

2.11. Weather Satellites / Sensors

I. Geostationary Satellites

* U. S. A. :

ATS-1, 1966 → GOES-1 (1975)

GOES 11, May, 2000 (West, 135°W)

GOES 13, May, 2006 (East, 75°W)

* Japan :

GMS-1, 1977, → GMS-5, 1995 - 2000

MTSAT, Feb., 2006 (145°E)

* Europe

METEOSAT-1, 1977 →

METEOSAT-8 (MSG-1), Aug. 2002 (0°)

* Mainland China

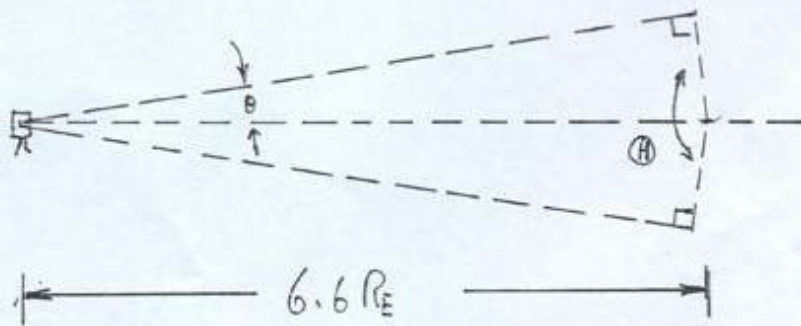
Feng-Yun-2A, July, 1997

Feng-Yun-2E, Dec., 2008

2.11.1



Geostationary



$$\theta = \sin^{-1} \frac{1 R_E}{6.6 R_E} \approx \frac{1}{6.6} \text{ radian} = 8.7^\circ$$

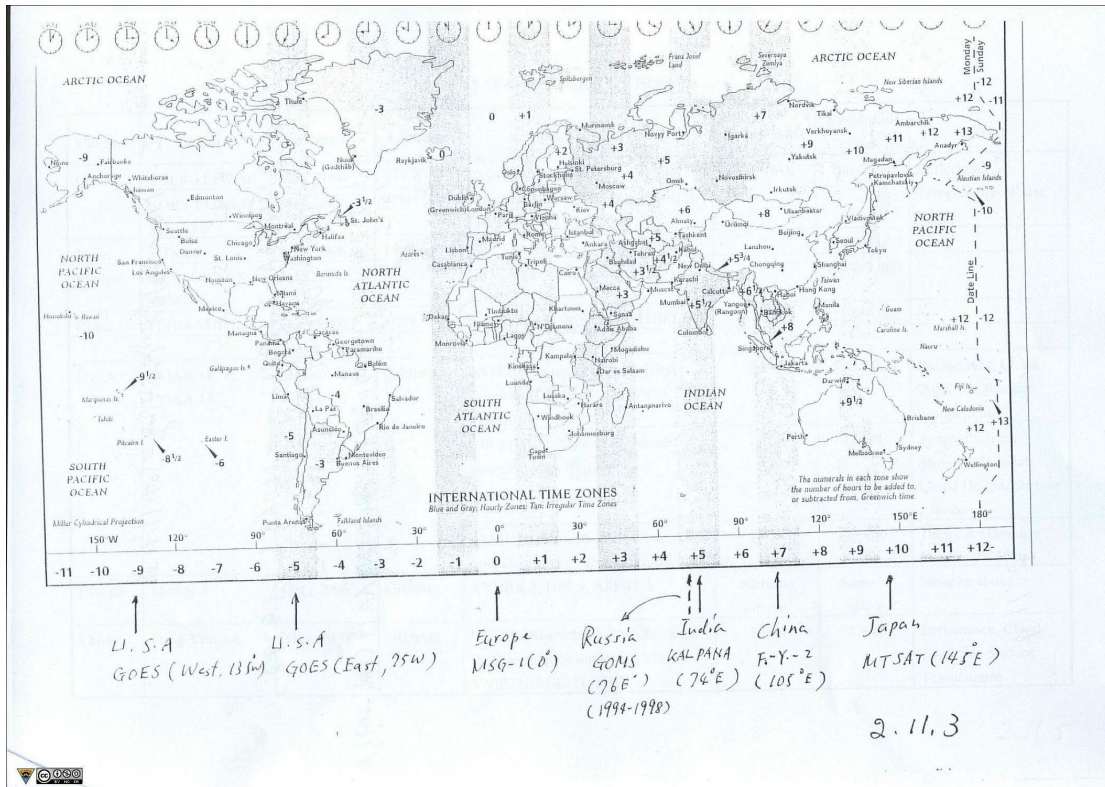
$$\left(\begin{array}{l} \text{Note: } \sin \theta \approx \theta \text{ if } \theta \leq 1 \text{ (radian)} \\ \cos \theta \approx 1 - \frac{\theta^2}{2} \end{array} \right)$$

$$\theta = 180^\circ - 2\theta \approx 163.6^\circ$$

$$\text{Swath Width} \approx 19,071 \text{ km}$$

2.11.2





II. Near Polar Orbiting Satellites

* U. S. A.

NOAA-1 (1970) → NOAA 6 (1979),
First Operational Satellite

NOAA 18 (May, 2005), ~~AM~~; NOAA 19 (Feb., 2009), A.

* Europe

MetOp-1 (Oct., 2006)

* China

Fung-Yun 1A (Sept., 1998)

Fung-Yun 3A (May, 2008)

2.11.4



2.11 Weather Satellite / Sensors

Country	Satellite	Launch	Location	Sensors/Spectral Band	Swath (km)	Resolution (m)	Notes
U.S.A.	GOES-11 (West)	May, 2000	135°W	VISSR (Visible and Infrared Spin Scan Radiometer)/VIS(2), SWIR(2), MWIR(2), THIR(5)	Full Disk	500-2,000	Reflectance, Temperature, Water Vapor
	GOES-13 (East)	May, 2006	75°W				
Japan	MTSAT	Feb., 2006	145°E	VIS, MWIR(2), THIR(2)	"	1,000-4,000	"
Europe	METEOSAT-8 (MSG-1)	Aug., 2002	0°	HRV, VIS(2), NIR, MWIR(3), THIR(5)	"	1,000-3,000	"
China	FENG-YUN-2E	Dec., 2008	105°E	S-VISSR/VIS, MWIR(2), THIR(2)	"	1,250-5,000	"
U.S.A.	NOAA 18 NOAA 19	May, 2005	Orbiting	AVHRR 3/Advanced Very High Resolution Radiometer (3)/VIS, NIR, MWIR(2), THIR(2)	2,894	500-1,000	Reflectance, Cloud Tops, Sea Surface Temperature
		Feb., 2009		HIRS (High Resolution Infrared Sounder) VIS, IR(19)	2,160	10,000	Temp. Profiles, Moisture Content, Cloud Height, Surface Albedo
				AMSU (Advanced Microwave Sounding Unit)/ Microwave (15)	2,054	45,000	Temp. & Humidity Profiles (0-50km)
Europe	MetOp-1	Oct., 2006	Orbiting	AVHRR 3, HIR 3, AMSU-A	Same as above	Same as above	Same as above
China	Feng-Yun 3A	May, 2008	Orbiting	MVISR (Multichannel Visible and IR Scanning Radiometer)/ VIS(4), VNIR(2), MIR(2), THIR(2)	3,000	1,100	Reflectance, Cloud Tops, Sea Surface Temperature



2.11.5



Landsat Evolution

Sensor Category: Cross-track Scanner

Swath Width: 185 km, View Angle: Nadir

Orbital (Target) Revisit Period:

Landsat 1-3: 18 days (18 days),

Landsat 4-7: 16 days (16days)

Equatorial Crossing Time: 9:30 AM



2.12.1¹



Note: ERTS – Earth Resource Technology Satellite

Landsat – Land Satellite

RBV – Return Beam Vidicon Camera

MSS – Multi-Spectral Scanner

TM – Thematic Mapper

ETM⁺ – Enhanced Thematic Mapper *plus*



2.12.2



	Launch	Sensor	No. of Bands	Resolution (m)	End of Service/ Status
LS-1 (ERTS)	July, 1972	RBV	3	80	Jan., 1978
		MSS	4	80	
LS-2	Jan., 1975	RBV	3	80	1983
		MSS	4	80	
LS-3	March, 1978	RBV	1	80	Jan., 1983
		MSS	4 (5 [*])	80 (240 [*])	
LS-4	July, 1982	MSS	4	80	Dec., 1993
		TM	6+1,	30, 120	
LS-5	March, 1984	MSS	4	80	Partial Operation Since 2003
		TM	6+1	30, 120	
LS-6	Oct., 1993	ETM	Pan	15	Launch failure
			6+1	30, 120	
LS-7	April, 1999	ETM ⁺	Pan	15	Interrup: May- July, 2003 Partial Operation
			6+1	30, 60	

2.12.3

SPOT Evolution

Sensor Category: Along-track Scanner
Swath Width: 60 km (117 km), View Angle: $\pm 27^\circ$
Orbital (Target) Revisit Period: 26 days (~3-4days)
Equatorial Crossing Time: 10:30 AM

