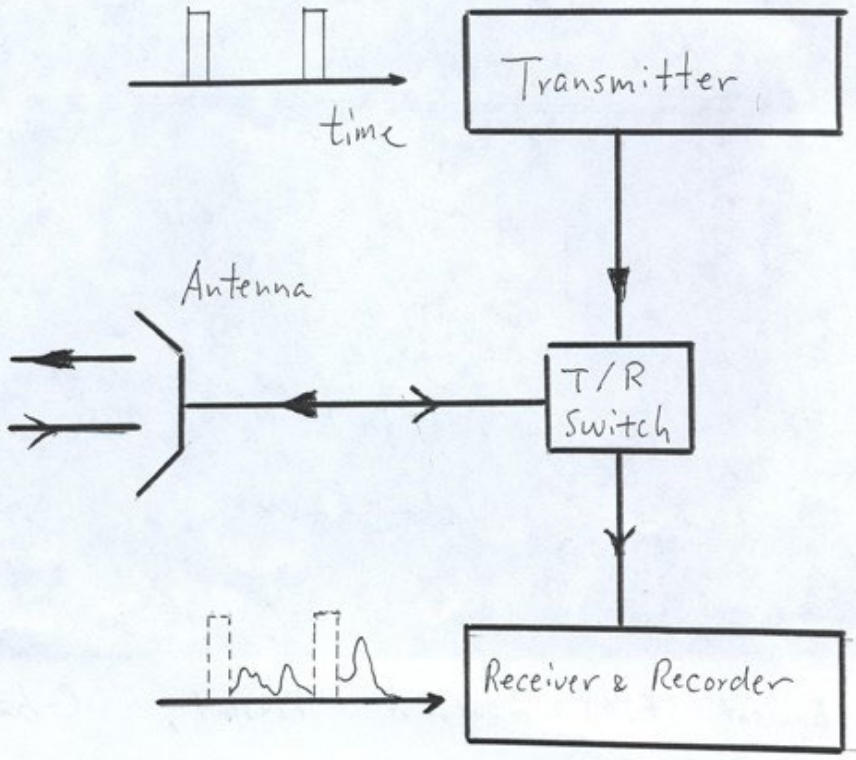
Space-borne SAR Satellites.

1. Seasat (U.S.A.) : 1978, 6/28 – 10/10, L-band
2. ERS-1 (ESA) : 1991, 7/27 – 2000, 3/ , C-band
3. JERS-1 (Japan) : 1992, 2/11 – 1998, 10/11, L-band
4. ERS-2 (ESA) : 1995, 4/21 – Present, C-band
5. Radarsat-1 (Canada) : 1995, 11/4 – Present, C-band
6. Envisat (ESA) : 2002, 3/1 – Present, C-band
7. ALOS (Japan) : 2006/1/24 – Present, L-band
8. Radarsat-2 (Canada) : 2007, 12/14 – Present, C-band
9. TerraSAR (Germany) : 2009, 6/15 – Present, X-band
10. TH-SEM-X (Germeny) : 2010/6-21, – Present, X-band

3.1.4



Radar Block Diagram

Polarization :

Single Polarization : HH, HV, ~ VV

Multiple Polarization : HH / HV, VH / VV

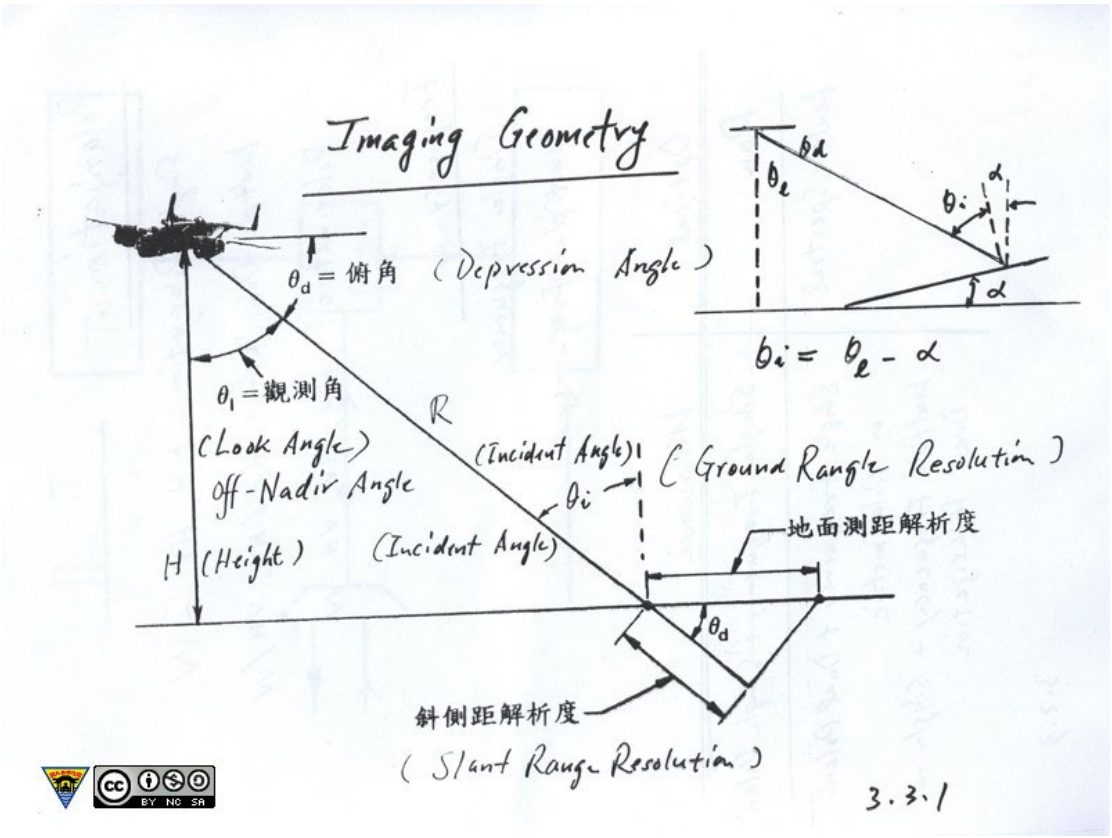
Polarimetric : HH, HV, VH, VV

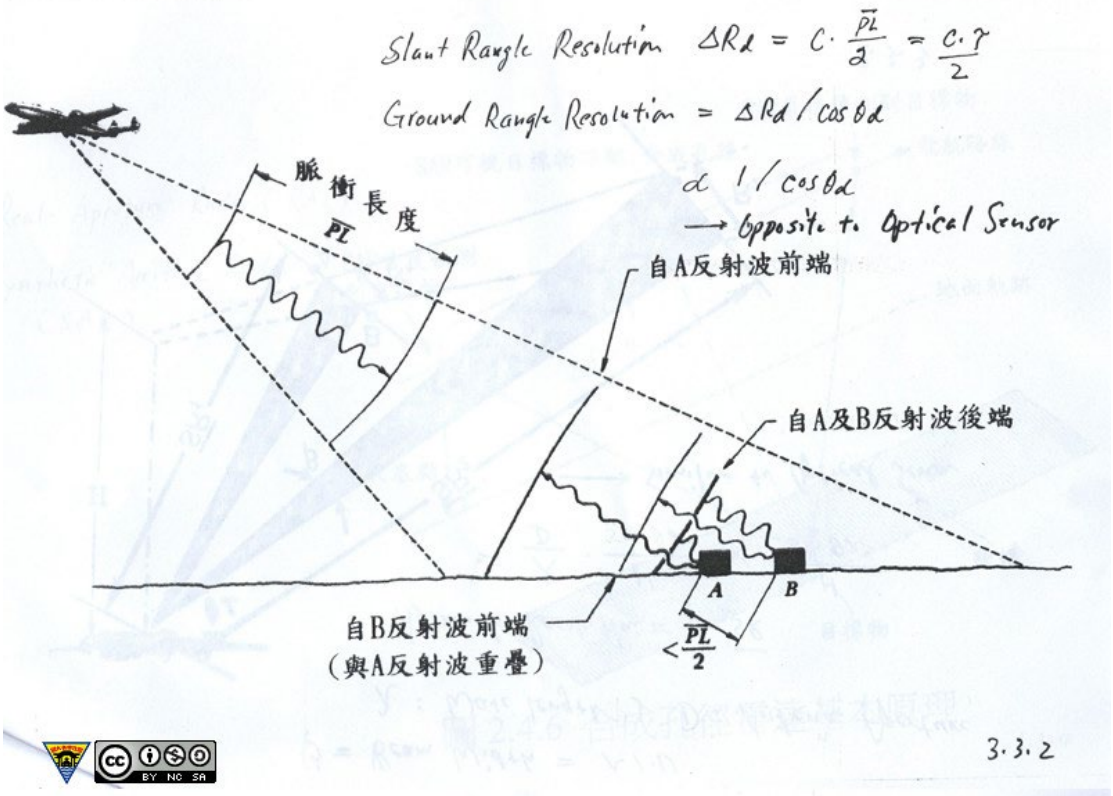
Frequency :

Single Frequency :

Multiple Frequency :

Optical	Microwave
Pan	Single Frequency + Single Polari.
Multi-Spectral	Single Frequency + Dual Polari. or Polarimetric Multiple Frequency + Single ~ Dual Polarization


Imaging Geometry
θd = 俯角 (Depression Angle)
θl = 觀測角
(Look Angle)
Off-Nadir Angle
R
(Incident Angle)
θi
H (Height)
(Incident Angle)
(Ground Range Resolution)
地面測距解析度
θd
斜側距解析度
(Slant Range Resolution)
θd
θl
θi
α
α
θi = θl - α
3.3.1


Slant Range Resolution ΔRd = C · PL/2 = C·τ/2
Ground Range Resolution = ΔRd / cos θd
α 1/cos θd
→ Opposite to Optical Sensor
脈衝長度
PL
自A反射波前端
自A及B反射波後端
A
B
自B反射波前端
(與A反射波重疊)
< PL/2
3.3.2

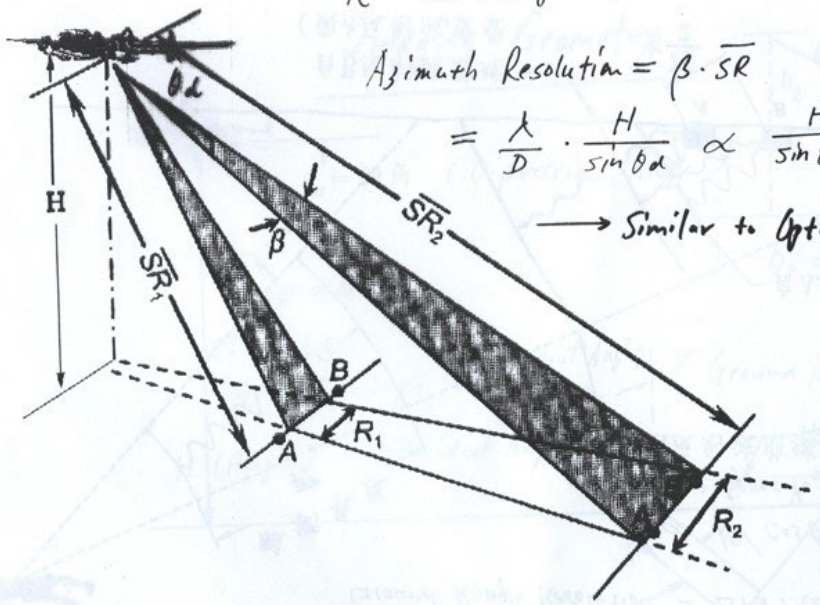
β = Beam Width = λ / D

λ : Wave Length ; D : Antenna Aperture

Azimuth Resolution = $\beta \cdot \overline{SR}$

$= \frac{\lambda}{D} \cdot \frac{H}{\sin\theta_d} \propto \frac{H}{\sin\theta_d}$

→ Similar to Optical Sensor



3.3.3

Real- Aperture Radar (RAR)

Synthetic Aperture Radar (SAR)

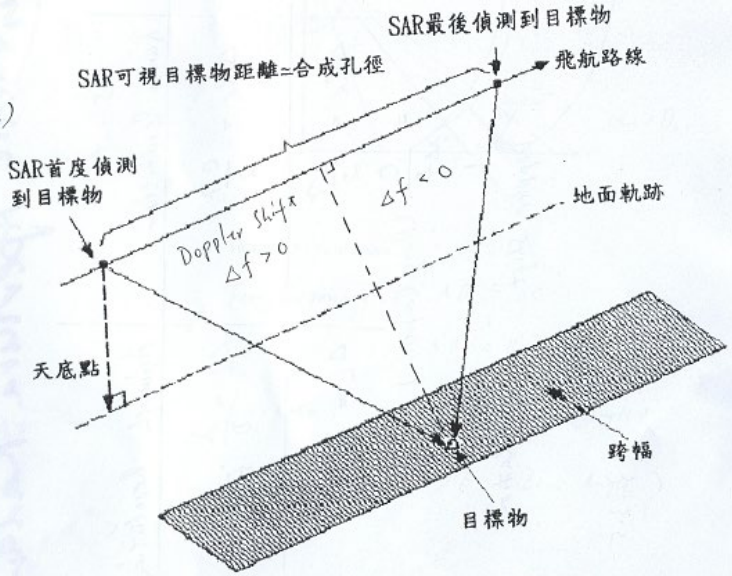


圖 2.4.6 合成孔徑雷達基本原理

3.3.4