



De l'Espace pour la Terre

Big Data

Accès et traitement des données d'Observation de la Terre



Jérôme GASPARI

Rencontres Décryptageo 2015 - Saint-Mandé, France - 09 Juin 2015



D

A

T

A





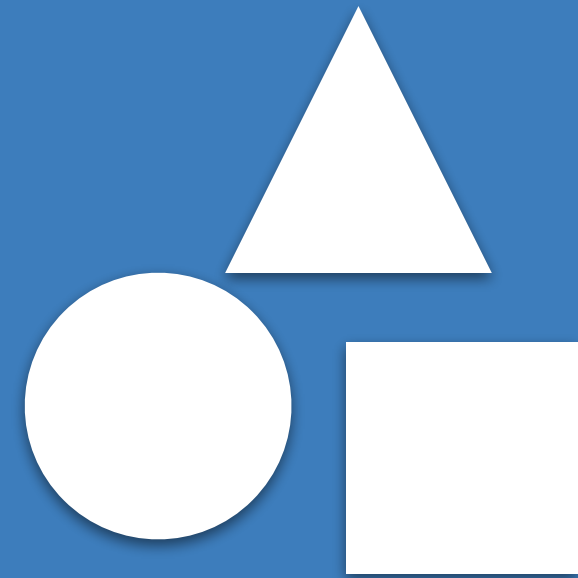
Volume

V



Volume

V

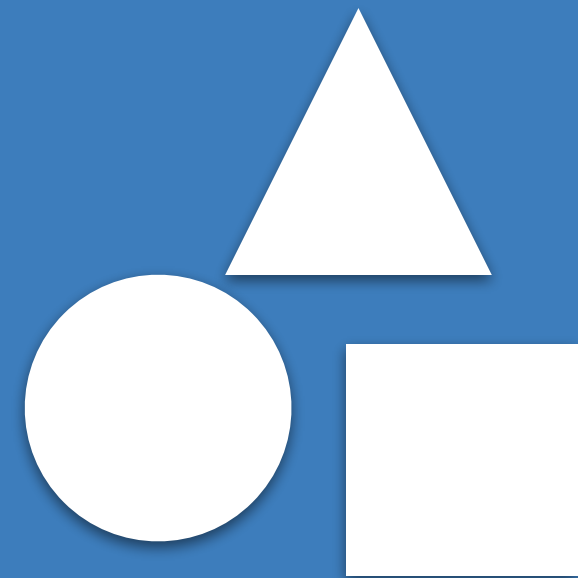


Variété



Volume

V



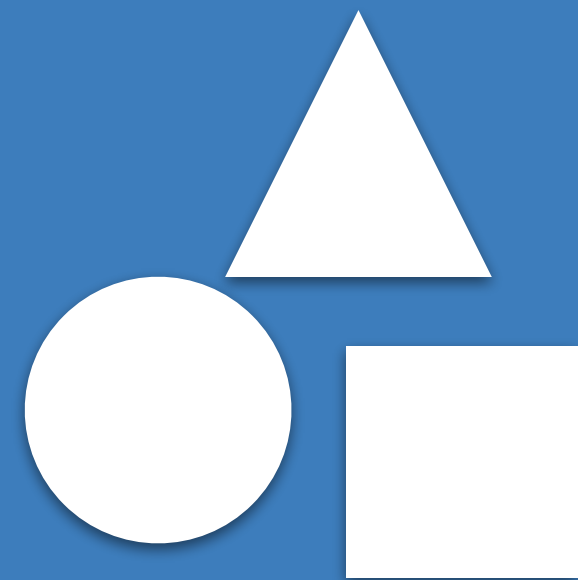
Variété



Vitesse



Volume



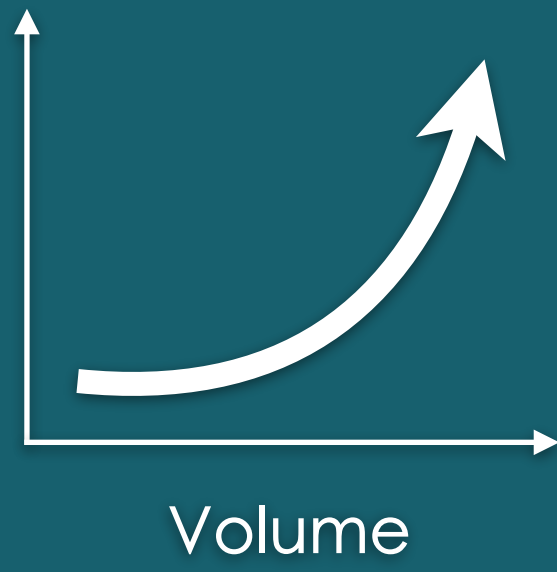
Variété



Valeur



Vitesse



An aerial view of Paris, France, during sunset. The Eiffel Tower is prominent on the left side of the frame. The city's dense urban landscape is visible, with numerous buildings and streets. The sky is filled with large, golden clouds, and the sun is low on the horizon, creating a warm, golden glow over the city. The text "L'ère du pétaoctet" is overlaid in the center of the image in a large, white, sans-serif font.

L'ère du pétaoctet

1

PETAOCTET

13.3 ANNEES DE VIDEO HD

1.5

PETAOCTET

TAILLE DES 10 MILLIARDS DE PHOTOS SUR FACEBOOK

20

PETAOCTETS

LA PRODUCTION MONDIALE DE DISQUES DURS EN 1995

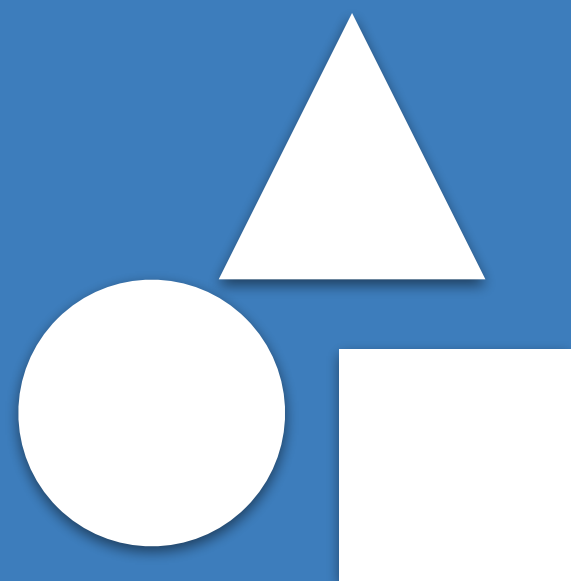
50

PETAOCTETS

L'INTEGRALITE DE TOUTE LA PRODUCTION ECRITE
DE L'HUMANITE DEPUIS L'INVENTION DE
L'ECRITURE DANS TOUTES LES LANGUES



1 petaoctet = 200 000 DVDs



Variété



Vitesse



1 **NEW** DEFINITION IS ADDED ON **Urban Dictionary**

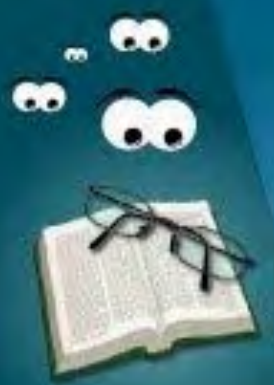
1,600+ **READS ON Scribd**

13,000+ HOURS **MUSIC** STREAMING ON **PANDORA**

12,000+ **NEW ADS** POSTED ON **craigslist**

370,000+ MINUTES **VOICE CALLS** ON **skype**

98,000+ **TWEETS**



20,000+ **NEW** POSTS ON **tumblr.**

THE **LARGEST** SOCIAL READING PUBLISHING COMPANY

320+ **NEW** **twitter** ACCOUNTS



13,000+ **iPhone** APPLICATIONS DOWNLOADED

100+ **NEW** **LinkedIn** ACCOUNTS

QUESTIONS ASKED ON THE INTERNET...

100+ **Answers.com**
40+ **YAHOO! ANSWERS**

1 **NEW** ARTICLE IS PUBLISHED **associatedcontent**

THE **WORLD'S LARGEST** COMMUNITY CREATED CONTENT!!



600+ **NEW** VIDEOS

6,600+ **NEW** PICTURES ARE UPLOADED ON **flickr**



25+ HOURS **TOTAL** DURATION

70+ **DOMAINS** REGISTERED

60+ **NEW** BLOGS

50+ **WORDPRESS** DOWNLOADS



168 MILLION **EMAILS** ARE SENT

694,445 **SEARCH** QUERIES

1,700+ **Firefox** DOWNLOADS

695,000+ **facebook** STATUS UPDATES

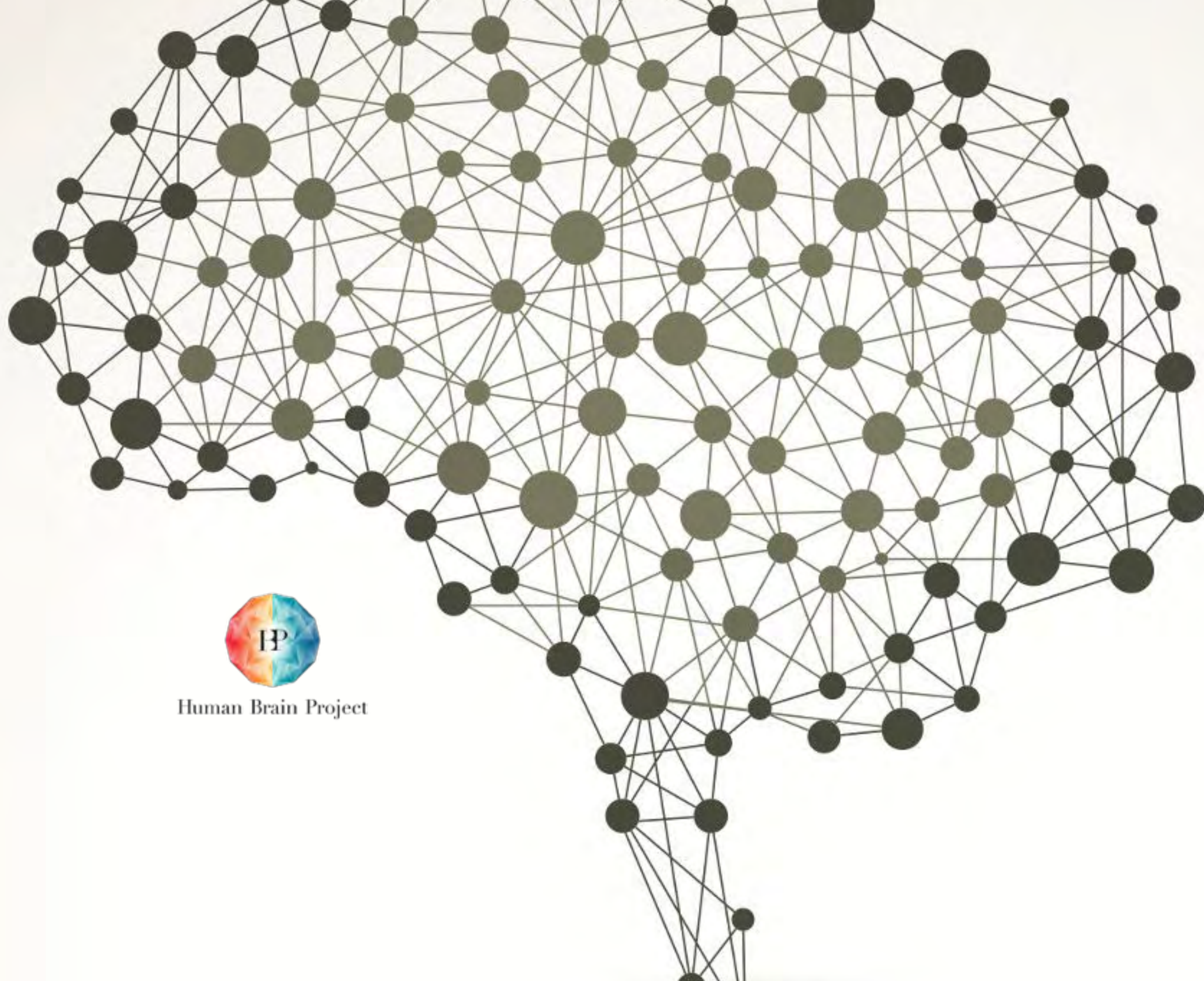
125+ **PLUGIN** DOWNLOADS



Valeur

Extraire l'information





Human Brain Project



1 exaflops

1 milliard de milliard d'opérations par seconde en 2024



Human Brain Project

Big Data...Big Problem ?





~ 30W

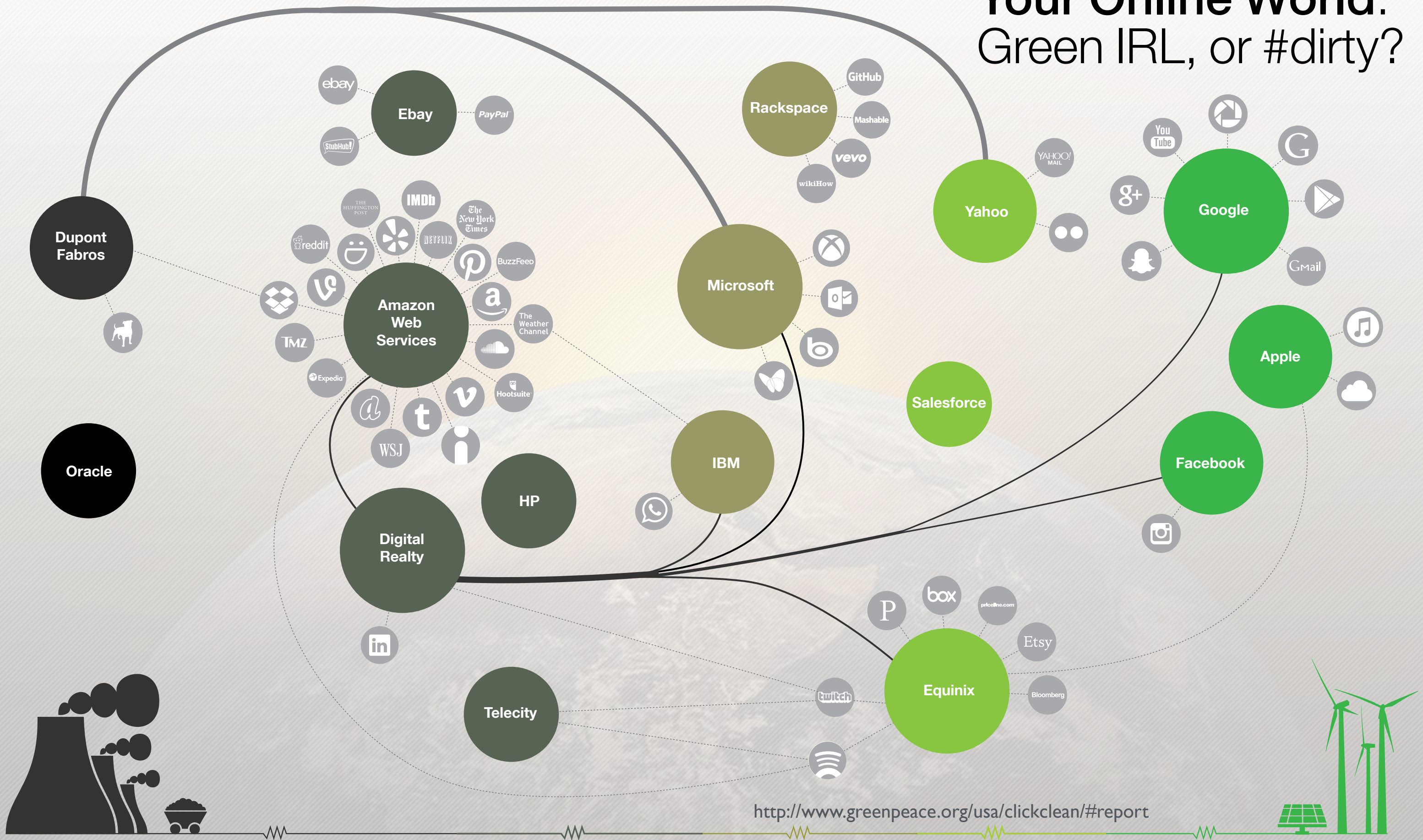


Human Brain Project

~ 30MW



Your Online World: Green IRL, or #dirty?





Big Data...from space

Le programme Sentinel

Sentinel-1

RADAR
S1A - April 2014
S1B mid 2015



Sentinel-2

OPTICAL
S2A - June 2015
S2B mid 2016



Sentinel-3

ALTIMETER / SEA SURFACE
S3A - Summer 2015
S3B mid 2016



Sentinel-4

ATMOSPHERE
2018



Sentinel-5P

ATMOSPHERE
End 2015



Sentinel-5

ATMOSPHERE
2020



Sentinel-6

?



A satellite with gold-colored panels and blue solar arrays is shown in orbit above the Earth. The Earth's surface is visible, showing landmasses and clouds. A rainbow-colored strip is overlaid on the Earth's surface, indicating the satellite's path or data collection area.

Sentinel 2

Une « photo » d'une résolution de 10 mètres de toutes les terres émergées...tous les 5 jours

Des millions d'images ?





Quand



Où



Comment



Quoi

Contenu de l' image ?

iTAg

Etiquetage automatique des produits d'Observation de la Terre



Image orthorectifiée

Ce que l'on a



C'est de la **forêt**

C'est de l'**eau**

C'est du **bâti**

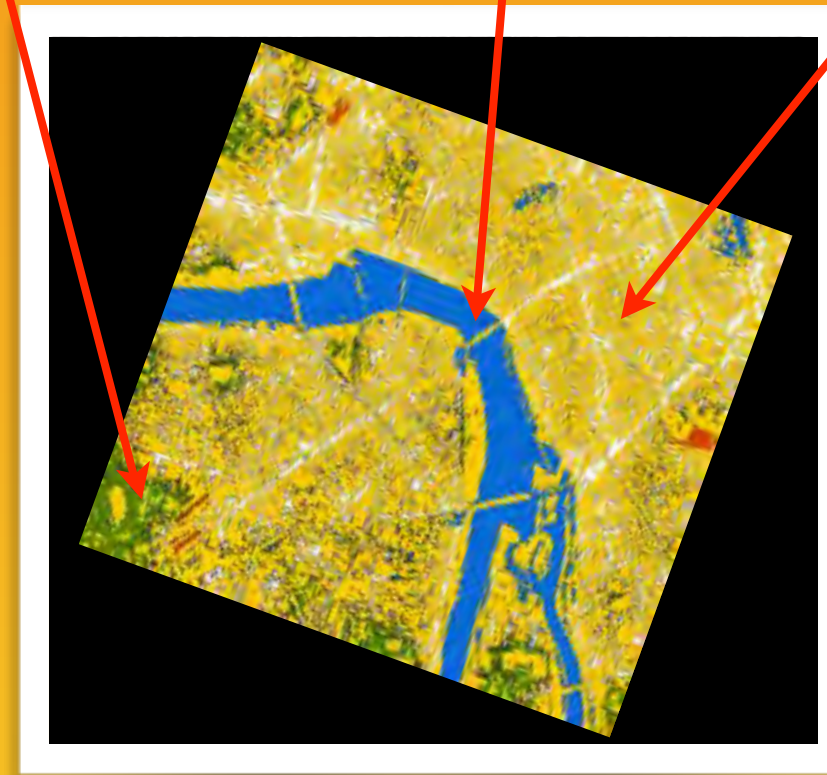
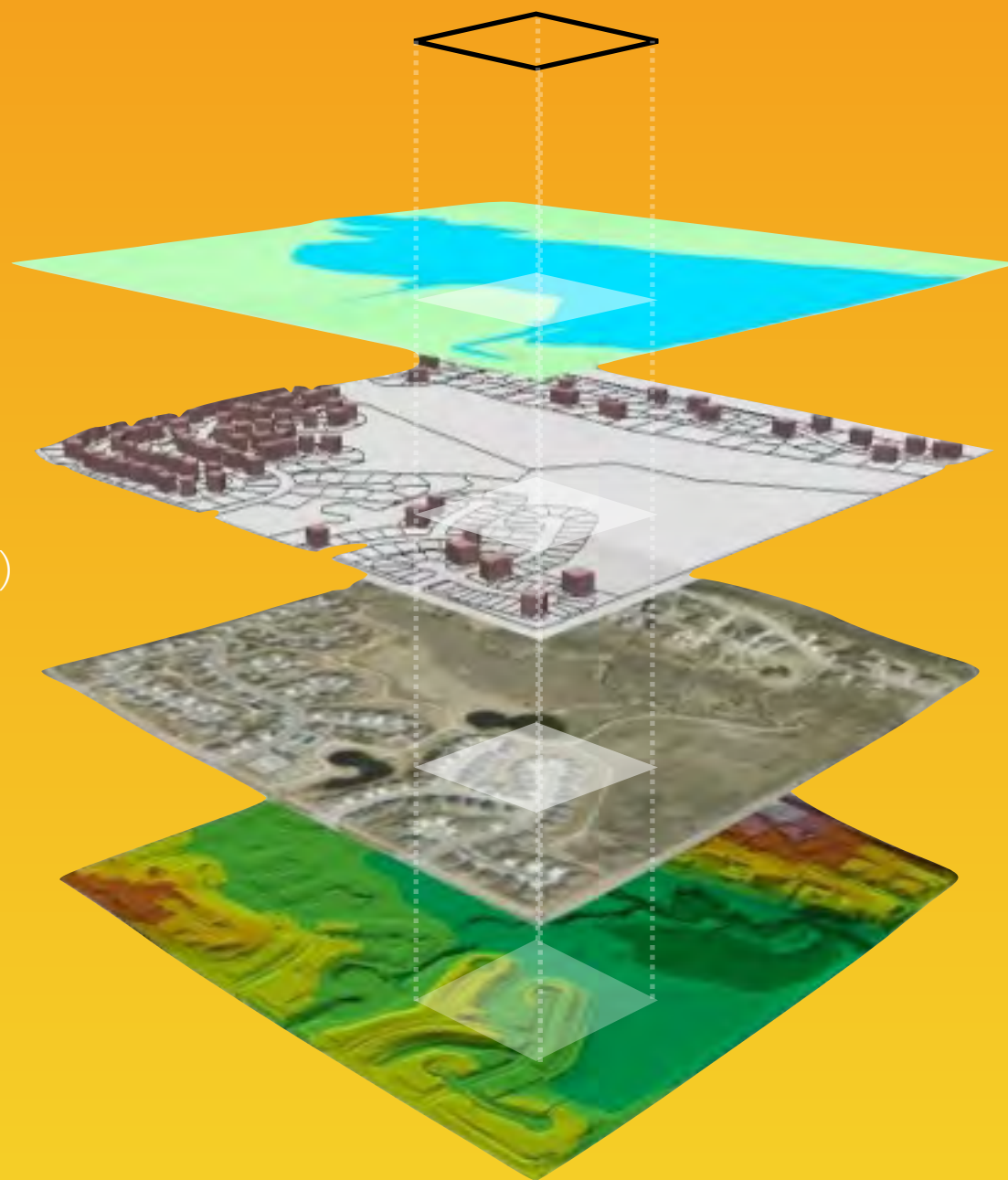


Image classifiée

Ce que l'on veut

Emprise de l'image



Bords de côtes

Toponymes

(Continents, Pays, Régions, Etats)

Densité de population

Occupation du sol

...etc...

Couches d'informations



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          ]  
        }  
      ]  
    }  
  ],  
  [...etc...]  
}
```



Mots clés descriptifs

🚩 Keywords

Northern hemisphere

🌍 Location

Europe
 France
 Rhône-Alpes
 Savoie
 Provence-Alpes-Côte-d'Azur
 Hautes-Alpes
 Italy
 Piemonte
 Turin
 Valle d'Aosta
 Aoste

Localisation
 « toponymique »

Occupation du sol

🌲 Land use

Forest 48.92%

Desert 31.74%

Herbaceous Area 15.92%

resto

Vers un moteur de recherche pour l'Observation de la Terre

ROCKET

EXPLORE

Coastal town of California acquired in spring without clouds

SIGN IN

REGISTER



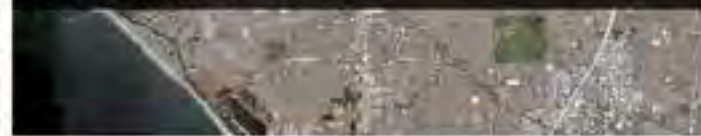
PLEIADES | June 4th 2015 - 19:08:40
United States of America



PLEIADES | June 4th 2015 - 19:08:31
United States of America



PLEIADES | June 1st 2015 - 18:44:05
United States of America



PLEIADES | April 30th 2015 - 18:39:52
United States of America



spring

PLEIADES | May 3rd 2015 - 19:04:44
United States of America



PLEIADES | May 1st 2015 - 18:32:46
United States of America



ROCKET | April 30th 2015 - 18:12:02
United States of America



PLEIADES | April 30th 2015 - 18:39:40
United States of America



PEPS

Plateforme d'Exploitation des Produits Sentinelles

Chercher
Visualiser
Télécharger
Exploiter

 cnes

<https://vimeo.com/122638288>

2020

17 PO

DVDs



Amener le traitement au
plus près des données




HPC 50 Teraflops

cnes

esa
ariane

Applications

 **Theia**
Pôle Thématique
Surfaces Continentales

<https://www.theia-land.fr>

Agriculture



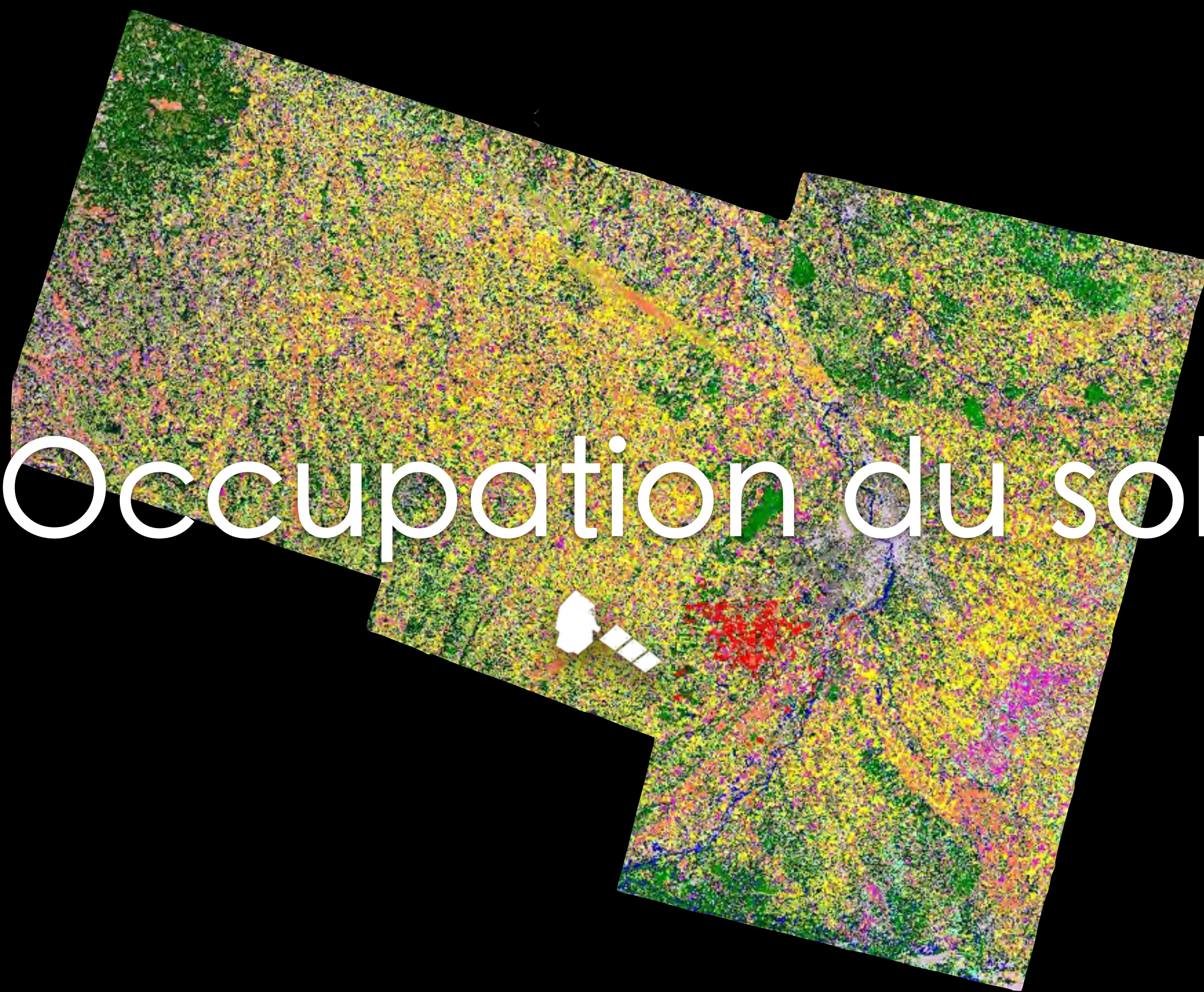
Biomasse



Surface enneigée



Occupation du sol





cnes

Pléiades 1A - 50 cm colour
Extract over Tokyo Sky Tree

© Cnes 2012 - Distribution: Astrium Services / Spot Image