Appendix D: Satellite Sensors

Satellites and sensors are commissioned and deployed annually. The list presented here is an attempt to briefly review the utility of only a few sensors. This list, though not fully comprehensive, is a good starting point in referencing sensors.

For an extensive list of satellite sensors (acronyms and full names) see http://ioc.unesco.org/oceanteacher/resourcekit/M3/Data/Measurements/Instrumentation/gcmd_sensors.htm.

Sensor	Spatial Resolution (metric)	Band/Wavelength or Frequency Detection	Application	URL
AATSR	1000m	0.555µm (green), 0.659µm (red), 0.865µm (NIR), 1.6µm (SWIR), 3.7µm (TIR), 10.85µm (TIR), 12.0µm (TIR)	Atmosphere, forest, vegetation, oceans, coasts, weather & climate	http://telsat.belspo.be/satellites/satelliteresult.asp?var=56
AC	250	0.89-1.58µm	Used to atmospherically correct high-spatial, low-spectral resolution multispectral sensors	http://eo1.gsfc.nasa.gov/Technology/AtmosCorr.htm
ACE-FTS	0.02-1cm 4km vertical resolution	2-13 µm (infrared)	Measures the temperature, vertical distribution of trace gases and aerosols an thin clouds	http://www.space.gc.ca/asc/eng/csa_sectors/space_science/atmospheric/scisat/fts.asp
AIRS		Measures 2,300 spectral channels: 0.4 - 1.7 µm and 3.4 - 15.4 µm	Weather, climate, O_3, and greenhouse gasses	http://telsat.belspo.be/satellites/satelliteresult.asp?var=92
ALI	30 m (10 m – panchromatic)	10 bands across 0.433-2.35 µm	Land use studies, mineral resource assessment, coastal processes research and climate change studies	http://eo1.gsfc.nasa.gov/miscPages/TechForum3.html
AMI (SAR and wind Scattometer)	30 m	37.5 – 77 mm	Ocean surface winds and mean sea level	http://www.eoc.nasda.go.jp/guide/satellite/sendata/ami_e.html
AMSR	5 to 50km depending on frequency band	8 frequency bands from 6.9GHz to 89GHz bands respectively	Water vapor content, precipitation, sea surface temperature, sea surface wind, sea ice, and clouds (detectable night and day)	http://www.eoc.nasda.go.jp/guide/satellite/sendata/amsr_e.html

AVHRR 2/3	1 6m Pan – 8m	0.42 - 0.50mm 0.52 - 0.60mm 0.61 - 0.69mm 0.76 - 0.89mm Pa : 0.52 - 0.69mm	Land and coastal zone monitoring of such phenomena as: desertification, deforestation, coastal zone pollution, resource exploration, land use, fire detection (and temperature), and vegetation indices.	http://edcdaac.usgs.gov/1KM/avhrr_sensor.html
AVNIR	16 km	Band1 : 0.42 - 0.50mm	For precise land coverage observation	http://www.eoc.nasda.go.jp/guide/satellite/sendata/avnir_e.html
AVNIR-2	10 m	Band1 : 0.42 - 0.50 Band2 : 0.52 - 0.60 Band3 : 0.61 - 0.69 Band4 : 0.76 - 0.89	Land-use classification	http://www.eoc.nasda.go.jp/guide/satellite/sendata/avnir2_e.html
EROS	1.8m	0.5 - 0.9µm	Very high resolution imagery	http://www.ccrs.nrcan.gc.ca/ccrs/data/satsens/eros/erostek_e.html
ERS	5.8m	0.5 - 0.75 µm + NIR, and mid IR	High resolution imagery	http://www.spaceimaging.com/products/irs/irs_technical_overview.htm
GEROS	V, N, & S, IR- 250m Infrared - 1km	23 visible and near-infrared bands 6 short-wave length infrared bands 7 middle & thermal infrared bands	Land, ocean, clouds sensitive to chlorophyll, dissolved organic substance, surface temperature, vegetation distribution, vegetation biomass, distribution of snow and ice, and albedo of snow and ice	http://www.oso.noaa.gov/goes/goes-calibration/index.htm
HYPERION	30 m	250 bands with in the 0.4 - 2.5 µm range	Measures ice sheet mass balance, cloud and aerosol heights, minute land topography changes, and vegetation characteristics	http://eo1.usgs.gov/
IKONOS	1m and 4m	Visible and infrared	Very high resolution imagery	http://www.spaceimaging.com/products/ikonos/index.htm
ILAS	1km Stratosphere monitoring	7.14 - 11.76mm 2 - 8mm 12.80 - 12.83mm 753 - 784nm	Measures the vertical profiles of O_3, NO_2, aerosols, H_2O, CFC_{11}, CH_4, N_2O, $ClONO_2$, temperature, & pressure	http://www.eoc.nasda.go.jp/guide/satellite/sendata/ilas2_e.html
IRS	5.8 – 70 m	0.52 - 0.59 0.62 - 0.68 0.77 - 0.86 1.55 – 1.70 Pan: 0.5 – 0.75	Vegetation (forest and agriculture), water, and urban features	http://www.fas.org/spp/guide/india/earth/irs.htm

Landsat1-7				http://landsat7.usgs.gov/general.html
TM ETM+	30 Bands 1-7: 30 Band 6 at 60m	Band 1: blue, 0.45-0.52µm Band 2: green, 0.52-0.60µm Band 3: red, 0.63-0.69µm Band 4: near IR, 0.76-0.90µm Band 5: mid IR, 1.55-1.74µm Band 6: thermal IR 10.40-12.50µm Band 7: mid IR, 2.08-2.35µm	Water, forest, soil/vegetation, and urban features Detects healthy vegetation Distinguishes plant species, soil and geologic boundaries Vegetation biomass, emphasizes soil/crop & land/water boundaries Plant water content/vegetation health, distinguishes clouds, snow and ice Crop stress detection, heat intensity, insecticide applications, thermal pollution and geothermal mapping Geologic and soil mapping and plant/soil moisture content	http://landsat7.usgs.gov/about.html
MSS	30 Pan: 15	TM bands 1-7 Pan: 0.52 - 0.90 µm Band 1: green, 0.50-0.60µm Band 2: red, 0.60-0.70µm Band 3:near IR, 0.70-0.80µm Band 4: near IR, 0.80-1.10µm	See TM Bands 1-7 above. Used to spatially sharpen TM and MSS color composites Sediment in water and urban features Soil / geologic boundary discrimination Vegetation biomass and health Vegetation discrimination, penetrating haze, and water/land boundaries	http://edc.usgs.gov/products/satellite/mss.html
LIS	4km	0.77765µm	Monitors lightening	http://www.eoc.nasda.go.jp/guide/satellite/sendata/lis_e.html
MISR	275 m to 1.1 km	blue, green, red, and near-infrared	Tropospheric Aerosol Data	http://terra.nasa.gov/About/MISR/about_misr.html
MODIS	250 m, 500 m, 1000 m	0.4 to 14.4 µm; Details at: http://modis.gsfc.nasa.gov/about/specs.html	Aerosol concentrations over land and water, fire detection (biomass burned), land-use, vegetation	http://www-misr.jpl.nasa.gov/
ORBVIEW-3	1 m, 4 m	450 – 520 nm 520 – 600 nm 625 – 695 nm 760 – 900 nm	Urban, crop, terrain detail for 3-dimensional mapping.	http://www.orbimage.com/corp/orbimage_system/ov1/
POLDER	7km	443, 490, 565, 665, 763, 765, 865, and 910 nm	Aerosols, clouds, over ocean and land surfaces	http://www.eoc.nasda.go.jp/guide/satellite/sendata/polder_e.html

PR	250 km	13.796 GHz and 13.802 GHz	Measures and maps rainfall (3-D)	http://www.eoc.nasda.go.jp/guide/satellite/sendata/pr_e.html
PRISM	2.5 m	0.52 - 0.77mm	For digital elevation mapping	http://www.nasda.go.jp/projects/sat/alos/component_e.html
QUICKBIRD	62 cm to 2.5 m	Blue: 450 - 520 nm Green: 520 - 600 nm Red: 630 - 690 nm Near-IR: 760-890 nm Pan: 450 - 900 nm	Forest fires, urban, vegetation, surveillance	http://www.satimagingcorp.com/gallery-quickbird.html
RADARSAT	10, 25, 50, and 100 m	Microwave c-band (5.6 cm)	Land-use/cover, change detection	http://www.rsi.ca/
SeaWinds	50 km	Frequency of 13.4 GHz	Ocean wind speed and direction	http://www.eoc.nasda.go.jp/guide/satellite/sendata/seawinds_e.html
SPOT				http://www.spot.com/
• PAN	10 m	Band 1: green-red, 0.51 - 0.73 µm	Useful for visual interpretation and improving low spatial resolution multi-spectral data	
• XS	20 m	Band 1: green, 0.50-0.59µm Band 2: red, 0.61-0.68µm Band 3: near IR, 0.79-0.89µm Band 4: short-wave IR, 1.5-1.75µm	Monitors healthy vegetation Distinguishes plant species, soil, and geologic boundaries Vegetation biomass and emphasizes soil/crop and land/water boundaries Soil and leaf moisture	
TMI	6-50 km	10.7, 19.4, 21.3, 37, and 85.5 GHz	Rainfall rates and precipitation profiles: http://trmm.gsfc.nasa.gov/overview_dir/tmi.html	