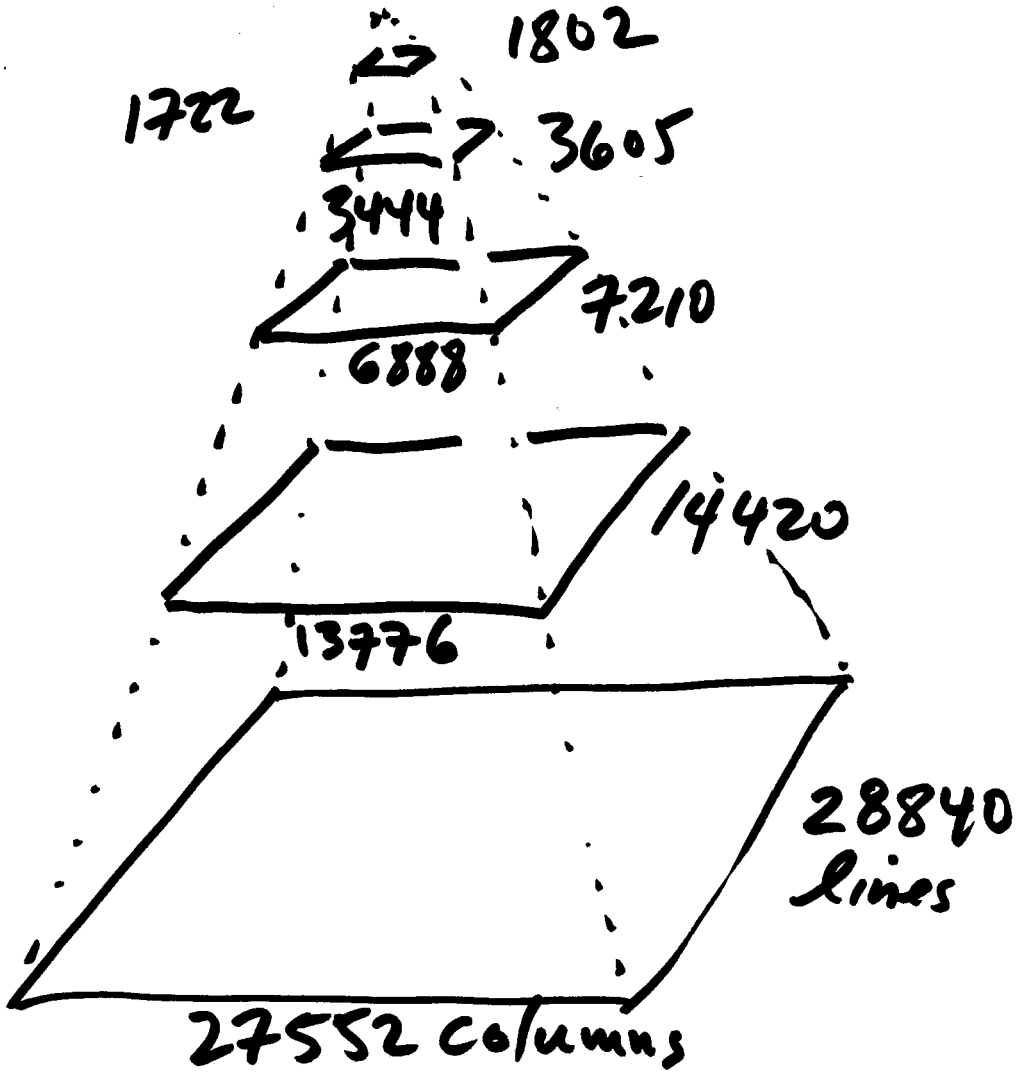
QB 30k × 30k × 2 bytes (11 bits)

~ 2 GB



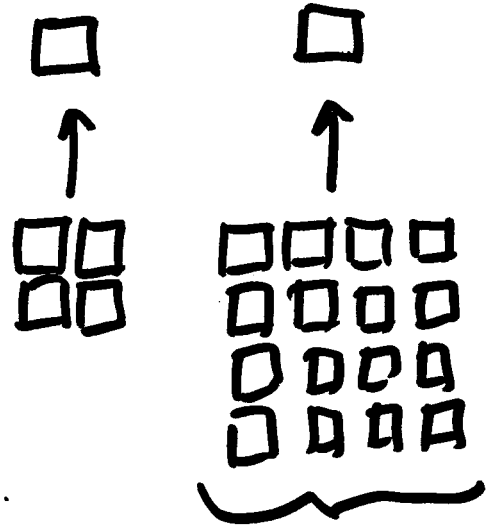
9.6 m (16×)

4.8 m (8×)

2.4 m (4×)

1.2 m (2×)

0.6 m (1×)

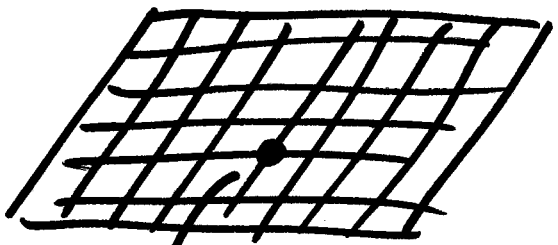


photoshop
└ image
  └ size
    └ W ——
      H ——

subsample ✗
vs.
aggregation ✓

} avoid aliasing

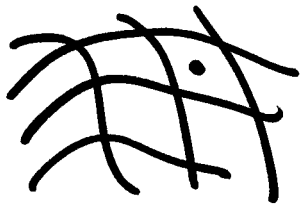
LPF
low pass filtering
sampling



$XY \to H \to h \to \begin{pmatrix} \alpha \\ \lambda \\ h \end{pmatrix} \xrightarrow{RPC} \begin{pmatrix} l \\ s \end{pmatrix} \div n \begin{pmatrix} l' \\ s' \end{pmatrix}$

interpolate in downsampled image

original image ($1\times$)

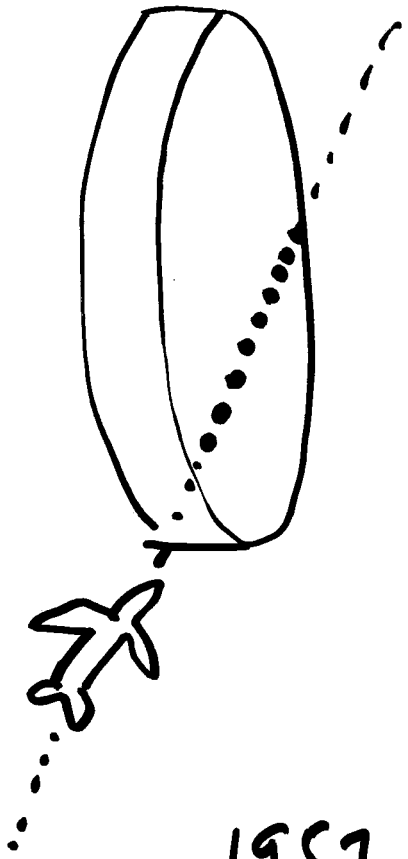


Text: ch. 11 <u>active sensing</u>

passive : reflected solar
thermal IR emitted

active : you provide illumination
flashbulb
laser scanning
- range
- intensity

microwave



Real Aperture ⇒

Synthetic Aperture

SAR : synthetic Aperture Radar

RADAR : Radio detection + ranging

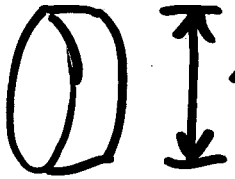
1957 : Carl Wiley

in order to focus : must record magnitude & phase

Coherent system

green light
550 nm

.000 000 550 m



$\frac{.01}{550\text{nm}} \Rightarrow 18{,}181$ wavelengths across aperture

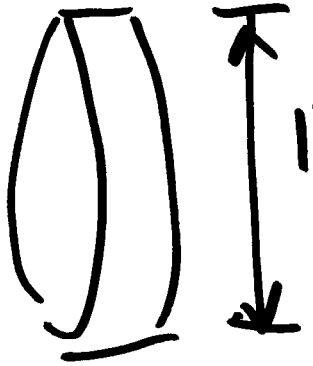
---

Ku Band, 15 Ghz

P Pete Lost St. Christopher's
L Xylophone in
S Kalamazoo.
C
X
K

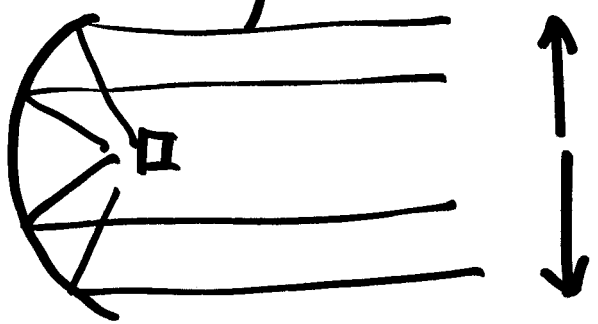
$f = 15{,}000{,}000{,}000$ hz cycle/sec

$\lambda = \frac{c}{f} = .02$ m/cycle $\underline{\underline{2\text{ cm}}}$



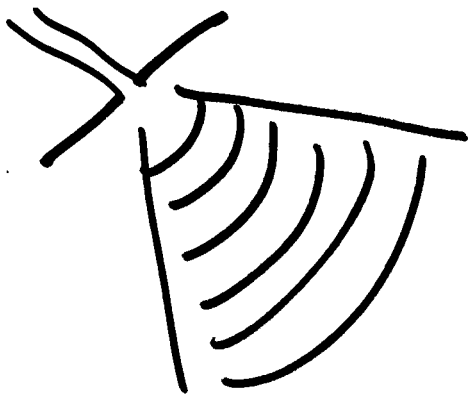
$18{,}000 \times .02 = \underline{\underline{360\text{ m}}}$

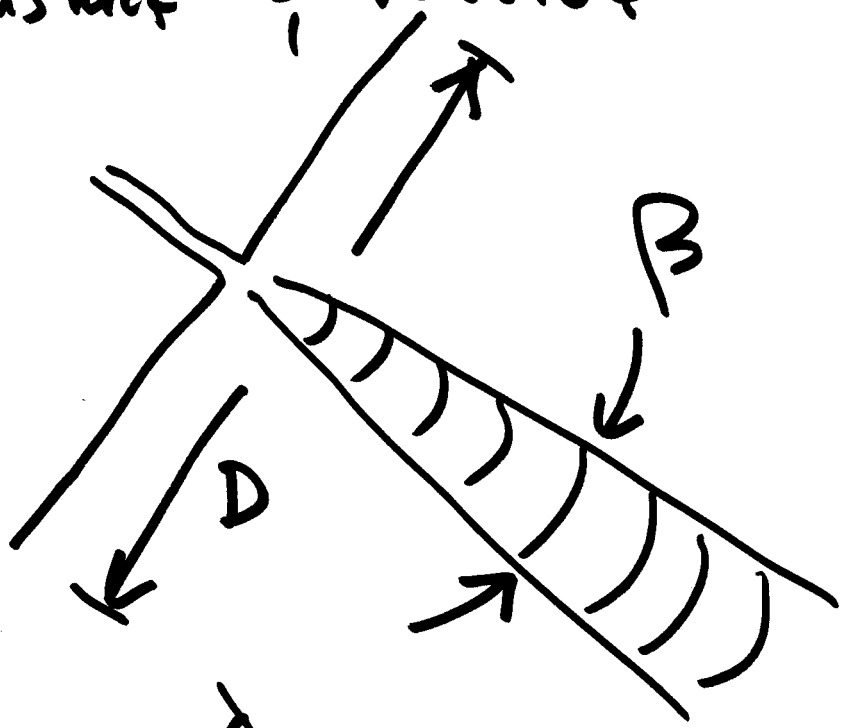
too big - no one can make it



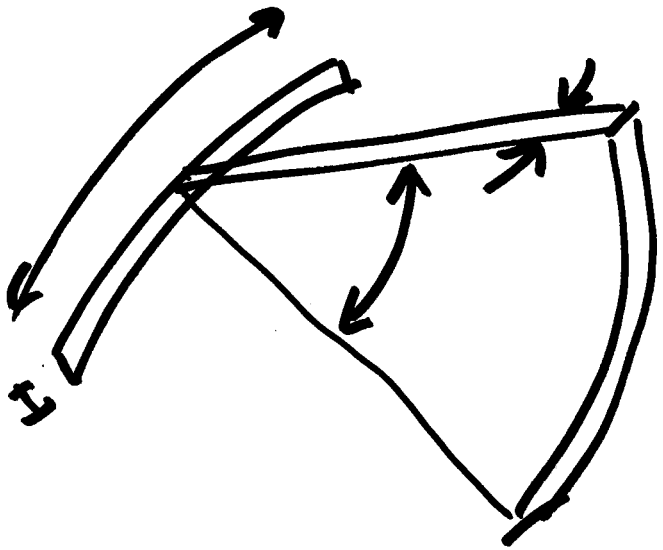
Real Aperture
Imaging

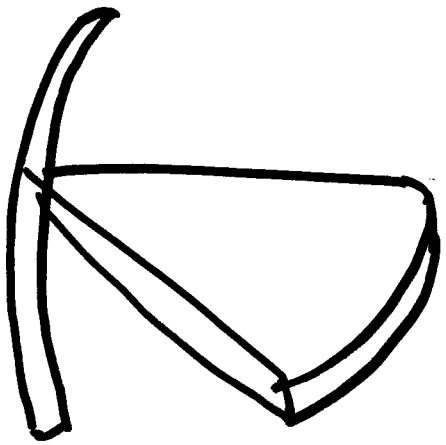
Antenna: transmit & receive

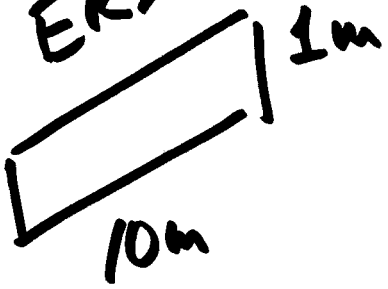




$$\beta = \frac{1.22\,\lambda}{D} \qquad \beta \approx \frac{\lambda}{D}$$







beamwidth angle $\sim \frac{\text{wavelength}}{\text{antenna width}}$

$\beta \propto \frac{\lambda}{D}$

Range resolution

Azimuth resolution