Home Work # 2

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EET-3132 Remote Sensing

Chapter # 3

- 1) The first corona was launched on Feb. 28, 1959.
- August 10, 1960 was the first successful launch and recovery of corona capsule. It was mission # 13.
- It took 13 launches before a film was successfully returned. Launch # 14th was the successful one.
- 4) When Francis Gary Power was shot down in U-2 on May 1, 1960, the president was forced to terminate reconnaissance with Soviet Union.
- 5) 160lines/min was the best resolution of KH4 camera which was possible to resolve targets of 6ft.
- 6) 9.6km was the swath width associated with the best-resolution KH-4 images.
- 7) There were 145 corona missions.
- 8)

$$f/\# = 3.5$$
, focal length = 24" = 0.61m, $Diameter = \frac{focal \, length}{f/\#} = \frac{0.61}{3.5} = 0.174m$
GSD = $1.22 \frac{\lambda R}{diameter} = 1.22 * \frac{500 * 10^{-9} * 115 * 10^3}{0.174} = 0.403m$

9) Earth to Geostationary = 35786 km, λ = 500nm, GSD = 0.12m

GSD =
$$1.22 \frac{\lambda R}{diameter}$$
 or D = $1.22 \frac{\lambda R}{GSD}$ = $1.22 * \frac{500 * 10^{-9} * 35786 * 10^{3}}{0.12}$ = 181m

- 10) The three factors that constrain the resolution obtainable with an imaging system are atmospheric absorption, scattering, and turbulence.
- 11) The Hubble primary optic has a focal length of 57.4m, a diameter of 2.4m, and f/ # of 24.
- 12) λ = 850nm, $\Delta \theta$ = 1.4544urad, 120nrad/pixel,

So, Pixels for each star =
$$\frac{1454.4nrad}{120nrad/pixel}$$
 = 12pixels

For uncompensated FWHM = 7.5Urad

So, Pixels =
$$\frac{7.5urad}{120nrad/pixel}$$
 = 62 pixels

13) Sol:- Energy band gap for lead sulfide = 0.35 to 0.40(eV) at 300 K

Cutoff wavelength = $\lambda = \frac{h * c}{\Delta E} = \frac{1.24 * 10^{-6} (eV m)}{0.40} = 3.1 * 10^{-6} m \text{ or } 3.1 \mu m.$

14) f/# = 5.0, focal length = 24" = 0.61m

Diameter =
$$\frac{focal \ length}{f/\#} = \frac{0.61}{5} = 12.2 * 10^{-2}m = 12.2cm$$

15) Focal length, f = 24inch = 0.61m, Altitude = 115km, pixel size = 0.01mm

$$GSD = \frac{Pixel \, size}{focal \, length} * Altitude = \frac{0.01 * 10^{-3} * 115 * 10^{3}}{0.61} = 1.885 \text{m}$$

16) f/# =?, Diameter = 0.57mm = 0.57 * 10^{-3} m, focal length = 50mm = 5* 10^{-3} m

$$f/\# = \frac{focal \, length}{Diameter} = \frac{50*10^{-3}}{0.57*10^{-3}} = 87.7$$

17) $GSD = \Delta x = 1.22 * \frac{\lambda * R}{diameter}$, $0.66 = 1.22 \frac{5 * 10^{-7} * 384,400 * 10^3}{a}$, diameter = 355.2 m $\Delta \theta = 1.22 \lambda/D = 1.22 * 5 * 10^{-7} m/355.35 = 1.7 \text{nm}$