

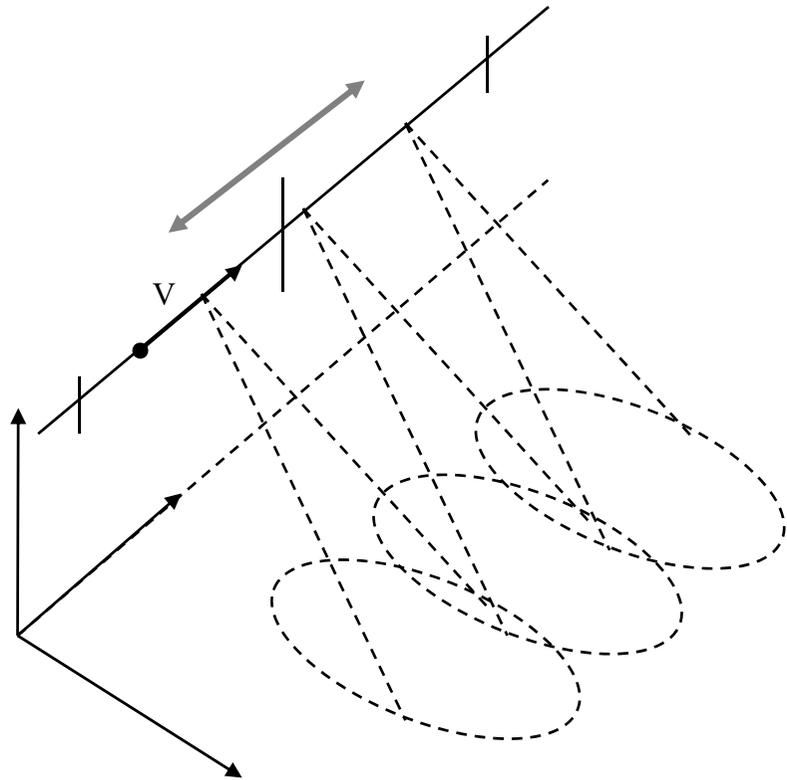
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# Radars di Immagine

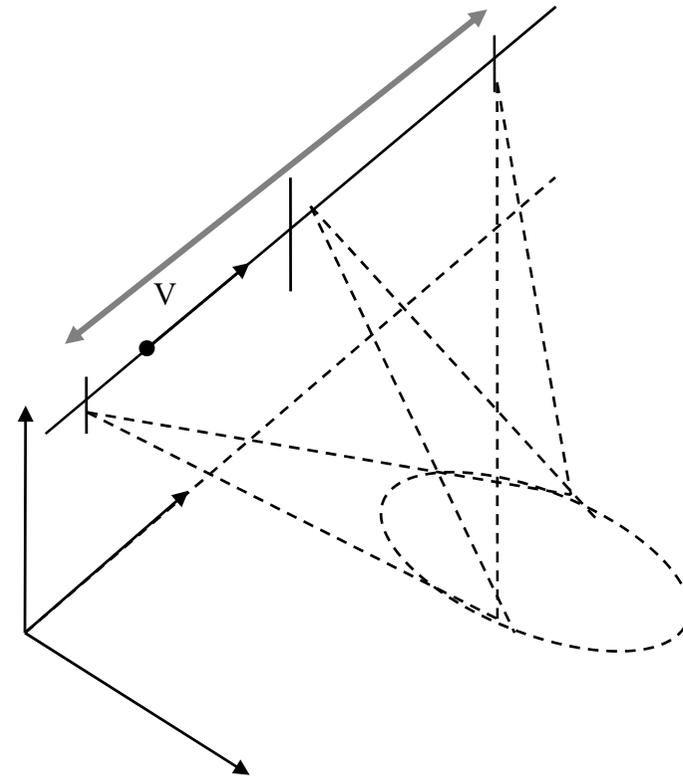
# Spotlight Mode SAR

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**Spotlight Mode SAR steers the real antenna toward the scene center to exceed the limit on the synthetic aperture of the stripmap mode**



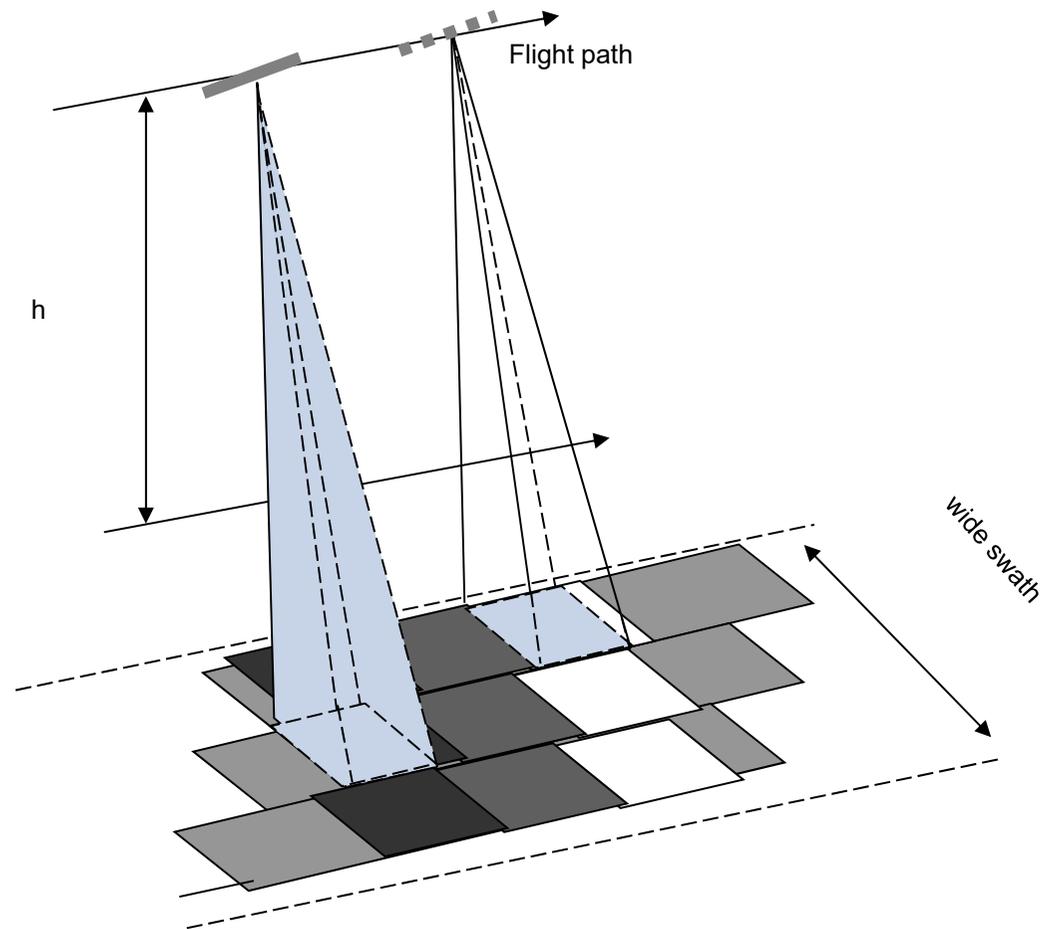
*STRIPMAP Mode*



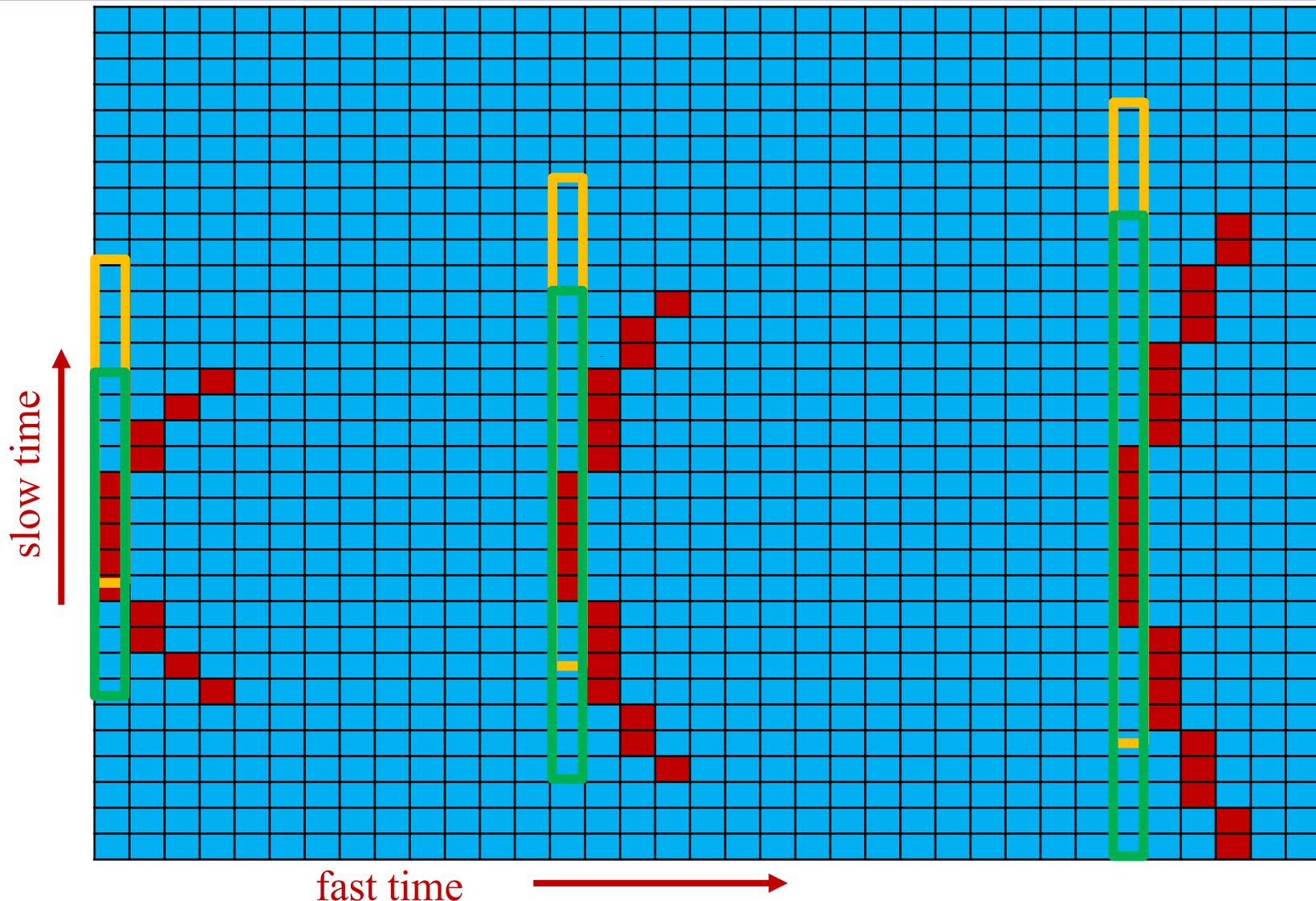
*SPOTLIGHT Mode*

# ScanSAR Mode

ScanSAR Mode acquisition are performed by using the same azimuth antenna steering of the stripmap mode, but switching the beam in elevation after each burst to cover a wider swath



# Range cell migration (RCM)



# RCM compensation

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**Hyperbolic shaped (approx. quadratic) range cell migration appears unless range resolution is coarse enough**

**For the sample airborne SAR case  
(using worst case Far range distance)**

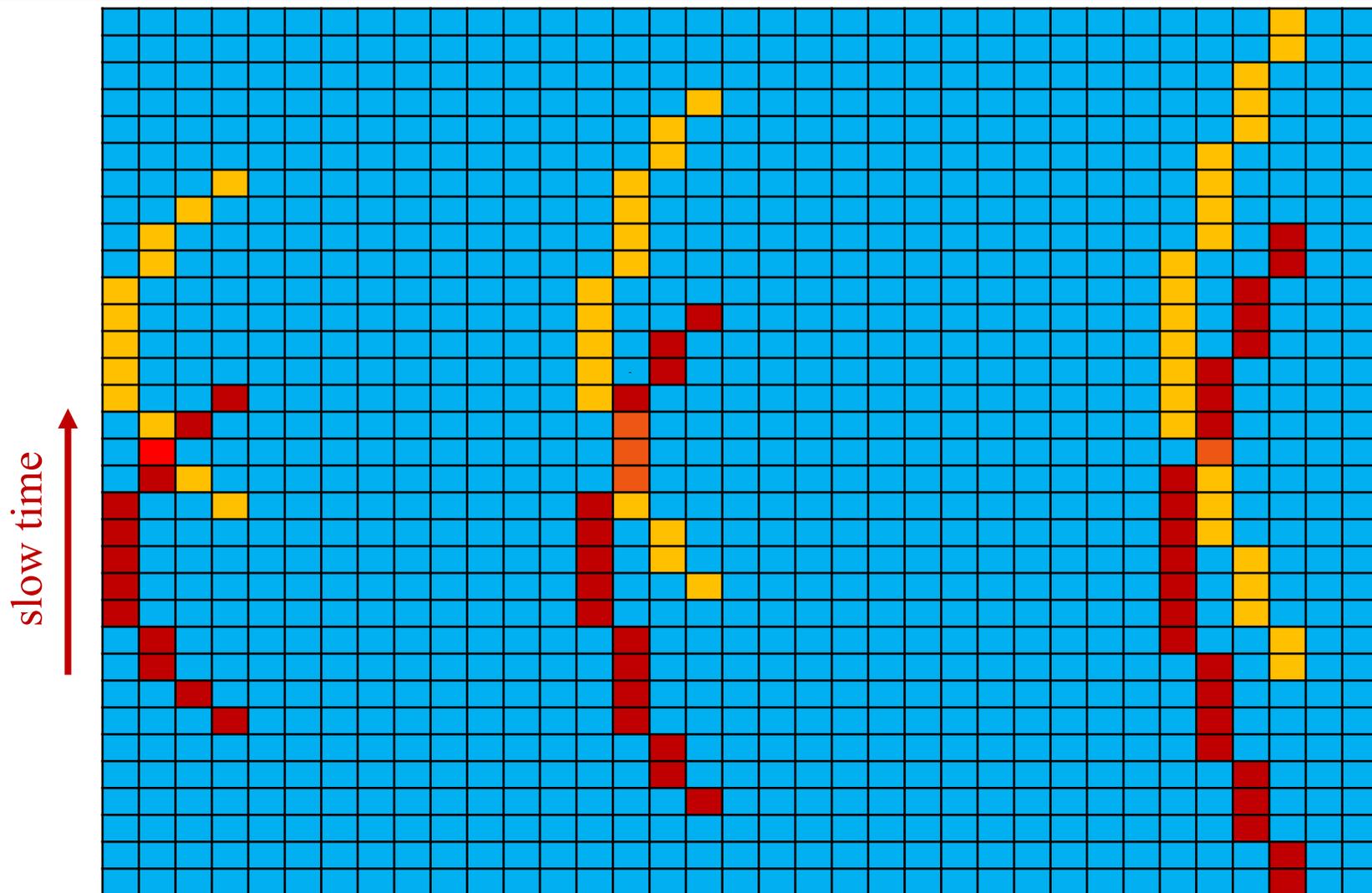
$$\delta_R > \frac{\lambda^2 R_y}{8 d_a^2} = 3.5 \text{ m}$$

**If higher range resolution is required, it is necessary to compensate the point target migration through range bins**

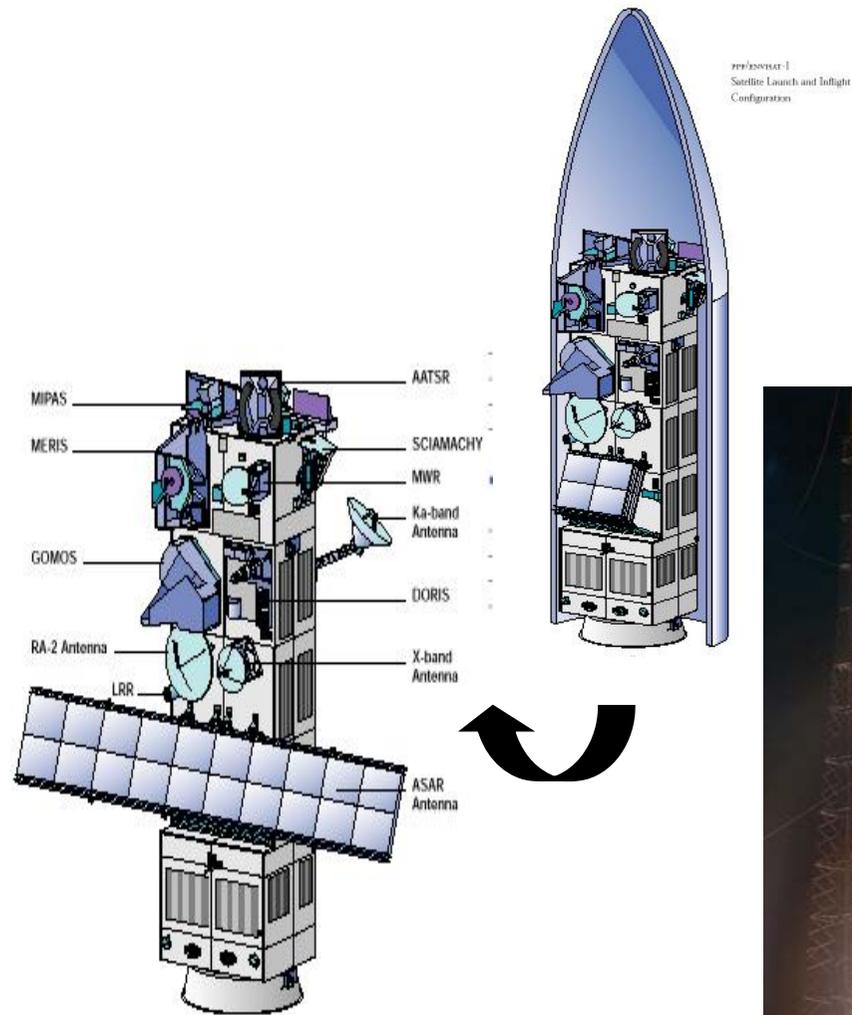
**Note:**

- 1) Range Cell Migration shape is range dependent ! → different compensation from N to F**
- 2) For targets at same range and different along-track displacement RCM compensation is different → Compensation in time domain must be repeated continuously in slow-time**

# RCM compensation (II)



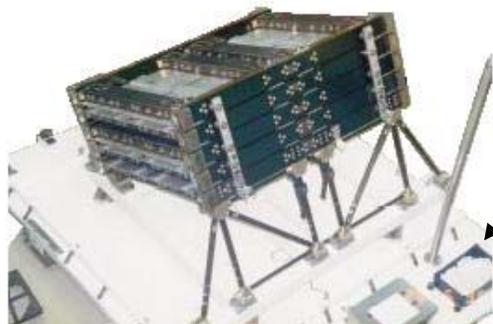
# Radar: Esempio – Envisat (I)



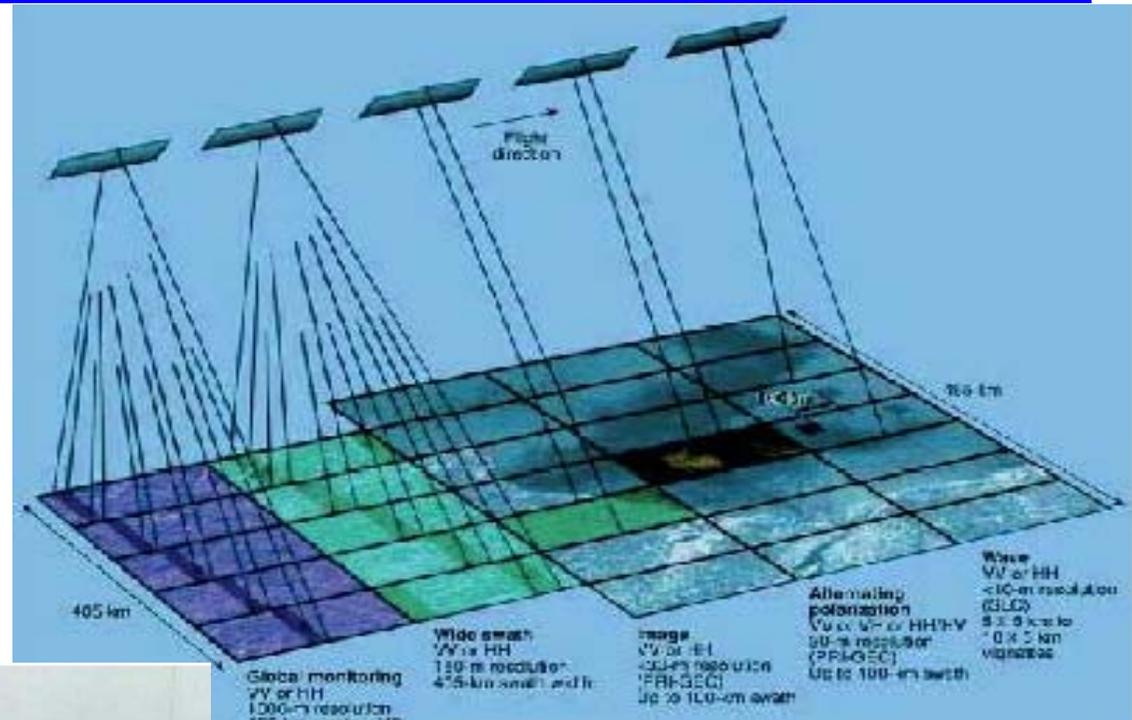
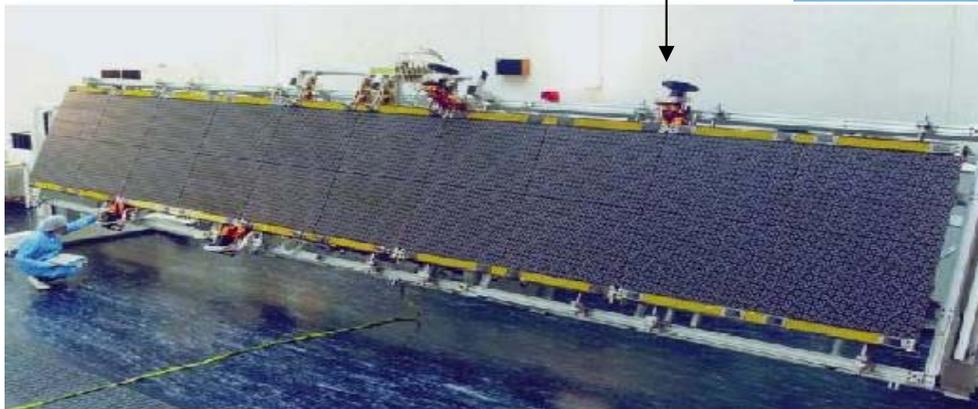
Satellite

# Radar: Esempio – Envisat (II)

## ASAR: Advanced Synthetic Aperture Radar



ASAR-  
Antenna



### Global monitoring:

VV o HH, 1000 m resolution, 405 Km swath width

### Wide Swath:

VV o HH, 150 m resolution, 405 Km swath width

### Image

VV o HH, <30 m resolution, fino a 100 Km swath width

### Alternating Polarization:

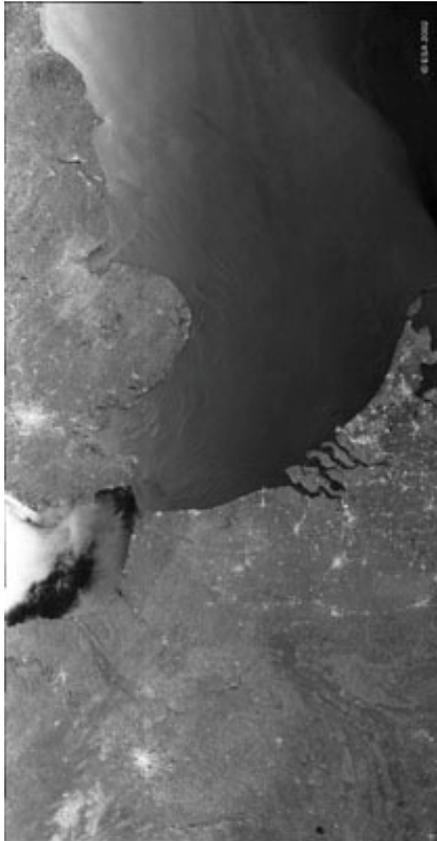
VV o VH o HH/HV, 30 m resolution, 100 Km swath width

### Wave

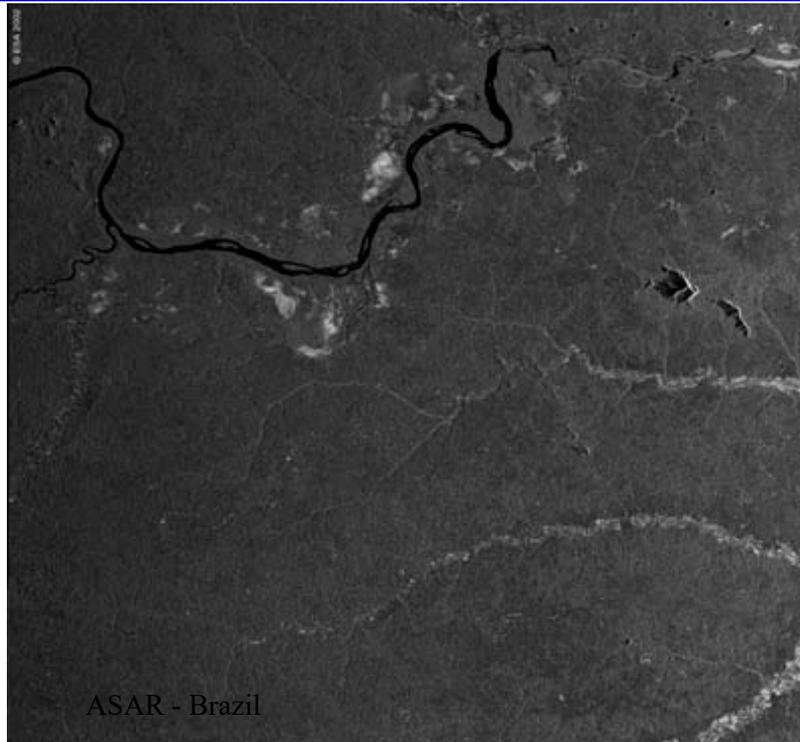
VV o HH, <10 m resolution, 5x5 Km fino a 10x10 Km

# Radar: Esempio – Envisat (III)

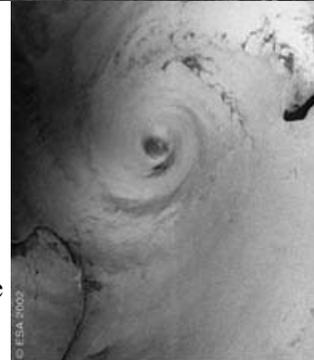
ASAR  
images



ASAR -Mare del Nord  
21 Agosto 2002



ASAR - Brazil



ASAR- Hurricane Isidore  
21 Settembre 2002



ASAR-Penisola Antartica

**RadioTecnica e RadioLocalizzazione**

# Cosmo-SkyMed

- Costellazione di 4 satelliti (orbita circolare eliosincrona) per l'osservazione della Terra.
- Tempo di rivisita minimo inferiore alle 12 ore.
- Sensori SAR in banda X ( $\approx 9.6$  HHZ), antenna a Phased Array (5.7 m x 1.4 m).
- Molteplici modalità operative (fino a 1 m di risoluzione cross-range).



## WIDE FIELD

### STRIPMAP

**HIMAGE**  
3x3 – 5x5 m Resol.  
(40 km X 40 km)

**PINGPONG**  
15x15 m Resol.  
(30 km X 30 km)

### SCANSAR

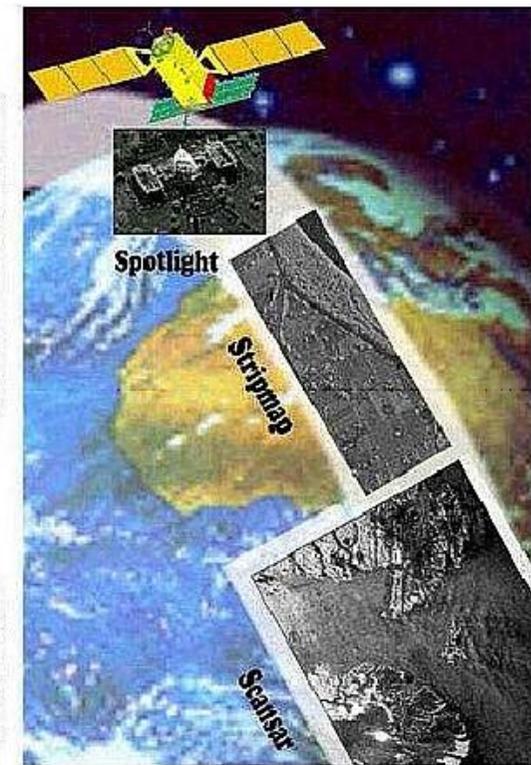
**WIDEREGION**  
30x30 m Resol.  
(100 km X 100 km)

**HUGEREGION**  
100x100 m Resol.  
(200 Km X 200 Km)

## NARROW FIELD

### SPOTLIGHT

**SPOTLIGHT 2**  
1 x 1 m  
(10 km X 10 km)



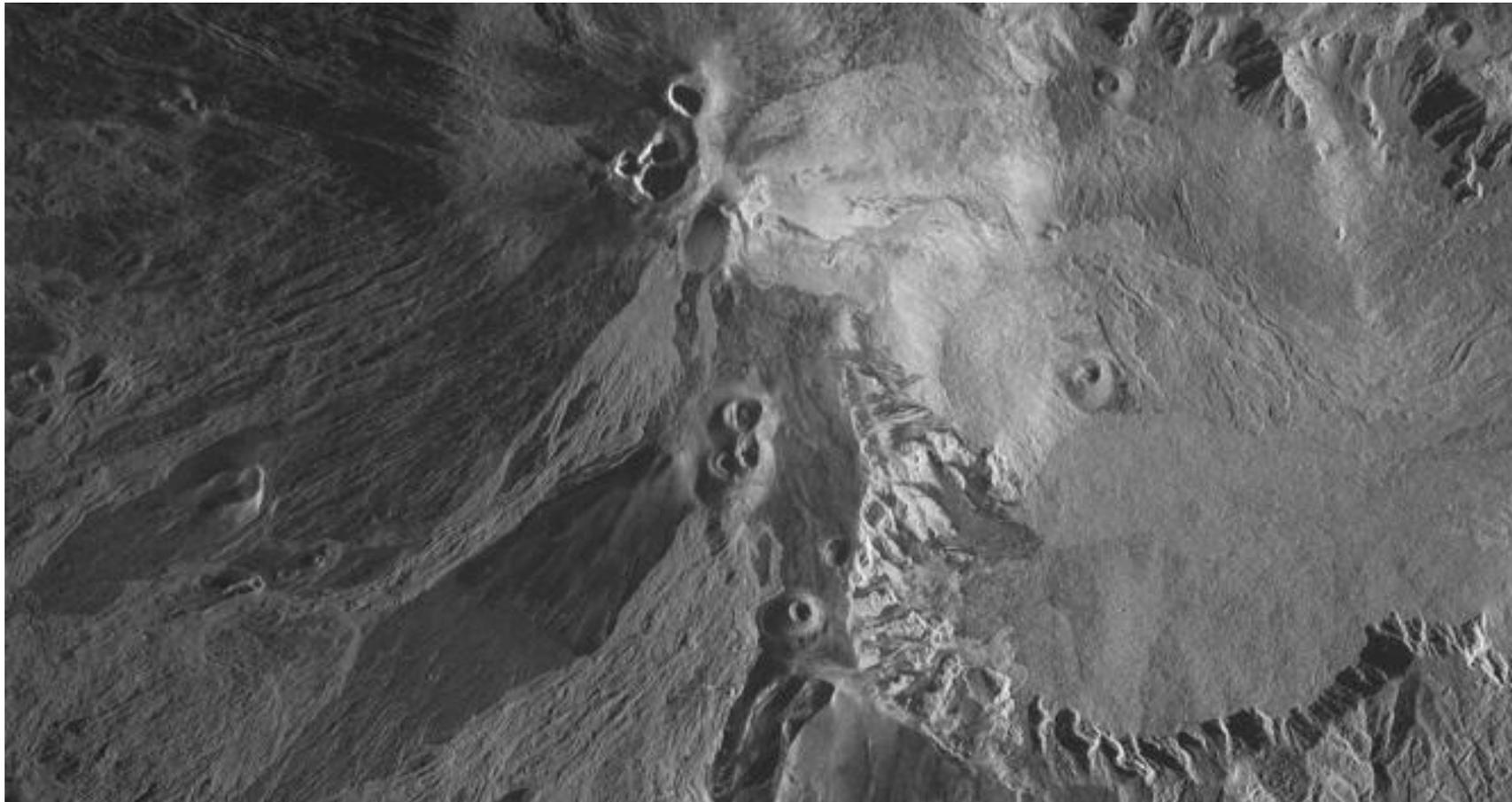
# COSMO-SkyMed: immagini

Roma



**RadioTecnica e RadioLocalizzazione**

# COSMO-SkyMed: immagini



Etna Spotlight-2 acquisition (1m resolution)

[RadioTecnica e RadioLocalizzazione](#)

# COSMO-SkyMed: immagini

Flevoland (Olanda)  
Spotlight-2 acquisition  
(1m resolution)



**RadioTecnica e RadioLocalizzazione**

# COSMO-SkyMed: immagini



Maracaibo (Venezuela)

# COSMO-SkyMed: immagini



Richat (Mauritania) StripMap image