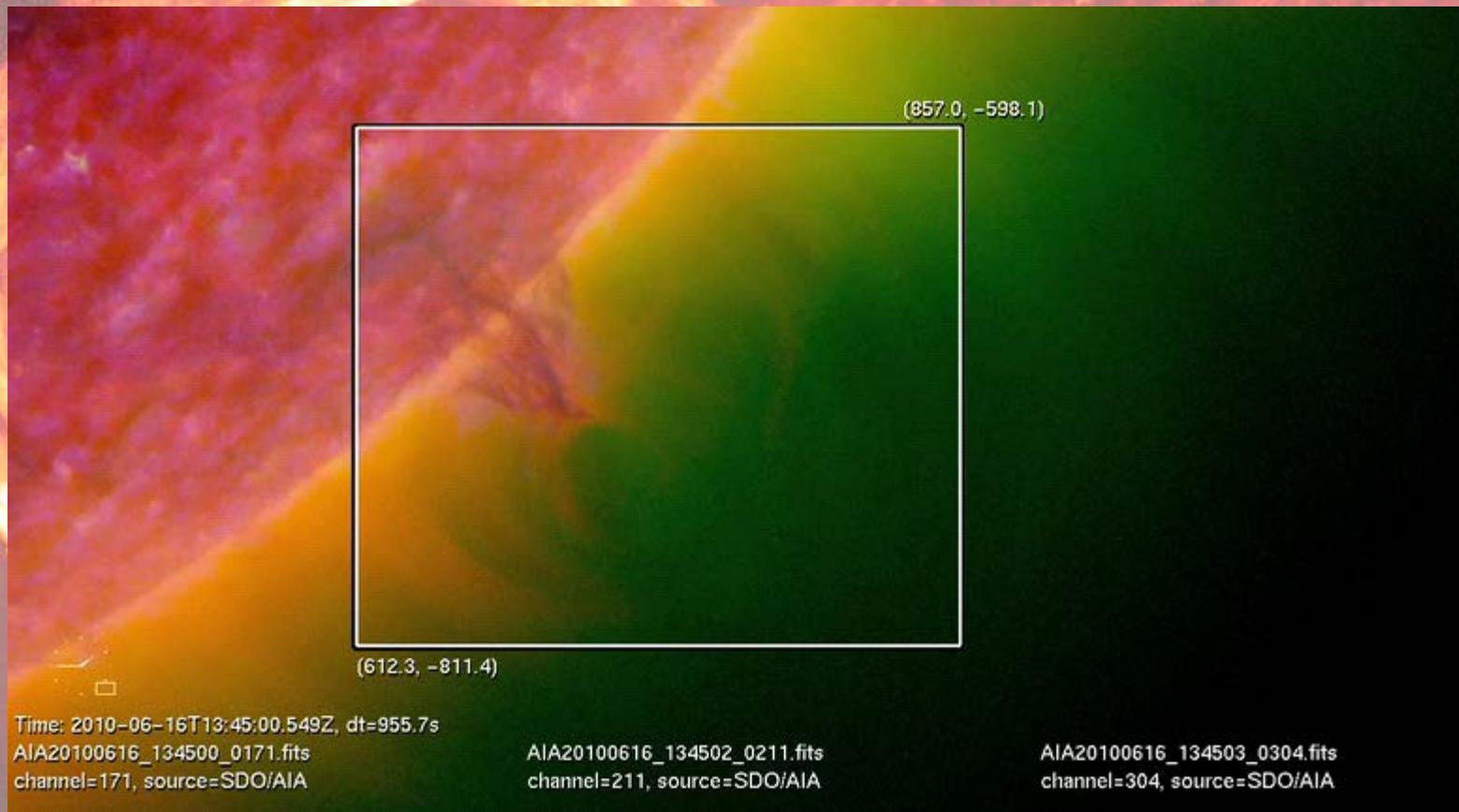
Eruption solaire



Taille de
la Terre →



Une protubérance et sa cavité



Observation du 17 Juin !

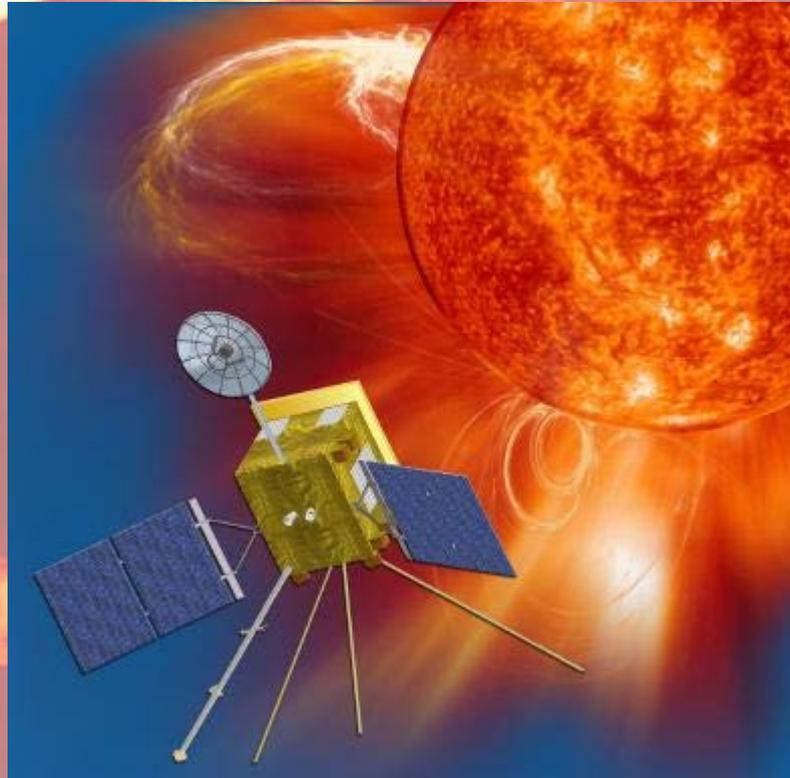
Taille de la Terre → 

Une masse énorme de données



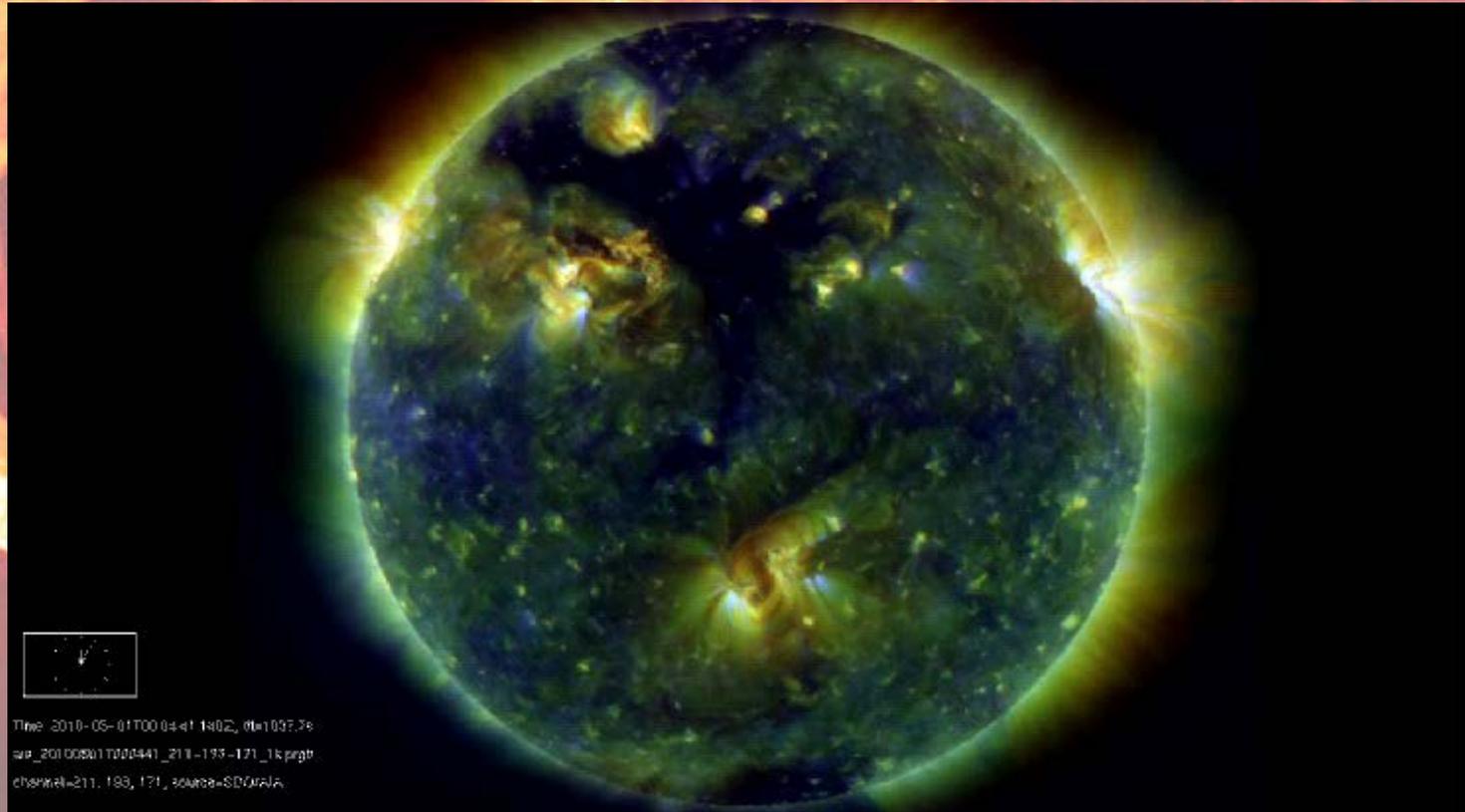
- Plus précis, plus large, plus souvent → Beaucoup plus de données
- SDO délivre l'équivalent de 300 DVDs ou 300 000 chansons mp3 par jour
- 15 ans de mission SOHO = 11 jours de SDO !

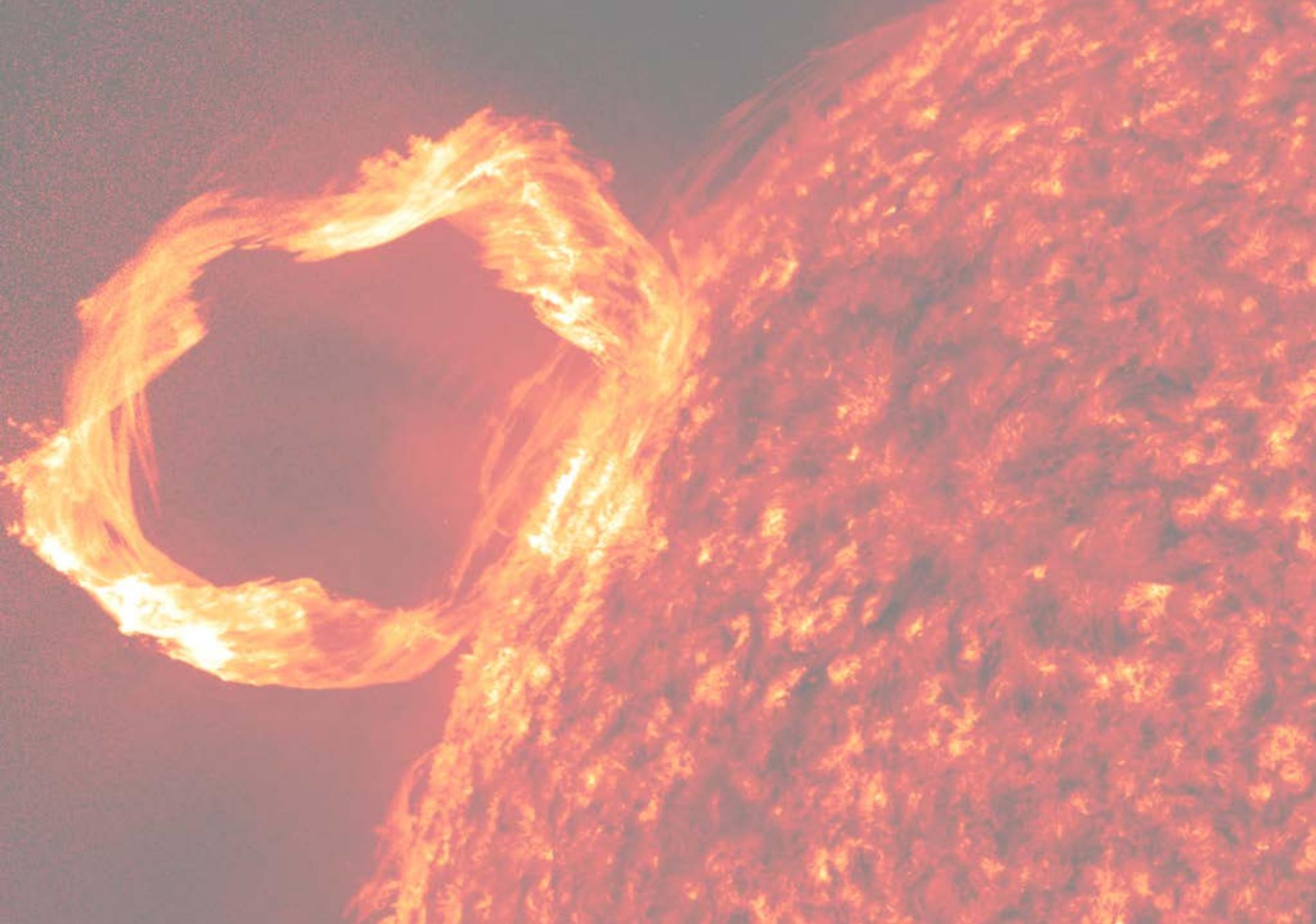
La suite ...



- Plus près : Solar Orbiter

Mai 2010 vu par SDO





20 Juin 2010 – Fête du Soleil – Observatoire de Meudon