

List of satellite instruments (alphabetical)

Instrument	Mission(s)	Type	Measurements /application	Technical characteristics
AATSR Advanced Along-Track Scanning Radiometer	Envisat	Imaging multi-spectral radiometer (vis/IR)	Measurements of sea surface temperature, land surface temperature, cloud top temperature, cloud cover, aerosols, vegetation, atmospheric water vapour and liquid water content	Waveband: VIS-NIR: 0.555, 0.659, 0.865µm, SWIR: 1.6µm, MWIR: 3.7µm, TIR: 10.85, 12µm Resolution: IR ocean channels: 1km x 1km Visible land channels: 1km x 1km Swath: 500km Accuracy: Sea surface temperature: <0.5K over 0.5 deg x 0.5 deg (lat/long) area with 80% cloud cover, Land surface temperature: 0.1K (relative)
ACE-FTS Atmospheric Chemistry Experiment (ACE) mission	SCISAT-1	Atmospheric Chemistry instrument	Objective is to measure and understand the chemical processes that control the distribution of ozone in the Earth's atmosphere, especially at high altitudes	Waveband: SWIR-TIR: 2-5.5µm, 5.5-13µm (0.02cm-1 resolution) Resolution: Swath: Accuracy:
ACRIM III Active Cavity Radiometer Irradiance Monitor	ACRIMSAT	Earth radiation budget radiometer	Measurements of solar luminosity and solar constant. Data used as record of time variation of total solar irradiance, from extreme UV through to infra-red	Waveband: UV-MWIR: 0.15-5µm Resolution: 5deg FOV Swath: 55 mins per orbit of full solar disk data Accuracy: 0.1% of full scale
A-DCS ARGOS-Data Collection System	NPOESS-1,2,3,4,5,6	Other	Data collection and communication system for receiving and retransmitting data from ocean and land-based remote observing platforms/transponders	Waveband: Resolution: Swath: Accuracy:
ADEOS Comms Communications package for ADEOS	ADEOS-2	Other		Waveband: Resolution: Swath: Accuracy:
AIRS Atmospheric Infra-red Sounder	Aqua	Atmospheric sounder (IR or microwave)	High spectral resolution measurement of temperature and humidity profiles in the atmosphere. Long-wave Earth surface emissivity. Cloud diagnostics. Trace gas profiles. Surface temperature	Waveband: Vis-TIR: 0.4 - 1.7 µm, 3.4 - 15.4 µm Has approximately 2382 bands from Visual to TIR Resolution: 1.1 degree (13X13 Km at nadir) Swath: +/-48.95 degrees Accuracy: Humidity: 20%, Temperature: 1K
ALADIN Atmospheric Laser Doppler Instrument	ADM - Aeolus	Lidar	Primary objective is to provide wind profile measurements for an improved analysis of global 3-D wind fields. Measures Doppler shift information from molecules and particles advected by the wind	Waveband: UV: 355nm Resolution: Swath: Accuracy:
ALI Advanced Land Imager	NMP EO-1	High resolution imager	Measurement of Earth surface reflectance. A prime objective is to validate new technologies contributing to cost reduction and increased capabilities for future land imaging missions. ALI comprises a wide field telescope and multispectral and panchromatic instrument	Waveband: 10 bands: VIS&NIR: 0.480-0.690µm, 0.433-0.453µm, 0.450-0.515µm, 0.525-0.605µm, 0.630-0.690µm, 0.775-0.805µm, 0.845-0.890µm, 1.200-1.300µm, SWIR: 1.550-1.750µm, 2.080-2.350µm Resolution: PAN: 10m, VNIR&S WIR: 30m Swath: 37km Accuracy: SNR @ 5% surf refl Pan:220, Multi 1: 215, Multi 2: 280, Multi 3: 290, Multi 4:240, Multi 4':190, Multi 5':130, Multi 5:175, Multi 7:170 (prototype instrument exceeds ETM+ SNR by a factor of 4 - 8)
ALT Altimeter	NPOESS-3,6	Radar altimeter	Obtains precise altimeter height measurements over world's oceans	Waveband: Resolution: Swath: Accuracy:

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AMI/SAR/ Image Active Microwave Instrumentation. Image Mode	ERS- 2	Imaging radar	All-weather images of ocean, ice and land surfaces. Monitoring of coastal zones, polar ice, sea state, geological features, vegetation (including forests), land surface processes, hydrology	Waveband: Microwave: 5.3 GHz, C band, VV polarisation, bandwidth 15.5 ± 0.06 MHz Resolution: 30m Swath: 100km Accuracy: Landscape topography: 3m, Bathymetry: 0.3m, Sea ice type: 3 classes
AMI/ scatterometer Active Microwave Instrumentation Wind mode	ERS-2	Scatterometer	Provides measurements of wind at the ocean surface, wind direction (range 0-360 deg), wind speed (range 1m/s - 30m/s)	Waveband: Microwave: 5.3GHz (C-band), VV polarisation Resolution: Cells of 50km x 50km at 25km intervals Swath: 500km Accuracy: Sea surface wind speed: 3m/s, Sea ice type: 2 classes
AMSR Advanced Microwave Scanning Radiometer	ADEOS-2	Imaging multi-spectral radiometer (microwave)	Provides measurements of water vapour, cloud liquid water, precipitation, winds, sea surface temperature, sea ice concentration, snow cover, soil moisture	Waveband: Microwave: 6.925, 10.65, 18.7, 23.8, 36.5, 50.3, 52.8, 89.0 GHz Resolution: 5-50km (dependent on frequency) Swath: 1600km Accuracy: Sea surface temperature: 0.5K, Sea ice cover: 10%, Cloud liquid water: 0.05kg/m2, Precipitation rate: 10%, Water vapour: 3.5kg/m2 through total column, Sea surface wind speed 1.5m/s
AMSR-E Advanced Microwave Scanning Radiometer-EOS	EOS Aqua	Imaging multi-spectral radiometer (microwave)	Provides measurements of water vapour, cloud liquid water, precipitation, winds, sea surface temperature, sea ice concentration, snow cover and soil moisture	Waveband: Microwave: 6.925, 10.65, 18.7, 23.8, 36.5, 89.0 GHz Resolution: 5-50km (dependent on frequency) Swath: 1445km Accuracy: Sea surface temperature: 0.5K, Sea ice cover: 10% Cloud liquid water: 0.05kg/m2 Precipitation rate: 10% Water vapour: 3.5kg/m2 through total column, Sea surface wind speed 1.5m/s
AMSU-A Advanced Microwave Sounding Unit-A	NOAA-15, 16, M, N, N', METOP-1, 2 Aqua	Atmospheric sounder (IR or microwave)	Provides all weather night-day temperature sounding to an altitude of 45km	Waveband: Microwave: 15 channels, 23.8-89.0GHz Resolution: 48km Swath: 2054km Accuracy: Temperature profile: 2K Humidity: 3kg/m2 Ice & snow cover: 10%
AMSU-B Advanced Microwave Sounding Unit-B	NOAA-15, 16, M	Atmospheric sounder (IR or microwave)	Provides all weather night-day humidity sounding	Waveband: Microwave: 89GHz, 150GHz, 183.3± 1.0 GHz (2bands), 183.3± 3.0 GHz (2bands), 183.3± 7.0 GHz (2bands) Resolution: 16km Swath: 2200km Accuracy: Humidity profile: 1kg/m2
APS Aerosol Polarimeter Sensor	NPOESS-1, 4	Atmospheric Chemistry instrument	Measures aerosol optical thickness, particle size and refractive index and cloud particle size distribution	Waveband: 9 channels Resolution: Swath: Accuracy:
ARGOS ARGOS	NOAA-11, 12, 14, 15, 16, M, N, N', METOP-1, 2, 3	Other	Provides location data by Doppler measurements	Waveband: Resolution: Swath: Accuracy:
ASAR Advanced Synthetic Aperture Radar	Envisat	Imaging radar	Provides all weather images of ocean, land and ice for monitoring of land surface processes, sea and polar ice, sea state, and geological and hydrological applications. Has 2 stripmap modes (Image and Wave (for ocean wave spectral)) and 3 ScanSAR modes	Waveband: Microwave: C-band, with choice of 5 polarisation modes (VV, HH, VV/HH, HV/HH, or VH/VV) Resolution: Image, wave and alternating polarisation modes: approx 30m x 30m Wide swath mode: 150m x 150m Global monitoring mode: 950mm x 950m Swath: Image and alternating polarisation modes: up to 100km Wave mode: 5km Wide swath and global monitoring modes: 400km or more Accuracy: Radiometric resolution in range: 1.5-3.5 dB, Radiometric accuracy: 0.65 dB

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ASCAT Advanced Scatterometer	METOP-1, 2, 3	Scatterometer	Provides sea ice cover, sea ice type and wind speed over sea surface measurements. Air pressure over ocean, Polar ice contours, Ice/snow imagery, Soil moisture	Waveband: Microwave: C Band, 5.256Ghz Resolution: Hi-res mode: 25-37km, Nominal mode: 50km Swath: Continuous Accuracy: Wind speeds in range 2-24m/s: 2m/s and direction accuracy of 20 deg
ASTER Advanced Spaceborne Thermal Emission and Reflection Radiometer	Terra	High resolution imager	Surface and cloud imaging with high spatial resolution, stereoscopic observation of local topography, cloud heights, volcanic plumes, and generation of local surface digital elevation maps. Surface temperature and emissivity	Waveband: VIS&NIR: 3 bands in 0.52-0.86µm SWIR: 6 bands in 1.6-2.43µm TIR: 5 bands in 8.125-11.65µm Resolution: VNIR: 15m, stereo: 15m horizontally and 25m vertical, SWIR: 30m TIR: 90m Swath: 60km Accuracy: VNIR and SWIR: 4% (absolute) TIR: 4K Geolocation: 7m
ATLID Atmospheric LIDar	ESA Future Missions	Lidar	Provides measurements of cloud top heights, aerosol properties, troposphere height, vertical distribution of cloud, boundary layer height	Waveband: NIR: 1.064µm Resolution: Shot spacing: <50km, footprint: 100m (at nadir) Swath: 350km Accuracy: Aerosol profile: 10%
Atmospheric Corrector Atmospheric Corrector	NMP EO-1	Imaging multi-spectral radiometer (vis/IR)	Corrects high spatial resolution multispectral imager data for atmospheric effects	Waveband: 256 bands, NIR-SWIR: 0.89-1.58µm Resolution: 250m Swath: 185km Accuracy:
ATMS Advanced Technology Microwave Sounder	NPOESS-2, 5, NPP	Atmospheric sounder (IR or microwave)	In conjunction with CrIS, global observations of temperature and moisture profiles at high temporal resolution. Advanced technology version of the current AMSU-A/B with similar performance	Waveband: Microwave: 22 channels, 23.8 - 183.1+/-7 GHz Resolution: Swath: Accuracy:
ATSR/M ATSR/M	ERS-2	Imaging multi-spectral radiometer (microwave)	Microwave channels of ATSR	Waveband: 23.8, 36.5GHz Resolution: Swath: Accuracy:
ATSR-2 Along Track Scanning Radiometer - 2	ERS-2	Imaging multi-spectral radiometer (vis/IR)	Provides measurements of sea surface temperature, land surface temperature, cloud top temperature and cloud cover, aerosols, vegetation, atmospheric water vapour and liquid water content	Waveband: VIS-SWIR: 0.65, 0.85, 1.27, and 1.6µm SWIR-TIR: 1.6, 3.7, 11 and 12µm Microwave: 23.8, 36.5GHz [bandwidth of 400MHz] Resolution: IR ocean channels: 1km x 1km, Microwave near-nadir viewing: 20km instantaneous field of view Swath: 500km Accuracy: Sea surface temperature to <0.5K over 0.5 deg x 0.5 deg (lat/long) area with 80% cloud cover Land surface temperature: 0.1K
AVHRR/2 Advanced Very High Resolution Radiometer/2	NOAA-11, 12, 14	Imaging multi-spectral radiometer (vis/IR)	Provides measurements of land and sea surface temperature, cloud cover, snow and ice cover, soil moisture and vegetation indices. Data also used for volcanic eruption monitoring	Waveband: VIS: 0.58-0.68µm, NIR: 0.725-1.1µm, MWIR: 3.55-3.93µm, TIR: 10.3-11.3µm, 11.5-12.5µm Resolution: 1.1km Swath: 3000km approx Accuracy:
AVHRR/3 Advanced Very High Resolution Radiometer/3	NOAA-15,16,M,N,N' METOP-1,2,3	Imaging multi-spectral radiometer (vis/IR)	Provides measurements of land and sea surface temperature, cloud cover, snow and ice cover, soil moisture and vegetation indices. Data also used for volcanic eruption monitoring	Waveband: VIS: 0.58-0.68µm, NIR: 0.725-1.1µm, SWIR: 1.58-1.64µm, MWIR: 3.55-3.93µm, TIR: 10.3-11.3µm, 11.5-12.5µm Resolution: 1.1km Swath: 33000km approx, Ensures full global coverage twice daily Accuracy:
AVNIR-2 Advanced Visible and Near Infra-red Radiometer type 2	ALOS	High resolution imager	High resolution multi-spectral imager for land applications which include environmental monitoring, agriculture and forestry, disaster monitoring	Waveband: VIS: 0.42-0.50µm, 0.52-0.60µm, 0.61-0.69µm, NIR: 0.76-0.89µm Resolution: 10m Swath: 70km Accuracy:

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AWiFS Advanced Wide Field Sensor	RESOURCESAT-1	High resolution imager	Vegetation and crop monitoring, resource assessment (regional scale), forest mapping, land cover/land use mapping and change detection	Waveband: VIS: 0.52-0.59 & 0.62-0.68 μ m, NIR:0.77-0.86 μ m SWIR: 1.55-1.7 μ m Resolution: 55m Swath: 700km Accuracy: 10 bit data
BISSAT Bissat Passive Radar	BISSAT	Imaging radar	Evaluation of bistatic radar cross section of natural and man-made targets, image classification, land surface. Passive instrument flown with main SAR mission	Waveband: Microwave: X-band (passive) Resolution: Swath: Accuracy:
BRK	GOMS/Electro N2,3 METEOR-3M N2,3	Other	Data collection and communication	Waveband: Resolution: Swath: Accuracy:
BSS & FSS transponders	INSAT-2D, E	Other	Data collection and communication	Waveband: Resolution: Swath: Accuracy:
CCD High Resolution CCD Camera	CBERS-1, 2, 3, 4	High resolution imager	Provides measurements of cloud type and extent and land surface reflectance, and used for global land surface applications	Waveband: VIS:0.45-0.52 μ m, 0.52-0.59 μ m, 0.63-0.69 μ m, NIR: 0.77-0.89 μ m, PAN: 0.51-0.71 μ m Resolution: 20m Swath: 113km Accuracy:
CCD camera	INSAT 2E, 3A	Imaging multi-spectral radiometer (vis/IR)	Cloud and Vegetation monitoring	Waveband: VIS: 0.62-0.68 μ m, NIR: 0.77-0.86 μ m SWIR: 1.55-1.69 μ m Resolution: 1 x 1km Swath: Normal: 6000km (N-S) X 6000km (E-W) anywhere on earth disc, Program: 6000km (N-S) X (n X 300) km (E-W) : n and number of frames programmable Accuracy:
CERES Cloud and the Earth's Radiant Energy System	Terra, Aqua, TRMM, NPOESS-2	Earth radiation budget radiometer	Long term measurement of the Earth's radiation budget and atmospheric radiation from the top of the atmosphere to the surface; provision of an accurate and self-consistent cloud and radiation database	Waveband: 3 channels: 0.3-5 μ m, 0.3 -100 μ m, 8-12 μ m Resolution: 20km Swath: Accuracy: 0.5%, 1%, 0.3% (respectively for the 3 channels)
CHAMP GPS Sounder GPS TurboRogue Space Receiver (TRSR)	CHAMP	Atmospheric sounder (IR or microwave)	Atmospheric sounding, temperature and water vapour profiles	Waveband: Resolution: Swath: Accuracy:
CHAMP gravity package (Accelerometer +GPS) STAR Accelerometer	CHAMP	Gravity field or geodynamic	Earth gravity field measurements	Waveband: Resolution: Swath: Accuracy:
CHAMP magnetometry package (1 Scalar+2 Vector Magnetometer) Overhauser Magnetometer (OVM) and Fluxgate Magnetometer (FGM)	CHAMP	Magnetic field	Earth magnetic field measurements	Waveband: Resolution: Swath: Accuracy:
CHRIS Compact High Resolution Imaging Spectrometer	PROBA	Imaging multi-spectral radiometer (vis/IR)	Supports a range of land, ocean and atmospheric applications, including agricultural science, forestry, environmental science, atmospheric science and oceanography	Waveband: Vis-NIR: 400nm-1050 nm (63 spectral bands at a spatial resolution of 36m; or 18 bands at full spatial resolution [18m]) Resolution: 36m or 18m depending on wavebands selected Swath: 14km Accuracy: S/N 200 @ target albedo of 0.2. 12 bits digitisation

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CIMS Conical-scanning Microwave Imager/ Sounder	NPOESS-1, 2, 3, 4, 5, 6	Imaging multi-spectral radiometer (microwave)	Collects microwave radiometry and sounding data. Data types include atmospheric temperature and moisture profiles, clouds, sea surface winds, and all-weather land/water surfaces	Waveband: Microwave: 1-250Ghz Resolution: 15-50km depending on frequency Swath: Accuracy:
COALA Calibration for Ozone through Atmospheric Limb Acquisitions	ESA Future Missions	Atmospheric Chemistry instrument	Atmospheric ozone profiles	Waveband: Resolution: Swath: Accuracy:
Communications payload (Ka and UHF band)	FedSat	Other	Communications	Waveband: Resolution: Swath: Accuracy:
CPR (CloudSat) Cloud Profiling Radar	CloudSat	Cloud profiler and/or rain radar	Primary goal is to provide data needed to evaluate and improve the way clouds are represented in global climate models. Measures vertical profile of clouds	Waveband: Microwave: 94Ghz Resolution: Vertical: 500m, Cross-track: 1.4km, Along-track: 2.5km Swath: Instantaneous Footprint < 2km Accuracy:
CPR Cloud Radar	ESA Future Missions	Cloud profiler and/or rain radar	Measures cloud characteristics including base height	Waveband: Microwave: 78 or 94GHz Resolution: Swath: Accuracy:
CrIS Cross-track Infrared Sounder	NPOESS-2, 5, NPP	Atmospheric sounder (IR or microwave)	Daily measurements of vertical atmospheric distribution of temperature, moisture and pressure	Waveband: MWIR-TIR: 3.92-4.64µm, 5.7-8.62µm, 9.1-15.3µm, 1300 spectral channels Resolution: IFOV 14km diameter, 1km vertical layer resolution Swath: 2300km Accuracy: Temperature profiles: to 0.9K Moisture profiles: 20-35%, Pressure profiles: 1%
DCP (SCD) Data Collecting Platform Transponder	SCD-1, 2, 3	Other	Data collection and communication	Waveband: Resolution: Swath: Accuracy:
DCP Data Collecting Platform Transponder	CBERS-1, 2, 3, 4	Other	Data collection and communication	Waveband: Resolution: Swath: Accuracy:
DCS (NASDA) Data Collection System (NASDA)	GMS-5	Other	Data collection	Waveband: Resolution: Swath: Accuracy:
DCS (NOAA) Data Collection System (NOAA)	GOES 8-Q	Other	Collects data on temperature (air/water), atmospheric pressure, humidity and wind speed/direction, speed and direction of ocean and river currents	Waveband: Resolution: Swath: Accuracy:
DELTA-2D Multispectral microwave scanning radiometer	OKEAN-0	Imaging multi- spectral radiometer (microwave)	Scanning microwave radiometer for measurement of emissive microwave radiation at atmosphere/ sea surface interface	Waveband: Microwave: 0.8cm, 1.35cm, 2.2cm, 4.3cm Resolution: 20km-100km depending on frequency Swath: 1100km Accuracy: 0.1-0.15K error
DMC Imager Disaster Management Constellation Imager	BNSCSAT (DMC)	High resolution imager	Visible and NIR imagery in support of disaster management	Waveband: VIS and NIR Resolution: 32m Swath: 2 beams of 300km Accuracy:

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DORIS Doppler Orbitography and Radio-positioning Integrated by Satellite	SPOT- 4 Topex-Poseidon	Gravity field or geodynamic	Orbit determination	Waveband: Resolution: Swath: Accuracy:
DORIS-NG Doppler Orbitography and Radio-positioning Integrated by Satellite-NG	Jason-1, 2, Envisat, SPOT-5, CRYOSAT	Gravity field or geodynamic	Precise orbit determination Real time onboard orbit determination (navigation)	Waveband: Resolution: Swath: Accuracy:
DPR Dual-frequency Precipitation Radar	GPM	Cloud profiler and/or rain radar	Measures rain rate classified by rain and snow, in latitudes up to 70 degrees	Waveband: Microwave: 13.6 GHz (Ku band) and 35.5 GHz (Ka band) Resolution: Range resolution: 4-5 km Swath: 245 km (Ku-band), 100km (Ka band) Accuracy: rainfall rate 0.2mm/h
DRT-S&R	INSAT-2E, D	Other	Relay of search and rescue information	Waveband: Resolution: Swath: Accuracy:
EGG 3-Axis Electrostatic Gravity Gradiometer	GOCE	Gravity field or geodynamic	The main objective of EGG is to measure the 3 components of the gravity-gradient tensor (ie gradiometer data)	Waveband: Resolution: Swath: Accuracy:
EMA Electric, Magnetic, fields Analyser	ESPERIA	Magnetic field	Study of perturbations in the atmosphere and ionosphere caused by electromagnetic waves, short term earthquake prediction	Waveband: Resolution: Swath: Accuracy:
ENVISAT Comms Communications package on ENVISAT	Envisat	Other	Communications	Waveband: Resolution: Swath: Accuracy:
EOC Electro-Optical Camera	KOMPSAT-1	High resolution imager	High resolution stereo imager for land applications of cartography and disaster monitoring	Waveband: Panchromatic VIS: 0.51-0.73µm Resolution: 6.6m Swath: 17km Accuracy:
EPIC Earth PolyChromatic Imaging Camera	Triana	Atmospheric Chemistry instrument	Measures ozone amounts, aerosol amounts, cloud height and phase, hotspot land properties and UV radiation estimates at the Earth's surface	Waveband: UV-NIR: 0.317-0.905µm Resolution: 10 bands Swath: 8km Accuracy:
ERBE Earth Radiation Budget Experiment	ERBS	Earth radiation budget radiometer	Radiation budget measurements - Total energy of Sun's radiant heat and light, Reflected solar radiation, Earth emitted radiation	Waveband: Sunview: NIR-FIR: 0.2-3.5 µm, 0.2-50.0 µm; Channel 5 : 0.2-50.0µm; Earth view: 0.2-50.0µm Resolution: 1000km sun, 40km earth Swath: Full sun and full earth views Accuracy:
ERBS Earth Radiation Budget Sensor	NPOESS-3, 6	Earth radiation budget radiometer	Measures Earth radiation gains and losses on regional, zonal and global scales	Waveband: Resolution: Swath: Accuracy:
ERS Comms Communication package for ERS	ERS-2	Other	Communications	Waveband: Resolution: Swath: Accuracy:
ETM+ Enhanced Thematic Mapper+	Landsat-7	High resolution imager	Measures surface radiance and emittance, land cover state and change (eg vegetation type). Used as multi-purpose imagery for land applications	Waveband: VIS-TIR: 8 channels: 0.45-12.5µm, Panchromatic channel: VIS 0.5-0.9µm Resolution: Pan: 15m, Vis-SWIR: 30m, TIR: 60m Swath: 185km Accuracy: 50-250m systematically corrected geodetic accuracy

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Fluxgate magnetometer	Fedsat	Magnetic field	Measures electrical currents and perturbations in the Earth's magnetic field in the range 0.1Hz to 1kHz	Waveband: Resolution: Swath: Accuracy:
GALS-M Galactic space rays detector	METEOR-3M N2,3	Other	Space environment monitoring	Waveband: protons fluxes density > 600 MeV Resolution: Visible: 1.25km, TIR: 5km Swath: Full Earth disk in all channels, every 1 hour Accuracy:
GERB Geostationary Earth Radiation Budget	MSG-1, 2, 3	Earth radiation budget radiometer	Measures long and short wave radiation emitted and reflected from the Earth's surface, clouds and top of atmosphere. Full Earth disk, all channels in 5 mins	Waveband: UV-MWIR: 0.32-4.0µm UV-FIR: 0.32-30µm Resolution: 44.6km x 39.3km Swath: Full Earth disk Accuracy: Emitted radiation: 0.12-1.3 W/m2, Reflectance: 1%
GIFTS Geostationary Imaging Fourier Transform Spectrometer	NMP EO-3	Atmospheric sounder (IR or microwave)	Measures temperature, water vapour, tracer winds, chemical composition with high spatial and temporal resolution for considerable improvements in weather observations and air quality monitoring. Tests next-generation met observing systems	Waveband: MWIR-TIR: 1724 channels in the bands 4.45-6.06µm and 8.85-14.6µm Resolution: Visible: 1km x 1km, IR: 4km x 4km Swath: Full Earth disk Accuracy:
GLAS Geoscience Laser Altimeter System	ICESat	Lidar	Provision of data on ice sheet height/thickness, land altitude, aerosol height distributions, cloud height and boundary layer height	Waveband: VIS-NIR: Laser emits at 1064nm (for altimetry) and 532nm (for atmospheric measurements) Resolution: Swath: Accuracy: Aerosol profile: 20%, Ice elevation: 20cm, Cloud top height: 75m, Land elevation: 20cm, Geoid: 5m
GLI Global Imager	ADEOS-2	Imaging multi-spectral radiometer (vis/IR)	Measures water vapour, aerosols, cloud cover, cloud top height/temp, ocean colour, sea surface temperature, land surface temperature, glacier extent, icebergs, sea ice and snow cover, photosynthetically active radiation, vegetation type and land cover	Waveband: VIS&NIR: 23 bands (380-830nm), NIR-SWIR: 6 bands (1050-2215nm), MWIR-TIR: 7 bands (3.75-11.95µm) Resolution: 1km for 28 bands, 250m for 6 bands Swath: 1600km Accuracy: Specific humidity profile: 0.5g/m2 through total column, Surface temp 0.4-0.5K, Cloud top temp: 0.5K, Cloud cover: 3%, Cloud top height: 0.5km, Ice and snow cover: 5%
GMI GPM Microwave Imager	GPM Primary and Constellation Satellites	Imaging multi-spectral radiometer (microwave)	Measures rainfall rates over oceans and land, combined rainfall structure and surface rainfall rates with associated latent heating. Used to produce three hour, daily, and monthly total rainfall maps over oceans and land	Waveband: Microwave: 10.65, 19.4, 21.3, 37, and 85.5 GHz Resolution: Horizontal: 36km cross-track at 10.65GHz (required - Primary Spacecraft, goal - Constellation Spacecraft); 10km along-track and cross-track (goal - Primary Spacecraft) Swath: 800km (Primary Spacecraft) 1300km (Constellation Spacecraft) Accuracy: NEDT 0.5 K - 1.0 K
GMS Comms Communications package on GMS	GMS-5	Other	Communications	Waveband: Resolution: Swath: Accuracy:
GOES Comms Communications package on GOES	GOES 8-Q	Other	Communications	Waveband: Resolution: Swath: Accuracy:
GOLPE Gps Occultation and Passive reflection Experiment	SAC-C	Other	Measurements of atmospheric effects on GPS signals and precise positioning information to assist gravitational measurements	Waveband: Resolution: Swath: Accuracy:
GOME Global Ozone Monitoring Experiment	ERS-2	Atmospheric Chemistry instrument	Measures concentration of O3, NO, NO2, BrO, H2O, O2/O4, plus aerosols and polar stratospheric clouds, and other gases in special conditions	Waveband: UV-NIR: 0.24-0.79µm (resolution 0.2-0.4nm) Resolution: Vertical: 5km (for O3) Horizontal: 40 x 40 km to 40 x 320 km Swath: 120-960km Accuracy:

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GOME-2 Global Ozone Monitoring Experiment - 2	METOP-1, 2	Atmospheric Chemistry instrument	Measurement of total column amounts and stratospheric and tropospheric profiles of ozone. Also amounts of H ₂ O, NO ₂ , OClO, BrO, SO ₂ and HCHO	Waveband: UV-NIR: 0.24-0.79µm (resolution 0.2-0.4nm) Resolution: Horizontal: 40 x 40 km (960km swath) to 40 x 5 km (for polarization monitoring) Swath: 120-960km Accuracy: Cloud top height: 1km (rms), Outgoing short wave radiation and solar irradiance: 5W/m ² , Trace gas profile: 10-20%, Specific humidity profile: 10-50g/kg
GOMOS Global Ozone Monitoring by Occultation of Stars	Envisat	Atmospheric Chemistry instrument	Provides stratospheric profiles of temperature and of ozone, NO _x , H ₂ O, aerosols and other trace species	Waveband: Spectrometers: UV-Vis: 248-371nm & 387-693nm, NIR: 750-776nm & 915-956nm, Photometers: 644-705nm & 466-528nm Resolution: 1.7km vertical Swath: Not applicable Accuracy:
GPS receiver	Fedsat	Gravity field or geodynamic	Sounding data for study of physics of upper atmosphere and water vapour, temperature and refractivity profiles	Waveband: Resolution: 1 sample every 30 secs Swath: Accuracy:
GPS GPS receiver	ESPERIA	Gravity field or geodynamic	Study of perturbations in the atmosphere and ionosphere caused by electromagnetic waves, short term earthquake prediction	Waveband: Resolution: Swath: Accuracy:
GPS (ESA)	GOCE	Gravity field or geodynamic	Satellite positioning	Waveband: Resolution: Swath: Accuracy:
GPSDR GPS Demonstration Receiver	Topex-Poseidon, VCL, GRACE, ICESat, SAC-A, CHAMP	Gravity field or geodynamic	Provides precise continuous tracking data of satellite to decimeter accuracy	Waveband: Resolution: Swath: Accuracy:
GPSOS Global Positioning System Occultation Sensor	NPOESS-2, 3, 5, 6	Other	Monitors signals from 24 GPS satellites that circle the Earth to help characterise ionospheric density profiles and atmospheric pressure, temperature and humidity profiles	Waveband: Resolution: Swath: Accuracy:
GRAS GNSS Receiver for Atmospheric Sounding	GOCE, METOP-1, 2, 3	Atmospheric sounder (IR or microwave)	GNSS receiver for atmospheric temperature and humidity profile sounding	Waveband: Resolution: Vertical: 150m (troposphere) and 1.5km (stratosphere), Horizontal: 100km approx (troposphere), 300km approx (stratosphere) Swath: Altitude range of 5-30km Accuracy: Temperature sounding to 1K rms
HAIRS High Accuracy Inter-satellite Ranging System	GRACE	Gravity field or geodynamic	Ranging instrument between the 2 GRACE spacecraft - to derive Earth gravity field measurements	Waveband: Microwave: K Band, Ka Band Resolution: Swath: Accuracy: 10 microns total at twice per revolution
HALOE Halogen Occultation Experiment	UARS	Atmospheric Chemistry instrument	Provides data on vertical distributions of hydrofluoric and hydrochloric acids, methane, water vapour and members of the nitrogen family. It also provides atmospheric temperature versus pressure profiles from observations of carbon dioxide	Waveband: SWIR: 2.43 µm, TIR: 10.25µm Resolution: Vertical (limb): approx 4.5km Horizontal (limb): about 300km along limb tangent path Swath: 6-150km (vertical limb coverage) Accuracy: 10-30%
HiRDLS High Resolution Dynamics Limb Sounder	EOS - Aura	Atmospheric Chemistry instrument	Measures atmospheric temperature, concentrations of ozone, water vapour, methane, NO _x , N ₂ O, CFCs and other minor species, aerosol concentration, location of polar stratospheric clouds and cloud tops	Waveband: TIR: 6.12-17.76µm (21 channels) Resolution: Vertical 1km, Horizontal: 10km Swath: Accuracy: Trace gas: 10%, Temperature 1K, Ozone: 10%

Instrument	Mission(s)	Type	Measurements /application	Technical characteristics
HIRS/2 High Resolution Infra-red Sounder/2	NOAA-11, 12, 14	Atmospheric sounder (IR or microwave)	Provides vertical profiles of temperature, humidity, and ozone. Measures atmospheric temperature, concentrations of ozone, water vapour, methane, NO _x , N ₂ O, CFCs and other minor species, aerosol concentration, location of polar stratospheric clouds and cloud tops	Waveband: VIS-TIR: 0.69-14.95µm (20 channels) Resolution: 20.3km (IFOV and ground sample) Swath: 2240km Accuracy:
HIRS/3 High Resolution Infra-red Sounder/3	NOAA-15,16,M	Atmospheric sounder (IR or microwave)	Provides atmospheric temperature profiles and data on cloud parameters, humidity soundings, water vapour, total ozone content, and surface temperatures	Waveband: VIS-TIR: 0.69-14.95µm (20 channels) Resolution: 20.3km (IFOV and ground sample) Swath: 2240km Accuracy:
HIRS/4 High Resolution Infra-red Sounder/4	NOAA-N,N', METOP-1,2	Atmospheric sounder (IR or microwave)	Provides atmospheric temperature profiles and data on cloud parameters, humidity soundings, water vapour, total ozone content, and surface temperatures. Same as HIRS/3, with 10km IFOV	Waveband: VIS-TIR: 0.69-14.95µm (20 channels) Resolution: 10km (IFOV) and 20.3km ground sample Swath: 2240km Accuracy:
HRDI High Resolution Doppler Imager	UARS	Atmospheric Chemistry instrument	Daytime wind measurements below 50km from Doppler shifts of molecular oxygen absorption lines. Day and night wind measurements above about 60km from Doppler shifts of neutral and ionised atomic oxygen emission lines. Also measures temperature	Waveband: Visible-NIR: 0.557-0.776µm Resolution: Vertical (limb): 4km Horizontal (limb): 80km Swath: 5 to 100km (vertical coverage) Accuracy: Daytime wind measurements: 5m/s or better Day and night: 15m/s or better
HRG HRG	SPOT-5	High resolution imager	High resolution multispectral mapper. 2 HRG instruments on this mission can be processed to produce simulated imagery of 2.5m. Images are 60km x 60km in size	Waveband: VIS: 0.55, 0.61-0.68, 0.64µm, NIR-SWIR: 0.78-0.89µm, 0.85µm, 1.5-1.7µm, Panchromatic: 0.5-0.75µm Resolution: Panchromatic: 5m, Multispectral: 10m Swath: 60km (1 instrument), 117km (2 instruments). Same as SPOT 4 with off-track steering capability (±27 deg) Accuracy:
HR-PAN High Resolution Panchromatic Camera	CARTOSAT-2	Hi resolution imager	High resolution stereo images for large scale (better than 1:0000) mapping applications, urban applications, GIS ingest	Waveband: VIS: 0.5-0.75µm Resolution: 1m Swath: 12km Accuracy:
HRS High Resolution Stereoscope	SPOT-5	High resolution imager	High resolution stereo instrument	Waveband: Panchromatic: VIS 0.49-0.69µm Resolution: Panchromatic: 10m, Altitude: 15m Swath: 120km Accuracy:
HRTC High Resolution Panchromatic Camera	SAC-C	High resolution imager	High resolution earth imagery to complement MMRS on the same mission	Waveband: VIS-NIR: 400-900 nm Resolution: 35m Swath: 90km Accuracy:
HRVIR High Resolution Visible and Infra-red	SPOT-4	High resolution imager	2 HRVIR instruments on this mission provide 60km x 60km images for a range of land and coastal applications	Waveband: VIS: 0.50-0.59µm, 0.61-0.68µm NIR: 0.79-0.89µm, SWIR: 1.5-1.7µm Resolution: 10m (0.64µm) or 20m Swath: 117km (ie 60km + 60km with 3km overlap). Steerable up to ±27 deg off-track Accuracy:
HSB Humidity Sounder/Brazil	Aqua	Atmospheric sounder (IR or microwave)	Humidity soundings for climatological and atmospheric dynamics applications	Waveband: Microwave: 5 discreet channels in the range of 150-183 MHz Resolution: 13.5km Swath: 1650km Accuracy: Temperature: 1.0-1.2k coverage of land and ocean surfaces, Humidity: 20%
HSRS Hot Spot Recognition Sensor	BIRD	Imaging multi-spectral radiometer (vis/IR)	Detection of hot spots (forest fires, volcanic activities, burning oil wells or coal seams)	Waveband: MWIR: 3.4-4.2µm, TIR: 8.5-9.3µm Resolution: 370m Swath: 190km Accuracy:

Instrument	Mission(s)	Type	Measurements /application	Technical characteristics
HSTC High Sensitivity Technological Camera	SAC-C	Other	Provides data to monitor forest fires, electrical storms and geophysical studies of aurora borealis	Waveband: 450-850 nm PAN-VIR Resolution: 250m Swath: 990km Accuracy:
HYC HYperspectral Camera	HypSEO	Imaging multi-spectral radiometer (vis/IR)	Pancromatic and Hyperspectral data for complex land ecosystem studies	Waveband: VIS-NIR:400-900 nm, 400-1000nm; SWIR: 900-2500nm; Spectral resolution 10 nm, 220 bands Resolution: PAN: 5m ; VNIR-SWIR:20m Swath: 20km Accuracy:
Hycam Hyperspectral Camera	FOURIER	High resolution imager	Atmospheric physics, radiative properties, climate change	Waveband: VIS-NIR: 0.4-1.1µm Resolution: Swath: Accuracy:
Hyperion Hyperspectral Imager	NMP EO-1	Imaging multi-spectral radiometer (vis/IR)	Hyperspectral imaging of land surfaces	Waveband: TVIS-NIR: 400-1000nm; NIR-SWIR: 900-2500nm; 10nm spectral resolution for 220 bands Resolution: 30m Swath: 7.5km Accuracy: SNR @ 10% refl target: vis 10-40 swir 10-20
IAP Instrument for plasma analysis	DEMETER	Other	Density, temperatures, speeds of major ions	Waveband: Resolution: Swath: Accuracy:
IASI Infra-red Atmospheric Sounding Interferometer	METOP-1, 2, 3	Atmospheric sounder (IR or microwave)	Measures tropospheric moisture and temperature, column integrated contents of ozone, carbon monoxide, methane, dinitrogen oxide and other minor gases which affect tropospheric chemistry. Also measures sea surface and land temperature	Waveband: MWIR-TIR: 3.4-15.5µm with gaps at 5µm and 9µm Resolution: Vertical: 1-30km, Horizontal: 25km Swath: 2052km Accuracy: Temperature: 0.5-2K Specific humidity: 0.1-0.3g/kg, Ozone, trace gas profile: 10%
ICARE Influence of Space Radiation on Advanced Components	SAC-C	Other	Improvement of risk estimation models on latest generation of integrated circuit technology	Waveband: Resolution: Swath: Accuracy:
ICE Instrument for Electric Field	DEMETER	Other	Electric field	Waveband: DC to 3MHz Resolution: Swath: Accuracy:
IDP Instrument for Plasma Detection	DEMETER	Other	Energy spectrum of electrons	Waveband: Resolution: Swath: Accuracy:
IGPM IGPM microwave radiometer	IGPM	Imaging multi-spectral radiometer (microwave)	Global water and energy cycle	Waveband: Resolution: Swath: Accuracy:
IIR Imaging infrared radiometer	CALIPSO	Imaging multi-spectral radiometer (vis/IR)	Radiometer optimized for combined IIR/lidar retrievals of cirrus particle size	Waveband: TIR: 8.7, 10.5, and 12.0 µm (0.8µm resolution) Resolution: 1km Swath: 64km Accuracy: 1K
IKFS-2 Fourier spectrometer	METEOR-3M N2,3	Atmospheric sounder (IR or microwave)	Atmospheric temperature and humidity sounding and radiation budget assessment	Waveband: 5-15µm, 1300 spectral channels Resolution: Swath: 2500km Accuracy: 1K
ILAS-II Improved Limb Atmospheric Spectrometer II	ADEOS-2	Atmospheric Chemistry instrument	Measures minor trace gas species at high latitudes, in the altitude range 10-60km (O3, CH4, NO2, N2O, H2O, CFC11, HNO3, ClONO2, N2O5, aerosols, temperature, pressure)	Waveband: VIS: 0.753-0.784µm, MWIR-TIR: 3.0-5.7µm, 6.21-11.76µm, 12.78-12.85µm Resolution: Vertical: 1km, Temperature, aerosols, pressure: 2km (horiz), ClONO2: 21.7km (horiz), Others: 13km (horiz) Swath: Accuracy: Temperature: 0.2K, Pressure: 1%, Aerosol: 2%, Ozone: 3-5%, Other trace gases: 2-25%

Instrument	Mission(s)	Type	Measurements /application	Technical characteristics
Imager	GOES-8, 9, 10, 11, 12, N. O. P, Q	Imaging multi-spectral radiometer (vis/IR)	Measures cloud cover, atmospheric radiance, winds, atmospheric stability, rainfall estimates. Used to provide severe storm warnings/ monitoring day and night (type, amount, storm features)	Waveband: GOES 8-11: VIS: 1 channel (8 detectors), IR: 4 channels: 3.9, 6.7, 10.7 and 12µm, GOES 12-Q: VIS: 1 channel (8 detectors), IR: 4 channels: 3.9, 6.7, 10.7 and 13.3µm Resolution: 1km in visible 4km in IR (8km for 13.3µm band (water vapour)) Swath: Full Earth disk Accuracy:
Imager (INSAT)	INSAT 3D	Imaging multi-spectral radiometer (vis/IR)	Cloud cover, severe storm warnings/monitoring day and night (type, amount, storm features), atmospheric radiance winds, atmospheric stability rainfall	Waveband: VIS: 0.55-0.75µm, SWIR: 1.55-1.7µm, MWIR: 3.80-4.00µm, 6.50-7.00µm, TIR: 10.2-11.3µm, 11.5-12.5µm Resolution: 1x1km (VIS & SWIR), 4x4km (MWIR, TIR), 8x8km (in 6.50-7.00µm) Swath: Full Earth disc and space around, Normal Frame [50 deg. N to 40 deg. S and full E-W Full coverage] Accuracy:
IMAGER/ MTSAT	MTSAT-1R, 2	Imaging multi-spectral radiometer (vis/IR)	Measures cloud cover, cloud motion, cloud height, water vapour, rainfall, sea surface temperature and Earth radiation	Waveband: VIS-SWIR: 0.55-0.80µm, MWIR-TIR: 3.5-4µm, 6.5-7µm, 10.3-11.3µm, 11.5-12.5µm Resolution: Visible: 1km, TIR: 4km Swath: Full Earth disk every hour Accuracy:
IMSC Instrument Search Coil Magnetometer	DEMETER	Other	Magnetic field	Waveband: 400 Hz - 10 kHz Resolution: Swath: Accuracy:
IMWAS Improved Microwave Atmospheric Sounder	FY-3C, D, E, F, G	Atmospheric sounder (IR or microwave)		Waveband: Microwave: 19.35-89.0 GHz (8 channels) Resolution: Swath: Accuracy:
INES Italian Navigation Experiment	SAC-C	Other	Composed of GPS Tensor and GNSS Lagrange Receiver to perform navigation experiment on precise orbit determination	Waveband: Resolution: Swath: Accuracy:
INSAT Comms Communications package for INSAT	INSAT-2D,E	Other		Waveband: Resolution: Swath: Accuracy:
IR Camera (SAOCOM)	SAOCOM 1A	Imaging Multispectral Radiometer (IR)	Fires monitoring	Waveband: NIR-TIR Resolution: 200m Swath: TBD Accuracy: TBD
IRAS Infrared Atmospheric Sounder	FY-3A, B, C, D, E, F, G	Atmospheric sounder (IR or microwave)	Atmospheric sounding for weather forecasting	Waveband: VIS - TIR: 0.65-14.95µm (26 channels) Resolution: 14km Swath: Accuracy:
IR-MSS Infrared Multispectral Scanner	CBERS-1, 2, 3, 4	High resolution imager	Used for fire detection, fire extent and temperature measurement	Waveband: VIS-NIR: 0.5-1.1µm, NIR-SWIR: 1.55-1.75µm, 2.08-2.35µm TIR: 10.4-12.5µm Resolution: Visible, NIR, SWIR: 78mm TIR: 156m Swath: 120km Accuracy:
ISL Langmuir probes	DEMETER	TBC	Density of the plasma and electron temperature	Waveband: Resolution: Swath: Accuracy:
ISP	Resurs-01 N4	Earth radiation budget radiometer	Measures solar radiation flux	Waveband: UV-FIR: 0.2-50µm Resolution: Swath: Accuracy: 0.01% (mean day accuracy)

Instrument	Mission(s)	Type	Measurements /application	Technical characteristics
IST Italian Star Tracker	SAC-C	Other	Test of a fully autonomous system for attitude and orbit determination using a star tracker	Waveband: Resolution: Swath: Accuracy:
IVISSR (FY-2) Improved Multispectral Visible and Infrared Scan Radiometer (5 channels)	FY-2 C, D, E	Imaging multi-spectral radiometer (vis/IR)	Meteorological	Waveband: Vis - TIR: 0.5-12.5µm (5 channels) Resolution: 1.4km Swath: Accuracy:
JMR JASON-1 Microwave Radiometer	Jason-1, 2	Imaging multi-spectral radiometer (microwave)	Provides altimeter data to correct for errors caused by water vapour and cloud-cover. Also measures total water vapour and brightness temperature	Waveband: Microwave: 18.7GHz, 23.8GHz, 34GHz Resolution: 41.6km at 18.7GHz, 36.1km at 23.8GHz, 22.9km at 34GHz Swath: 120 deg cone centred on nadir Accuracy: Total water vapour: 0.2g/sq cm, Brightness temperature: 0.15 K
KGI-4C	METEOR-3M N1	Earth radiation budget radiometer	Measures particle flux and electromagnetic emissions. Electron flux density range: 0.15-2.0MeV, proton flux density range: 5- 90MeV, gamma ray flux density range: 0.1-1.0MeV	Waveband: Resolution: Swath: Accuracy:
Klimat Scanning IR radiometer	METEOR-3M N1	Imaging multi-spectral radiometer (vis/IR)	Provides images of cloud, ice and snow. Measures sea surface temperature	Waveband: TIR: 10.5-12.5µm Resolution: 0.45km x 0.9km Swath: 1300km Accuracy:
KONDOR-2 Data collection and transmission system	OKEAN-0	Other	Data collection and retransmission	Waveband: Resolution: Swath: Accuracy:
Lagrange LABEN GNSS Receiver for Advanced Navigation, Geodesy and Experiments	FOURIER	Other	GPS Receiver. Including specialised version equipped with limb sounding antenna and dedicated signal tracking capability for meteorological, climate and space weather applications	Waveband: Resolution: Swath: Accuracy:
Laser reflectors (ESA)	CRYOSAT, GOCE	Gravity field or geodynamic	Measures distance between the satellite and the laser tracking stations	Waveband: Resolution: Swath: Accuracy:
Laser reflectors Laser reflectors	STELLA, STARLETTE	Gravity field or geodynamic	Measures distance between the satellite and the laser tracking stations	Waveband: Resolution: Swath: Accuracy:
Lidar Lidar	CALIPSO	Lidar	High resolution vertical profiles of aerosols and clouds	Waveband: VIS & NIR: 532 nm and 1064 nm Nd:YAG laser Resolution: Horizontal: 333m, Vertical: 30m Swath: Accuracy:
LIS Lightning Imaging Sensor	TRMM	Other	Global distribution and variability of total lightning. Data can be related to rainfall to study hydrological cycle	Waveband: NIR: 0.7774µm Resolution: 4km Swath: FOV: 80 x 80 deg Accuracy: 90% day and night detection probability
LISS-I Linear imaging Self Scanner - I	IRS-1B	High resolution imager	Provides data for: monitoring land use/land cover, forest cover, coastal zones and wastelands; identification of prospective ground water zones; and crop acreage and production estimation for wheat, rice, sorghum, cotton, groundnut, tobacco, etc	Waveband: VIS: 0.46-0.52µm, 0.52-0.59µm, 0.62-0.68µm, NIR: 0.77-0.86µm Resolution: 72.5m Swath: 148km Accuracy:

Instrument	Mission(s)	Type	Measurements /application	Technical characteristics
LISS-II Linear imaging Self Scanner - II	IRS-1B, IRS-P3	High resolution imager	Data used for vegetation type assessment, resource assessment, crop stress detection, crop production forecasting, forestry and for monitoring land use and land cover change	Waveband: VIS: 0.46-0.52µm, 0.52-0.59µm, 0.62-0.68µm, NIR: 0.77-0.86µm Resolution: 32 x 37m Output sampled to 3.6m compatible to IRS-1A/1B Swath: 132km Accuracy:
LISS-III Linear Imaging Self Scanner - III	IRS-1C, D RESOURCESAT-1, 5	High resolution imager	Data used for vegetation type assessment, resource assessment, crop stress detection, crop production forecasting, forestry, land use and land cover change	Waveband: VIS: Band 2: 0.52-0.59µm, Band 3: 0.62-0.68µm, NIR: Band 4: 0.77-0.86µm, SWIR: Band 5: 1.55-1.75µm Resolution: Bands 2, 3 & 4: 23.5m, Band 5: 70.5m Swath: 140km Accuracy:
LISS-IV Linear Imaging Self Scanner - IV	RESOURCESAT-1, 2	High resolution imager	Vegetation monitoring, improved crop discrimination, crop yield, disaster monitoring and rapid assessment of natural resources	Waveband: VIS: 0.52-0.59µm, 0.62-0.68µm NIR: 0.77-0.86µm Resolution: 5.8m Swath: 70km Accuracy:
LP/RPA Langmuir Probe and Retarding Potential Analyser	ESPERIA	Magnetic field	Study of perturbations in the atmosphere and ionosphere caused by electromagnetic waves, shortterm earthquake prediction	Waveband: Resolution: Swath: Accuracy:
LRA Laser Retroreflector Array	TOPEX-POSEIDON, Jason-1, 2, LAGEOS-1, 2, 3	Gravity field or geodynamic	Provides baseline tracking data for precision orbit determination and/or geodesy. Also for calibration of radar altimeter bias. Several types used on various missions	Waveband: Resolution: Swath: Accuracy: 2cm overhead ranging
L-SAR L-Band SAR	TerraSAR-L	Imaging radar	L-Band Sar for agriculture and forestry	Waveband: Microwave: L-band (2GHz) Resolution: 5m Swath: 10-200km depending on mode Accuracy:
MADRAS	MEGHA-TROPIQUES	Imaging multi-spectral radiometer (vis/IR)	Measures precipitation and cloud properties. 89 & 157GHz channels permit detection of convective rain regions over land and sea. Lower frequencies used over oceans for measuring cloud liquid water and precipitation	Waveband: Microwave: 18.7GHz, 23.8GHz, 36.5GHz, 89GHz, 157GHz Resolution: Swath: Accuracy:
MAESTRO Measurements of Aerosol Extinction in the Stratosphere and Troposphere Retrieved by Occultation	SCISAT-1	Atmospheric Chemistry instrument	Will aid in the SCISAT-1 overall mission of increasing our understanding of the chemical processes involved in the depletion of the ozone layer	Waveband: UV-NIR: 0.285 to 1.03um (1-2nm spectral resolution) Resolution: Approx 1km vertical Swath: Accuracy:
MASTER	ESA Future Missions	Atmospheric sounder (IR or microwave)	Data for study of exchange mechanisms between stratosphere/troposphere, and information for studies on global change. Measures upper troposphere/ lower stratosphere profiles of O3, H2O, CO, HNO3, SO2, N2O, pressure and temperature	Waveband: Microwave: 199-207, 296-306, 318-326, 342-348GHz Resolution: 3km Swath: Accuracy: 199-207GHz channel: 1K, Other channels: 1.5K, 50MHz resolution, 0.3 secs integration time
MBLA Multi-Beam Laser Altimeter	VCL	Lidar	Pulsed lidar for continuous global remote sensing of tree canopy height, vertical distribution of intercepted surfaces in the canopy, and ground topography elevations	Waveband: NIR: Nd:YAG lasers operating at 1064nm Resolution: 25m footprint diameter Swath: 8km Accuracy: Elevation: +/-1m in low slope terrain, Vegetation height: +/-1m
MCP Meteorological Communications Package (MCP)	METOP-1, 2, 3	Other	Communications	Waveband: Resolution: Swath: Accuracy:

Instrument	Mission(s)	Type	Measurements /application	Technical characteristics
MERIS Medium-Resolution Imaging Spectrometer	Envisat	Imaging multi-spectral radiometer (vis/IR)	Main objective is monitoring marine biophysical and biochemical parameters. Secondary objectives are related to atmospheric properties such as cloud and water vapour and to vegetation conditions on land surfaces	Waveband: VIS-NIR: 15 bands selectable across range: 0.4-1.05µm (bandwidth programmable between 0.0025 and 0.03µm) Resolution: Ocean: 1040m x 1200 m, Land & coast: 260m x 300m Swath: 1150km, global coverage every 3 days Accuracy: Ocean colour bands typical S:N = 1700
METEOSAT Comms Communications package for METEOSAT	METEOSAT-3, 4, 5, 6, 7	Other	Communications	Waveband: Resolution: Swath: Accuracy:
MHS Microwave Humidity Sounder	NOAA-N,N', METOP-1,2,3	Atmospheric sounder (IR or microwave)	Provides atmospheric humidity profiles, cloud cover, cloud liquid, water content, ice boundaries and precipitation data	Waveband: Microwave: 89, 166GHz and 3 channels near 183GHz Resolution: Vertical: 37km, Horizontal: 30-50km Swath: 1650km Accuracy: Cloud water profile: 10g/m2, Specific humidity profile: 10-20%
MIPAS Michelson Interferometric Passive Atmosphere Sounder	Envisat, ESA Future Missions	Atmospheric Chemistry instrument	Provides data on stratosphere chemistry (global/polar ozone), climate research (trace gases/ clouds), transport dynamics, tropospheric chemistry. Primary/secondary species: O3, NO, NO2, HNO3, N2O5, ClONO2, CH4	Waveband: MWIR-TIR: between 4.15 and 14.6µm Resolution: Vertical resolution: 3km, vertical scan range 5-150km Horizontal: 3km x 30km Spectral resolution: 0.035 lines/cm Swath: Accuracy: Radiometric precision: 685-970 cm-1: 1%, 2410 cm-1: 3%
MIRAS Multichannel Infrared Atmospheric Sounder	FY-3 C, D, E, F, G	Atmospheric sounder (IR or microwave)		Waveband: Resolution: Swath: Accuracy:
MIRAS Microwave Imaging Radiometer using Aperture Synthesis	SMOS	Multi-direction / polarisation instruments	Objective is to demonstrate observations of sea surface salinity and soil moisture in support of climate, meteorology, hydrology, and oceanography applications	Waveband: Microwave: L-Band 1.416GHz (based on MIRAS concept) Resolution: Science requirements: Soil moisture: 10km (desired), Sea surface salinity: 20km (desired) Swath: Science requirements: Soil moisture: 10km (desired), Sea surface salinity: 20km (desired) Accuracy: Desired radiometric accuracy: 1K for land, 0.5K for sea
MISR Multi-angle Imaging Spectro Radiometer	Terra	Multi-direction / polarisation instruments	Provides measurements of global surface albedo, aerosol and vegetation properties. Also provides multi-angle bidirectional data (1% angle-to-angle accuracy) for cloud cover and reflectances at the surface and aerosol opacities. Global and local modes	Waveband: VIS: 0.44, 0.56, 0.67µm, NIR: 0.86µm Resolution: 275m, 550m or 1.1km, Summation modes available on selected cameras/bands: 1x1, 2x2, 4x4, 1x4. 1 pixel = 275m Swath: 360km common overlap of all 9 cameras Accuracy: 0.03% hemispherical albedo, 10% aerosol opacity, 1-2% angle to angle accuracy in bidirectional reflectance
MIVZA MIVZA	METEOR-3M N1	Atmospheric sounder (IR or microwave)	Microwave radiometer for temperature sounding of atmosphere	Waveband: Microwave: 1.5, 0.86, 0.32cm Resolution: 1500m Swath: Accuracy:
MLS (EOS-Aura) Microwave Limb Sounder [EOS-Aura]	EOS-Aura	Atmospheric sounder (IR or microwave)	Measures lower stratospheric temperature and concentration of H2O, O3, ClO, HCl, OH, HNO3, N2O and SO	Waveband: Microwave: 118, 190, 240, 640 GHz & 2.5 THz Resolution: 3km x 300km horizontal x 1.2km vertical Swath: Limb scan 2.5 - 62.5km Limb to limb Accuracy: Temperature: 4K, Ozone: 50%
MLS Microwave Limb Sounder (UARS)	UARS	Atmospheric sounder (IR or microwave)	Provides data on emissions of chlorine monoxide, water vapour and ozone. Data also used for determination of atmospheric pressure and temperatures as a function of altitude from observations of molecular oxygen emissions	Waveband: Resolution: Swath: Accuracy:

Instrument	Mission(s)	Type	Measurements /application	Technical characteristics
MMP Magnetic Mapping Payload	SAC-C	Magnetic field	Magnetic Field Measurement of the Earth's magnetic field with a vector and a scalar magnetometer	Waveband: 2 arcsec and 1 nT Resolution: Swath: Accuracy:
MMRS Multispectral Medium Resolution Scanner	SAC-C	Imaging multi-spectral radiometer (vis/IR)	Applications related to agriculture, environment, forestry, hydrology, oceanography, mineralogy and geology, desertification, contamination and protection of ecosystems	Waveband: VIS-NIR: 480 - 500nm, 540-560nm, 630-690nm, 795-835nm, SWIR: 1550-1700nm Resolution: 175m Swath: 360km Accuracy:
MODIS Moderate-Resolution Imaging Spectro radiometer	Terra, Aqua	Imaging multi-spectral radiometer (vis/IR)	Data on biological and physical processes on the surface of the Earth and in the lower atmosphere, and on global dynamics. Surface temperatures of land and ocean, chlorophyll fluorescence, land cover measurements, cloud cover (day and night)	Waveband: VIS-TIR: 36 bands in range 0.4-14.4µm Resolution: Cloud cover: 250m (day) and 1000m (night), Surface temperature: 1000m Swath: 2330km Accuracy: Long wave radiance: 100nW/m ² , Short wave radiance: 5%, Surface temperature of land: <1K, Surface temperature of ocean: <0.2K, Snow and ice cover: 10%
MOPITT Measurements of Pollution in the Troposphere	Terra	Atmospheric Chemistry instrument	Measurements of greenhouse gases (CO, methane) in the troposphere	Waveband: SWIR-MWIR: 2.3, 2.4 and 4.7µm Resolution: CO profile: 4km vertical, 22 x 22km horizontal, CO, CH4 column: 22x22km horizontal Swath: 616km Accuracy: Carbon monoxide (4km layers): 10%, Methane column: 1%
MOS Modular Opto-electronic Scanner	IRS-P3	Ocean colour radiometer	Provides data for spectral analysis of O ₂ absorption in the NIR band, vegetation and indices and vegetation condition and soil assessment	Waveband: NIR: 755-768nm (4 bands), VIS-NIR: 408-1010nm (13 bands), SWIR: 1600nm Resolution: 1570m, 525m, 645m Swath: 200km (approximately) Accuracy: Radiometric: < 1%
MR-2000M1	METEOR-3M N1	Imaging multi-spectral radiometer (vis/IR)	TV camera images of cloud, snow and ice	Waveband: VIS-NIR: 0.5-0.8µm Resolution: 0.7 x 1.4km Swath: 3100km Accuracy:
MR-900B Scanning visual band telephotometer	METEOR-3 N5 METEOR-2 N21 Resurs-01 N4	Imaging multi-spectral radiometer (vis/IR)	TV camera images of cloud, snow and ice	Waveband: VIS-NIR: 0.5-0.8µm Resolution: 2 x 1km Swath: 2600km Accuracy:
MSC Multi-Spectral Camera	KOMPSAT-2	High resolution imager	High resolution imager for land applications of cartography and disaster monitoring	Waveband: VIS-NIR : 0.5-0.92µm, VIS : 0.45-0.52µm, 0.52-0.6µm, 0.63-0.69µm NIR : 0.76-0.9µm Resolution: Pan: 1m, VNIR: 4m Swath: 15km Accuracy:
MSG Comms Communications package for MSG	MSG-1, 2, 3	Other	Communications	Waveband: Resolution: Swath: Accuracy:
MSGI-5EI Multichannel System for Geoactive Emission Measurements	METEOR-3M N1	Other	Geoactive Emission Measurements	Waveband: Ions energetic spectrum: 0.1 - 15 keV, 3 channels, Energy of electrons: 0.05 - 20 keV and more than 40 keV, 4 channels Resolution: Swath: Accuracy:
MSGI-MKA Spectrometer	METEOR-3M N2,3	Other	Geoactive corpuscular emissions measurements	Waveband: Resolution: Swath: Accuracy:
MSMR Multifrequency Scanning Microwave Radiometer	IRS-P4	Imaging multi-spectral radiometer (microwave)	Sea state and meteorological parameter monitoring (sea surface temperature, surface wind speed, water vapour over ocean and liquid water content of the cloud)	Waveband: Microwave: 6.6, 10.6, 18 and 21GHz Resolution: 40m at 21GHz to 120m at 6.6GHz Wind speed: 75 x 75km, Sea surface temperature: 146 x 150km Swath: 1360km Accuracy: Sea surface temperature: 1.5K Sea surface wind speed: 1.5 m/s

Instrument	Mission(s)	Type	Measurements /application	Technical characteristics
MSU Microwave Sounding Unit	NOAA-11, 12, 14	Atmospheric sounder (IR or microwave)	Provides temperature sounding through cloud up to 20km in altitude	Waveband: Microwave: 50.3, 53.74, 54.96 and 57.95GHz Resolution: 105km Swath width: 2348 km, +/-47.4 deg scan Accuracy:
MSU-E Multispectral high resolution electronic scanner	Resurs-01 N4, METEOR-3M N1	High resolution imager	Multispectral scanner images of land surface and ice cover	Waveband: VIS: 0.5-0.6µm, 0.6-0.7µm NIR: 0.8-0.9µm Resolution: 35-45m Swath: 45km for one scanner, 80km for two scanners (pointable ±30 deg from nadir) Accuracy:
MSU-EU Multi-Spectral Radiometer with High Resolution	SICH-1M	High resolution imager	Multispectral scanner images of land surface	Waveband: VIS: 0.5-0.6µm, 0.6-0.7µm (scanning radiometer), NIR: 0.8-0.9µm Resolution: Visible: 24x34m Swath: 48 km or 105km; pointable ±30° from nadir Accuracy:
MSU-GS Multispectral scanning imager-radiometer	GOMS/Electro N2, 3	Imaging multi-spectral radiometer (vis/IR)	Measurements of cloud cover, cloud top height, precipitation, cloud motion, vegetation, radiation fluxes, convection, air mass analysis, cirrus cloud discrimination, tropopause monitoring, stability monitoring, total ozone and sea surface temperature	Waveband: Visible: 0.5-0.65µm, 0.65-0.8µm (broadband), NIR: 0.9µm, SWIR: 1.5µm, MWIR: 3.5-4.01µm TIR: 5.7-7.0µm, 8µm, 8.7µm, 9.7µm, 10.2-11.2µm, 11.2-12.5µm, 13.4µm Resolution: 1km (at SSP) for visible and 4 km for IR channels Swath: Full Earth disk Accuracy:
MSU-M Multi-Spectral Low Resolution Scanning System	SICH-1M OKEAN-0	Imaging multi-spectral radiometer (vis/IR)	Provides images of ocean surface and ice sheets	Waveband: VIS: 0.5-0.6, 0.6-0.7 µm NIR: 0.7-0.8, 0.8-1.1 µm Resolution: Visible: 1.7x1.8km Swath: 1930km Accuracy:
MSU-MR Images of clouds, snow, ice and land cover	METEOR-3M N2,3	Imaging multi-spectral radiometer (vis/IR)	Images of clouds, snow, ice and land cover	Waveband: Visible: 0.5-0.7µm, NIR: 0.7-1.1µm, SWIR: 1.6-1.8µm, MWIR: 3.5-4.1µm, TIR: 10.5-11.5µm, 11.5-12.5µm Resolution: 1km Swath: 3000km Accuracy: VIS: 0.5%, IR: 0.1K
MSU-SK Multispectral medium resolution conical scanner	Multispectral medium resolution conical scanner	Imaging multi-spectral radiometer (vis/IR)	Multispectral scanner images of land surface and ice cover	Waveband: Resolution: Swath: Accuracy:
MSU-SM Multi-Spectral Medium Resolution Scanning System	METEOR-3M N1	Imaging multi-spectral radiometer (vis/IR)	Images of clouds, snow, ice and land cover	Waveband: Visible: 0.5-0.7µm, NIR: 0.7-1.1µm Resolution: 225m Swath: 2250km Accuracy:
MSU-UM Visible Multi-Spectral Radiometer	SICH-2	Imaging multi-spectral radiometer (vis/IR)		Waveband: VIS-NIR: 0.52-0.90µm (3 channels) Resolution: Swath: Accuracy:
MSU-V Multispectral high resolution conical scanner	OKEAN-0	Imaging multi-spectral radiometer (vis/IR)		Waveband: Resolution: Swath: Accuracy:
MTSAT Comms Communications package for MTSAT	MTSAT-1R, 2	Other	Communications	Waveband: Resolution: Swath: Accuracy:
MTVZA Scanning microwave radiometer	METEOR-3M N1,2	Atmospheric sounder (IR or microwave)	Provision of atmospheric temperature and humidity profiles	Waveband: Microwave:18.7-183 GHz, 52-55 GHz, 19 channels Resolution: 12-75km Swath: 2600 km Accuracy:

Instrument	Mission(s)	Type	Measurements /application	Technical characteristics
MTVZAOK Scanning microwave radiometer	SICH-1M	Atmospheric sounder (IR or microwave)	Multi-Spectral Scanner Images of Earth Surface	Waveband: Microwave: 6.9 (V,H), 10.6 (V,H), 18.7 (V,H), 23.8 (V), 31.5 (V,H), 36.7 (V,H), 42 (V,H), 48 (V,H), 52.3-57.0 (V,H), 91 (V,H), 183.31 GHz VIS: 0.37-0.45, 0.45-0.51, 0.58-0.68, 0.68-0.78 μ m IR: 10.4-11.5, 11.5-12.6 μ m Resolution: Microwave: 12x200 km Visible:1.1 or 4.0 km IR:1.1 or 4.0 km Swath: 2000km Accuracy:
Multispectral high resolution scanner	Resurs DK	High resolution imager	Research of Earth natural resources, cartography	Waveband: VIS-NIR: 0.5-0.6, 0.6-0.7, 0.7-0.8, 0.58-0.8 μ m Resolution: Panchromatic band 1.8 m, Narrow spectral bands 3.5 –4.5m Swath: 48.5km Accuracy:
MVIRI METEOSAT Visible and Infrared Imager	METEOSAT 7 (MTP)	Imaging multi-spectral radiometer (vis/IR)	Measures cloud cover, motion, height, upper tropospheric humidity and sea surface temperature	Waveband: TVIS-NIR: 0.5-0.9 μ m, TIR: 5.7-7.1 μ m (water vapour), 10.5-12.5 μ m Resolution: VIS-NIR: 0.5-0.9 μ m, TIR: 5.7-7.1 μ m (water vapour), 10.5-12.5 μ m Swath: Full Earth disk in all three channels, every 30 minutes Accuracy: Cloud top height: 0.5km, Cloud top/ sea surface temperature: 0.7K, Cloud cover 15%
MVIRS Moderate Resolution Visible and Infrared Imaging Spectro radiometer	FY-3 A, B, C, D, E, F, G	Imaging multi-spectral radiometer (vis/IR)	Measures surface temperature and cloud and ice cover. Used for snow and flood monitoring and surface temperature	Waveband: VIS-TIR: 0.47-12.5 μ m (20 channels) Resolution: Swath: Accuracy:
MVISR (10 channels) Multispectral Visible and Infrared Scan Radiometer (10 channels)	FY-1 C, D	Imaging multi-spectral radiometer (vis/IR)	To provide multispectral analysis of hydrological, oceanographic, land use and meteorological parameters. Global imager & SST. Ocean colour	Waveband: 10 channels: VIS: 0.43-0.48 μ m, 0.48-0.53 μ m, 0.53-0.58 μ m, 0.58-0.68 μ m, NIR: 0.84-0.89 μ m, NIR-SWIR: 0.90-0.965 μ m, 1.58-1.68 μ m, 3.55-3.93 μ m, TIR: 10.3-11.3 μ m, 11.5-12.5 μ m Resolution: 1.1km Swath: 3200km Accuracy:
MWAS Microwave Atmospheric Sounder	FY-3 A, B	Atmospheric sounder (IR or microwave)	Meteorological applications	Waveband: Microwave: 19.35-89.0 GHz (8 channels) Resolution: Swath: Accuracy:
MWHS MicroWave Humidity Sounder	FY-3 C, D, E, F, G	Atmospheric sounder (IR or microwave)	Meteorological applications	Waveband: Microwave: 19.35-89.0 GHz (8 channels) Resolution: Swath: Accuracy:
MWR MicroWave Radiometer	ERS-2, Envisat	Imaging multi-spectral radiometer (microwave)	To provide multispectral analysis of hydrological, oceanographic, land use and meteorological parameters	Waveband: Microwave: 23.8 and 36.5 GHz Resolution: 20km Swath: 20km Accuracy: Temperature: 2.6K
MWR-2 MicroWave Radiometer-2	ESA Future Missions	Imaging multi-spectral radiometer (microwave)	To provide multispectral analysis of hydrological, oceanographic, land use and meteorological parameters	Waveband: Resolution: Swath: Accuracy:
MWRI MicroWave Radiation Imager	FY-3 A, B, C, D, E, F, G	Imaging multi-spectral radiometer (microwave)		Waveband: Resolution: Swath: Accuracy:
NISTAR NIST Advanced Radiometer	Triana	Earth radiation budget radiometer	Measures radiance output from the sunlit Earth over a broad spectrum (UV and VIS reflected and IR emitted) to detect energy balance changes in support of climate studies	Waveband: UV-FIR: 0.2-100 μ m, 0.2-4 μ m, 0.7-4 μ m, 0.3-1 μ m Resolution: Swath: Full Earth disk Accuracy: Total Earth reflected and emitted power to within 0.1%

Instrument	Mission(s)	Type	Measurements /application	Technical characteristics
NOAA Comms Communications package for NOAA	NOAA-11,12,14,15,16,M,N,N'	Other	Communications	Waveband: Resolution: Swath: Accuracy:
OBA Observadr Brasileiro da Amazonia	SSR-1, 2	Imaging multi-spectral radiometer (vis/IR)	Used for fire extent detection and temperature measurement, coastal and vegetation monitoring, land cover and land use mapping	Waveband: VIS: 0.45-0.50µm, 0.52-0.57µm, 0.63-0.69µm, NIR: 0.76-0.90µm, MWIR: 3.4-4.2µm Resolution: VIS-NIR: 100m, MIR: 300m Swath: 2200km (equatorial belt from latitude 5N to 15S) Accuracy:
OCM Ocean Colour Monitor	IRS-P4,OCEANSAT 2	Ocean colour radiometer	Ocean colour information, coastal zone monitoring, land resources monitoring	Waveband: VIS-NIR: 0.40-0.88µm (8 channels) Resolution: 236m x 360m Swath: 1440km Accuracy:
OEK DZZ WR High resolution electron-optical complex for Earth remote sensing	Resurs-01 N5	High resolution imager	Research of Earth natural resources, cartography	Waveband: PAN (VIS-NIR) 0.45-0.9µm, Narrow bands: VIS: 0.43-0.47µm, 0.51-0.59µm, 0.61-0.69µm, VIS-NIR: 0.7-0.8µm, NIR: 0.8-0.9µm, 0.8-1.1µm Resolution: Panchromatic band 1.0 m, Narrow spectral bands 2.0 m Swath: 30km Accuracy:
OLS Operational Linescan System	DMSP F-8, 12, 13, 14, 15, 16, 17, 18, 19, 20	Imaging multi-spectral radiometer (vis/IR)	Day and night cloud cover imagery	Waveband: VIS-NIR: 0.4-1.1µm, TIR: 10.0-13.4µm, and 0.47-0.95µm Resolution: 0.56km (fine), 5.4km (stereo products) Swath: 3000km Accuracy:
OMI Ozone Measuring Instrument	EOS Aura	Atmospheric Chemistry instrument	Mapping of ozone columns, key air quality components (NO ₂ , SO ₂ , BrO, OClO and aerosols), measurements of cloud pressure and coverage, global distribution and trends in UV-B radiation	Waveband: UV: 270-314nm & 306-380nm, VIS: 350-500nm Resolution: 13km x 24km or 36km x 48km depending on the product. Also has zoom modes (13km x 13km) for example for urban pollution detection Swath: 2600km Accuracy:
OMPS Ozone Mapping and Profiler Suite	NPOESS-2, 5	Atmospheric Chemistry instrument	Measures total amount of ozone in the atmosphere and the ozone concentration variation with altitude	Waveband: Nadir Mapper: UV 0.3-0.38µm, Nadir profiler: UV 0.25-0.31µm, Limb soundings: UV-TIR 0.29-10µm Resolution: Mapper: 50km, Profiler: 250km, Limb: 1km vertical Swath: Mapper: 2800km, Profiler: 250km, Limb: 3 vertical slits along track +/- 250km Accuracy:
OP Ozone Profiler	FY-3A, B, C, D, E, F, G	Atmospheric Chemistry instrument	Ozone measurements	Waveband: Resolution: Swath: Accuracy:
OPUS Ozone and Pollution Measuring Ultraviolet Spectrometer	GCOM-A1	Atmospheric Chemistry instrument	Primary objective of measuring global total column ozone on a daily basis. Also measures volcanic SO ₂ , aerosols, NO ₂ ,HCHO,BrO and stratospheric OClO, plus cloud top heights	Waveband: UV-VIS: 0.306-0.420µm (228 channels - with a resolution of 0.5-0.7nm) Resolution: 20km Swath: 2500km Accuracy: Total ozone 5% nominal (2% after calval with a precision of 2%)
OSIRIS Optical Spectrograph and Infrared Imaging System	Odin	Atmospheric Chemistry instrument	Detects aerosol layers and abundance of species such as O ₃ , NO ₂ , OClO, and NO. Consists of spectrograph and IR imager. Measures temperature for altitudes above 30km	Waveband: Spectrograph: UV-NIR: 0.28-0.80µm, IR Imager, NIR: 1.26µm, 1.27µm, 1.52µm Resolution: Spectrograph 1km at limb, Imager 1km in vertical Swath: N/A, but measures in the altitude range 5-100 km Accuracy: Depends on species
OSMI Ocean Scanning Multispectral Imager	KOMPSAT-1	Imaging multi-spectral radiometer (vis/IR)	Ocean colour measurements for biological oceanography	Waveband: VIS : 0.412µm, 0.443µm, 0.490µm, 0.555µm, NIR: 0.765µm, 0.865µm Resolution: 1km Swath: 800km Accuracy:

Instrument	Mission(s)	Type	Measurements /application	Technical characteristics
PALSAR Phased Array type L-Band Synthetic Aperture Radar	ALOS	Imaging radar	High resolution microwave imaging of land and ice for use in environmental monitoring, agriculture and forestry, disaster monitoring, Earth resource management and interferometry	Waveband: Microwave: L-Band 1270MHz Resolution: Hi-res: 7-44m or 14-88m (depends on polarisation and looks), ScanSAR mode: <100m, Polarimetry 24-88m Swath: High resolution mode: 70km, Scan SAR mode: 250-360km Polarimetry: 30km Accuracy: Radiometric: ±1dB
PAN Panchromatic sensor	IRS-1C,D, CARTOSAT-1	High resolution imager	High resolution stereo images for study of topography, urban areas, development of DTM, run-off models etc. Urban sprawl, forest cover/timber volume, land use change	Waveband: Panchromatic VIS: 0.5-0.75µm Resolution: 5.8m (2.5m on CARTOSAT-1) Swath: 70km at nadir (30km each camera on CARTOSAT) Accuracy: CARTOSAT: 5m elevation discrimination
PAN MUX Panchromatic and multispectral imager	CBERS-3, 4	High resolution imager	Provides measurements of cloud type and extent and land surface reflectance and used for global land surface applications	Waveband: VIS: 0.52-0.59µm, 0.63-0.69µm NIR: 0.77-0.89µm, PAN: 0.51-0.85µm Resolution: 5m panchromatic and 10m multispectral Swath: 60km Accuracy:
PDA Particle Detector Analyser	ESPERIA	Magnetic field	Study of perturbations in the atmosphere and ionosphere caused by electromagnetic waves, short term earthquake prediction	Waveband: Resolution: Swath: Accuracy:
PEM Particle Environment Monitor	UARS	Magnetic field	PEM measures UV and charged particle energy inputs: determines type, amount, energy and distribution of charged particles injected into Earth's thermosphere, mesosphere and stratosphere	Waveband: Resolution: Swath: Accuracy:
PFS Planetary Fourier Spectrometer	FOURIER	Atmospheric sounder (IR or microwave)	Atmospheric physics, radiative properties, climate change	Waveband: NIR-FIR: 1.2-45µm Resolution: Swath: Accuracy:
Plasma-Mag Plasma-Mag	Triana	Magnetic field	Sun-viewing instrument to measure the solar wind and magnetic field parameters. Also serves as early-warning for solar-event storms that could damage satellites and equipment on Earth	Waveband: Resolution: Swath: Accuracy:
POLDER POLarization and Directionality of the Earth's Reflectances	ADEOS-2	Multi-direction / polarisation instruments	Measures polarisation, and directional and spectral characteristics of the solar light reflected by aerosols, clouds, oceans and land surfaces	Waveband: VIS-NIR: 0.443, 0.670 and 0.865µm at 3 polarisations, and 0.443, 0.49, 0.565, 0.763, 0.765 and 0.91µm with no polarisation Resolution: 6km x 7km Swath: 2400km (across track) x 1800km (along track) Accuracy: Radiation budget, land surface, Reflectance: 2%
POLDER-P POLarization and Directionality of the Earth's Reflectances (PARASOL version)	PARASOL	Multi-direction / polarisation instruments	Measures polarization, and directional and spectral characteristics of the solar light reflected by aerosols, clouds, oceans and land surfaces	Waveband: VIS-NIR: 0.490, 0.670 and 0.865µm at 3 polarisations, and 0.49, 0.565, 0.763, 0.765, 0.91µm, and 1.02µm with no polarisation Resolution: 5.5km x 5.5km Swath: 1600km Accuracy: Radiation budget, land surface, Reflectance: 2%
POSEIDON-1 (SSALT-1) Positioning Ocean Solid Earth Ice Dynamics Orbiting Navigator (Single frequency solid state radar altimeter)	Topex-Poseidon	Radar altimeter	Nadir viewing sounding radar for provision of real-time high precision sea surface topography, ocean circulation and wave height data	Waveband: Microwave 13.65GHz Resolution: 2km antenna footprint Basic measurement: 1/sec (6km along track) Raw measurement: 20/sec (300m along track) Swath width: 10 day cycle 300km between tracks at equator Accuracy: Sea level: 4cm Significant waveheight: 0.5m Horizontal sea surface wind speed: 2m/s

Instrument	Mission(s)	Type	Measurements /application	Technical characteristics
POSEIDON-2 (SSALT-2) Positioning Ocean Solid Earth Ice Dynamics Orbiting Navigator (Single frequency solid state radar altimeter)	Jason-1, 2	Radar altimeter	Nadir viewing sounding radar for provision of real-time high precision sea surface topography, ocean circulation and wave height data	Waveband: Microwave: Ku-band (13.5756GHz), C-band (5.3GHz) Resolution: Basic measurement: 1/sec (6km along track), Raw measurement: 10/sec (600m along track) Swath: On baseline TOPEX/POSEIDON orbit (10 day cycle): 300km between tracks at equator Accuracy: Sea level: 3.9cm, Significant waveheight: 0.5m, Horizontal sea surface wind speed: 2m/s
PR Precipitation Radar	TRMM	Cloud profiler and/or rain radar	Measures precipitation rate of clouds in tropical latitudes	Waveband: Microwave: 13.796 and 13.802GHz Resolution: Range resolution: 250m Horizontal resolution: 4.3km at nadir Swath: 215km (scanned every 0.6 secs) Observable range: from surface to approx 15km altitude Accuracy: Rainfall rate 0.7mm/h at storm top
PREMOS PRECision Monitoring of Solar variability	PICARD	Earth radiation budget radiometer	Solar UV and visible flux in selected wavelength bands	Waveband: UV: 230nm, 402nm; VIS: 548nm Resolution: Swath: Accuracy:
PRISM (ALOS) Panchromatic Remote-sensing Instrument for Stereo Mapping	ALOS	High resolution imager	High resolution panchromatic stereo imager for land applications which include cartography, digital terrain models, civil planning, agriculture and forestry	Waveband: VIS-NIR: 0.52-0.77µm (panchromatic) Resolution: 2.5m Swath: 35km (triplet stereo observations), 70km (nadir observations) Accuracy:
RA Radar Altimeter	ERS-2	Radar altimeter	Measures wind speed, significant wave height, sea surface elevation, ice profile, land and ice topography and sea ice boundaries	Waveband: Microwave: Ku-band: 13.8GHz Resolution: Footprint is 16-20km Swath: Accuracy: Wave height: 0.5m or 10% (whichever is smaller) Sea surface elevation: better than 10cm
RA-2 Radar Altimeter - 2	Envisat	Radar altimeter	Measures wind speed, significant wave height, sea surface elevation, ice profile, land and ice topography, and sea ice boundaries	Waveband: Microwave: 13.575Ghz (Ku-Band) & 3.2GHz (S-Band) Resolution: Swath: Accuracy: Altitude: better than 4.5cm, Wave height: better than 5% or 0.25m
REI REFIR Embedded Imager	REFIR	Imagng multi-spectral radiometer (vis/IR)	Study of radiation processes for climate change, study of water vapour feedback processes and gaseous forcing	Waveband: TIR: 10.5-12.5µm Resolution: Swath: Accuracy:
RFTS REFIR Fourier Transform Spectrometer	REFIR	Imaging atmospheric sounder (IR or microwave)	Study of radiation processes for climate change, study of water vapour feedback processes and gaseous forcing	Waveband: TIR-FIR: 9-100µm Resolution: Swath: Accuracy:
RIMS-M Mass-spectrometer	METEOR-3M N2,3	Other	Ion composition in upper atmosphere	Waveband: 1-4 a.e.m., 5-20 a.e.m Resolution: Swath: Accuracy:
RLSBO Side looking microwave radar	SICH-1M OKEAN-0	Imaging radar	Provides images of ocean surface and ice sheets	Waveband: Microwave: 3.0cm Resolution: 1.3 x 2.5km or 1.3x 2.8km Swath: 450km Accuracy:
RM-08 Imaging Microwave Radiometer	SICH-1M	Imaging multi-spectral radiometer (microwave)	Passive microwave images of ocean surface and ice sheets	Waveband: Microwave: 0.8cm Resolution: 25 x 25km Swath: 550km Accuracy: 3K temperature sensitivity
RMS Radiation measurement system	GOMS/Electro N1,2	Other	Measures flux of charged particles and EM radiation and Earth's magnetic field	Waveband: Resolution: Swath: Accuracy:
RRA Retroreflector Array	Diademe-1, 2	Gravity field or geodynamic	Satellite laser ranging for geodynamic measurements	Waveband: Resolution: Swath: Accuracy:

Instrument	Mission(s)	Type	Measurements /application	Technical characteristics
RTER REFIR total energy radiometer	REFIR	Earth radiation budget radiometer	Study of radiation processes for climate change, study of water vapour feedback processes and gaseous forcing	Waveband: MWIR-FIR: 3-30µm Resolution: Swath: Accuracy:
S&R (GOES) Search and Rescue	GOES 8-12, N-Q	Other	Satellite and ground based system to detect and locate aviators, mariners, and landbased users in distress	Waveband: Resolution: Swath: Accuracy:
S&R (NOAA) Search and Rescue Satellite Aided Tracking	NOAA-11,14,15,16,M,N,N', METOP-1,2	Other	Satellite and ground based system to detect and locate aviators, mariners, and landbased users in distress	Waveband: Resolution: Swath: Accuracy:
SAGE II Stratospheric Aerosol and Gas Experiment-II	ERBS	Atmospheric Chemistry instrument	Profiles of ozone, water vapour, NO ₂ , OClO, aerosols	Waveband: 7 channels, UV-NIR: 0.385 - 1.02 µm Resolution: 0.5km Swath: Accuracy:
SAGE III Stratospheric Aerosol and Gas Experiment-III	ISS, Meteor-3M N1	Atmospheric Chemistry instrument	Profiles of ozone, water vapour, NO ₂ , OClO, aerosols, temperature and pressure	Waveband: UV-NIR: 0.29-1.55µm (9 channels) Resolution: 1-2km vertical resolution Swath: Accuracy: Temperature: 2K, Ozone: 6%, Humidity: 3-10%, Aerosol and trace gases: 5-10%
SAPHIR SAPHIR	MEGHA-TROPIQUES	Atmospheric sounder (IR or microwave)	Cross-track sounder with the objective of measuring water vapour profiles in the troposphere in six layers from 2-12km altitudes	Waveband: Microwave: 183.3GHz Resolution: 10km Swath: Accuracy:
SAR (RISAT)	RISAT-1	Imaging radar	Radar backscatter measurements of land, water and ocean surfaces for applications in soil moisture, crop applications (under cloud cover), terrain mapping etc	Waveband: C-Band (5.350GHz) Resolution: 1-2m (HRS), 3-6m (FRS-1), 9-12m (FRS-2), 25/50m (MRS/CRS) Swath: 10km (HRS), 30km (FRS-1/FRS-2), 120/240km (MRS/CRS) Accuracy:
SAR (RADARSAT) Synthetic Aperture Radar (CSA) C band	RADARSAT-1	Imaging radar	Provides all-weather images of ocean, ice and land surfaces. Used for monitoring of coastal zones, polar ice, sea ice, sea state, geological features, vegetation and land surface processes	Waveband: Microwave: C band: 5.3GHz, HH polarisation Resolution: Standard: 25 x 28 m (4 looks), Wide beam (1/2): 48-30 x 28m/ 32-25 x 28m (4 looks), Fine resolution: 11-9 x 9m (1 look), ScanSAR (N/W): 50 x 50m/ 100 x 100m (2-4/4-8 looks), Extended (H/L): 22-19x28m/ 63-28 x 28m (4 looks) Swath: Standard: 100km Wide: 150km Fine: 45km ScanSAR Narrow: 300km ScanSAR Wide: 500km Extended (H): 75km Extended (L): 170km Accuracy: Geometric distortion: < 40m, Radiometric: 1.0dB
SAR (RADARSAT-2) Synthetic Aperture Radar (CSA) C band	RADARSAT-2	Imaging radar	Provides all-weather images of ocean, ice and land surfaces. Used for monitoring of coastal zones, polar ice, sea ice, sea state, geological features, vegetation and land surface processes	Waveband: Microwave: C band 5.405 GHz: HH, VV, HV, VH polarisation includes fully polarimetric imaging modes, and left- and right-looking capability Resolution: Standard: 25 x 28 m (4 looks), Wide beam (1/2): 48-30 x 28m/ 32-25 x 28m (4 looks), Fine resolution: 11-9 x 9m (1 look), ScanSAR (N/W): 50 x 50m/ 100 x 100m (2-4/4-8 looks), Extended (H/L): 22-19x28m/ 63-28 x 28m (4 looks) Ultrafine: 3m Swath: Standard: 100km (20-49deg), Wide beam (1/2): 165km/ 150km (20-31/ 31-39deg), Fine resolution: 45km (37- 48deg), ScanSAR (W): 510km (20-49deg), Extended (H/L): 75km/170km (50-60/ 10-23deg) Ultrafine: 10-20km Accuracy: Geometric distortion: < 40m, Radiometric: 1.0dB

Instrument	Mission(s)	Type	Measurements /application	Technical characteristics
SAR (SAOCOM) SAOCOM 1A	SAOCOM 1A	Imaging radar	Land and Ocean Emergencies	Waveband: Microwave L-Band SAR 1.275 GHz Resolution: 10x10m – 100x100m Swath: Accuracy: 70m
SAR 2000 Multi-Mode Synthetic Aperture Radar	COSMO - Skymed	Imaging radar	All weather images of ocean, land and ice for monitoring of land surface processes, ice, environmental monitoring, risk management, environmental resources, maritime management, earth topographic mapping	Waveband: Microwave: X-band, with choice of 4 polarisation modes (VV, HH, VV/HH, HV/HH) Resolution: Single polarisation mode; Stripmap: few metres, ScanSAR: from few tens to several tens of metres; Frame: resolution: order of metres Two polarisation modes- PING PONG: few metres Swath: Single polarisation modes: Stripmap (tens of km), ScanSAR (hundreds of km), Frame (spot width several tens km ²) Two polarisation modes: PING PONG (several tens of km) Accuracy:
SARSAT Search and Rescue Satellite Aided Tracking	NPOESS-1, 2, 3, 4, 5, 6	Other	Satellite and ground based system to detect and locate aviators, mariners, and land-based users in distress	Waveband: Resolution: Swath: Accuracy:
SBUV/2 Solar Backscatter Ultra-Violet Instrument/2	NOAA-11, 14, 16, M, N, N'	Atmospheric Chemistry instrument	Provides data on trace gases including vertical profile ozone, and solar irradiance and total ozone concentration measurements	Waveband: UV: 0.16-0.47µm (12 channels) Resolution: 170km Swath: Accuracy: Absolute accuracy: 1%
ScaRaB/MV2 Scanner for Earth's Radiation Budget	Resource-01 N4, MEGHA-TROPIQUES	Earth radiation budget radiometer	Measures top-of-atmosphere shortwave radiation (0.2-4.0µm) and total radiation (0.2-50µm). Two additional narrow-band channels (0.5-0.7µm and 11-12µm) allow cloud detection and scene identification	Waveband: VIS window channel: 0.5-0.7µm, Solar channel UV-SWIR: 0.2-4µm, Total channel UV-FIR: 0.2-50µm, Thermal window channel: 10.5-12.5µm Resolution: 60km Swath: 2200km Accuracy: Absolute: ± 2.5W/m ² /sr, Relative: ± 0.7W/m ² /sr
Scatterometer (ISRO)	OCEANSAT-2	Scatterometer	Mainly for wind measurements	Waveband: Resolution: Swath: Accuracy:
SCATTEROMETER	ESA Future Missions	Scatterometer	Ocean, land, ice applications	Waveband: Resolution: Swath: Accuracy:
SCIAMACHY Scanning Imaging Absorption Spectrometer for Atmospheric Cartography	Envisat	Atmospheric Chemistry instrument	Measures middle atmosphere temperature. Provides tropospheric and stratospheric profiles of O ₂ , O ₃ , O ₄ , CO, N ₂ O, NO ₂ , CO ₂ , CH ₄ , H ₂ O, and tropospheric and stratospheric profiles of aerosols and cloud altitude	Waveband: UV-SWIR: 240-314, 309-3405, 394-620, 604-805, 785-1050, 1000-1750, 1940-2040 and 2265-2380nm Resolution: Limb vertical 3 x 132km, Nadir horizontal 32 x 215km Swath: Limb and nadir mode: 1000km (max) Accuracy: Radiometric: <4%
SeaWiFS Sea-Viewing Wide Field-of-View Sensor	SeaStar	Ocean colour radiometer	Provides data on aerosols and ocean colour and biology	Waveband: VIS-NIR: 0.402-0.422µm, 0.433-0.453µm, 0.48-0.5µm, 0.5-0.52µm, 0.545-0.565µm, 0.66-0.68µm, 0.745-0.785µm and 0.845-0.885µm Resolution: 1.1km (local) and 4.4km (global) at nadir Swath: 1500-2800km Accuracy: 5% (absolute radiometric accuracy)
SeaWinds SeaWinds	QuikSCAT, ADEOS-2	Scatterometer	Measurement of surface wind speed and direction	Waveband: Microwave: 13.402GHz Resolution: 25km Swath: 1600km Accuracy: Speed: 2-3.5 m/s Direction: 20 deg
SEM (GOES) Space Environment Monitor	GOES-8, 9, 10, 11, 12, N, O, P, Q	Other	Used for equipment failure analysis, solar flux measurement, solar storm warning, and magnetic and electric field measurement at satellite	Waveband: Resolution: Swath: Accuracy:

Instrument	Mission(s)	Type	Measurements /application	Technical characteristics
SEM (POES) Space Environment Monitor	NOAA-12, 14, 16, M, N, N' METOP-2	Other	Used for equipment failure analysis, solar flux measurement, solar storm warning, and magnetic and electric field measurement at satellite	Waveband: Resolution: Swath: Accuracy:
SESS Space Environmental Sensor Suite	NPOESS-2, 3, 5, 6	Magnetic field	Measures characteristics of auroral boundary, auroral energy deposition, auroral imagery, electric field, electron density profile, geomagnetic field, in-situ plasma fluctuations, ionosphere scintillation. Data aids future space system design	Waveband: Resolution: Swath: Accuracy:
SEVIRI Spinning Enhanced Visible and Infrared Imager	MSG-1, 2, 3	Imaging multi-spectral radiometer (vis/IR)	Measurements of cloud cover, cloud top height, precipitation, cloud motion, vegetation, radiation fluxes, convection, air mass analysis, cirrus cloud discrimination, tropopause monitoring, stability monitoring, total ozone and sea surface temperature	Waveband: VIS: 0.56-0.71µm, 0.5-0.9µm (broadband), NIR: 0.74-0.88µm, SWIR 1.5-1.78µm, SWIR: 3.48-4.36µm, TIR: 5.35-7.15µm, 6.85-7.85µm, 8.3-9.1µm, 9.38-9.94µm, 9.8-11.8µm, 11-13µm, 12.4-14.46µm Resolution: 1km (at SSP) for one broadband visible channel HRV, 5km (at SSP) for all other channels Swath: Full Earth disk Accuracy: Cloud cover: 10%, Cloud top height: 1km, Cloud top temperature: 1K, Cloud type: 8 classes, Surface temperature: 0.7-2.0K, Specific humidity profile: 10%, Wind profile (horizontal component): 2-10m/s, Long wave Earth surface radiation: 5W/m ²
SFM-2 UV limb spectrometer	METEOR-3M N1	Atmospheric Chemistry instrument	Global ozone monitoring	Waveband: UV-Visible: 0.2-0.51µm (4 channels) Resolution: Swath: Accuracy:
SIM Spectral Irradiance Monitor	SORCE	Earth radiation budget radiometer	Measures solar spectral irradiance in the 200-2000nm range	Waveband: UV-SWIR: 200-2000nm Resolution: Swath: Accuracy:
SIRAL SAR Interferometer Radar Altimeter	CRYOSAT	Radar altimeter	Objective is to observe ice sheet interiors, the ice sheet margins, for sea ice and other topography	Waveband: Microwave: 13.575 GHz (Ku-Band) Resolution: range resolution 45cm, along-track resolution 250m Swath: Footprint 15km Accuracy: Arctic sea-ice: 1.6cm/year for 300kmx300km cells, Land ice (small scale): 3.3cm/year for 100km x 100km cells, Land ice (large scale): 0.17cm/year for Antarctica size area
SKL-M Solar ray spectrometer	METEOR-3M N2,3	Other	Proton flux density	Waveband: 2, 4, 6 and > 6 MeV, 30, 50, 100, 300 and > 300 MeV Resolution: Swath: Accuracy:
SMR Submillimetre Radiometer	Odin	Atmospheric sounder (IR or microwave)	Measures global distributions of ozone and species of importance for ozone chemistry, ClO, HNO ₃ , H ₂ O, N ₂ O, (H ₂ O, H ₂ O ₂). Measures temperature in the height range 15-100 km	Waveband: Microwave: 118.7 GHz + 4 bands in the region 480-580 GHz: Tunable, measures 2-3 x 1 GHz regions at a time Resolution: Vertical resolution 1.5-3 km, along track 600 km Swath: Altitudes of 5-100km Accuracy: 2-40 % depending on species and altitude
SODISM Solar Diameter Imager and Surface Mapper	PICARD	Earth radiation budget radiometer	Measures diameter and differential rotation of the sun – a whole Sun imager	Waveband: UV: 230nm, VIS: 548nm, Active regions: 160nm plus Lyman alpha detector Resolution: Swath: Accuracy:
SOFIS Solar Occultation Fourier transform spectrometer for Inclined Orbit Satellite	GCOM-A1	Atmospheric Chemistry instrument	Monitors ozone and its minor constituents to obtain the global distribution of O ₃ , HNO ₃ , NO _x , N ₂ O, CH ₄ , H ₂ O, CO ₂ , CFC-11, CFC-12, ClONO ₂ , aerosols, pressure & temperature. Provides 3-D global ozone distribution along with OPUS	Waveband: MWIR-TIR: 3.25-6.5µm, 6.5-13µm, 753-784nm Resolution: Swath: Altitudes of 5-150km Accuracy:

Instrument	Mission(s)	Type	Measurements /application	Technical characteristics
SOLSTICE SOLar STellar Irradiance Comparison Experiment	SORCE UARS	Earth radiation budget radiometer	Provides data on UV and charged particle energy inputs, and on time variation of full-disk solar UV spectrum. Measures solar UV radiation (115 to 430nm) with resolution of 0.12nm. Compares solar UV output with UV radiation of stable bright blue stars	Waveband: UV: 115-180nm & 170-320nm Resolution: Swath: Accuracy: 1%
SOPRANO Sub-millimetre Observation of Processes in the Absorption Noteworthy for ozone	ESA Future Missions	Atmospheric Chemistry instrument	Provides temperature profiles and trace gases in the upper troposphere to mesosphere including ClO, O ₃ , HCl, NO, BrO as first priority, and HOCl, CH ₃ Cl, H ₂ O, N ₂ O, HO ₂ , HNO ₃ as second priority	Waveband: Sub-millimetre a) 499.4-505GHz b) 624.5-626.6 and 628.2-628.7GHz c) 730.5-732GHz d) 851.3-852.8GHz Resolution: Vertical: 2km at lowest level, Limb viewing instrument Swath: 10-50km tangent height range Accuracy: Band a: 2.5K, Bands b and c: 12K, Band d: 8K at 3MHz resolution, 0.3 secs integration time
Sounder	GOES-8, 9, 10, 11, 12, N, O, P, Q	Atmospheric sounder (IR or microwave)	Provides atmospheric soundings and data on atmospheric stability and thermal gradient winds	Waveband: VIS-TIR: 19 channels Resolution: 10km Swath: Horizon to horizon Accuracy:
Sounder (INSAT)	INSAT 3D	Atmospheric sounder (IR or microwave)	Atmospheric soundings, atmospheric stability, thermal gradient winds	Waveband: SWIR: 3.74-4.74µm, MWIR: 6.51-11.03µm, TIR: 12.02-14.71µm, VIS: 0.55-0.75µm Resolution: 10 x 10km Swath: Full (Full Earth disc sounding), Program (Options provided for Sector Scans) Accuracy:
SOVAP SOLar Variability Picard radiometer	PICARD	Earth radiation budget radiometer	Total solar irradiance measurements	Waveband: Total irradiance Resolution: Swath: Accuracy:
SPECTRA Surface Processes and Ecosystem Changes Through Response Analysis	ESA Future Missions	Imaging multi-spectral radiometer (vis/IR)	Data for study of land surface processes	Waveband: VIS-SWIR: 450-2350 nm and TIR: 10.3-12.3 micron Resolution: Spatial sampling interval approx 50m, along track pointing ±30 deg Swath: 50km Accuracy:
SSB/X Special Sensor Gamma Ray Particle Detector	DMSP F-8	Other	Detects the location, intensity and spectrum of X-rays emitted from the Earth's atmosphere	Waveband: Resolution: Swath: Accuracy:
SSB/X-2 Special Sensor Gamma Ray Particle Detector	DMSP F-12, 13, 14	Other	Detects the location, intensity and spectrum of X-rays emitted from the Earth's atmosphere	Waveband: Resolution: Swath: Accuracy:
SSIES-2 Special Sensor Ionospheric Plasma Drift/Scintillation Meter	DMSP F-12, 13, 14, 15	Other	Measurement of the ambient electron density and temperatures, the ambient ion density, and ion temperature and molecular weight	Waveband: Resolution: Swath: Accuracy:
SSIES-3 Special Sensor Ionospheric Plasma Drift/Scintillation Meter	DMSP F-16, 17, 18, 19, 20	Other	Measurement of the ambient electron density and temperatures, the ambient ion density, and ion temperature and molecular weight	Waveband: Resolution: Swath: Accuracy:

Instrument	Mission(s)	Type	Measurements /application	Technical characteristics
SSJ/4 Special Sensor Precipitating Plasma Monitor	DMSP F-12, 13, 14, 15	Magnetic field	Measurement of transfer energy, mass, and momentum of charged particles through the magnetosphere-ionosphere in the Earth's magnetic field	Waveband: Resolution: Swath: Accuracy:
SSJ/5 Special Sensor Precipitating Plasma Monitor	DMSP F-16, 17, 18, 19, 20	Magnetic field	Measurement of transfer energy, mass, and momentum of charged particles through the magnetosphere-ionosphere in the Earth's magnetic field	Waveband: Resolution: Swath: Accuracy:
SSM Special Sensor Magnetometer	DMSP 12, 13, 14, 15, 16, 17, 18, 19, 20	Other	Measures geomagnetic fluctuations associated with solar geophysical phenomena. With SSJES and SSJ provides heating and electron density profiles in the ionosphere	Waveband: Resolution: Swath: Accuracy:
SSM/I Special Sensor Microwave Imager	DMSP F-8, 12, 13, 14, 15	Imaging multi-spectral radiometer (microwave)	Measures atmospheric, ocean and terrain microwave brightness temperatures to provide: sea surface winds, rain rates, cloud water, precipitation, soil moisture, ice edge, ice age	Waveband: Microwave: 19.35, 22.235, 37, 85 GHz Resolution: 15.7km x 13.9km to 68.9 x 44.3km (depends on frequency) Swath: 1400km Accuracy:
SSM/T-1 Special Sensor Microwave Temperature Sounder	DMSP F-8, 12, 13, 14, 15, 16, 17, 18, 19, 20	Atmospheric sounder (IR or microwave)	Measures Earth's surface and atmospheric emission in the 50-60GHz oxygen band	Waveband: Microwave: 7 channels in the 50-60 GHz range Resolution: 174km diameter beam Swath: 1500km Accuracy:
SSM/T-2 Special Sensor Microwave Water Vapour Sounder	DMSP F-12, 13, 14, 15	Atmospheric sounder (IR or microwave)	Water Vapour profiler	Waveband: Microwave: 91.6, 150, 183.31 (3 channels) (Total 5 channels) Resolution: Approx 48km Swath: 1500km Accuracy:
SSMIS Special Sensor Microwave Imager Sounder	DMSP F-16, 17, 18, 19, 20	Atmospheric sounder (IR or microwave)	Measures thermal microwave radiation. Global measurements of air temp profile, humidity profile, ocean surface winds, rain overland/ocean, ice concentration/age, ice/snow edge, water vapour and clouds over ocean, snow water content, land surface temperature	Waveband: Microwave: 19 - 183GHz (24 frequencies) Resolution: Varies with frequency: 25x17km to 70x42km Swath: 1700km Accuracy:
SSU Stratospheric Sounding Unit	NOAA-11, 14	Atmospheric sounder (IR or microwave)	Provides temperature profiles in stratosphere, top-of-atmosphere radiation from 25km to 50km altitude	Waveband: 669.99, 669.63 and 669.36/cm (carbon dioxide) Resolution: 147.3km at nadir Swath: ±40 deg scan Accuracy:
SSULI Special Sensor Ultraviolet Limb Imager	DMSP F-16, 17, 18, 19, 20	Other	Measures vertical profiles of the natural airglow radiation from atoms, molecules and ions in the upper atmosphere and ionosphere	Waveband: Resolution: Swath: Accuracy:
SSUSI Special Sensor Ultraviolet Spectrographic Imager	DMSP F-16, 17, 18, 19, 20	Other	Monitors the composition and structure of the upper atmosphere and ionosphere, as well as auroral energetic particle inputs, with spectrographic imaging and photometry	Waveband: Resolution: Swath: Accuracy:
SSZ	DMSP F-13,14,15	Other	Laser threat detector	Waveband: Resolution: Swath: Accuracy:
SUSIM (UARS) Solar Ultraviolet Irradiance Monitor	UARS	Earth radiation budget radiometer	Provides data on UV and charged particle energy inputs, and on time variation of full-disk solar UV spectrum	Waveband: UV: 0.12-0.4µm (0.15nm resn) Resolution: Not applicable Swath: Looks at sun Accuracy: 1%

Instrument	Mission(s)	Type	Measurements /application	Technical characteristics
SU-UMS Stereo Radiometer with High Resolution	SICH-2	High resolution imager		Waveband: Resolution: Swath: Accuracy:
SU-VR Visible Radiometer with High Resolution	SICH-2	High resolution imager		Waveband: Resolution: Swath: Accuracy:
SWIFT Stratospheric Wind Interferometer for Transport studies	GCOM-A1	Atmospheric Chemistry instrument	Measures a mid-infrared thermal emission line of ozone in order to reach the 20-40 km region in the stratosphere and to measure stratospheric winds, as well as ozone	Waveband: Resolution: Swath: Accuracy:
SXI Solar X-ray Imager	GOES-12, N, P	Other	Obtains data on structure of solar corona. Full disk imagery also provides warnings of geomagnetic storms, solar flares, and information on active regions of sun and filaments	Waveband: Resolution: Swath: Accuracy:
TES Tropospheric Emission Spectrometer	EOS Aura	Atmospheric Chemistry instrument	3-D profiles on a global scale of all infra-red active species from surface to lower stratosphere. Measures greenhouse gas concentrations, tropospheric ozone, acid rain precursors, gas exchange leading to stratospheric ozone depletion	Waveband: MWIR-TIR: 3.2-15.4µm Resolution: In limb mode: 2.3km vertical resolution. In down-looking mode: 50km x 5km (global), 5km x 0.5km (local) Swath: Limb mode: global: 50km x 180km, local: 5km x 18km Accuracy: Ozone: 20ppb, Trace gases: 3-500ppb
TIM Total Irradiance Monitor	SORCE	Earth radiation budget radiometer	Measurement of total solar irradiance directly traceable to SI units with an absolute accuracy of 0.03% and relative accuracy of 0.001% per year	Waveband: Resolution: Swath: Looks at the sun every orbit, providing 15 measurements per day Accuracy:
TIR Surface Temperature Imager	VISIR	Imaging multi-spectral radiometer (vis/IR)	Sea surface Temperature	Waveband: 11µm, 12µm Resolution: Swath: Accuracy:
TM Thematic Mapper	Landsat-5	High resolution imager	Measures surface radiance and emittance, land cover state and change (eg vegetation type). Used as multipurpose imagery for land applications	Waveband: VIS-TIR: 7 channels: 0.45-12.50µm Resolution: VIS-SWIR, 30m; TIR: 120m Swath: 185km Accuracy:
TMI TRMM Microwave Imager	TRMM	Imaging multi-spectral radiometer (microwave)	Measures rainfall rates over oceans (less reliable over land), combined rainfall structure and surface rainfall rates with associated latent heating. Used to produce monthly total rainfall maps over oceans	Waveband: Microwave: 10.7, 19.4, 21.3, 37, and 85.5GHz Resolution: Vertical: 2.5km approx Horizontal: 18km Swath: 790km Accuracy: Liquid water: 3mg/cm ³ , Humidity: 3mg/cm ³ , Ocean wind speed: 1.5 m/s
TMR TOPEX Microwave Radiometer	Topex-Poseidon	Imaging multi-spectral radiometer (microwave)	Provides altimeter data to correct for errors caused by water vapour and cloud-cover. Also measures total water vapour and brightness temperature	Waveband: Microwave: 18GHz, 21GHz, 37GHz Resolution: 44.7km at 18GHz, 37.4km at 21GHz, 23.6km at 37GHz Swath: 120 deg cone centred on nadir Accuracy: Total water vapour: 0.2g/sq cm, Brightness temperature: 0.3 K
TOM Total Ozone Mapper	FY-3 A, B, C, D, E, F, G	Atmospheric Chemistry instrument		Waveband: Resolution: Swath: Accuracy:
TOMS Total Ozone Mapping Spectrometer	TOMS EP	Atmospheric Chemistry instrument	Retrieval of ozone column measurements	Waveband: UV: 0.3086, 0.3125, 0.3175, 0.3223, 0.3312 and 0.36µm Resolution: Nadir: 39kmx39km Swath: 3100km Accuracy: 0.1%

Instrument	Mission(s)	Type	Measurements /application	Technical characteristics
TOPEX TOPEX NASA Radar Altimeter	Topex-Poseidon	Radar altimeter	Measurement of global ocean surface topography	Waveband: Microwave: 13.6 GHz and 5.3 GHz Resolution: Swath: 6km Accuracy: 2.3cm
TOPSAT telescope	TOPSAT	High resolution imager	Experimental high-resolution imaging satellite supporting a range of possible land applications	Waveband: Panchromatic VIS: 0.5-0.75µm. 3-band multi-spectral Resolution: 2.5m pan. 5m multi-spectral Swath: 10km Accuracy:
TRASSER	OKEAN-0	Imaging multi-spectral radiometer (vis/IR)		Waveband: Resolution: Swath: Accuracy:
TRSR Turbo-Rogue Space Receiver	Jason-1, 2	Gravity field or geodynamic	Provides precise continuous tracking data of satellite to decimeter accuracy	Waveband: Resolution: Swath: Accuracy:
TSIS Total Solar Irradiance Sensor	NPOESS-3, 6	Earth radiation budget radiometer	0.2- 2 micron solar spectral irradiance monitor	Waveband: UV-SWIR: 0.2-2µm Resolution: Swath: Accuracy:
VEGETATION	SPOT-4, 5	Imaging multi-spectral radiometer (vis/IR)	Data of use for crop forecast and monitoring, vegetation monitoring, and biosphere/geosphere interaction studies	Waveband: Operational mode: VIS: 0.61-0.68µm, NIR: 0.78-0.89µm, SWIR: 1.58-1.75µm, Experimental mode: VIS: 0.43-0.47µm Resolution: 1.15km at nadir - minimal variation for off-nadir viewing Swath: 2200km Accuracy:
VHRR Very High Resolution Radiometer	INSAT-2 E, INSAT-3 A, METSAT	Imaging multi-spectral radiometer (vis/IR)	Cloud cover, rainfall, wind velocity, sea surface temperature, outgoing longwave radiation, reflected solar radiation in spectral band 0.55-0.75µm, emitted radiation in 10.5-12.5µm range	Waveband: VIS: 0.55-0.75µm, NIR: 5.7-7.1µm TIR: 10.5-12.5µm Resolution: 2km in visible, 8km in IR Swath: Full earth disk every 30 minutes Accuracy:
VIIRS Visible/Infrared Imager Radiometer Suite	NPOESS-1,2,3,4,5,6, NPP	Imaging multi-spectral radiometer (vis/IR)	Global observations of land, ocean, and atmosphere parameters: cloud/weather imagery, sea-surface temperature, ocean colour, land surface vegetation indices	Waveband: VIS - TIR: 0.6-12.5µm (22 channels) Resolution: 400m-800m Swath: 30000km Accuracy:
VIRR Multispectral Visible and Infrared Scan Radiometer (10 channels)	FY-3 A, B, C, D, E, F, G	Imaging multi-spectral radiometer (vis/IR)		Waveband: Resolution: Swath: Accuracy:
VIRS Visible Infrared Scanner	TRMM	Imaging multi-spectral radiometer (vis/IR)	Data to be used in conjunction with data from CERES instrument to determine cloud radiation. Will enable 'calibration' of precipitation indices derived from other satellite sources	Waveband: VIS: 0.63µm, SWIR-MWIR: 1.6 and 3.75µm, TIR: 10.8 and 12µm Resolution: 2km at nadir Swath: 720km Accuracy:
VISSR (FY-2) Multispectral Visible and Infrared Scan Radiometer (3 channels)	FY-2 A, B	Imaging multi-spectral radiometer (vis/IR)		Waveband: Resolution: Swath: Accuracy:

Instrument	Mission(s)	Type	Measurements /application	Technical characteristics
VISSR (GMS-5) Visible and Infrared Spin Scan Radiometer (GMS-5)	GMS-5	Imaging multi-spectral radiometer (vis/IR)	Data used for cloud type and motion detection wind. Also measures sea surface temperature and atmospheric water vapour	Waveband: VIS: 0.55-0.9µm, TIR: 6.5-7, 10.5-11.5, 11.5-12.5µm Resolution: Visible: 1.25km, TIR: 5km Swath: Full Earth disk in all channels, every 1 hour Accuracy:
VNIR Imaging Spectrometer	VISIR	High resolution imager	Ocean Color, columnar content of atmospheric aerosol particles bio-geo-chemical fluxes through vegetation, air sea fluxes of energy, hydrological analysis	Waveband: VIS-NIR: 412,4,443,490,510,555,570,665,680,705,765,865,946nm Resolution: Swath: Accuracy:
WALES Water Vapour Lidar Experiment in Space	ESA Future Missions	Lidar	Accurate profiles of water vapour globally and at high vertical resolution, with the horizontal resolution expected for global atmospheric models	Waveband: NIR: 935 nm range Resolution: Typically 100km sampling Swath: 1-2km vertical sampling Accuracy: < 5 % systematic error
WAOSS-B Wide-Angle Optoelectronic Stereo Scanner	BIRD	Imaging multi-spectral radiometer (vis/IR)	Vegetation and Cloud coverage	Waveband: 1 x VIS: 600-670nm 1 x NIR: 840-900nm Resolution: 185m Swath: 533km Accuracy:
WEFAX Weather Facsimile	GOES 8-Q	Other		Waveband: Resolution: Swath: Accuracy:
WFC Wide Field Camera	CALIPSO	Imaging multi-spectral radiometer (vis/IR)	Acquires high spatial resolution imagery for meteorological context	Waveband: VIS: 620 to 670nm Resolution: 125m Swath: 60km Accuracy:
WFI Wide Field Imager	CBERS-1, 2, 3, 4	High resolution imager	Data used for coastal and vegetation monitoring	Waveband: VIS: 0.63-0.69µm, NIR: 0.77-0.89µm Resolution: 258m Swath: 890km Accuracy: 0.3 pixels
WIFS Wide Field Sensor	IRS-1C,D,P3,P4	Imaging multi-spectral radiometer (vis/IR)	Vegetation monitoring, environmental monitoring, drought monitoring, snow melt run-off forecasting, global green cover assessment, agro-climatic regional planning	Waveband: VIS: 0.62-0.68µm NIR: 0.77-0.86µm SWIR: 1.55-1.7µm (IRS P3 only) Resolution: 188m Swath: 810km Accuracy:
WINDII Wind Imaging Interferometer	UARS	Atmospheric Chemistry instrument	Day and night wind measurements between 80km and 300km altitude. Measures atmospheric temperature and concentration of emitting species	Waveband: Visible-NIR:0.55-0.78µm Resolution: Vertical: 2km Horizontal: 25km Swath: 70-310km Accuracy: Wind speed: 10m/s
WTE Whale Tracker Experiment	SAC-C	TBC	Tracking of Eubalean Australis and environmental data collection system	Waveband: Resolution: Swath: Accuracy:
X-Band SAR X-Band Synthetic Aperture Radar	TerraSAR-X	Imaging radar	Provides images for monitoring of land surface and coastal processes and for agricultural, geological and hydrological applications. Instrument modes: Spotlight, Stripmap, ScanSAR	Waveband: Microwave: 9.6 GHz (X-band), 4 polarisation modes: HH, VV, HV, VH (selectable or twin) Resolution: Spotlight: 1,2m x 1-4m Stripmap: 3m x 3-6m ScanSAR: 16m x 16m Swath: Spotlight: 5-10km x 10 km, Stripmap: 30 km, ScanSAR: 100 km Accuracy:
XPS XUV Photometer System	SORCE	Other	Objective is to measure the extreme UV solar irradiance fro 1-35nm	Waveband: Resolution: Swath: Accuracy:
X-ray astronomy payload	IRS-P3	Other	Study of time variability and spectral characteristics of cosmic X-ray sources	Waveband: Resolution: Swath: Accuracy: