

HRPT/AHRPT System



Avda. Filipinas, 46

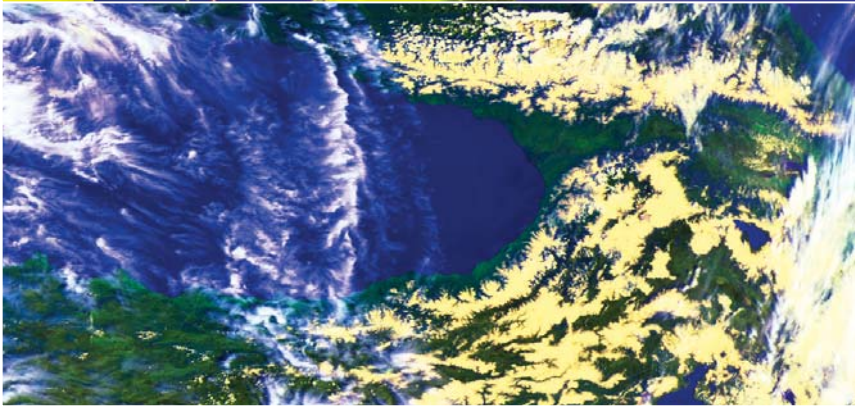
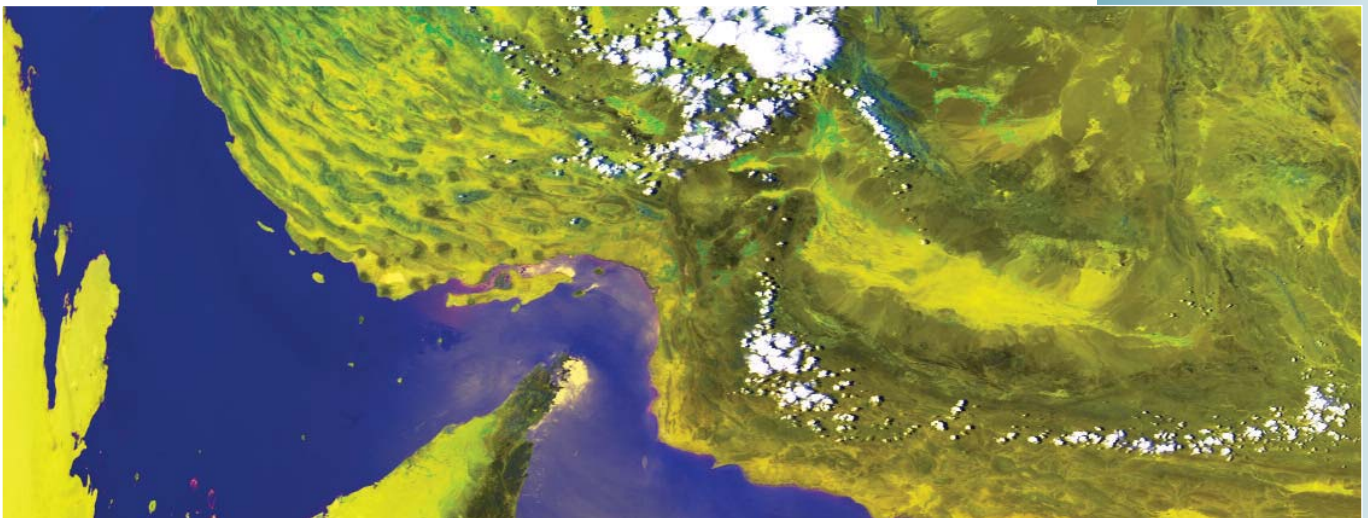
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Reliable, high performance land-based and marine solutions for receiving, archiving, processing and displaying HRPT, AHRPT, DMSP and LRD data from NOAA, Metop, FengYun-3, DMSP and JPSS satellites



▲ NOAA HRPT false-colour images (channels 1, 2 and 4) showing the Persian Gulf and the Black Sea with snow on the mountains to the east appearing light yellow

▲ Dartcom 1.8m land-based antenna

The Dartcom HRPT/AHRPT System receives, archives, processes and displays data from NOAA and Metop satellites, and optionally FengYun-3 (L-Band) and DMSP (S-Band).

A number of land-based antennas are available (1.8m, 1.2m and radome-enclosed 1.5m) or for marine use a radome-enclosed 1.3m antenna with active stabilisation can be specified.

Ingested data can be viewed and processed using the Dartcom iDAP/MacroPro software. Outputs

are also available for popular image processing software packages such as PCI Geomatica, ERDAS IMAGINE and ENVI/IDL, as well as standard interchange formats such as NOAA level 1B, EPS level 0 and GeoTIFF.

Direct broadcast LRIT reception from MSG, GOES, MTSAT and COMS-1 is also possible with optional extra hardware and software.

The hardware itself is LRD ready, requiring only firmware and software updates to support the proposed JPSS L-Band service.





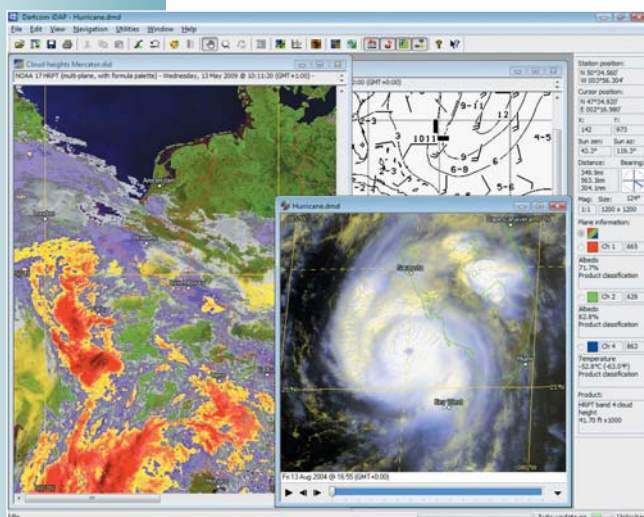
HRPT/AHRPT System Overview



▲ Dartcom HRPT/AHRPT System at the Spanish Institute of Oceanography, with a radome-enclosed 1.5m antenna installed on a roof-mounted platform (circled)



▲ Dartcom HRPT/AHRPT System on the British Antarctic Survey research vessel **RRS James Clark Ross**, with a radome-enclosed 1.3m active-stabilised antenna (circled)



▲ Dartcom iDAP and MacroPro software

Components

- **Antenna** – land-based and marine options available.
- **Modular receiver rack** – containing plug-in modules for easy maintenance and upgrade.
- **Ingest and visualisation PC** – running Dartcom Polar Orbiter Ingestor and Dartcom iDAP/MacroPro software.

Dartcom can also provide on-site installation and training services.

Features

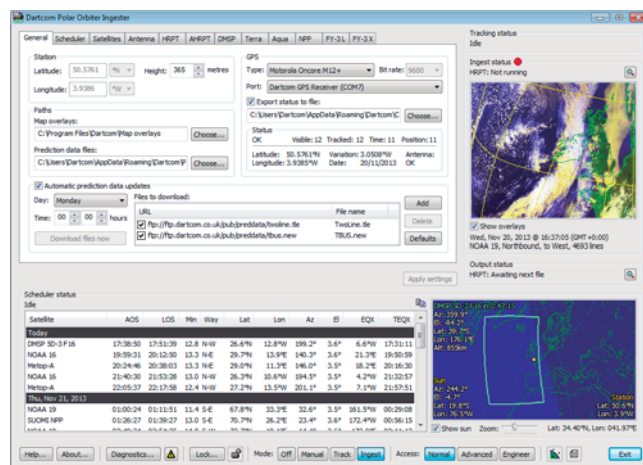
- Automatic reception, archiving and processing of data from NOAA HRPT and Metop AHRPT polar-orbiting satellites.
- Optional USB interface module, additional LRD-100 digital multi-mode receiver and XRIT Ingestor software to also allow reception of MSG, GOES, MTSAT and COMS-1 LRIT data between satellite passes, or continuously with an optional dedicated LRIT antenna.
- Optional LRD-200B receiver to also allow FengYun-3 L-Band reception, plus LRIT between satellite passes, all with one receiver.
- Optional L/S-band feed/LNB to allow S-Band DMSP reception.
- Only requires firmware and software updates to support JPSS LRD.
- Proven, robust, reliable hardware and software, with installations all over the world in all climates, temperatures and environments.
- Modular construction for easy maintenance and future upgrades.
- Comprehensive hardware and software diagnostics at all levels.

Antenna options

The 1.2m, 1.8m and radome-enclosed 1.5m antennas are designed for fixed, land-based ground stations. The 1.3m active-stabilised marine antenna uses a state-of-the-art active stabilisation system to compensate for the pitch, roll and yaw of a moving vessel.

Software

- **Dartcom Polar Orbiter Ingestor** – provides automatic satellite tracking, data ingesting, archiving and output.
- **Dartcom iDAP** – provides a comprehensive range of display, manipulation, processing and printing facilities.
- **Dartcom MacroPro** – automates the powerful processing facilities provided by iDAP.



▲ Dartcom Polar Orbiter Ingestor software

Land-based antennas

All antenna options provide continuous tracking of satellites with no “cone of silence” (data loss at high elevations). A state-of-the-art dual-axis rotator controller with closed-loop feedback gives excellent pointing accuracy and smooth tracking. An RS-232–RS-422 link allows the ingest PC to control the rotator and provide diagnostics.

The reflector is a prime focus aluminium parabolic dish finished in matt white paint (RAL 9010). An integrated feed/downconverter (IFD) is mounted at the focal point in a hermetically sealed unit.

1.2m parabolic dish and rotator

The 1.2m antenna has a 0.38 F/D ratio and 24.4dBi gain to achieve a system G/T of better than 2.6dBK at 1.7GHz and 5° elevation, and a bit error rate of better than 1:10⁶ from 3.5° elevation.

The dish is fixed to the rotator using a counter-weighted aluminium frame assembly. The rotator is a compact unit with a separate housing for the power supply and controller. The dish and rotator assembly is mounted on a galvanised steel pedestal.

1.8m parabolic dish and rotator

The 1.8m antenna has a 0.42 F/D ratio and 27.5dBi gain to achieve a G/T of better than 6.0dBK at 5° elevation, and a bit error rate of better than 1:10⁶ from 1° elevation.

The dish is fixed to the rotator using interface steelwork galvanised to BS729. The rotator is precision engineered using aluminium castings and machined steel for strength. The controller is mounted inside the rotator with a separate remote housing for the power supply. The dish and rotator assembly is mounted on a durable galvanised steel pedestal.

1.5m radome-enclosed parabolic dish and rotator

The 1.5m antenna has a 0.36 F/D ratio and 26.0dBi gain to achieve a system G/T of better than 4.3dBK at 1.7GHz and 5° elevation, and a bit error rate of better than 1:10⁶ from 2° elevation. This antenna allows future upgrade to receive X-Band data from Terra, Aqua, Suomi-NPP and FengYun-3.

The dish is fixed to the rotator using a counter-weighted aluminium frame assembly. The rotator is a compact unit with a separate housing for the power supply and controller. The dish and rotator assembly is mounted on a zinc plated, powder coated steel pedestal and enclosed in a two-part (plus base) composite radome with inspection hatch on the bottom or side.



▲ Dartcom 1.2m parabolic dish and rotator



▼ Dartcom 1.8m parabolic dish and rotator

► Dartcom radome-enclosed 1.5m parabolic dish and rotator



▼ Integrated feed/downconverter specifications

Feed:	
Beamwidth	3dB at 80° 10dB at 150°
Gain	+4.5dBi
Polarisation	Right-hand circular
Input filter:	
Insertion loss	0.3dB maximum
Bandwidth	120MHz maximum
Overall:	
Noise figure	1.2dB typical
Gain	60dB minimum
Converted bandwidth	50MHz typical
Input range	1682–1710MHz
IF output	117–145MHz

▼ Land-based antenna specifications

	1.8m antenna	1.2m antenna	1.5m antenna and radome
Bit error rate	1:10 ⁶ from 1° elevation	1:10 ⁶ from 3.5° elevation	1:10 ⁶ from 2° elevation
Azimuth range	0° to 359.9° (minimum)	0° to 359.9° (minimum)	0° to 359.9° (minimum)
Elevation range	0° to 180.0° (minimum)	0° to 180.0° (minimum)	0° to 180.0° (minimum)
Azimuth rate	12.0°/second (±10%)	10.0°/second (±10%)	48.0°/second (±10%)
Elevation rate	1.0°/second (±10%)	10.0°/second (±10%)	10.0°/second (±10%)
Mechanical tolerance	±0.1° azimuth and elevation	±0.15° azimuth and elevation	±0.15° azimuth and elevation
Tracking accuracy	±0.1°	±0.1°	±0.1°
Survival temperature	–35°C to +63°C	–20°C to +60°C	–20°C to +60°C
Wind speeds	100km/h operational 210km/h survival	85km/h operational 145km/h survival	185km/h operational 185km/h survival



HRPT/AHRPT System Marine antenna



▲ ▼ Dartcom 1.3m active-stabilised marine antenna installed on the NERC research vessel RRS Discovery



▲ Equipment rack and active-stabilised pedestal

1.3m active-stabilised marine antenna

This antenna is designed to track polar-orbiting satellites on moving vessels using a state-of-the-art active-stabilised X-Y pedestal to compensate for pitch, roll and yaw. It has continuous axis movement to eliminate cable wrap problems without slip-rings or rotary joints. Together with the pedestal's high speed and accuracy this ensures no "cone of silence" (data loss at high elevations).

The antenna has a 0.35 F/D ratio and 24.7dBi gain (S-band 27dBiC) to achieve a system G/T of better than 3.4dBK at 1.7GHz and 4.7dB/K at 2.252GHz, both at 5° elevation, and a bit error rate of better than 1:10⁶ from 3.5° elevation.

The reflector is a 1.3m diameter prime focus aluminium parabolic dish finished in light grey paint (RAL 7044). An integrated feed/downconverter (IFD) is mounted at the focal point in a hermetically sealed unit – see the *Land-based antennas* section for specifications.

The dish and pedestal assembly is mounted inside a weather-tight glass fibre radome and base with access hatch.

The antenna control unit (ACU) is located below decks in a 19" equipment rack with the receiver rack, ingest PC, UPS and network switch. The ACU provides fully automatic control of the pedestal using an advanced stabilisation algorithm. Full diagnostics and maintenance facilities are available on a colour TFT screen.

This antenna is ISO9001/CE certified and has been designed to meet or exceed military standard (MIL-STD) specifications.

▼ 1.3m active-stabilised marine antenna specifications

Pedestal:	
Stabilisation	Active, with gyro sensors for pitch, roll and yaw rates
Azimuth range	No limit (continuous)
Elevation range	–10° to 190°
Pitch rate	±15° in 6 seconds
Roll rate	±30° in 8 seconds
Yaw rate	±80° in 50 seconds
Turn rate	10°/second
Total weight	150kg approx
Radome:	
Height	1.68m approx
Diameter	1.52m approx
Environment:	
Operational wind speed	185km/h (100 knots)
Survival wind speed	240km/h (130 knots)
Operating temperature	–30°C to +70°C
Design specifications:	
EMI/RFI	MIL-STD-461
Vibration	MIL-STD-167-1
Shock	MIL-STD-901
Power requirements:	
Voltage	115/230V AC @ 50/60Hz
Power consumption	1000VA typical

Receiver rack HRPT/AHRPT System



Receiver rack

The receiver rack is supplied as standard with a single LRD-100 digital multi-mode receiver to provide reception of NOAA HRPT and Metop AHRPT data.

If continuous LRIT reception is also required, an additional LRD-100 receiver and USB interface module can be fitted, together with a dedicated antenna and XRIT Ingestor software. Alternatively a single LRD-200B digital multi-mode receiver can be supplied to provide HRPT, AHRPT and FengYun-3 L-Band reception, with LRIT reception between satellite passes.

If DMSP reception is required an additional USB interface can be fitted to the receiver rack. However LRIT reception is then not possible unless a separate Dartcom USB LRIT receiver is supplied.

To support the proposed JPSS LRD service the digital multi-mode receivers will require a firmware upgrade, but apart from that the receiver rack is LRD ready.

Features

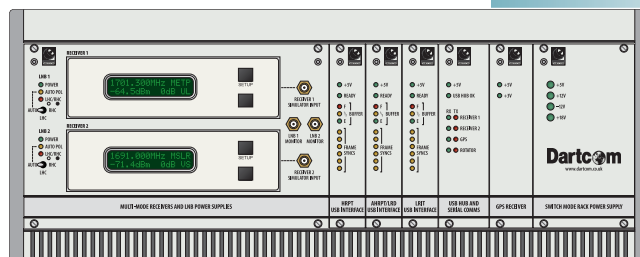
- 19" 4U high Eurocard rack.
- Plug-in modules for easy maintenance and upgrades.
- Desk or rack mount.
- USB connection for data, rack control and GPS receiver.
- RS-232/422/485 connection for rotator control, or optionally via USB if serial ports are not available on the ingest PC.

Modules

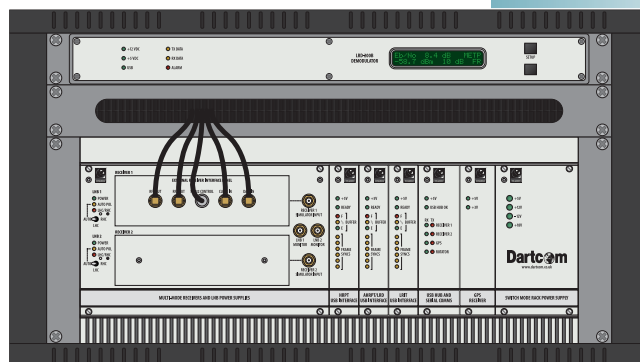
- Multi-mode receivers and LNB power supplies module containing up to two digital multi-mode receivers (one as standard).
- HRPT USB interface module.
- AHRPT/LRD USB interface module.
- Optional DMSP or LRIT USB interface module.
- USB hub and serial communications module containing 7-port USB hub, USB serial adaptors and RS-232/422/485 rotator interface.
- GPS receiver module.
- Switch mode rack power supply module.

▼ Digital multi-mode receiver specifications

	LRD-100	LRD-200B
Signal input range	–90dBm to –20dBm	–90dBm to –20dBm
IF conversion	Direct 70MHz, up to 50Msps, 10-bit resolution	Direct 70MHz, up to 50Msps, 10-bit resolution
IF bandwidth	Programmable	Programmable
Supported symbol rates	0.1–3.5Msps	0.1–3.5Msps
Demodulator modes	BPSK, QPSK, PSK	BPSK, QPSK, PSK, 8PSK, 16QAM
BPSK/QPSK performance	BPSK/QPSK within 1dB of theoretical, 0.5dB typical	BPSK/QPSK within 0.4dB of theoretical, 0.2dB typical
Convolution decoding	Viterbi, rate $\frac{3}{4}$	Viterbi, rates $\frac{1}{2}$ and $\frac{3}{4}$
RF inputs	Simulator or signal, selectable	Simulator or signal, selectable
Outputs	50Ω TTL clock and NRZ data	50Ω TTL clock and NRZ data
Display	LCD, 16-character × 2 line	LCD, 16-character × 2 line
Control interface	RS-232 serial via USB serial adaptor	RS-232 serial via USB serial adaptor



▲ Receiver rack fitted with optional additional LRD-100 digital receiver and LRIT USB interface



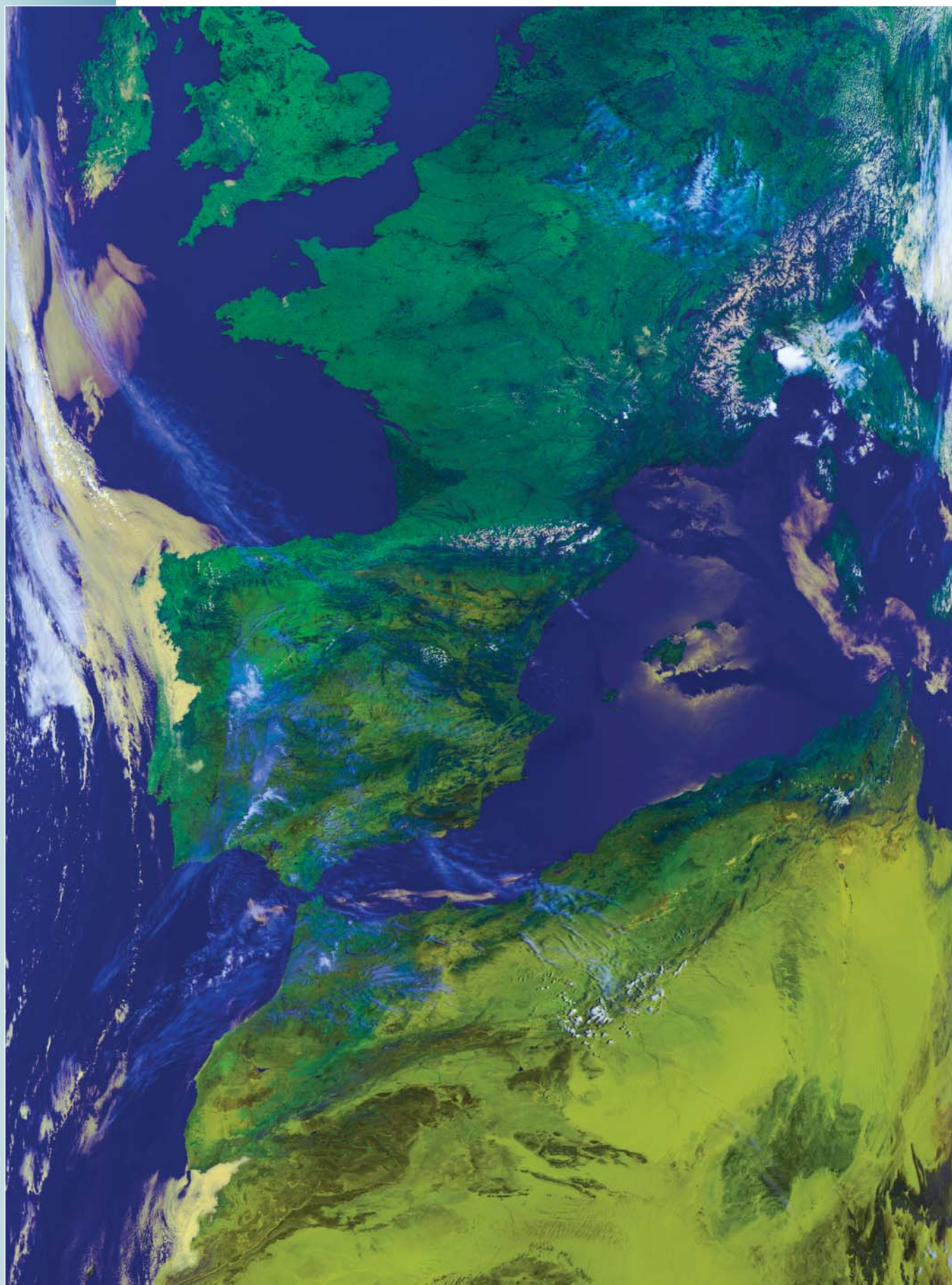
▲ Receiver rack with optional LRD-200B digital receiver and LRIT USB interface

▼ Receiver rack specifications

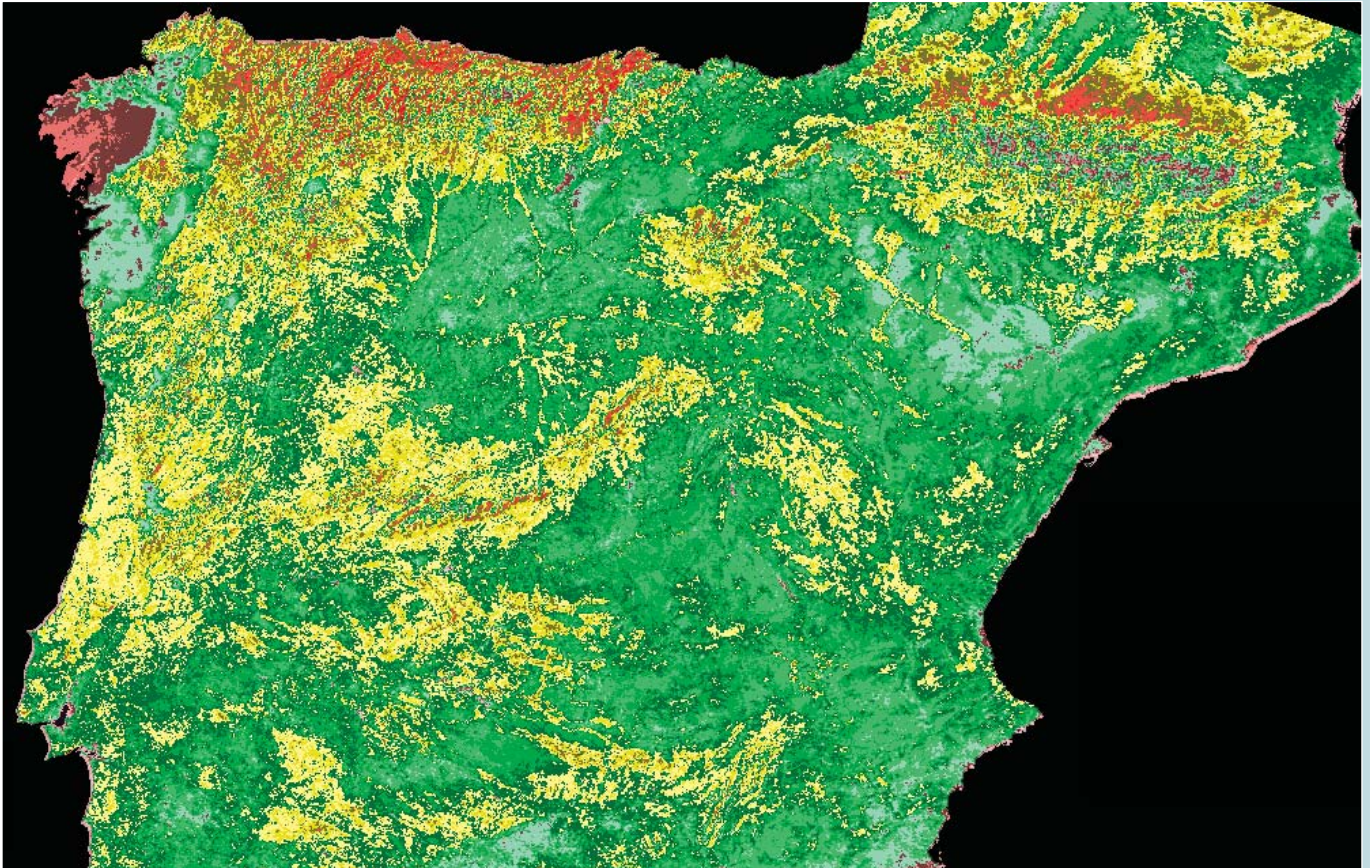
Operating temperature	0 °C to +50 °C
Storage temperature	0 °C to +70 °C
Humidity	30% to 70% non-condensing
EMC emissions	EN61000-6-4:2007 A1
EMC immunity	EN61000-6-2:2005
Electrical safety	LVD 2006/95/EC EN60950-1:2006
Dimensions (W×H×D)	450×180×455mm including connector projections
Weight	14.5kg approx
Power requirements	110–240V AC @ 50–400Hz
Power consumption	60VA
Wild heat	100W



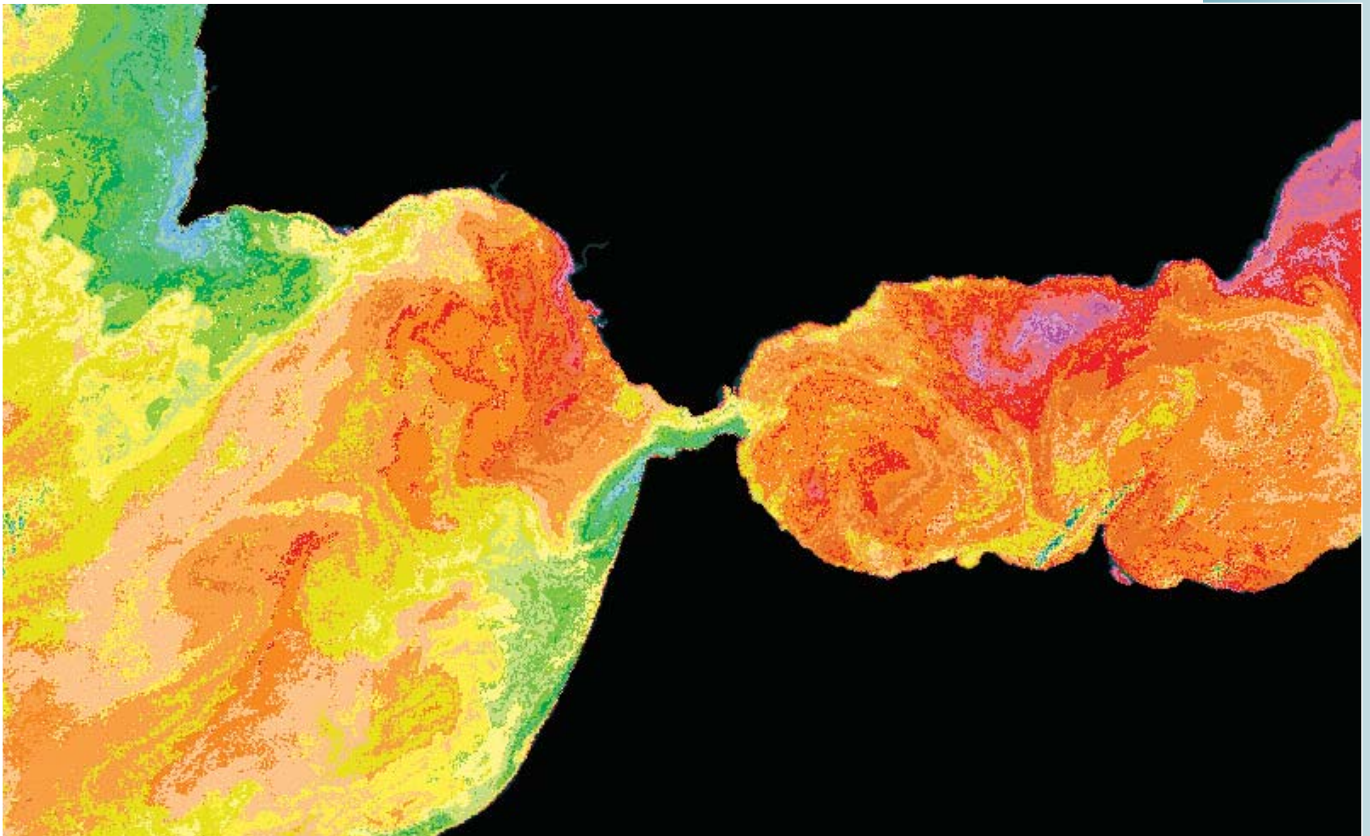
HRPT/AHRPT System Sample images



▲ Metop-A AVHRR false colour composite image (channels 1, 2 and 4) showing Europe and northern Africa



▲ Normalised Difference Vegetation Index (NDVI) product created from a NOAA AVHRR image of Spain and Portugal using the Projection Transformation, Formula Palette and DEM Masking functions of the Dartcom iDAP software



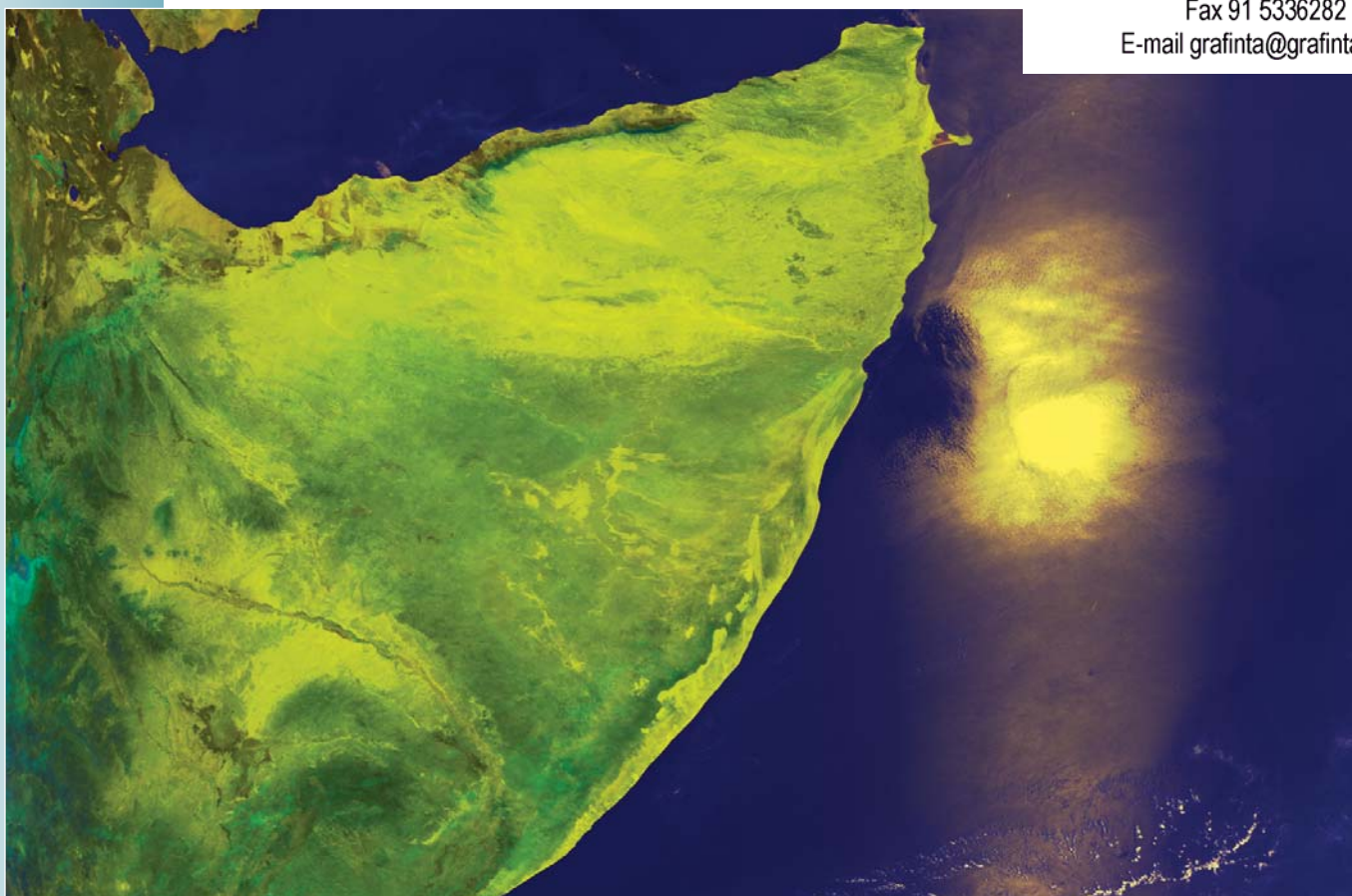
▲ McClain Sea Surface Temperature (MCSST) product created from a NOAA AVHRR image of the Strait of Gibraltar using the Projection Transformation, Formula Palette and DEM Masking functions of the Dartcom iDAP software

HRPT/AHRPT System Sample images

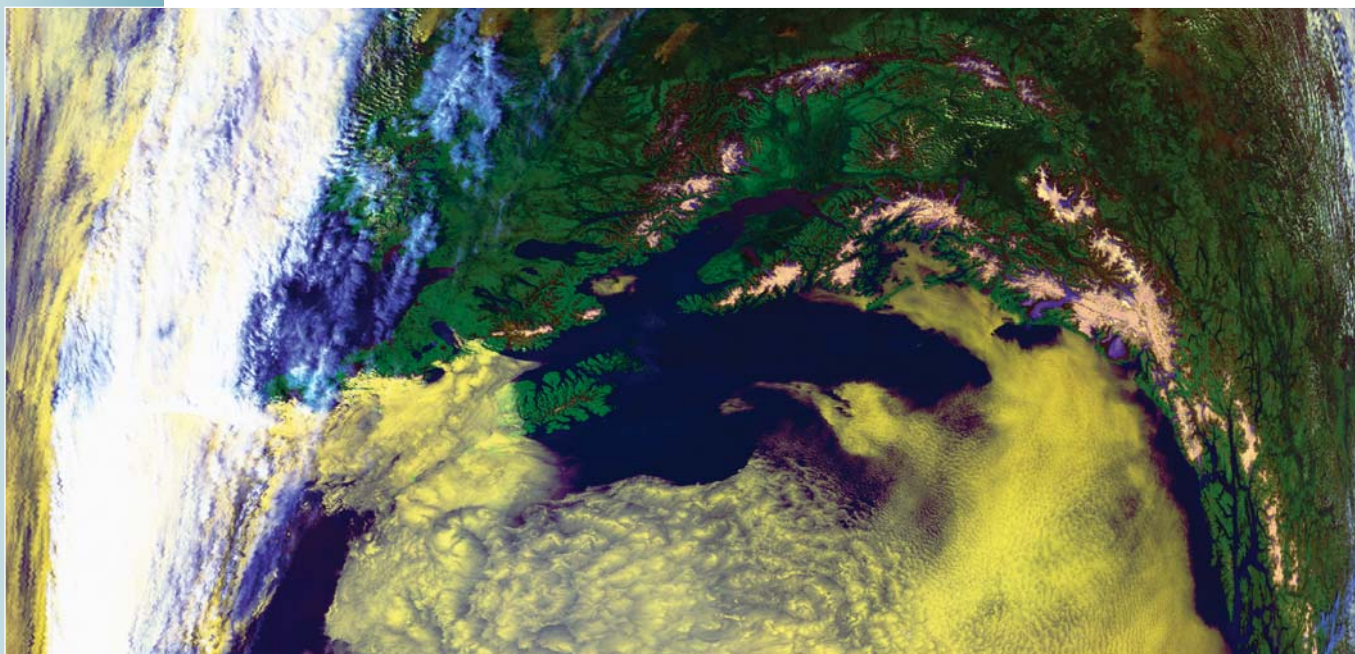


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▲ NOAA AVHRR HRPT false colour composite image showing the Horn of Africa with sun glint on a dust plume



▲ NOAA AVHRR HRPT false colour composite image of Alaska showing low cloud in yellow and snow on the mountain tops

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Correct from 5th August 2014. E&OE.