# Luminosity Constraints

Solar radiation: 492 to 715 W/m² (1 321 to 1 413 on earth)

Irradiance [W/m²]: light falling on a surface

F=Fsol\*(Rsol/R)², with R=distance mars-sun

F=589W.m-2

Assumption: 10% of the irradiance is absorbed by the dust particles of the Mars atmosphere.

@book{rapp2007human,

title={Human missions to Mars: Enabling technologies for exploring the red planet},

author={Rapp, Donald},

year={2007},

publisher={Springer Science \& Business Media}

}

Feff = 0.90\*F=530 W.m-2

Fmoy=F/4 =147.25 W.m-2 Irradiance on the surface on Mars with

Fmoyeff=0.90\*Fmoy=132 W.m-2

Radiance [W.m-².sr-1]: amount of light radiated from a surface

Assumption: *ideal Lambertian surface (BRDF* f=1/π if ideal)

Which BRDF choose?

Lambertian : ro/pi \* cos(thetai)

Ro ?

We can choose the rock “El Capitan” for example which is a rock of Mars with a lot of hematite on its surface. (source wiki, mars, français, géologie)

Let’s choose the hematite’s reflectance ro = 0.28 for wavelength from 400 to 700 nm

@article{strens1979diffuse,

title={Diffuse reflectance spectra and optical properties of some iron and titanium oxides and oxyhydroxides},

author={Strens, RGJ and Wood, BJ},

journal={Mineralogical Magazine},

volume={43},

number={327},

pages={347--354},

year={1979}

}

Radiance L=E\*ro\*cos(thetai)/pi, thetai is the angle between the zenith and the sun beam

L=530\*0.28/pi\* cos(thetai) = 47\*cos(thetai)

DeltaO : élément de la surface à observer

DeltaI : élément de surface correspondant

Alpha : angle entre l’axe optique et le centre de l’objet

Theta : angle entre le rayon et la normale de l’objet

Z : distance lentille – objet

F : focale de la lentille

D : diamètre de la lentille

L : radiance of the surface in direction of the lens

Solid angle :

Irradiance of the image:

S=250\*(N²/E\*t), S ensibility, N corespond à ton ouverture de diaf, E à ton eclairement en lux, et t ton temps d'exposition en seconde