ÇEV 361
Coğrafi Bilgi Sistemleri ve Uzaktan Algılama

Uzaktan Algılamaya Giriş

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https://ozgurzeydan.com.tr/

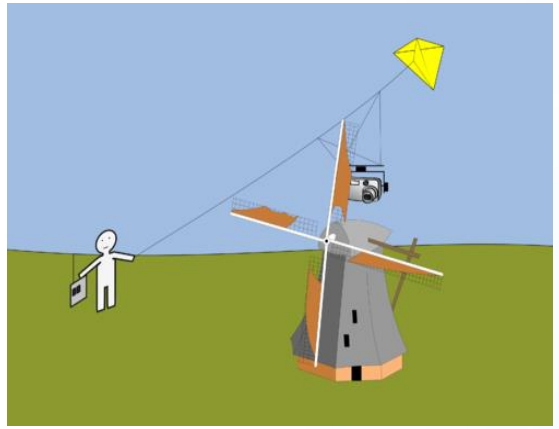
Uzaktan Algılama - Tanım

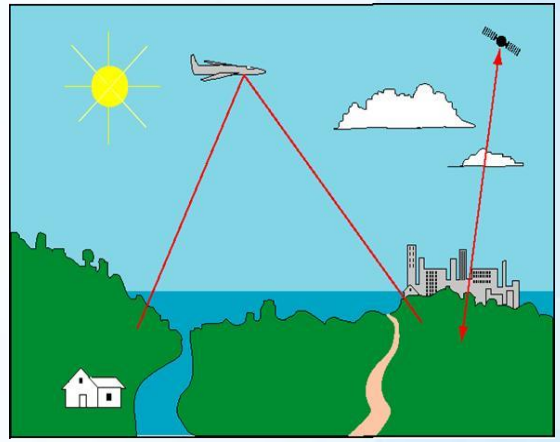
- Bir nesneye dokunmadan o nesne hakkında bilgi sahibi olma yöntemidir.
- Dünya üzerindeki bir bölge hakkındaki bilgiler, o bölge ile fiziksel temas halinde bulunmayan sensörler aracılığıyla elde edilir.
- Sensörlerin veri elde etmeleri sırasında atmosferik etkiler söz konusudur.

Uzaktan Algılama - Tarihçesi

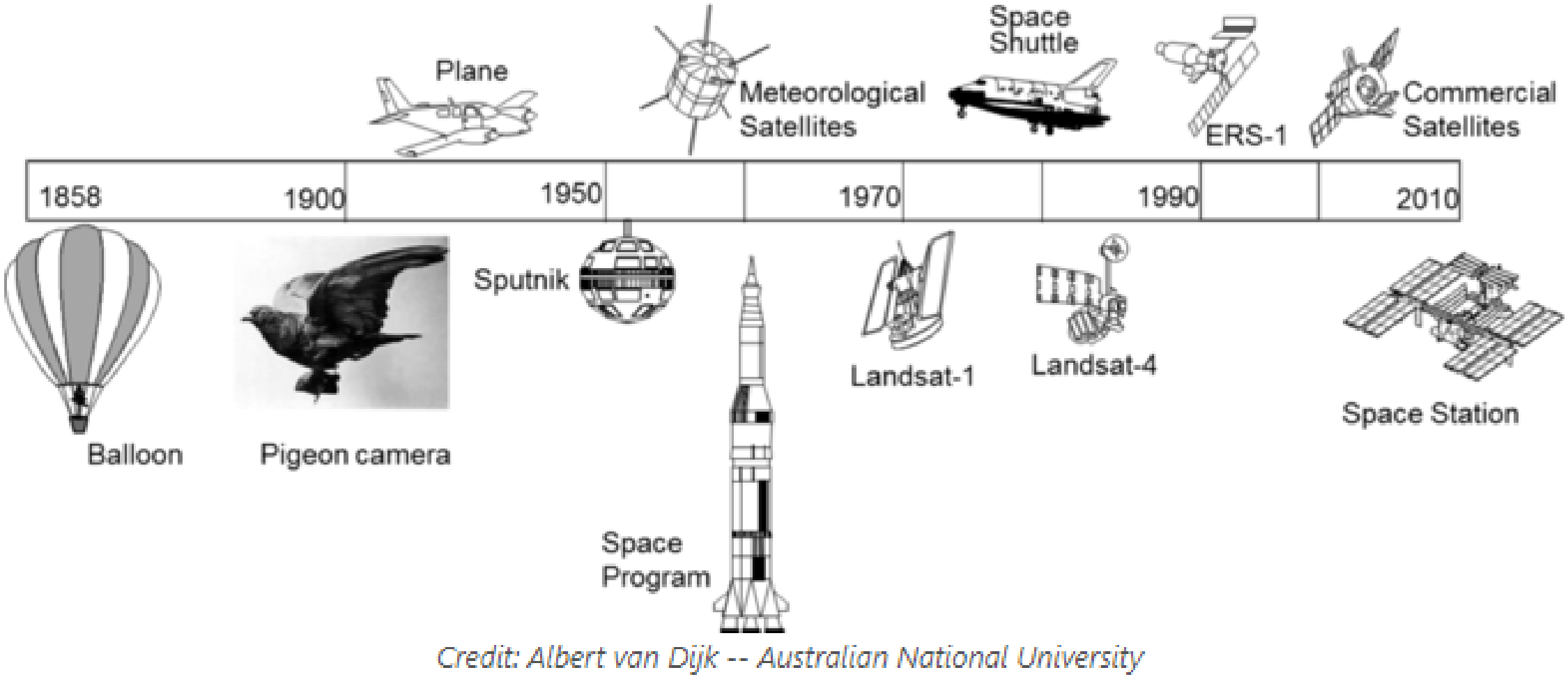
- Balon fotoğrafları
- Güvercinler üzerindeki kameralar
- Uçurtma üzerindeki kameralar

- Uçaklardan çekilen fotoğraflar
  - Hava fotoğrafları
- Uzaydan alınan görüntüler
  - Uydu görüntüleri





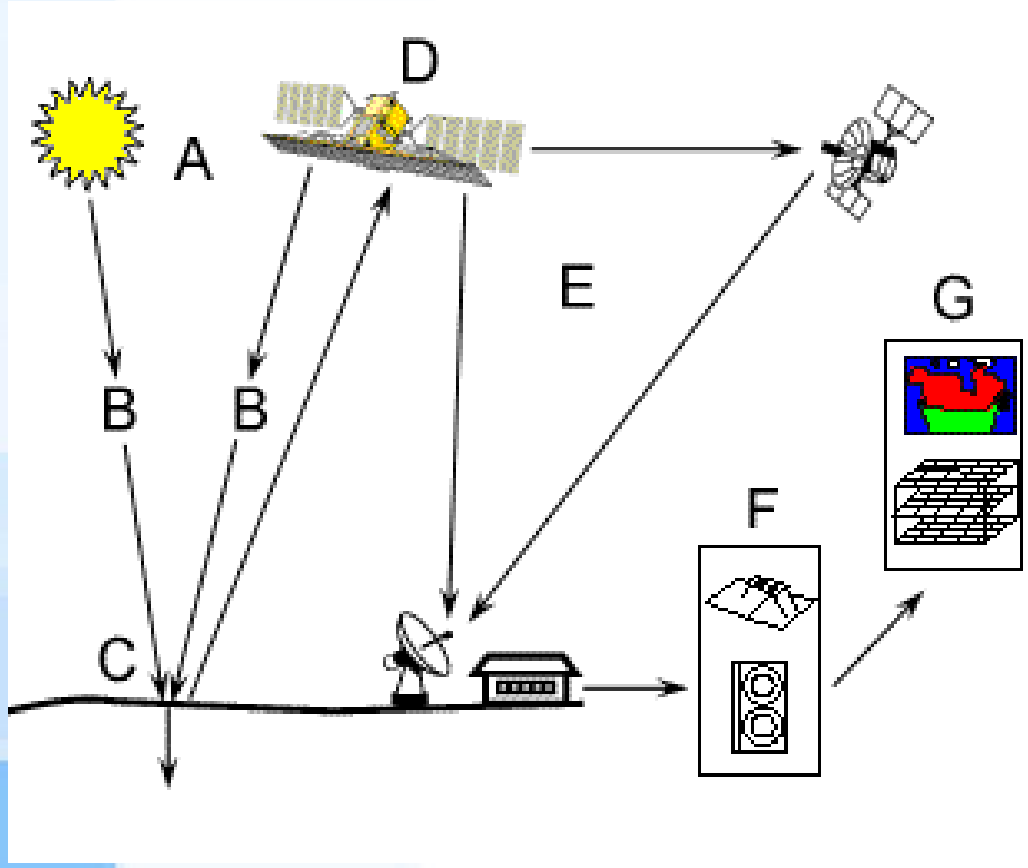
Uzaktan Algılama - Tarihçesi



Credit: Albert van Dijk -- Australian National University

https://anu-wald.github.io/dea_course/numpy/matplotlib/satellite/2020/08/09/introduction-to-remote-sensing.html

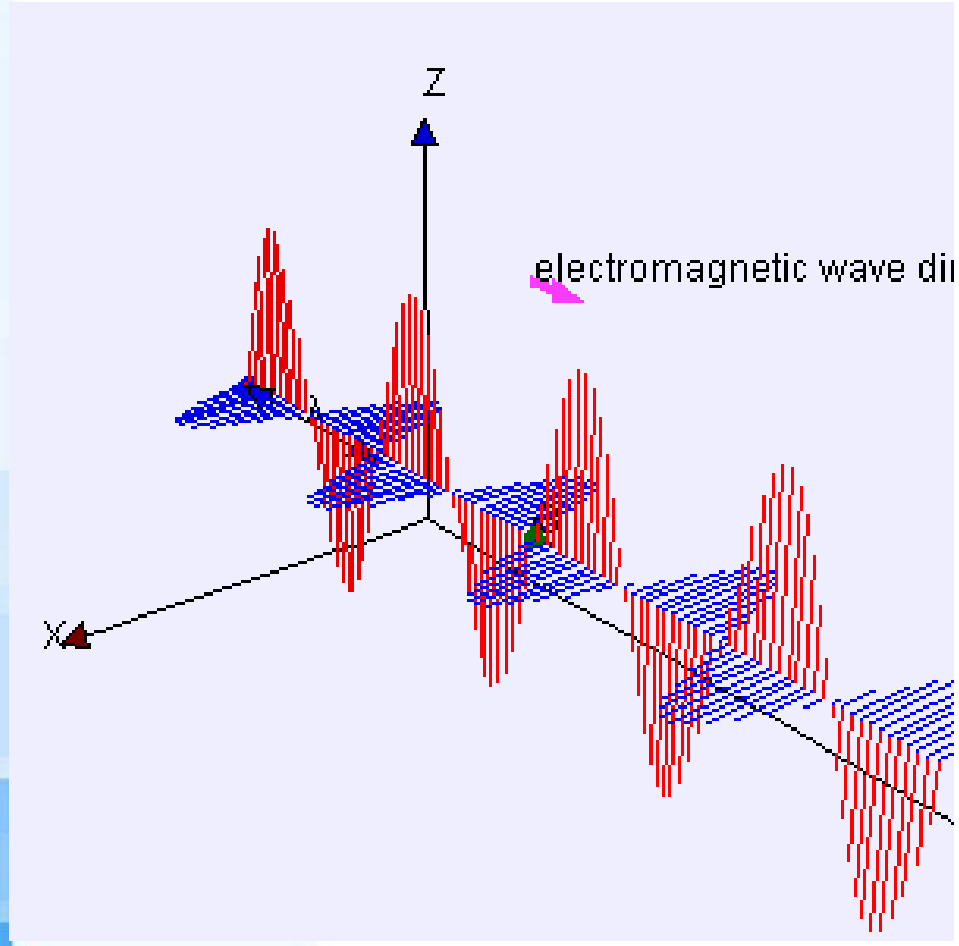
Uzaktan Algılamanın Bileşenleri



- A: Enerji kaynağı
- B: Atmosferik radyasyon
- C: Görüntülenen nesne
- D: Sensör tarafından kaydedilen enerji
- E: Verinin iletilmesi, kaydedilmesi ve işlenmesi
- F: Verinin yorumlanması ve analizi
- G: Uygulama

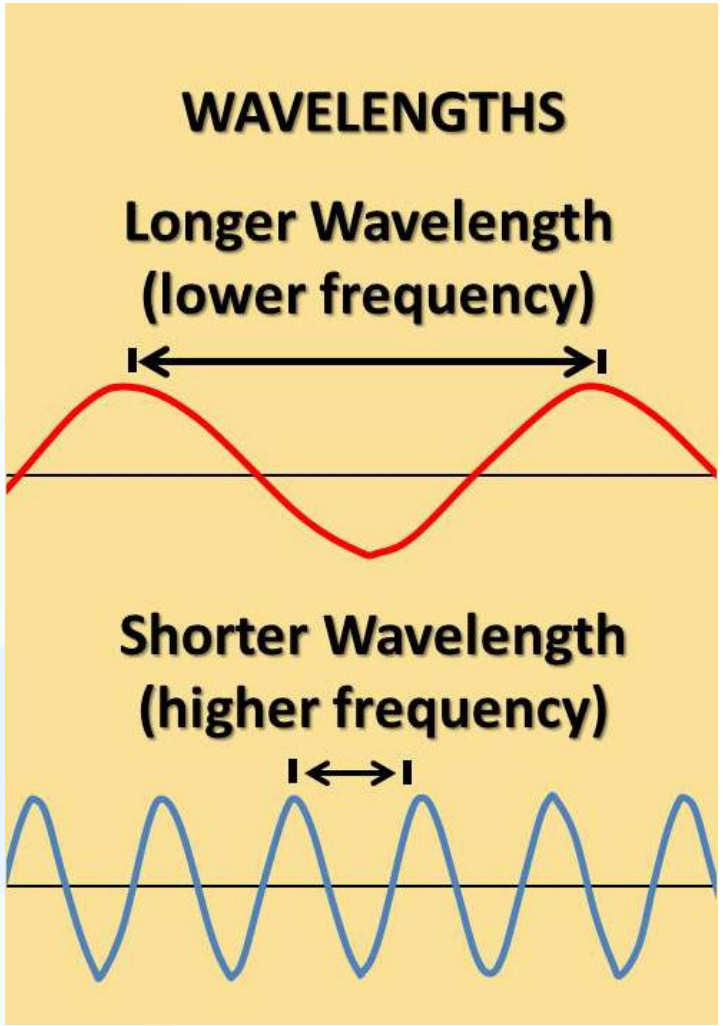
http://maprabu.blogspot.com.tr/2014/03/remote-sensing.html

Elektromanyetik Dalgalar



- Mavi renk manyetik alanı, kırmızı renk elektrik alan temsil emektedir.
- Görüldüğü gibi manyetik alan, elektrik alan ve dalganın yayılma yönü birbirine diktir.
- (James Clerk Maxwell)

Elektromanyetik Dalgalar

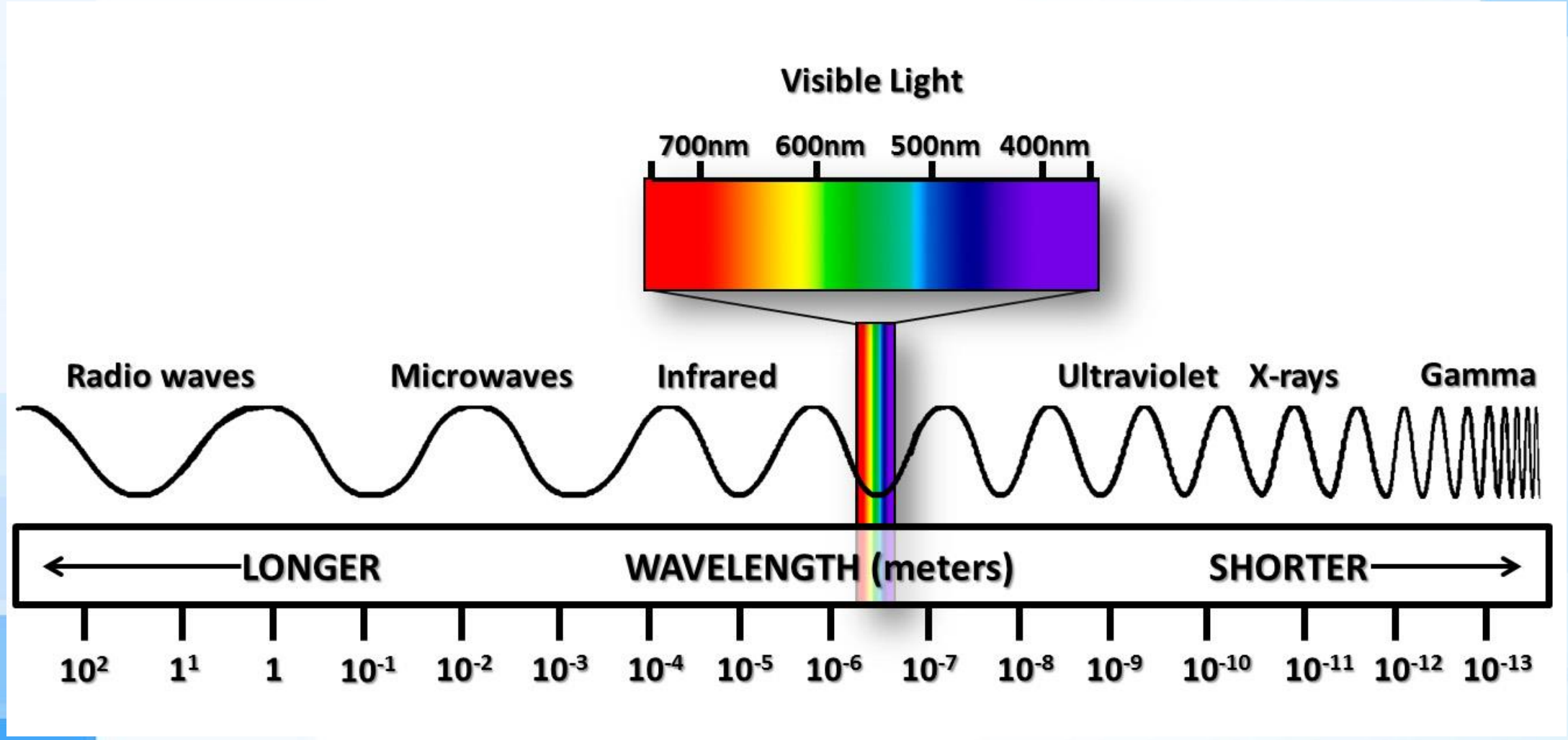


- $C = \lambda f$

- C : ışık hızı ($3x10^8$ m/s)
- λ : Dalga boyu (m)
- f : Frekans (1/s - hertz)

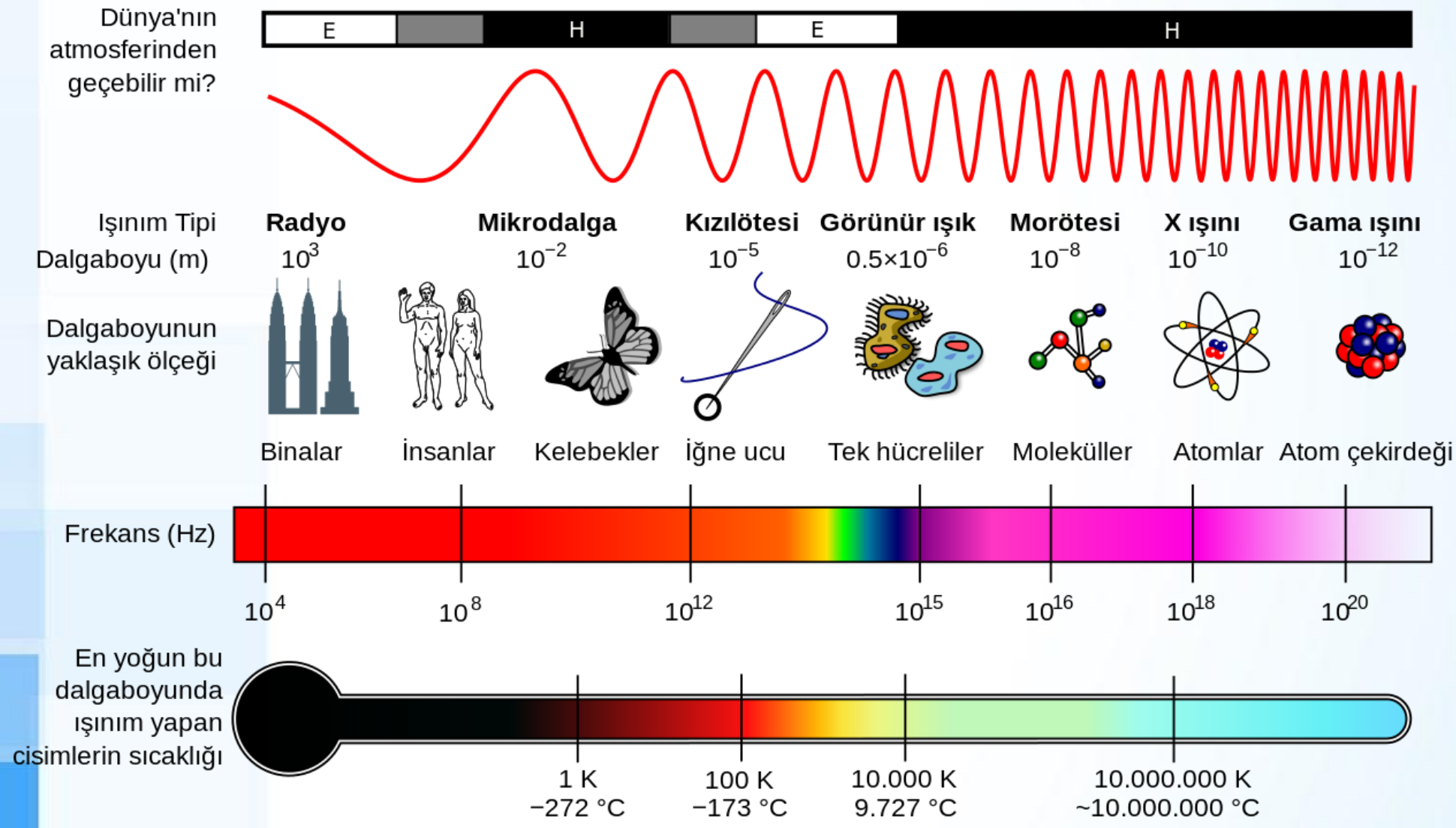
Wavelength units:	length
Angstrom (A) :	1 A = $1x10^{-10}$ m;
Nanometer (nm):	1 nm=$1x10^{-9}$ m;
Micrometer (μm):	1 μm = $1x10^{-6}$ m;

Elektromanyetik Spektrum

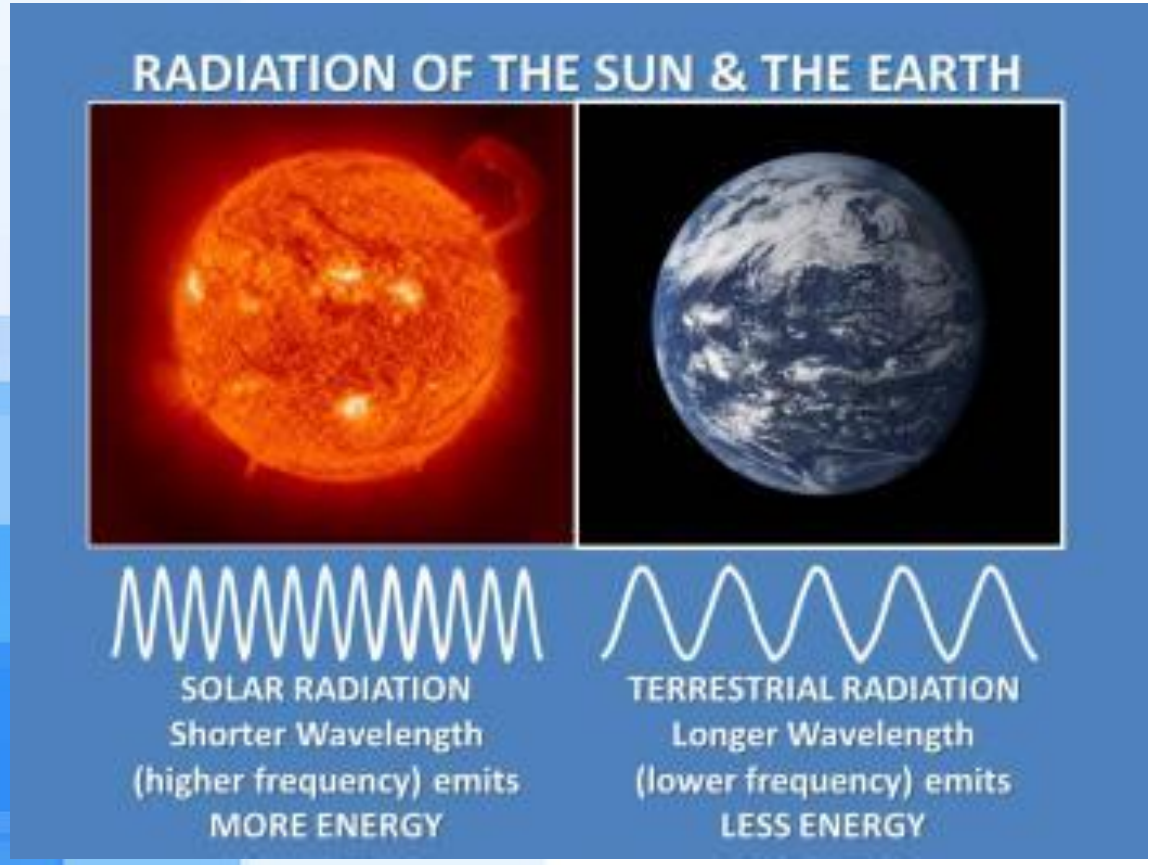


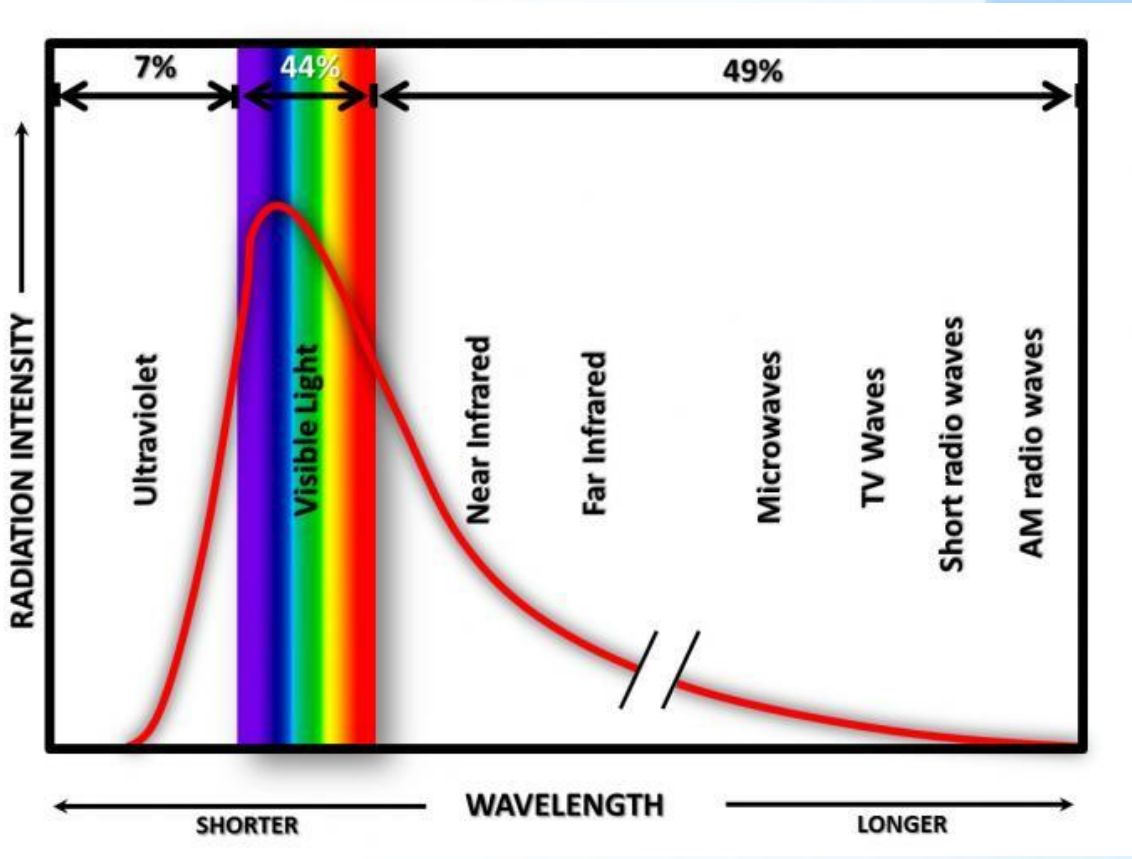
http://www.ces.fau.edu/nasa/module-2/radiation-sun.php

Elektromanyetik Spektrum



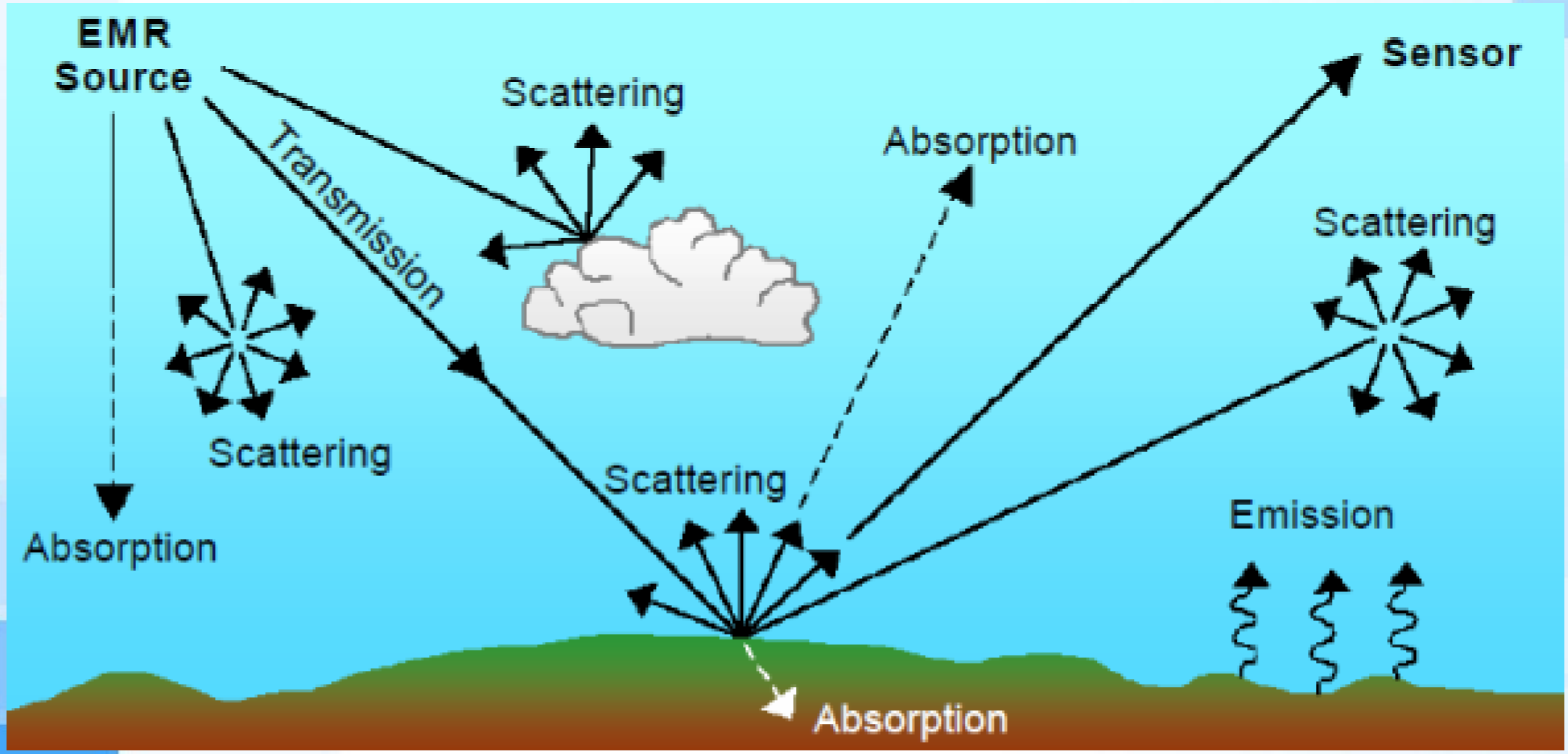
Güneşin Elektromanyetik Spektrumu



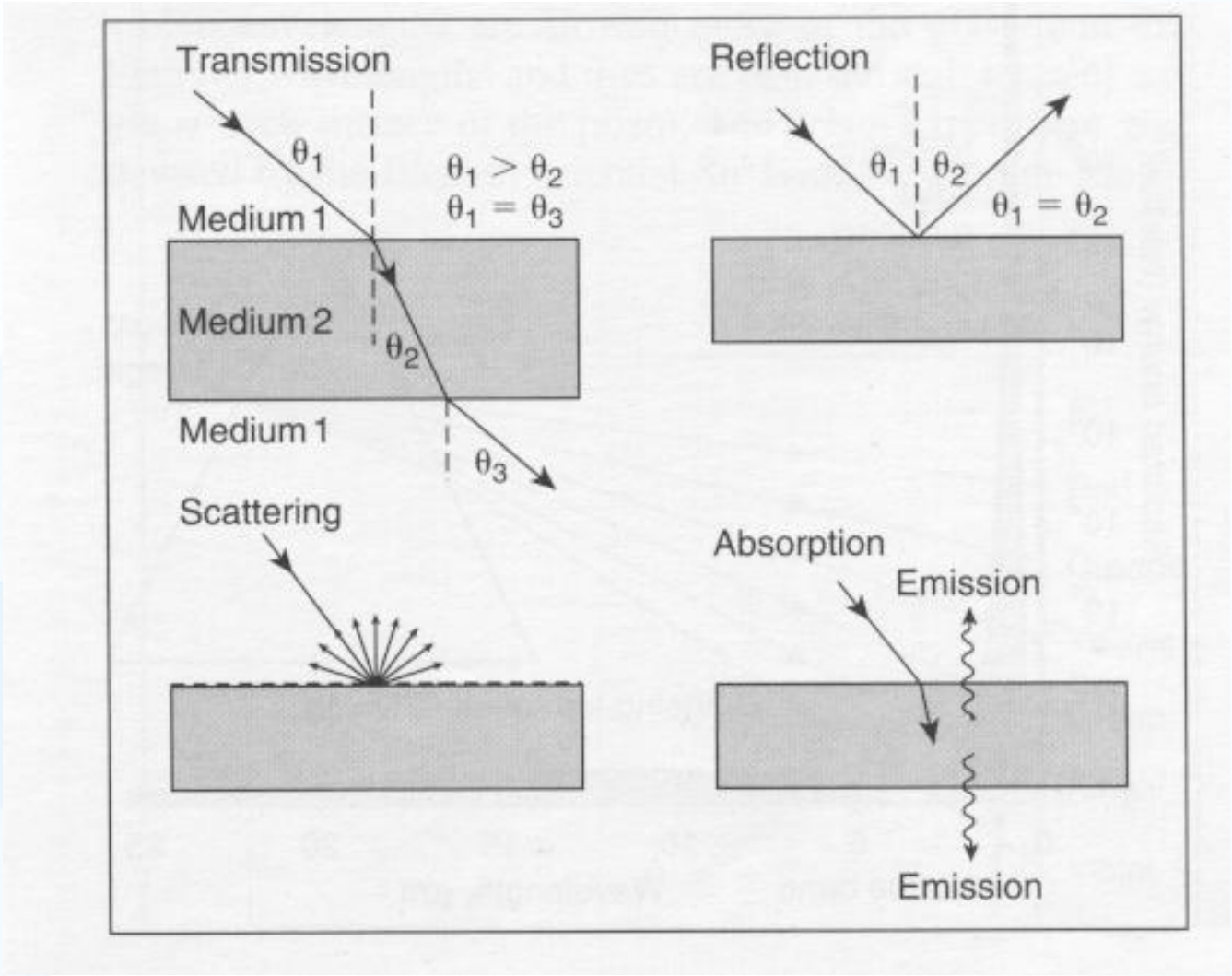


http://www.ces.fau.edu/nasa/

Atmosfer ile Etkileşim

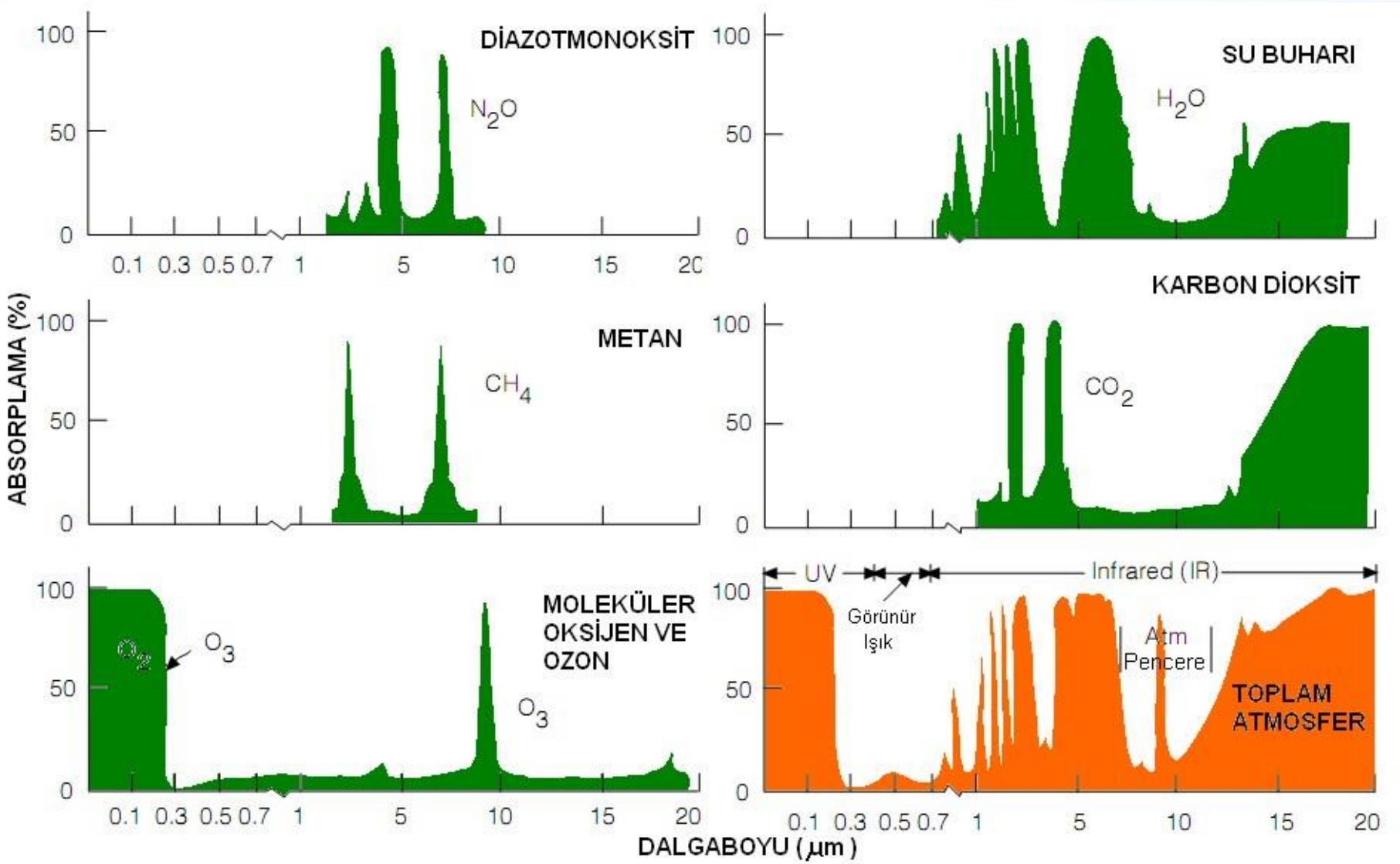


EMR - Madde Etkileşimleri

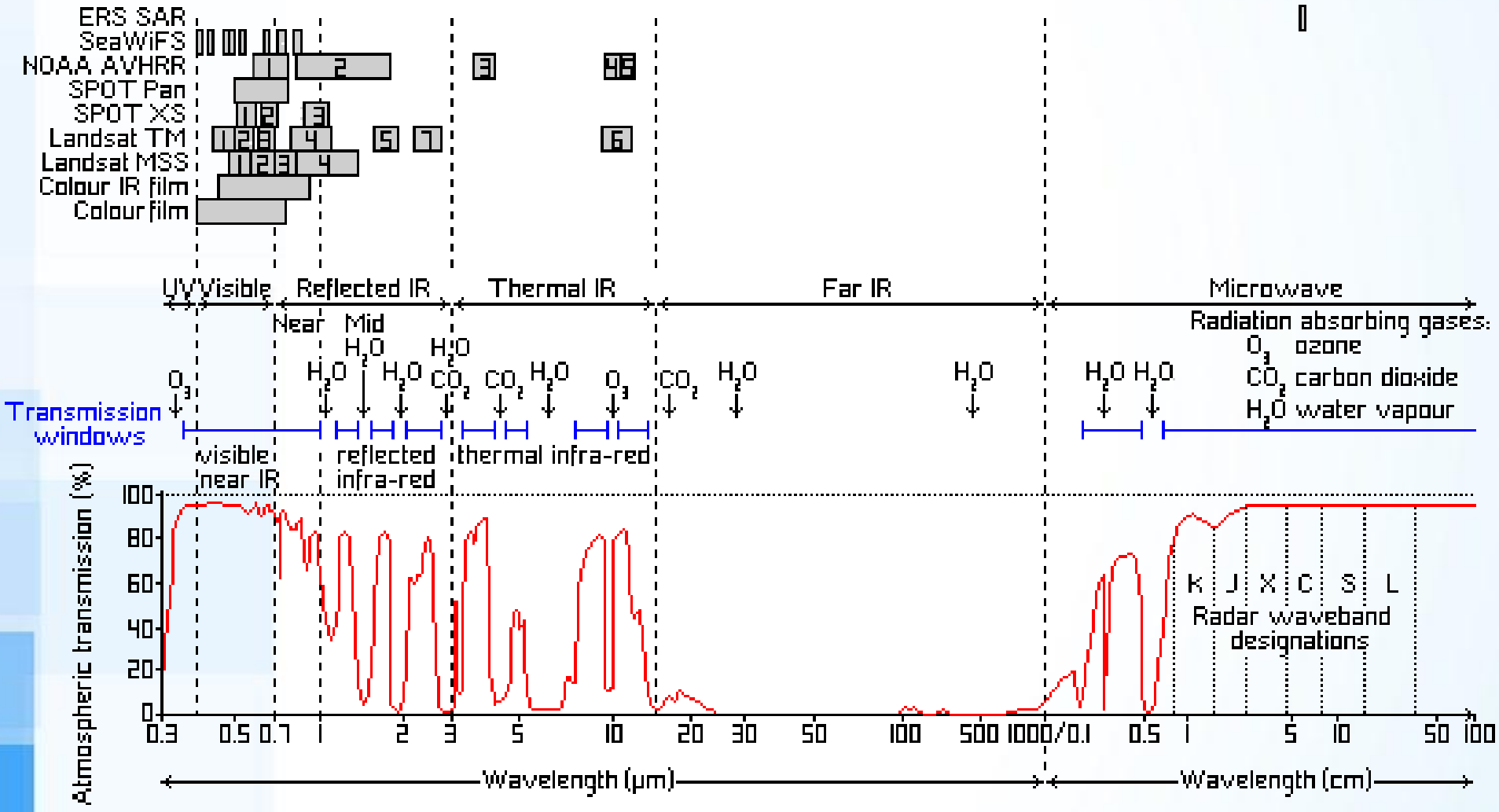


http://www.udel.edu/Geography/DeLiberty/Geog474/geog474_energy_interact.html

Atmosferik Absorplama

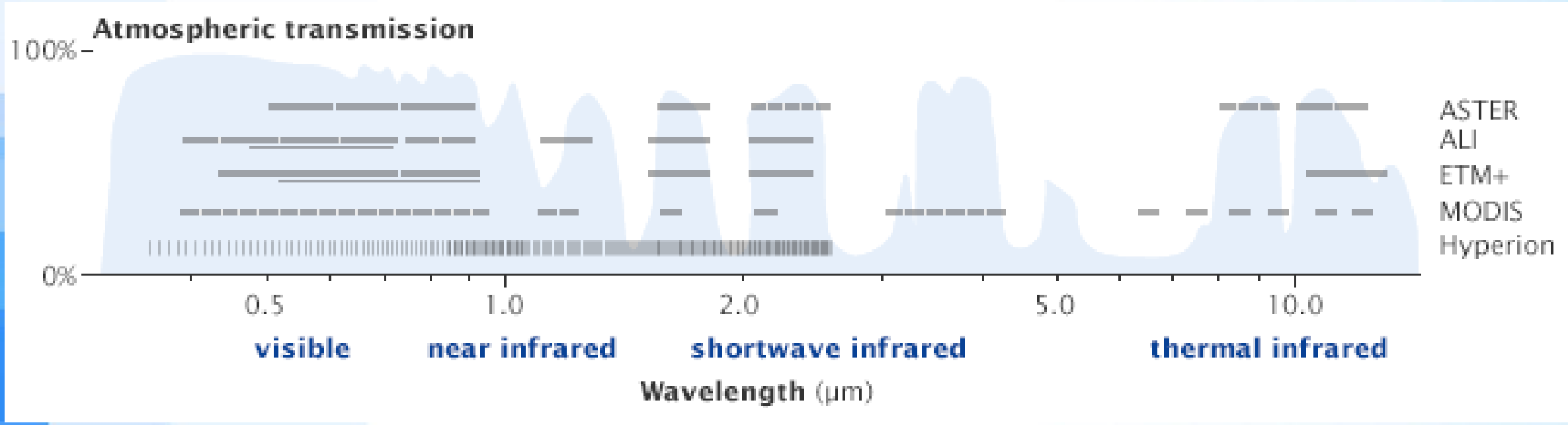


Atmosferik İletim ve Uyduların Dalga Boyları



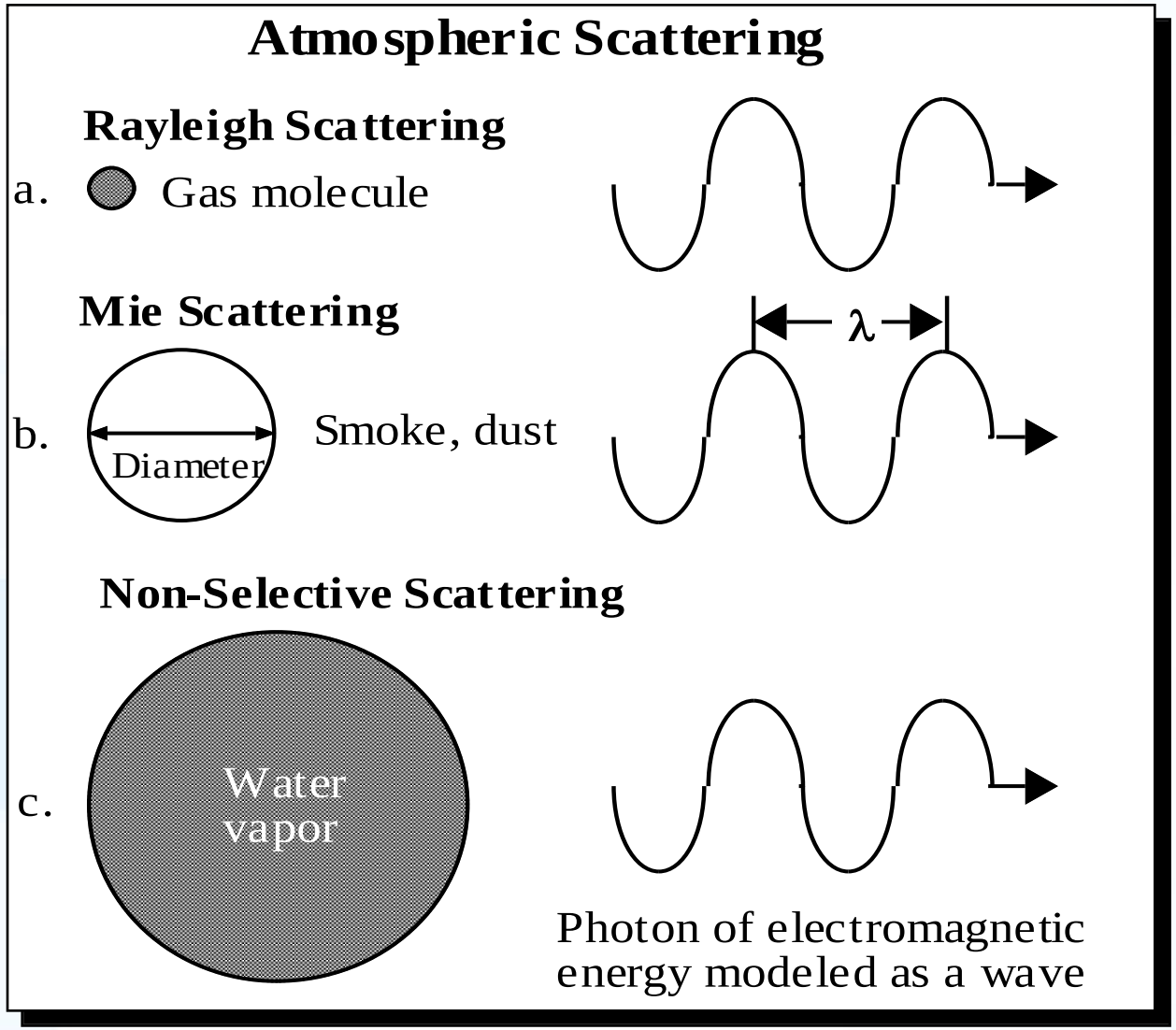
http://www.unesco.org/csi/pub/source/rs8.htm

Atmosferik İletim ve Uyduların Dalga Boyları



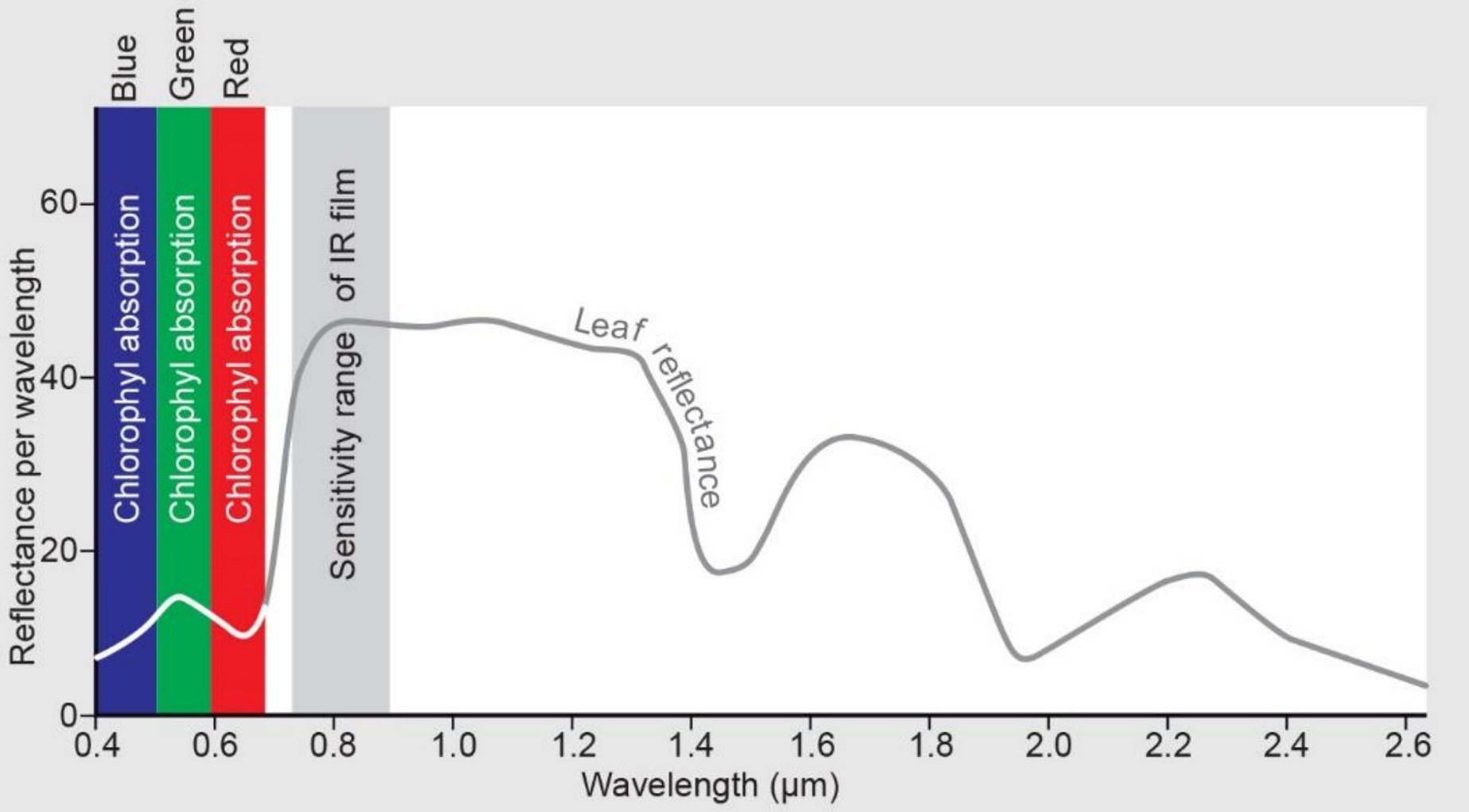
http://earthobservatory.nasa.gov/Features/PaintedGlaciers/page5.php

Atmosferik Saçılma



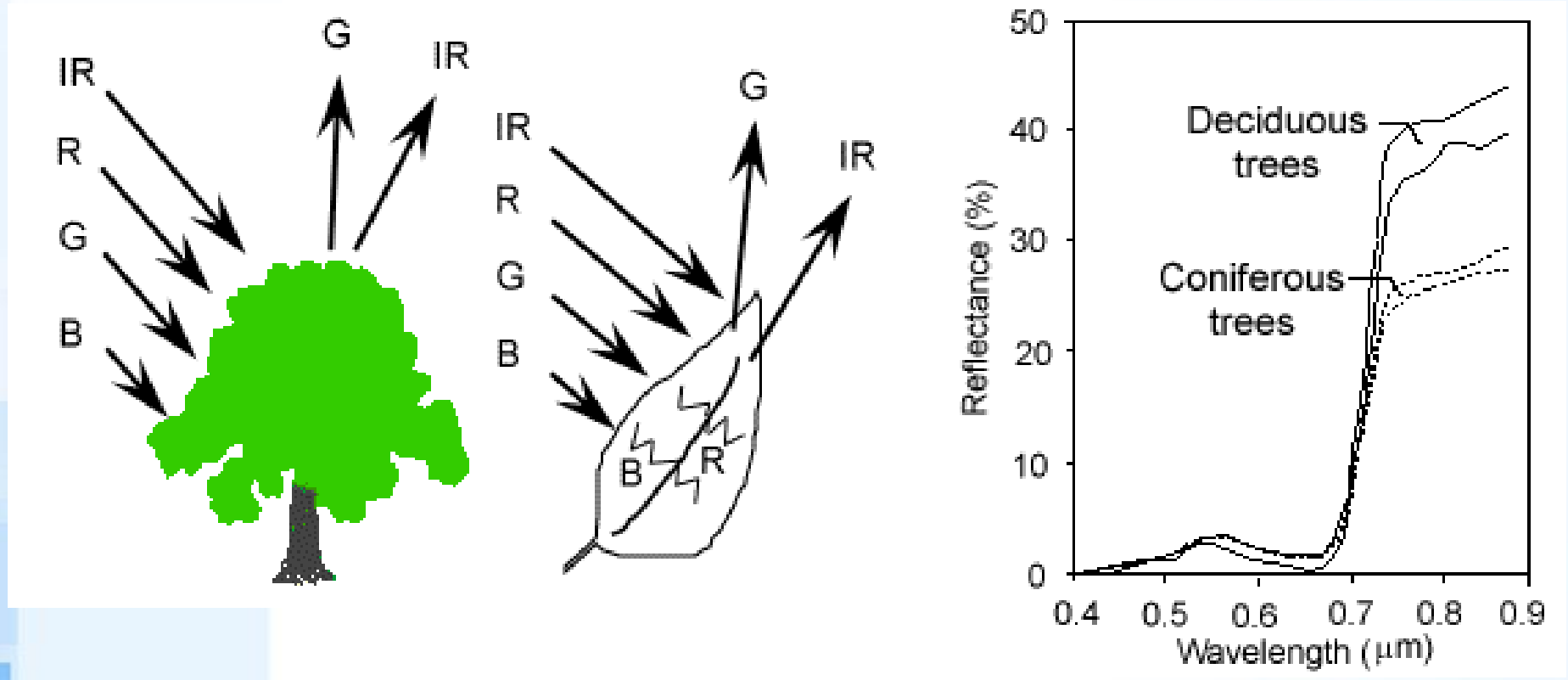
(N_2 ve O_2)

Yansıma (yeşil bitkiler)



https://ltb.itc.utwente.nl/page/491/concept/79785

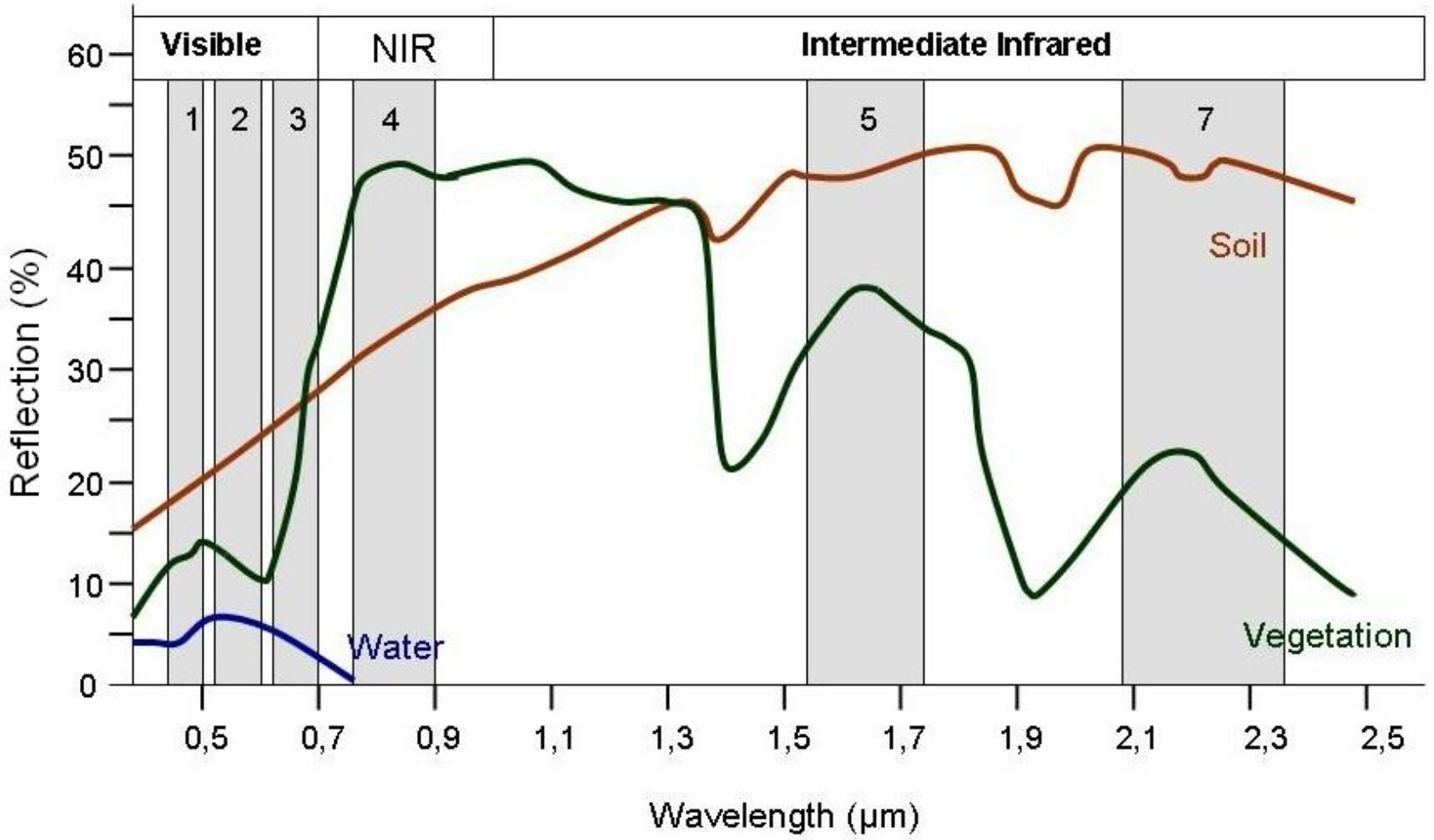
Yeşil Bitkiler ve Yansıma



- Klorofil kırmızı ve mavi dalga boyunu absorbe ederken yeşil dalga boyunu yansıtır.

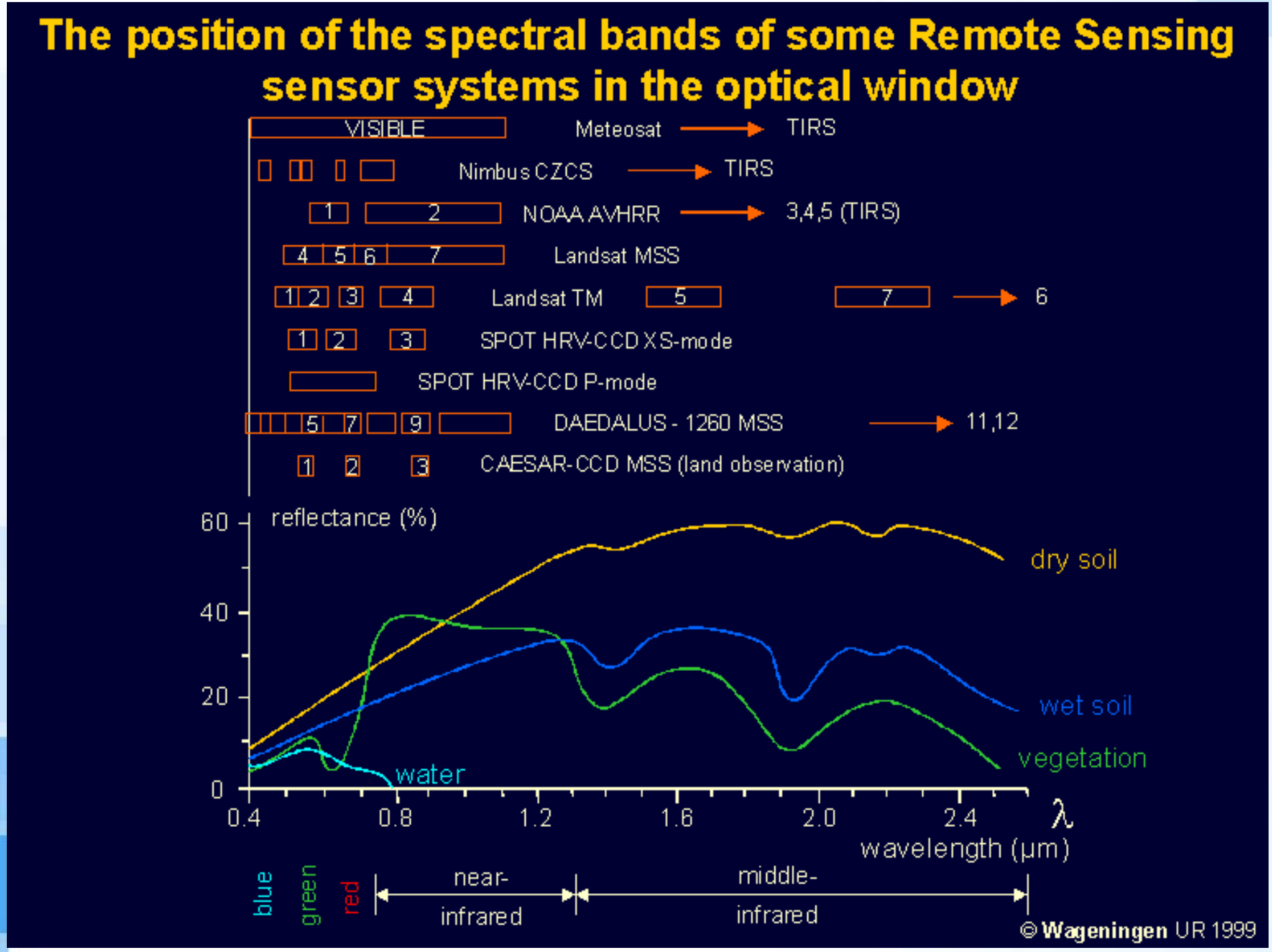
http://maprabu.blogspot.com.tr/2014/03/remote-sensing.html

Yansıma



http://www.seos-project.eu/modules/remotesensing/remotesensing-c01-p05.html

The position of the spectral bands of some Remote Sensing sensor systems in the optical window

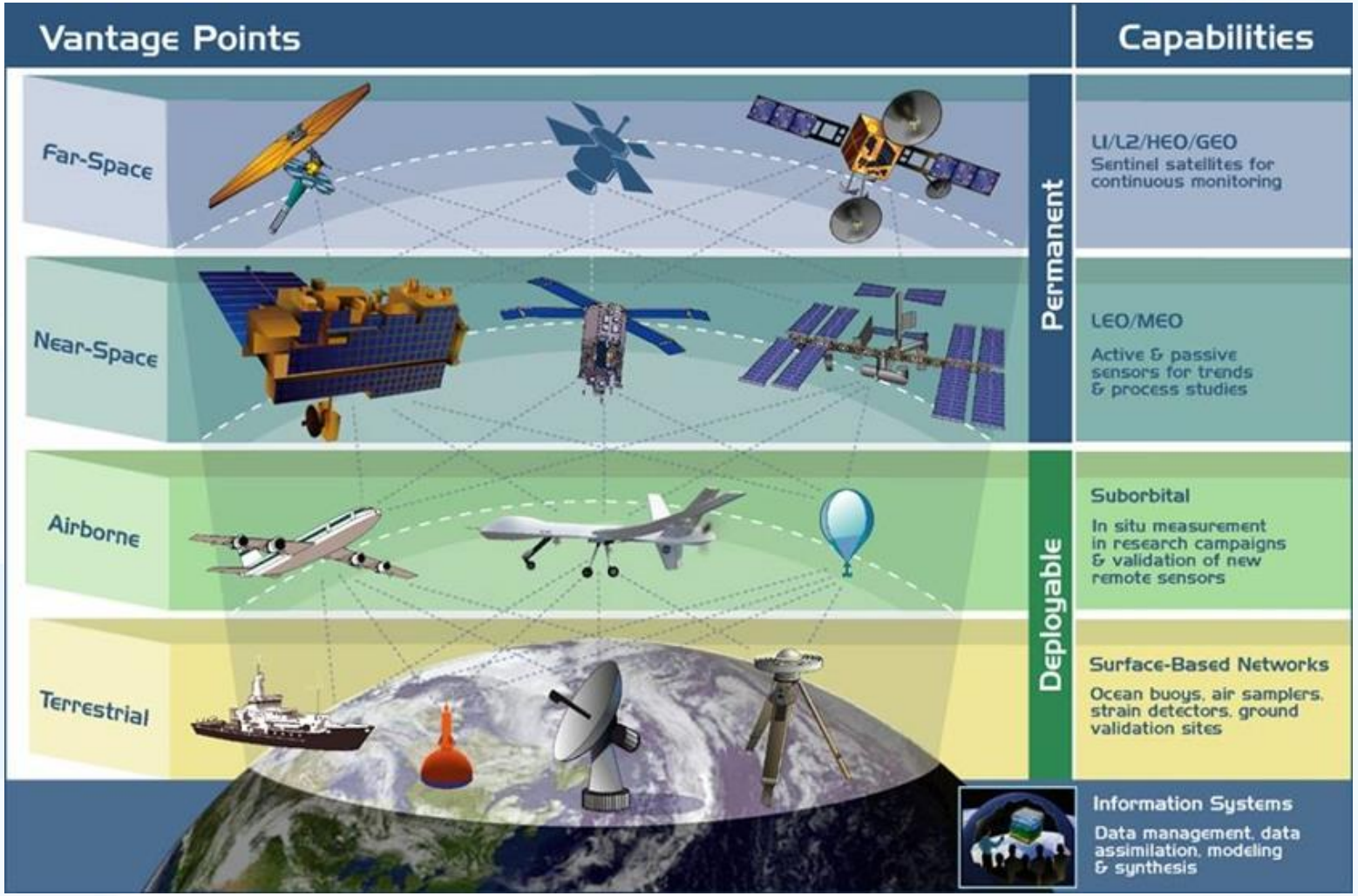


EMR'nin Yüzeylerde Yansıması

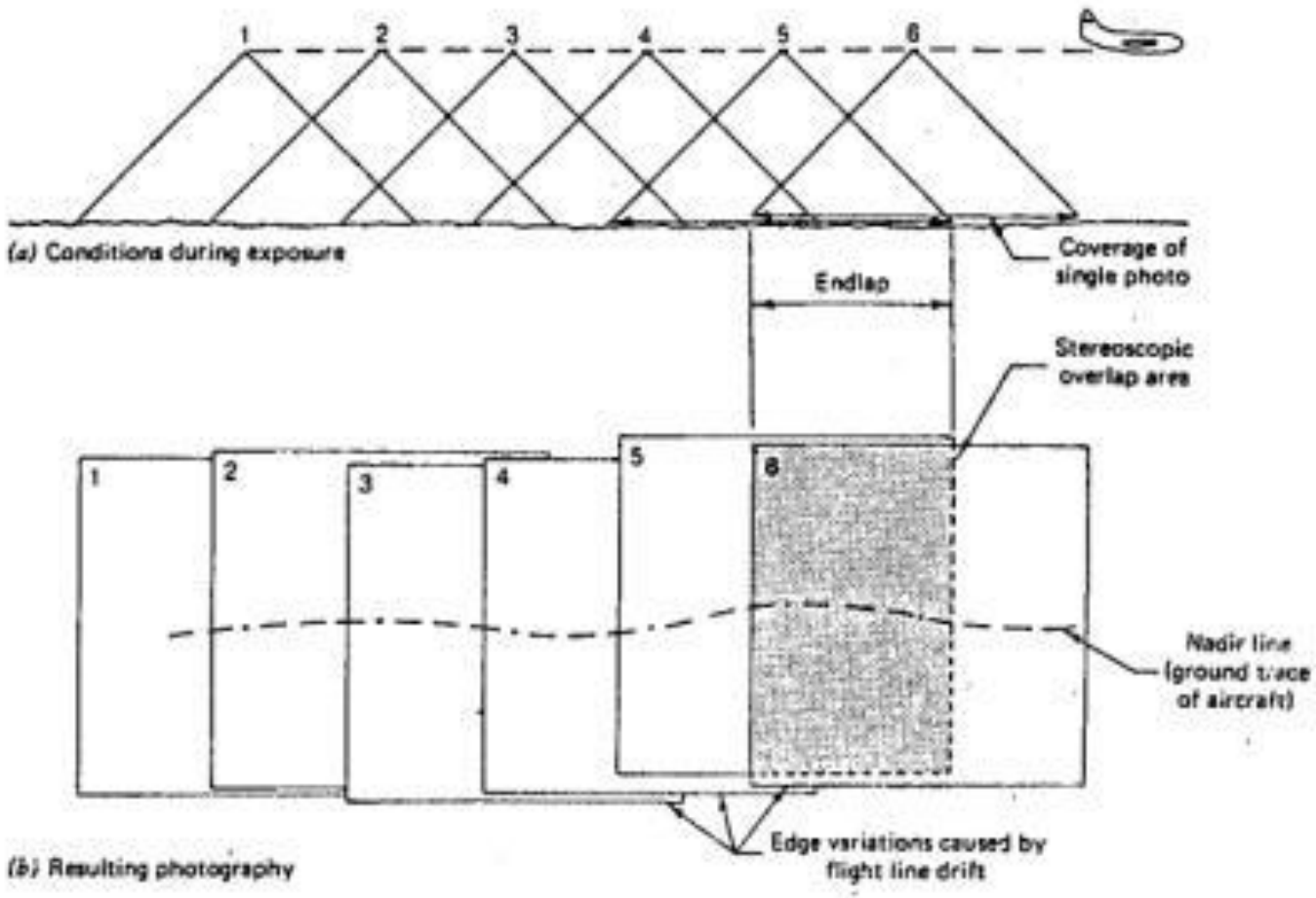
Material	Percent Reflected
Fresh snow	80–95
Old snow	50–60
Thick cloud	70–80
Thin cloud	20–30
Water (sun near horizon)	50–80
Water (sun near zenith)	3–5
Asphalt	5–10
Light soil	25–45
Dark soil	5–15
Dry soil	20–25
Wet soil	15–25
Deciduous forest	15–20
Coniferous forest	10–15
Crops	10–25
Earth system	35

http://www.udel.edu/Geography/DeLiberty/Geog474/geog474_energy_interact.html

Yüksekliği Göre Uzaktan Algılama Türleri

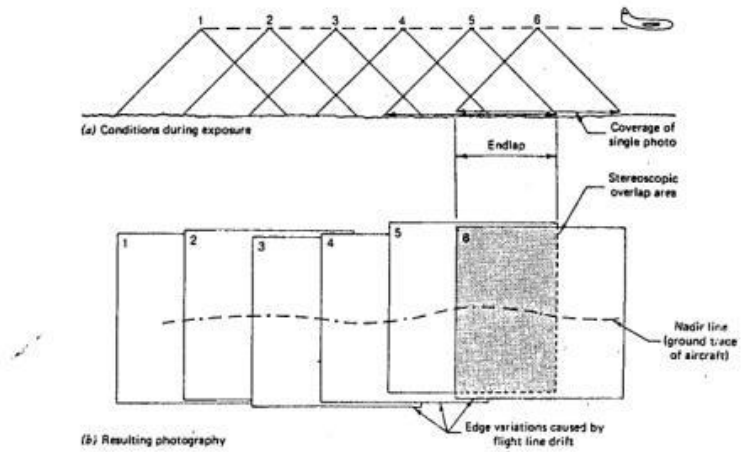


Hava Fotoğrafları

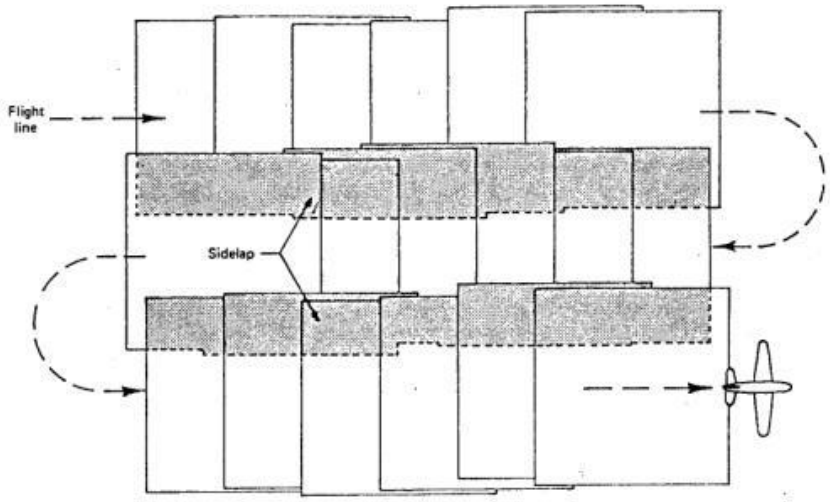


(a) Photographic coverage along a flight strip

Hava Fotoğrafları

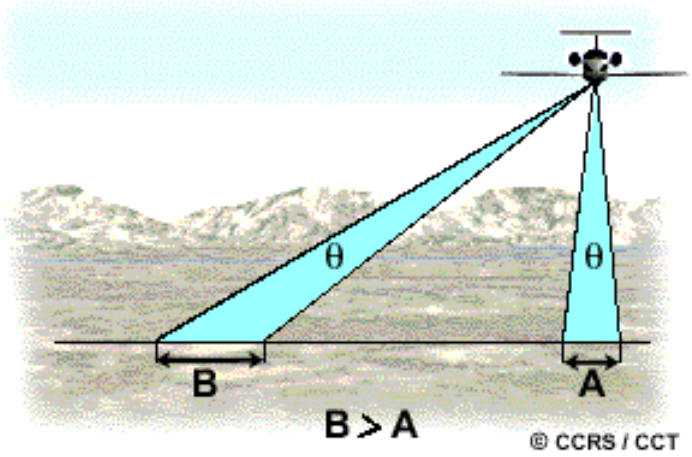


(a) Photographic coverage along a flight strip

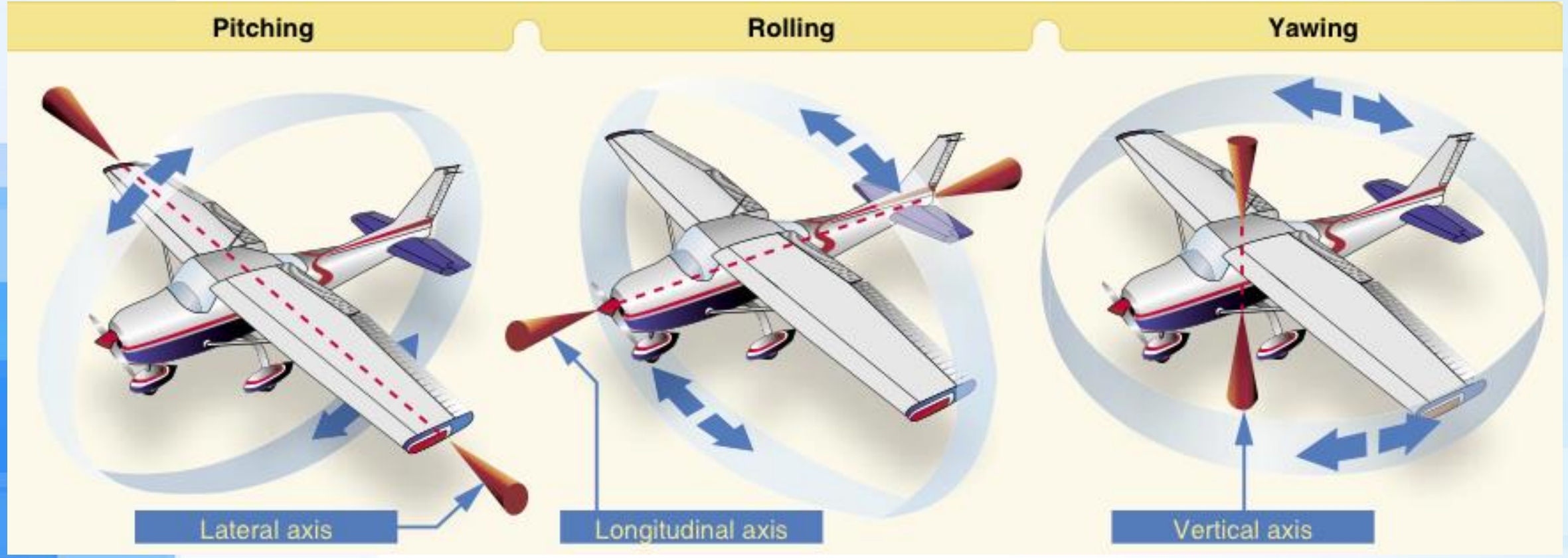


(b) Adjacent flight lines over a project area

Eğik (Oblique) – Dik (Vertical) Görüntüleme

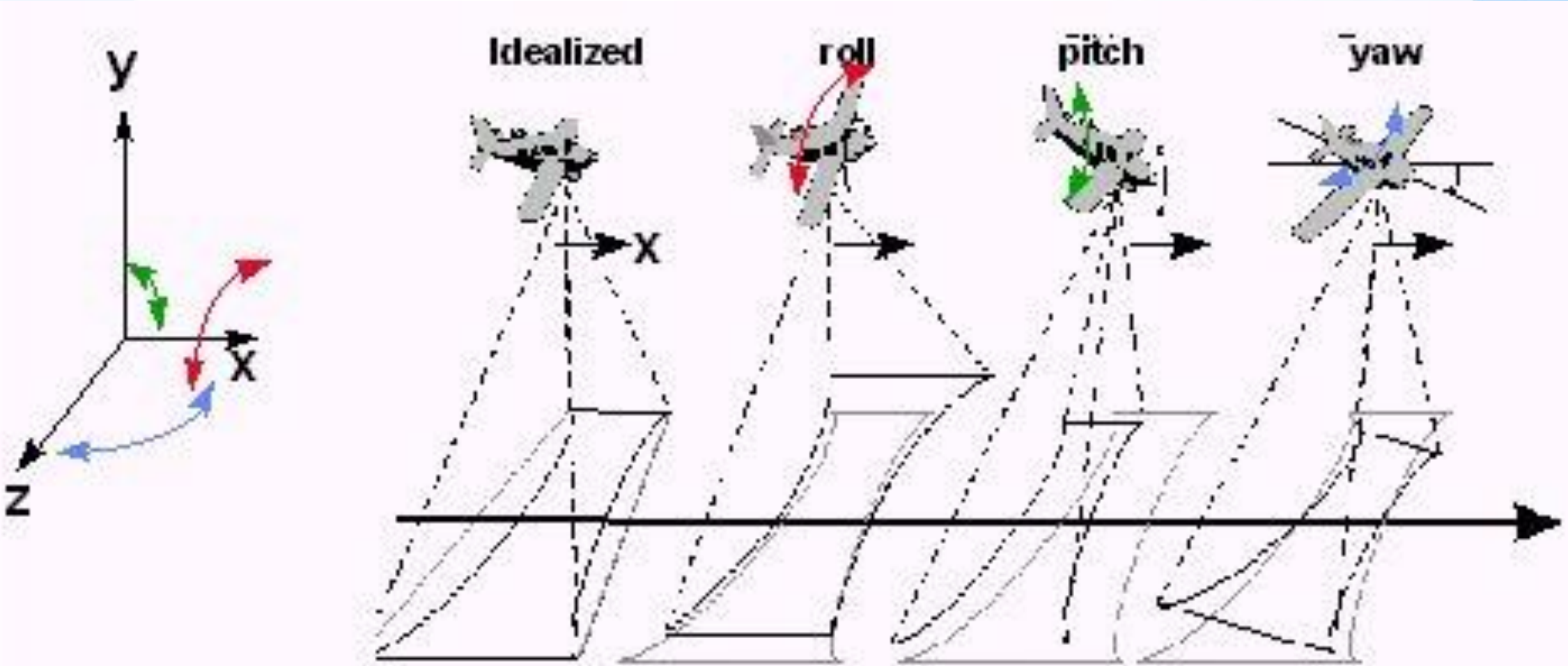


Hava Fotoğraflarında Bozulmalar



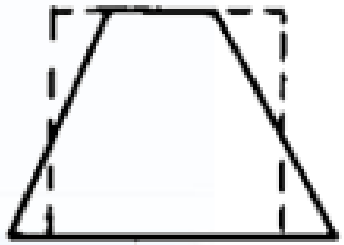
http://jamiebeckett.com/three-axis-no-waiting/

Hava Fotoğraflarında Bozulmalar

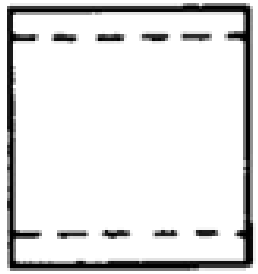


https://www.cis.rit.edu/research/thesis/bs/1998/kopacz/thesis.html

Hava Fotoğraflarında Bozulmalar

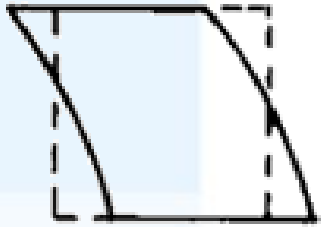


Altitude variation



Spacecraft velocity

Earth rotation



Roll variation

Pitch variation

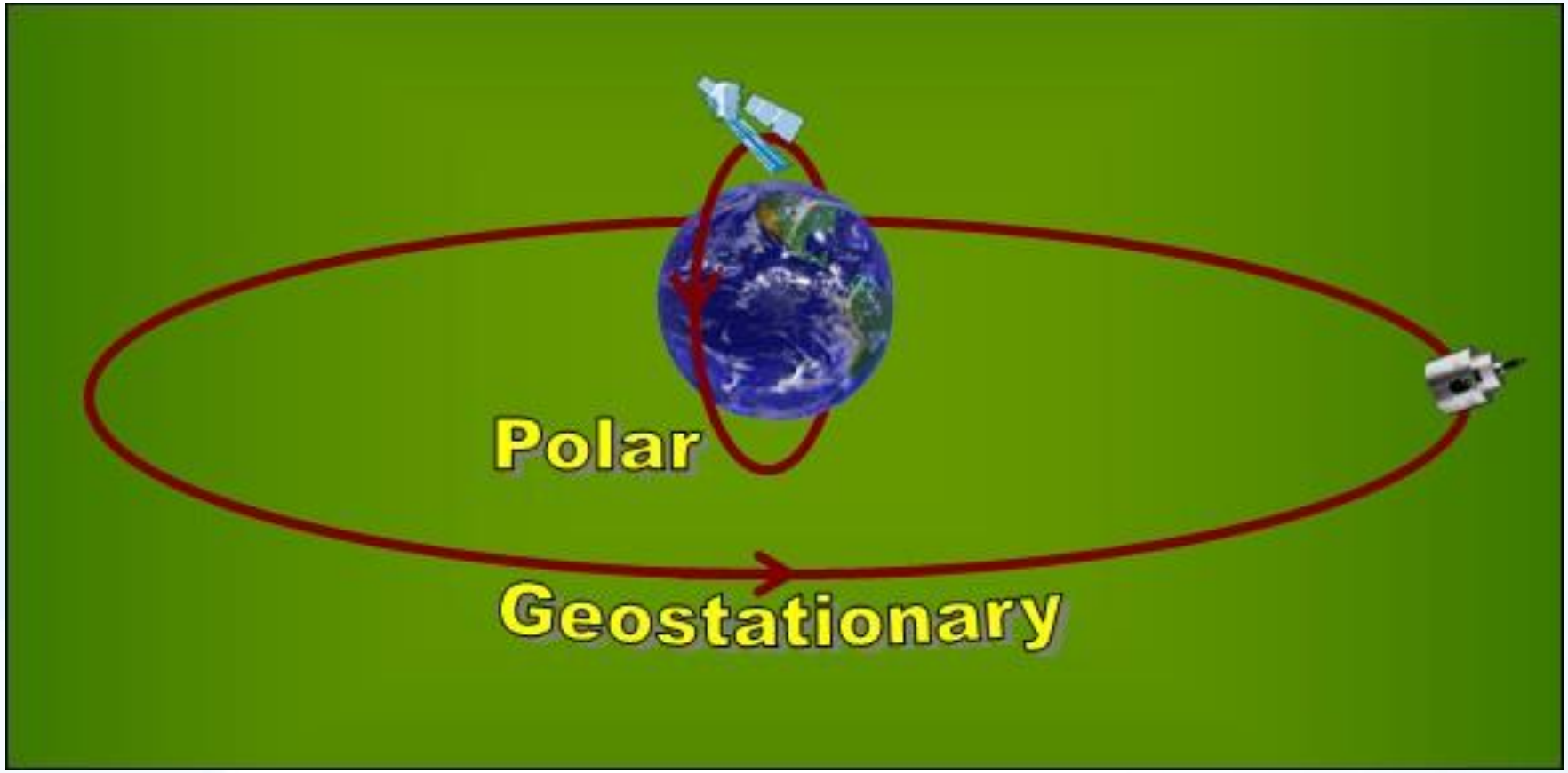
Yaw variation

http://nptel.ac.in/courses/105104100/lectureD_26/D_26_4.htm

Uydu Yörüngeleri

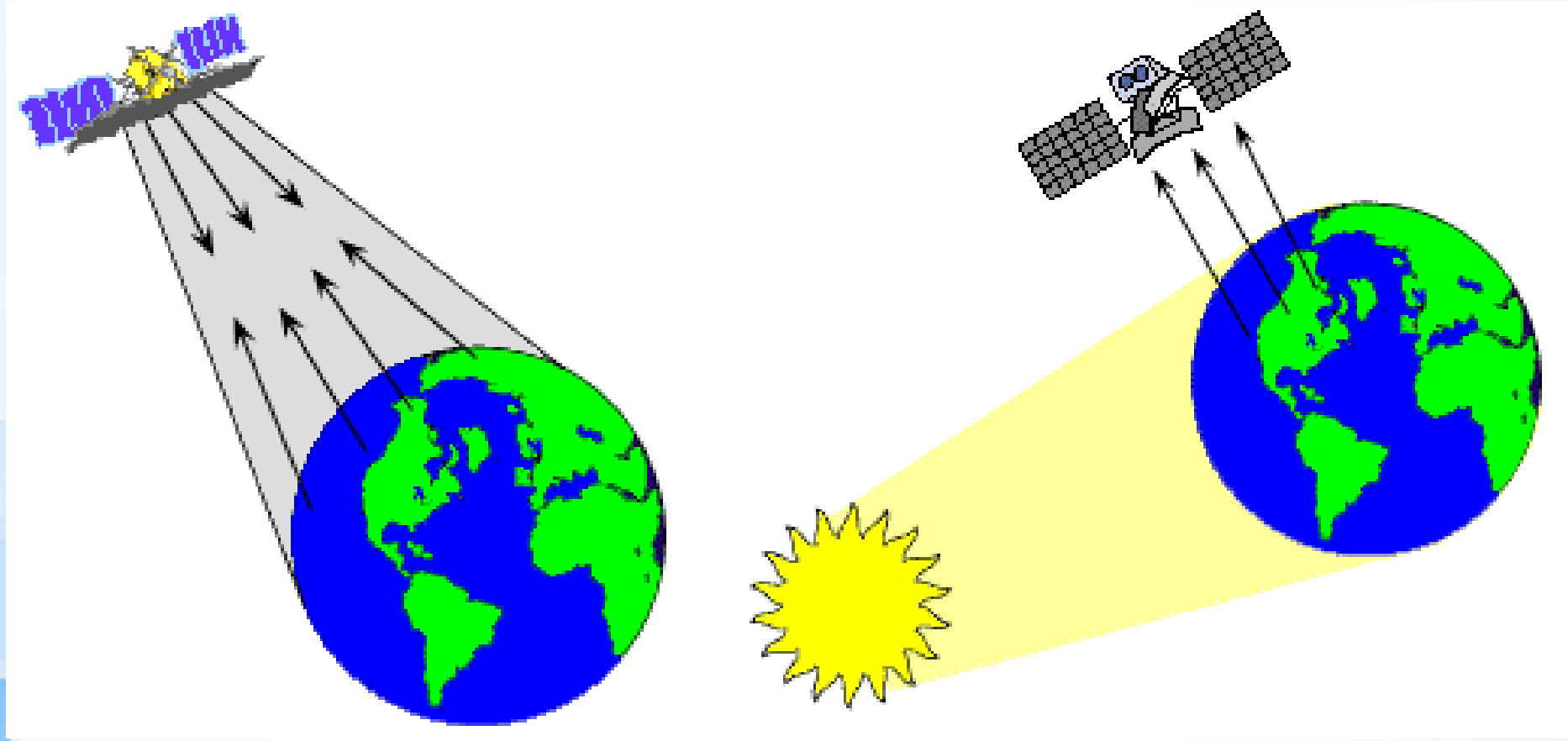
Jeostatik Yörünge (Geostationary Orbit)

Kutupsal Yörünge (Polar Orbit)



http://www.treasure-hunt.alaska.edu/ch3/info_satellites.html

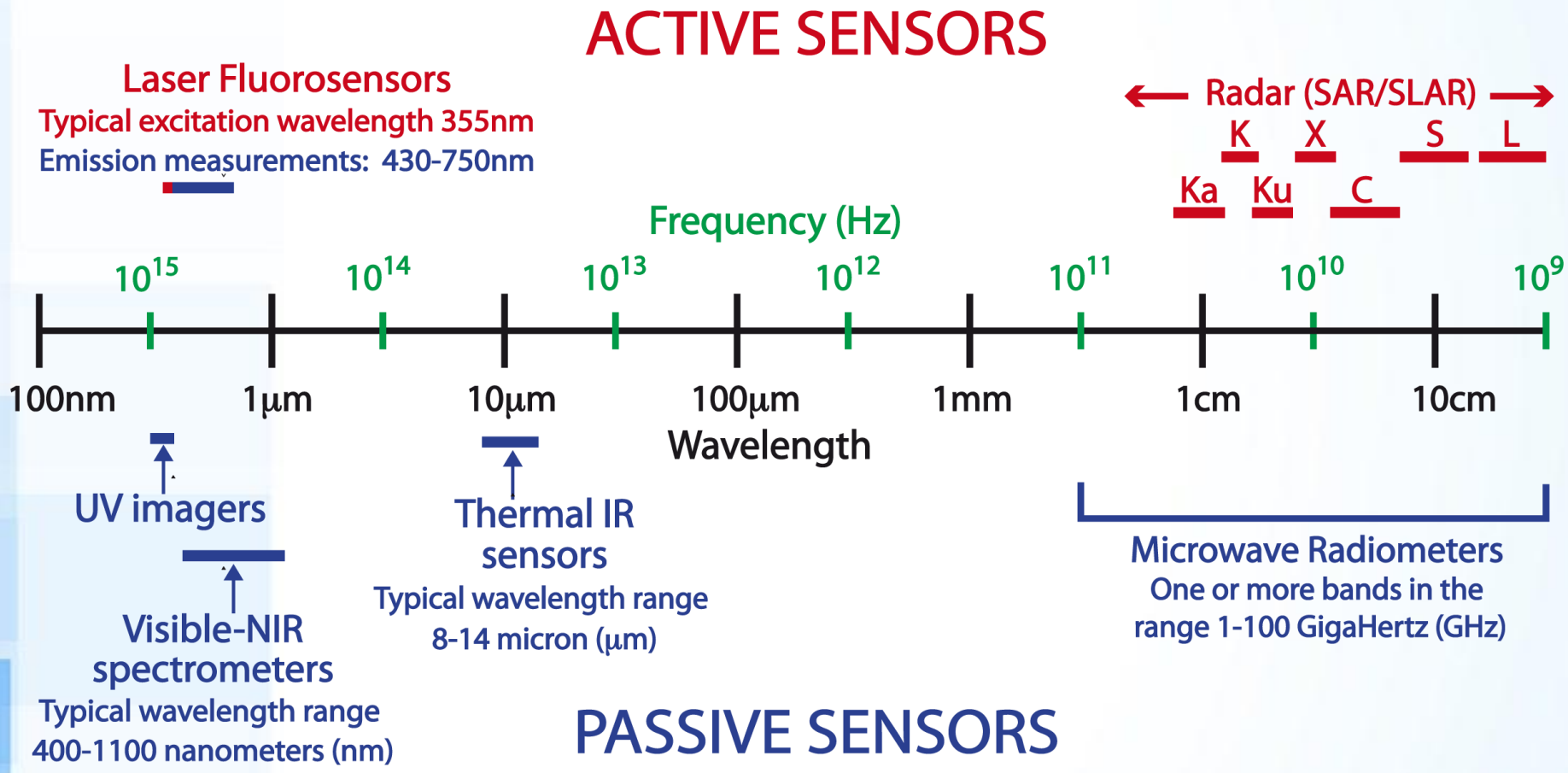
Aktif – Pasif Uzaktan Algılama



Örnek: Radar, Lidar

http://maprabu.blogspot.com.tr/2014/03/remote-sensing.html

Aktif – Pasif Sensörler



http://lms.seos-project.eu/learning_modules/marinepollution/marinepollution-c01-s02-p01.html