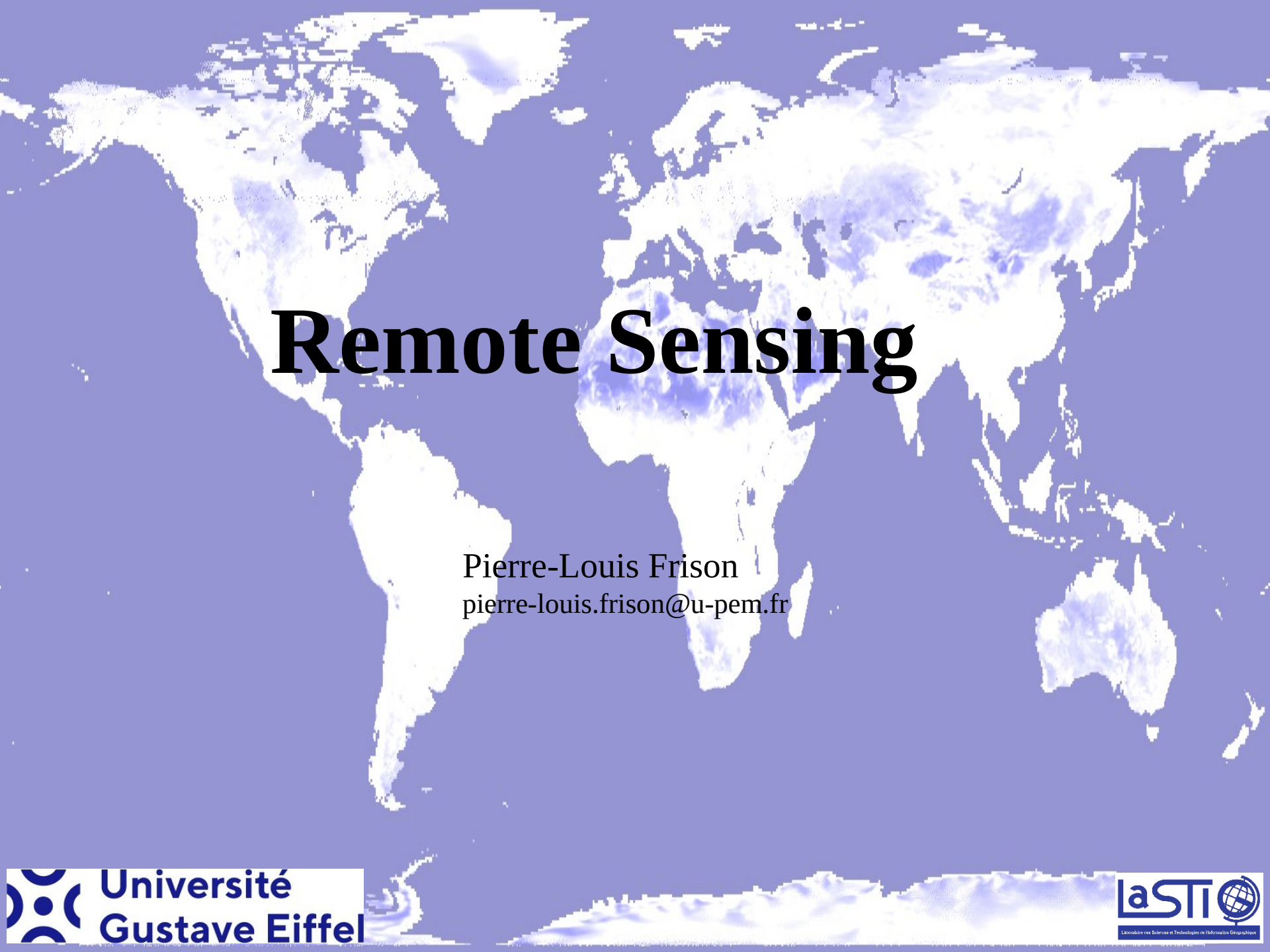

Remote Sensing

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- M. Canty, « Image Analysis, Classification, and Change Detection in Remote Sen
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Some web sites

Centre Canadien de Télédétection: *http://www.ccrs.nrcan.gc.ca/resource/tutor/fundam/chapter3/01_f.php*

Missions du CNES: *http://smsc.cnes.fr/Fr/HomeFr.html*

Missions de l'ESA: *http://earth.esa.int/missions/*

Sentinel-1 /

Satellite ENVISAT de l'ESA: http://envisat.esa.int/handbooks/

http://envisat.esa.int/earth/www/area/index.cfm?fareaid=6

SPACEBORNE REMOTE SENSING

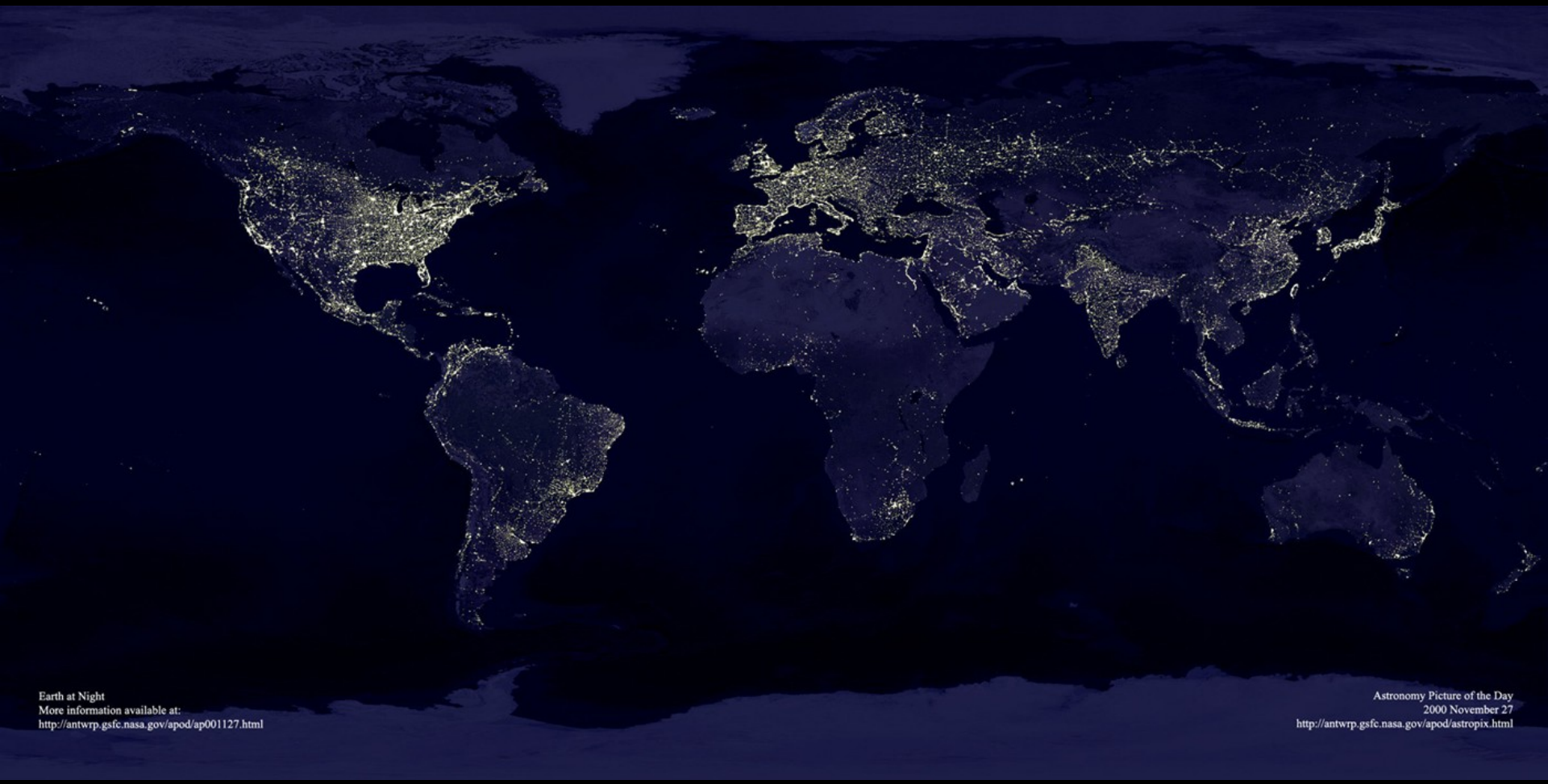
<u>Principle</u>: - Studies of Earth (planets) : ocean – land surfaces - atmosphere
- detection EM Waves: emited, reflected or scatteredou from observed surfaces

<u>Interest :</u> - terrestrial ressources survey
- Meteorological forecast improvment
- geographical data

<u>Observation</u>:

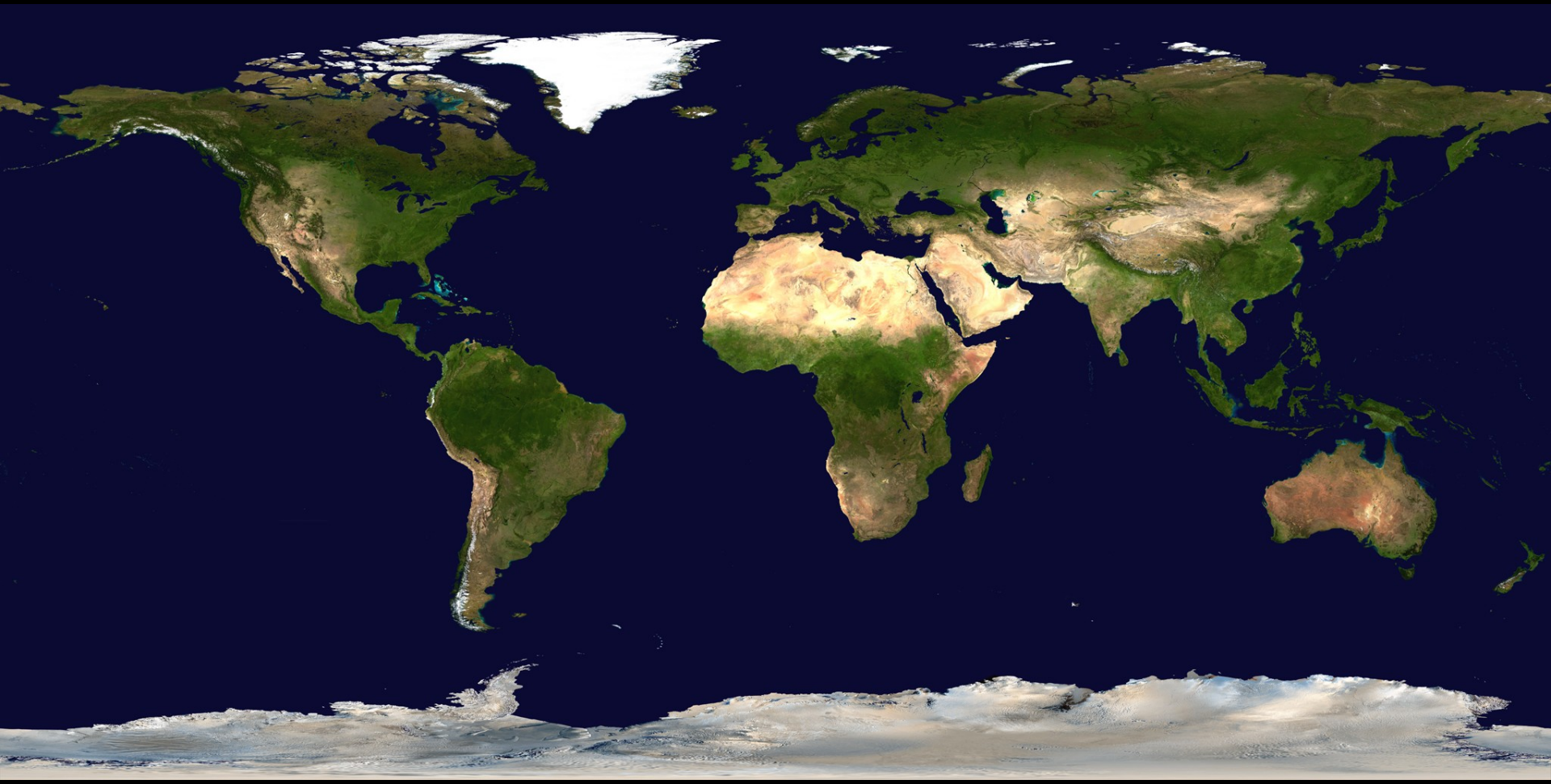
- global
- continuous
- over large temporal period
  - different types of informations:
    - spatial (coverage/ resolution)
    - spectral
    - temporal

The Earth seen at night



Satellite DMSP

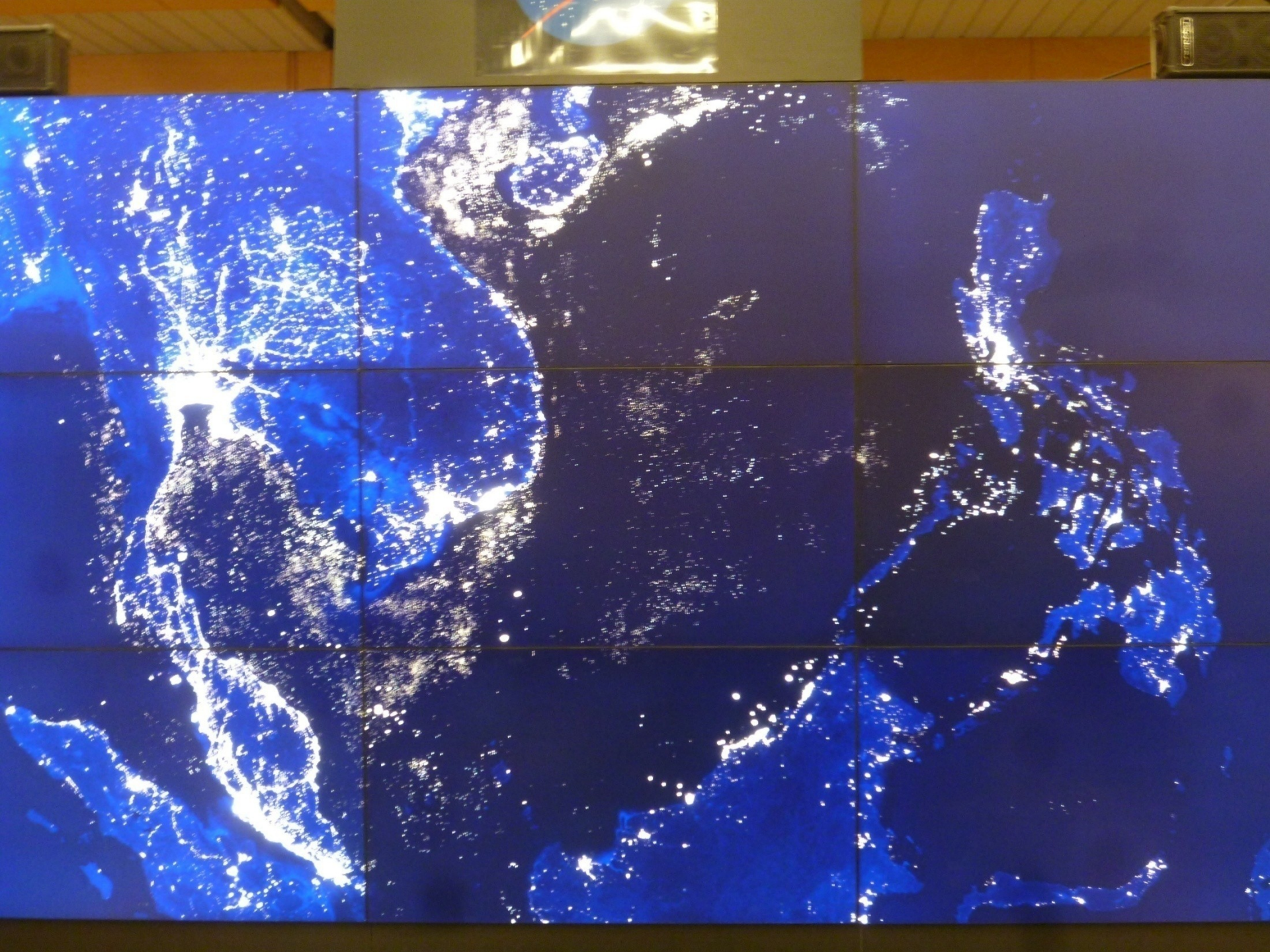
The Earth seen during the day

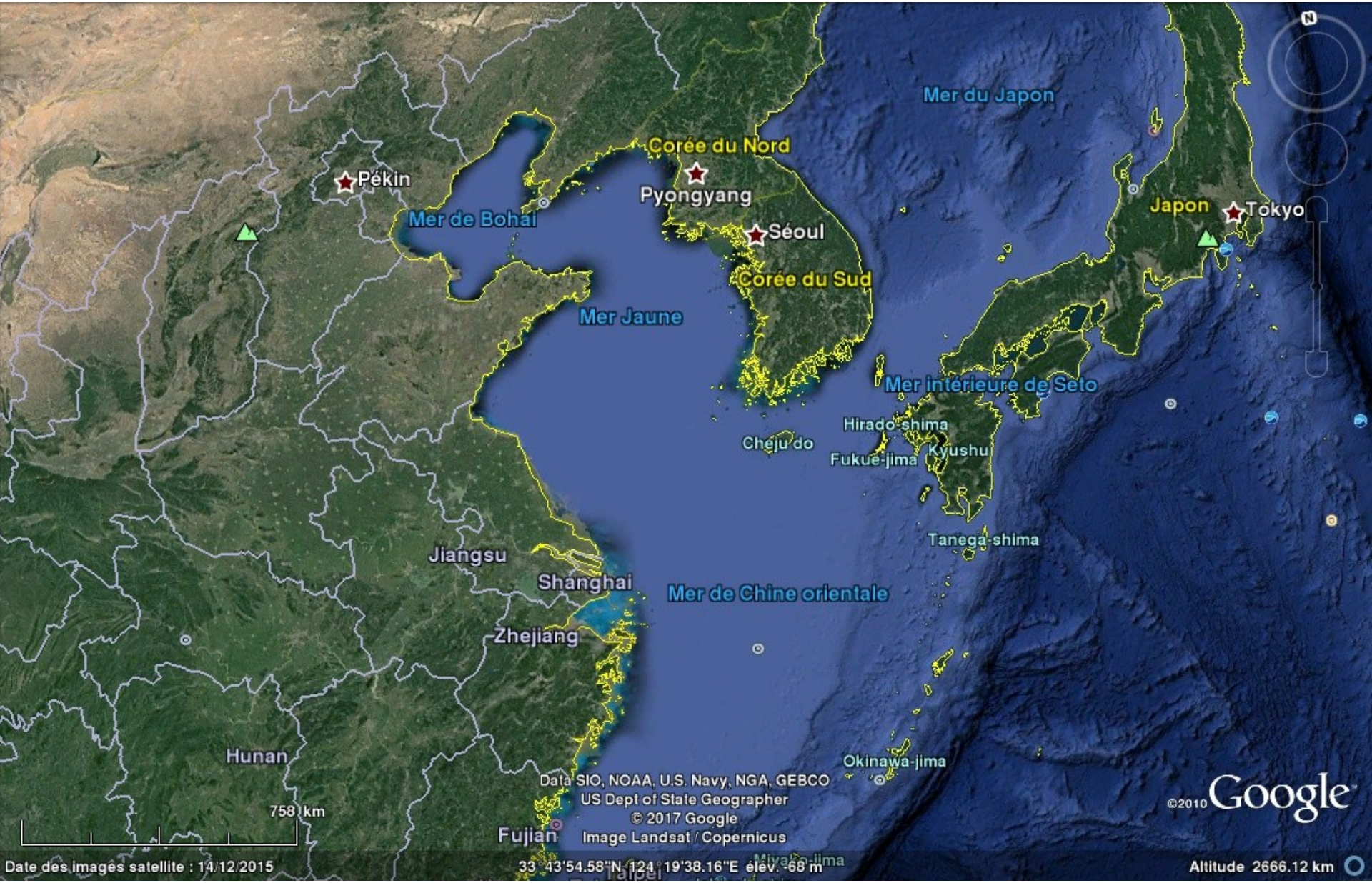


Capteur MODIS


NASA/NOAA


NASA




Mer du Japon
Corée du Nord
Pyongyang
Pékin
Mer de Bohai
Séoul
Japon
Tokyo
Corée du Sud
Mer Jaune
Mer intérieure de Seto
Hirado-shima
Cheju do
Fukue-jima
Kyushu
Tanega-shima
Jiangsu
Shanghai
Mer de Chine orientale
Zhejiang
Hunan
Okinawa-jima
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
US Dept of State Geographer
© 2017 Google
Image Landsat / Copernicus
758 km
Fujian
©2010 Google
Date des images satellite : 14/12/2015
33°43'54.58"N 124°19'38.16"E élev. -68 m
Altitude 2666.12 km

Accessible Variables byRemote Sensing

Atmosphere

temperature, rainfalls, clouds (types, distribution), winds (speed/direction), gaz concentrations (Co_2, 0_3….)

Océans

temperature, topography, bathimetry,
colour(phytoplancton, sediments, chimical composition,..),
winds (speed/direction), Energie spectrum of waves

Land surfaces

topography, ground movements, temperature, albedo, soil moisture, vegetation (type, stress), land use, biomass, urban structures, …..

Cryosphere

Distribution, land/sea ice, ice dynamics and types,
icebergs, glaciers, snow, ….

CONCERNED DOMAiNS

climatology

meteorology

Océanography

glaciology

Agriculture, forestry

geology, cartography,…

Natural hazards

2 MAIN TYPES OF ORBITS

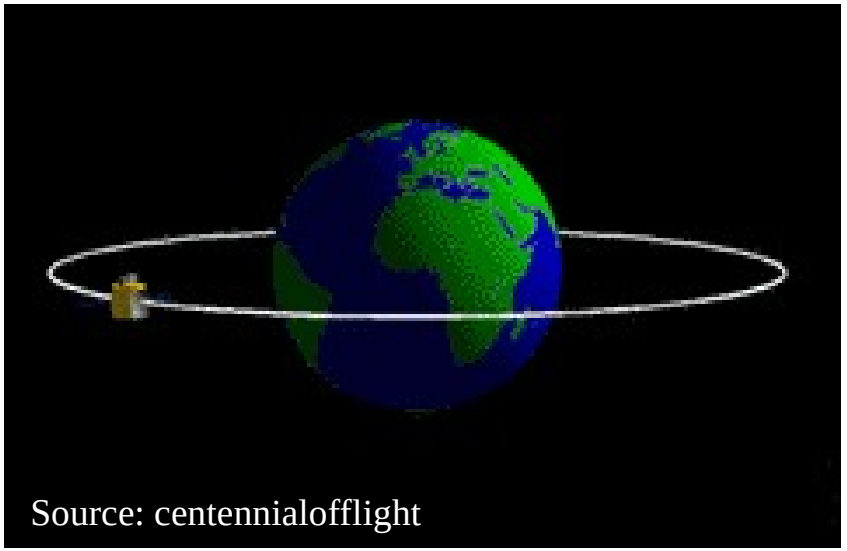
Geostationary

Heliosynchroneous

GEOSTATIONARY ORBIT

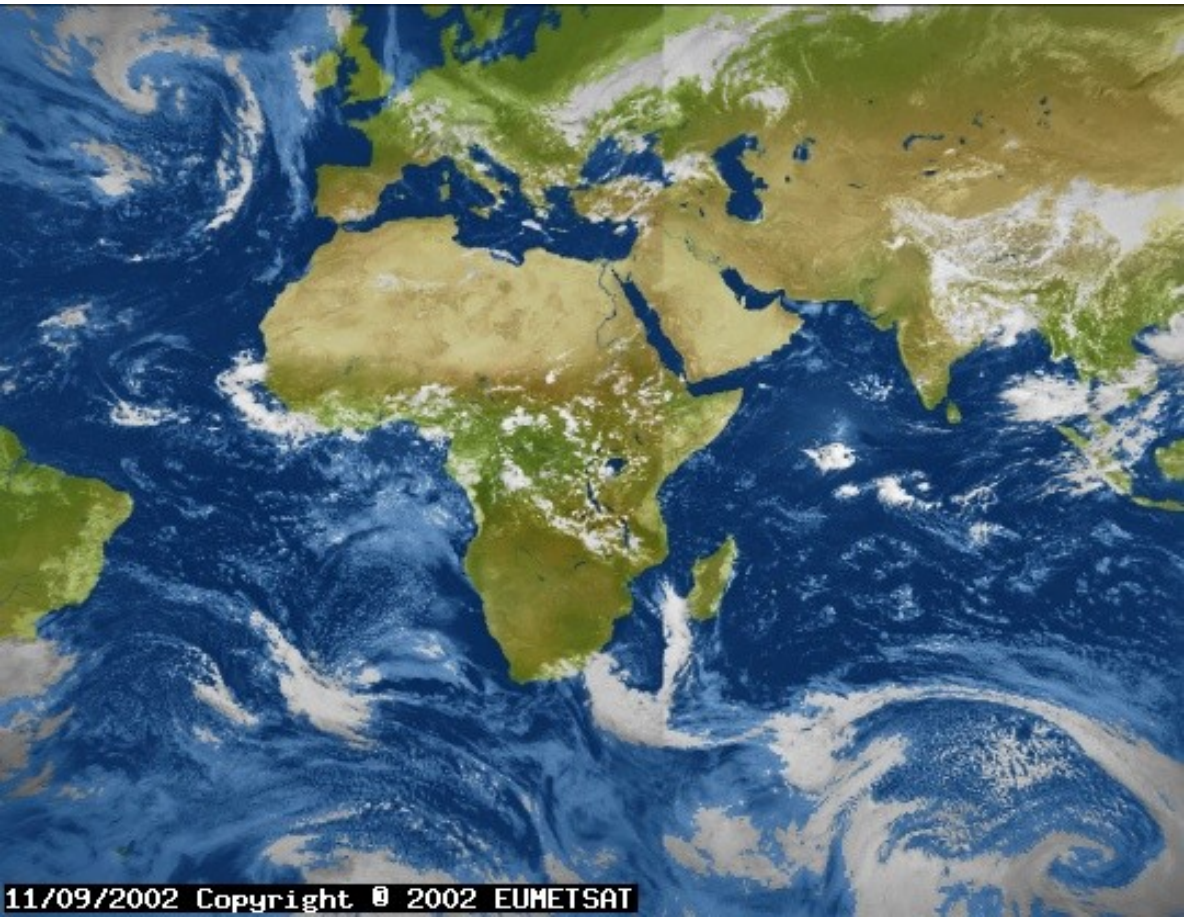
Equatorial plane

R = 36 000 km



Source: centennialofflight

GEOSTATIONARY ORBIT: ADVANTAGES & INCONVENIENTS



(+)

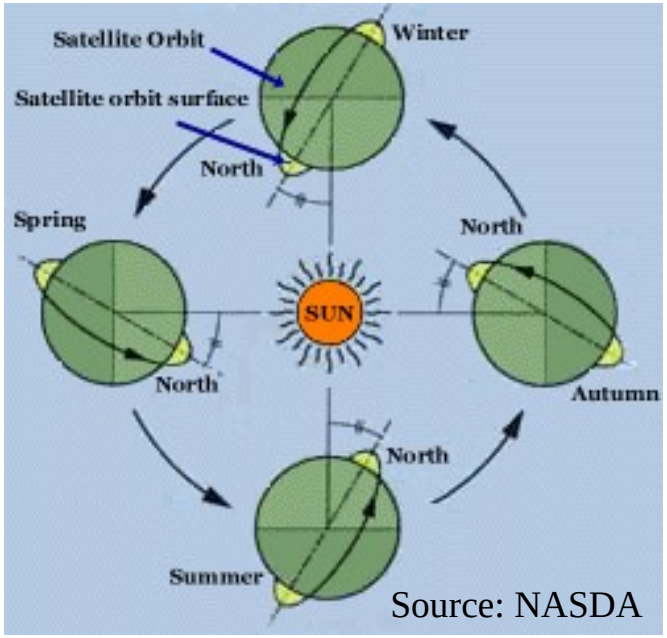
- Temporal revisit (1 acquisition / 15 min)
- 3 satellites enough for simultaneous global coverage

(-)

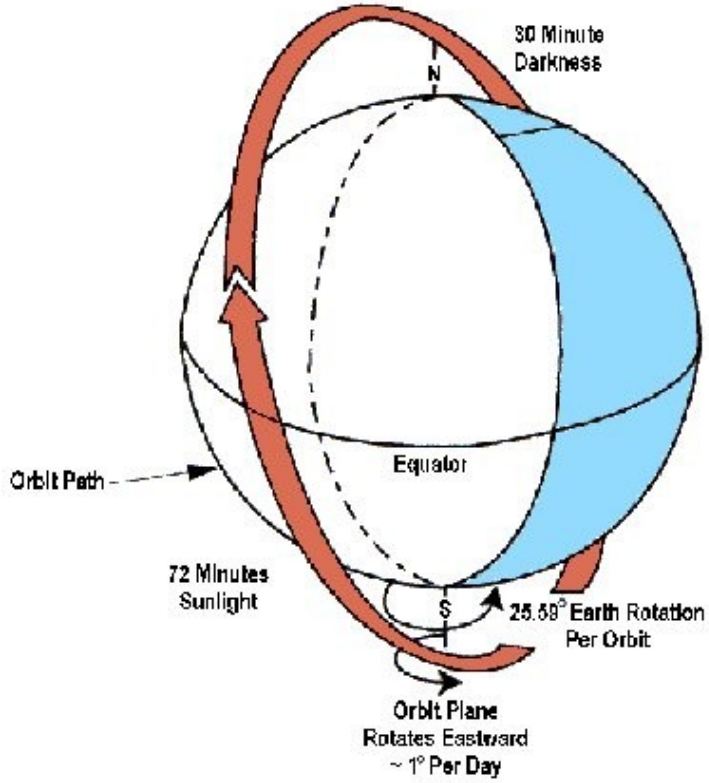
- Low spatial resolution
- Limited to low latitudes

Exemple of METEOSAT et MSG satellites

HELIOSYNCHRONEOUS ORBIT



Source: NASDA



Source: centennialofflight

- Orbital plane – Solar direction = cste
  ➔latitude visit: same local time
- Near-polar orbite
- R 700 – 800 km
- T 1h40 (14 orbits / days)

HELIOSYNCHRONEOOUS ORBIT: ADVANTAGES & INCONVENIENTS

(+)

- Access everywher in the globe
- Homogeneous acquisition configuration (whatever the longitude)
- Same solar illumination

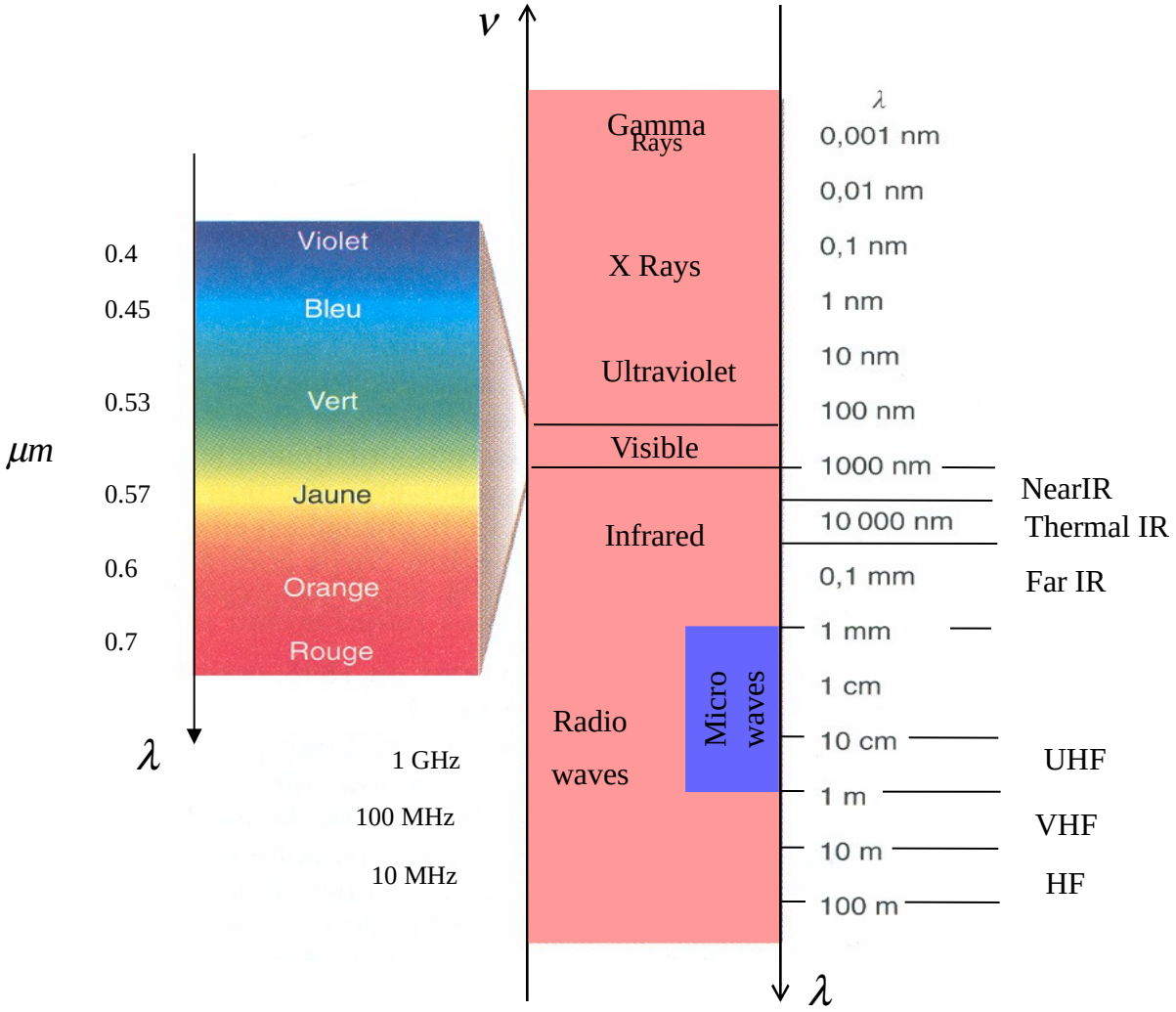
(-)

- Temporal revisit
- Global cover:

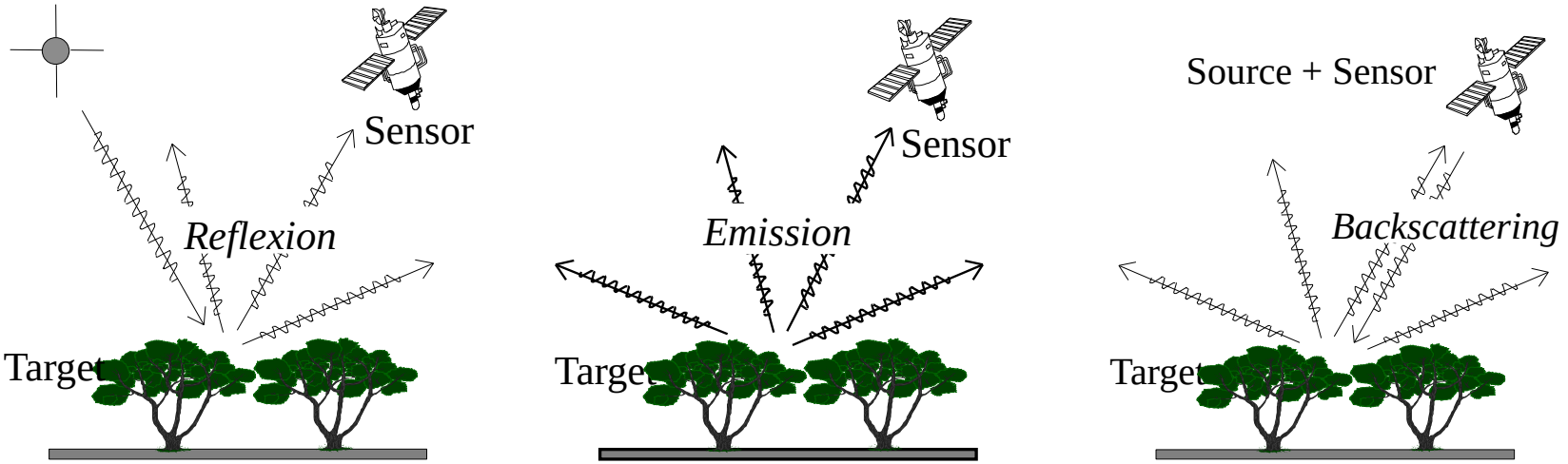
SEAWIFS ground tracks after 24 hours of acquisition


SPECTRAL INFORMATION

The Electromagnetic Spectrum



Observation modes



VIS
NIR, MIR

TIR
Microwaves

'active'
microwaves

Content

Radiometry

Optical domain

Spatial Information

Thermal IR and passive microwaves domain