

OCEAN & LAND SPACECRAFT: PAST, PRESENT & FUTURE: 1972 - 2004+ (Table 1)

<u>SATELLITE</u>	<u>SPONSOR</u>	<u>OCEAN-RELATED SENSORS TECHNICAL DETAILS & COMMENTS</u>	<u>LAUNCH</u>	<u>STATUS</u>
LANDSAT-1, 2 & 3	NASA/NOAA	MSS (3 vis & 1 ir bands), ~80m resolution	1972 #1 ('72 - '78), #2 ('75 - '82), #3 ('78 - '83)	Completed
DMSP (5D-1)	USAF	VS/IR (OLS, 2 frequency)	Sept 1976	Completed
NIMBUS-7	NASA	MR (SMMR), IR (THIR), OC (CZCS)	1978	Completed in 1985
SEASAT	NASA	ALT (1-frequency), SCAT (SASS, Ku-band) MR (SMMR), SAR (L-band)	1978	Failed at ~100 days
US POLAR SERIES NOAA 6-15 ('79-present), #14 (pm) [Dec '94], #15 (am) with 6-channel AVHRR [May '98], #16 [Fall 2000]	NOAA	VS/IR (AVHRR/5-channel), ARGOS	October 1978	Operational
SPACE SHUTTLE	NASA	Astronaut hand-held photographs using Hasselblad & Nikon cameras	1981	On-going
GEOSTATIONARY GOES-8 (April '94 - Atlantic @ 75° W), GOES-10 (Apr '97 - Pacific @ 135° W), GOES-11 (Launch in Fall '99)	NOAA-GOES	VS/IR (VISSR), Radiation	Ongoing	Operational
LANDSAT 4 & 5	NASA/NOAA	MSS (3 vis & 1 ir bands, ~80m resolution) TM (4 vis & 3 ir bands, ~30m resolution)	#5 in 1984 (#4, '82 - '92)	#5 is Quasi- Operational
GEOSAT	USN	ALT (1-frequency)	March 1985	Completed Late-1989
SPOT-1, 2 & 3	CNES	HRV PAN, ~10m resolution HRV XS (2 vis & 1 ir bands), ~20m resolution DORIS (tracking system)	#1- '86, #2- '90) #3- '93 - Nov'96	SPOT-1 & 2 Operational

OCEAN & LAND SPACECRAFT: PAST, PRESENT & FUTURE: 1972 - 2004+ (Table 2)

<u>SATELLITE</u>	<u>SPONSOR</u>	<u>OCEAN-RELATED SENSORS TECHNICAL DETAILS & COMMENTS</u>	<u>LAUNCH</u>	<u>STATUS</u>
MOS-1A	NASDA	OC/VS, VS/Land, IR, MR (MSR)	<u>February 1987</u>	Completed in 1995
DMSP (5D-2) (SSMI First Launch in 1987, Last Launch of 5D-2 was April 1997)	USAF	MR (SSMI), VS/IR (OLS, 2-frequency)	December 1982	Operational
MOS-1B	NASDA	OC/VS, VS/Land, IR, MR (MSR)	February 1990	Completed in 1996
ERS-1	ESA NASA	ALT (1-frequency), C-SAR+C-SCAT (AMI), IR/MR (ATSR) Alaska SAR Facility	July 1991	On Standby In June 1996
IRS-1A & 1B	INDIA	LISS-I (3vis., 1ir band), ~72m resolution LISS-II (3vis, 1ir band), ~36 m resolution	1988 (1A) 1991 (1B)	1A Off 1994 Operational
JERS-1	NASDA NASA	SAR (L-band), high & low resolution Visible (stereo) Alaska SAR Facility	February 1992	Completed 11 Oct 1998
TOPEX/POSEIDON	NASA CNES	ALT (2-frequency), GPS (tracking), MR ALT (1-frequency), DORIS (tracking), Launch	August 1992	Operational
LANDSAT 6	NASA/NOAA	ETM & PAN (30m & 15m resolution)	October 1993	Failed at Launch
ERS-2	ESA	ALT (1-frequency), C-SAR+C-SCAT (AMI), PRARE (tracking), IR/MR (ATSR)	April 1995	Operational

OCEAN & LAND SPACECRAFT: PAST, PRESENT & FUTURE: 1972 - 2004+ (Table 3)

<u>SATELLITE</u>	<u>SPONSOR</u>	<u>OCEAN-RELATED SENSORS TECHNICAL DETAILS & COMMENTS</u>	<u>LAUNCH</u>	<u>STATUS</u>
RADARSAT-1	CANADA NASA NOAA	SAR (C-band) Alaska SAR Facility, Launch Distribute Data	November 1995	Operational
IRS-1C	INDIA	LISS-III (3 vis & 2 ir bands), ~23m resolution Pan (5.8m resolution), stereo WiFS (1 vis & 1 nir bands), 188m resolution	December 1995	Operational
IRS-P3 (German supply MOS)	INDIA MOS-B	MOS-A (nir, 4 bands), 3km resolution MOS-B (vis & nir, 13 bands), .7km resolution	January 1996	Operational
PRIODA-MIR (German supply MOS)	RUSSIA	MOS-A (nir, 4 bands), 3km resolution MOS-B (vis & nir, 13 bands), .7km resolution	Spring 1996	<u>Onboard</u> (Never On)
MIDORI (ADEOS-1)	NASDA NASA CNES	AVNIR-1 (3 vis & 1 nir bands), ~16m resolution Pan (~8m resolution), 80km swath OC/VS & IR (OCTS, 6 vis & 6 ir bands), ~1,400km swath NSCAT (Ku-band) POLDER	August 1996	<u>Failure of</u> Solar Panel June 1997
ORBVVIEW-2	Orbital Sci. Corp. NASA	OC/VS (SeaWiFS, 8 vis bands) Data Purchase & Data Facility	August 1997	Operational Sept 1997
SSTI/LEWIS (Hyperspectral)	NASA/TRW	HIS (Pan), 5m resolution HIS (384 [ms] bands), 30m resolution LEISA (atmospheric gases)	August 1997	<u>Failed 1997</u> Lost Power

OCEAN & LAND SPACECRAFT: PAST, PRESENT & FUTURE: 1972 - 2004+ (Table 4)

<u>SATELLITE</u>	<u>SPONSOR</u>	<u>OCEAN-RELATED SENSORS TECHNICAL DETAILS & COMMENTS</u>	<u>LAUNCH</u>	<u>STATUS</u>
IRS-1D	INDIA	LISS-III (3 vis & 2 ir bands), ~23m resolution PAN (5.8m resolution), stereo, 70km swath WIFS (1 vis & 1 nir bands), 188m resolution 810km swath	Sept 1997	Operational
TRMM	NASDA/NASA	VS/IR (VIRS), MR (TMI) Precipitation Radar, CERES, LIS 35° Inclination	November 1997	Operational
<u>Early Bird</u>	Earth-Watch (Ball Brothers)	HRC/PAN, 3m resolution WFC (3bands), 15m resolution	December 1997 (Russia Start 1 Launch)	<u>Failed</u>
SSTI/Clark	NASA/CTA	HRC/PAN, 3m resolution WFC (3bands), 15m resolution MAPS (atmospheric gases)		Canceled 1998
GFO (GEOSAT Follow-On)	US Navy	ALT (1-frequency), GPS (tracking), MR	February 1998 Taurus Launch	Not Yet Operational
SPOT-4	CNES	HRV PAN (~10m resolution) HRV XS (2 vis & 2 ir bands), ~20m resolution	March 1998	Operational
ROCSAT-1	TAIWAN	OC/VS (OCI, 6 bands) 35° Inclination	January 1999	Operational

OCEAN & LAND SPACECRAFT: PAST, PRESENT & FUTURE: 1972 - 2004+ (Table 5)

<u>SATELLITE</u>	<u>SPONSOR</u>	<u>OCEAN-RELATED SENSORS</u> <u>TECHNICAL DETAILS & COMMENTS</u>	<u>LAUNCH</u>	<u>STATUS</u>
LANDSAT-7	NASA/NOAA	Adv. ETM+ (4 vis & 3 ir & PAN bands), resolution is 30m (ETM+) & 15m (PAN), 185km swath	April 15, 1999	Operational
IKONOS-1	Space Imaging	CRSS PAN, <1m resolution, 11km FOV	April 27, 1999	<u>Launch Failure</u>
	Corp., Samsung & EOSAT	CRSS MS (4 vis bands), <4m resolution Accurate digital elevation models	Athena 2 Launch	
IRS-P4 (OCEANSAT-1)	INDIA (ISRO)	MR (MSRS), 40-120km resolution 4 bands (6.6, 10.6, 18 & 21GHz) OC/VS (OCM, 8 bands), 360m resolution	May 26, 1999	Operational
QUICKSCAT	NASA Ball Aerospace	SeaWinds-1 (~Ku-band SCAT)	June 19, 1999 Titan-2 Launch	Operational
IKONOS-2	Space Imaging Corp., Samsung & EOSAT	CRSS PAN, <1m resolution, 11km swath CRSS MS (4 vis bands), <4 m resolution 3 day repeat, Accurate digital elevation models	Sept. 24, 1999 Launch by Athena 2 Rock.	Operational
CBERS-1 (Zi Yuan 1) (China-Brazil Earth Resources Satellite)	CHINA-BRAZIL	CCD (PAN & MS, 3 bands), 20m resolution IR/MSS (Multi-Spectral Scanner, 4 bands), 80-160m resolution VS/WFI (Wide Field Imager, 2vis bands), 260m resolution	October 14, '99 Long March 4B Launch	Operational
DMSP (5D-3)	USAF/NOAA	MR (SSMIS, multi-frequency)	Dec 12, 1999	Operational
TERRA (EOS-AM1)	NASA	OC/VS & IR (MODIS, 36 bands), MOPITT MR (MISR, 4 bands, 9 looks), ASTER, CERES	Dec 18, 1999 Atlas IIAS	Launched

KOMPSAT (Arrirang-1) (Korean Multi-Purpose Sat)	KOREA (KARI) & TRW	OC/VS (OSMI, 6 bands) Pan (~6.6m resolution)	Dec 20, 1999 Taurus Launch	Operational
--	-----------------------	---	-------------------------------	-------------

OCEAN & LAND SPACECRAFT: PAST, PRESENT & FUTURE: 1972 - 2004+ (Table 6)

<u>SATELLITE</u>	<u>SPONSOR</u>	<u>OCEAN-RELATED SENSORS TECHNICAL DETAILS & COMMENTS</u>	<u>LAUNCH</u>	<u>STATUS</u>
SRTM (Shuttle Radar Topography Mission)	NASA/NIMA DRL/ASI	C/X-band Interferometric SAR, 57° Inclination Map Elevation of 80% of Earth's Surface @ ~10-15m height, ~30m spatial resolution	Feb 11, 2000 11 day mission	Complete
EROS Constellation - Earth Remote Operation System A Series: 2000 & 2001+ B Series: 2002 to 2004	West Indian Space (Israel Aircraft Industry & Core Software Technol.)	PAN (CCD), ~1m resolution, ~16 km swaths <u>Multi-spacecraft in various orbits; rapid processing & distribution; will not carry onboard recorder.</u>	Summer 2000 A -1 launch by Russian Start-1	Approved for a fleet of 8 satellites
EO-1 (Earth Orbiter) (Hyperspectral)	NASA	MS/ALI (6 [LANDSAT/ETM+] + 3 bands) 30m resolution, 37km swath width PAN/ALI, 10m resolution, 37km swath Hyperion/HS (0.4-2.5 μ m, 220 bands) 10m resolution, 7km swath width LAC/HS (0.9-1.6 μ m, 256 bands) 250m resolution, 185km swath width	April 13, 2000	Approved
QuickBird-1 (Cosmos Launch)	Earth-Watch	HRC-Pan, 1m resolution, 22km swath WFC (3 vis, 1 nir bands), 4m resolution	Summer 2000	Approved
OrbView-3 (or 4?)	Orbital Science Corp. (OrbImage) &Partners	PAN, 1m resolution, 6km swath MS(color), ~4m resolution	Late-2000+	Approved
JASON-1	CNES NASA	ALT (2-frequency), DORIS/GPS Launch, Microwave Radiometer, Operations	Nov 2000+ (Delta Launch)	Approved

OCEAN & LAND SPACECRAFT: PAST, PRESENT & FUTURE: 1972 - 2004+ (Table 7)

<u>SATELLITE</u>	<u>SPONSOR</u>	<u>OCEAN-RELATED SENSORS TECHNICAL DETAILS & COMMENTS</u>	<u>LAUNCH</u>	<u>STATUS</u>
IRS-P5 (CARTOSAT-1)	INDIA (ISRO)	VS(HR-PAN), 2.5m resolution, 30 km swath, stereo	Late-2000+	Approved
CBERS-2 (Yi Zuan 2) (China-Brazil Earth Resources Satellite)	CHINA-BRAZIL	CCD (PAN & MS, 3 bands), 20m resolution IR/MSS (Multi-Spectral Scanner, 4 bands), 80-160m resolution VS/WFI (Wide Field Imager, 2 bands), 260m res.	Late-2000	Approved
WEOS (Whale Ecology Observation Satellite/Japan Chiba Institute of Technology)	NASDA	Whale tracking/ocean temperature & pressure	2000+	Approved
AQUA (EOS-PM1)	NASA	OC/VS&IR (MODIS, 36 bands), AMSU, AIRS MR (AMSR/E, 12 channels), HSB, CERES	Dec 2000+	Approved
OrbView-4 (Hyperspectral)	Orbital Sciences Corp. (OrbImage) & Partners	PAN, 1m resolution, 6km swath MS (color), ~4m resolution Hyper-S pec(color), ~8m resolution	Early-2001+	Planned
ENVISAT	ESA	ALT (RA-2, 2-frequency), Adv. C-band SAR, IR/MR (AATSR), OC/VS (MERIS, 15 bands), MR (MWR, 2 frequency {23.8 & 36.5 GHz}) Advanced DORIS (tracking)	June 2001	Approved
NEMO (Navy Earth Map Observer) (Hyperspectral)	US Navy Space Systems Loral	Hyper-Spec (COIS), 30m resolution, 210 bands, 30km swath PAN, 5m resolution	June 2001 Launch by Russian Rocket	Approved

OCEAN & LAND SPACECRAFT: PAST, PRESENT & FUTURE: 1972 - 2004+ (Table 8)

<u>SATELLITE</u>	<u>SPONSOR</u>	<u>OCEAN-RELATED SENSORS</u> <u>TECHNICAL DETAILS & COMMENTS</u>	<u>LAUNCH</u>	<u>STATUS</u>
QuickBird-2 (Cosmos Launch)	Earth-Watch Ball Aerospace	HRC/PAN, 1m res., 22km swath WFC (3 bands, 1 nir), 4m resolution	Mid- 2001	Approved
GRACE (Gravity Recovery And Climate Experiment)	NASA	High resolution & time varying gravity, 2 Satellites	~2001	Approved
RADARSAT-2	CANADA/ESA(?) Orbimage	SAR (C-band), 3m resolution Data Distribution	2002	Approved Approved
SPOT-5	CNES	HRV PAN (~5m resolution) HRV XS (2 vis & 2 ir bands), ~10m resolution	Early- 2002	Approved
IRS-P6 (RESOURCESAT-1)	INDIA (ISRO)	VS/NIR(AWiFS, 3 bands), ~200m resolution, ~800km swath NIR/VIS (LISS-IV, 3 bands) 2.5m resolution, 23.5km swath, stereo	2002	Approved
ADEOS-2	NASDA NASDA NASA CNES	OC/VS&IR (GLI, 36 bands) MR (AMSR, 6 frequency), 10-50km resolution SeaWinds-2 (~Ku-band SCAT) OC/VS (POLDER, 9 bands), DCS	2002+	Approved
ROCSAT-2	TAIWAN (Matra Marconi)	PAN, ~2m resolution, 60km swath MSS, ~15m resolution (stereo capability)	2002+	Approved

OCEAN & LAND SPACECRAFT: PAST, PRESENT & FUTURE: 1972 - 2004+ (Table 9)

<u>SATELLITE</u>	<u>SPONSOR</u>	<u>OCEAN-RELATED SENSORS TECHNICAL DETAILS & COMMENTS</u>	<u>LAUNCH</u>	<u>STATUS</u>
CORIOLIS	USN/NPOESS	Polarimetric MR (SSMI-type resolution) 5-bands (6.2, 10.7, 18.7, 23.8 & 37 GHz) Passive Microwave Vector Wind Demonstration	Early-2002	Approved
ARIES-1 (Australian Resource Information & Environmental Satellite) (Hyperspectral)	AUSTRALIA Auspace Ltd.	HyperSpec (96 bands), 30m resolution, ~15km swath PAN, 10m resolution, sun sync. orbit	Early-2002+	Approved
ALOS	NASDA	PALSAR (L-band, variable off-nadir) Prism PAN (3bands), ~2.5m resolution, 35km swath, stereo mapping AVNIR-2 MS (4bands,), ~10m resolution, 70 km swath	2002+	Approved
OCEANSAT-2	INDIA (ISRO)	Ku-ALT, Ku-SCAT &/or MR (being considered)	2003+	Approved
METOP-1, 2 & 3	ESA NOAA CNES	Advanced C-band SCAT VS/IR (AVHRR-3) ARGOS DCS	#1 in ~2003+ #2 in ~2008+ #3 in ~2013+	Approved Approved Approved
CARTOSAT-2	INDIA (ISRO)	VIS (1m resolution)	2003	Approved
Radar1	RDL Space	SAR (~1m resolution), 62° inclination rapid (<12 hrs.) data delivery	2004?	Proposed