

http://www.eohandbook.com/eohb2012/sat_earth_obs_high_res_optical.html

High Resolution Optical Imagers

Description

High resolution optical imagers provide detailed images of the Earth's surface. In general, these are nadir-viewing instruments with a horizontal spatial resolution in the range 10 to 100 m and swath widths of order 100 km. In the past few years, high resolution sensors have emerged with spatial resolution in the range 1 to 5 m. An increasing number of government-funded and private sector-funded sensors with sub 5 m resolution are planned for the coming years.

High resolution imagers are, in general, panchromatic (a single waveband) and multi-spectral (multiple waveband) sensors, with spectral bands in the visible and IR range which are simultaneously recorded. This increases the information content that may be derived from the imagery (including the ability for land cover classification) and allows corrections to be made, for example, for the effects of atmospheric water vapour on the measured surface parameters. In order to reduce atmospheric absorption and to increase image quality, the operating wavelengths of these instruments are selected to coincide with atmospheric windows.

Use of these sensors can be limited by weather conditions, since they are unable to penetrate thick cloud, rain or fog and are typically restricted to fair weather, daytime-only operation. Some have pointing capability which enables imagery of specified areas to be acquired more frequently.

Many countries, including developing countries, have and/or are planning high resolution optical imaging missions. Future trends will include a greater number of sampling channels, as well as improved spectral and spatial resolution. More instruments will also become available that are capable of producing stereo images from data collected on a single orbit, i.e. along track, as opposed to across track, so that stereo images can be acquired from different passes.

Current & planned instruments

AEISS	MSI (Sentinel-2)
AEISS-A	MHMSS (Kanonpus)S
ALI	MSS (Landsat)
ASTER	MSS (Sich)
ATCOR	MSU-200
BGIS 2000	NigeriaSat Medium and High Resolution
Event Imaging Spectrometer from GEO (GeoCape)	PAN (Cartosat-1)
Geoton-L1	PAN (Cartosat-2)
HiRI	PAN (Cartosat-2A/2B)
HISUI	PAN (Cartosat-3/3A)
HRG	PAN (CBERS)
HRS	PAN (FORMOSAT)

HRTC	PAN (GISTDA)
HRVIR	PAN CAM
LISS-III (Resourcesat)	PAN CAMERA
LISS-IV	PAN+MS (RGB+NIR)
MSC	PSS
MSI	TES PAN

Applications

High resolution optical imagers are amongst the most common Earth observation satellite instruments, finding application in, for example:

- agriculture, including definition of crop type and area, crop inventory, yield prediction and crop stress identification
- damage assessment associated with natural hazards;
- geological mapping;
- urban planning, including land cover mapping, topographic mapping and urban development monitoring;
- cartography, including map generation and updating, generation of digital elevation models;
- environmental planning and monitoring.



Pleiades-HiRI image of San Francisco.



Cartosat natural colour image at 2.5 m resolution.

Further Information

ALOS (AVNIR-2 & PRISM): www.jaxa.jp/missions/projects/sat/eos/alos/index_e.html

Cartosat, Resourcesat: www.isro.org/satellites/earthobservationsatellites.aspx

CBERS: <http://www.cbears.inpe.br/ingles/>

Landsat: landsat.usgs.gov

PLEIADES: smc.cnes.fr/PLEIADES/Fr/

Sentinel-2: www.esa.int/esaLP/SEMM4T4KXMF_LPgmes_0.html

SPOT: www.spotimage.fr

TOPSAT: earth.esa.int/web/guest/missions/3rd-party-missions/historical-missions/topsat