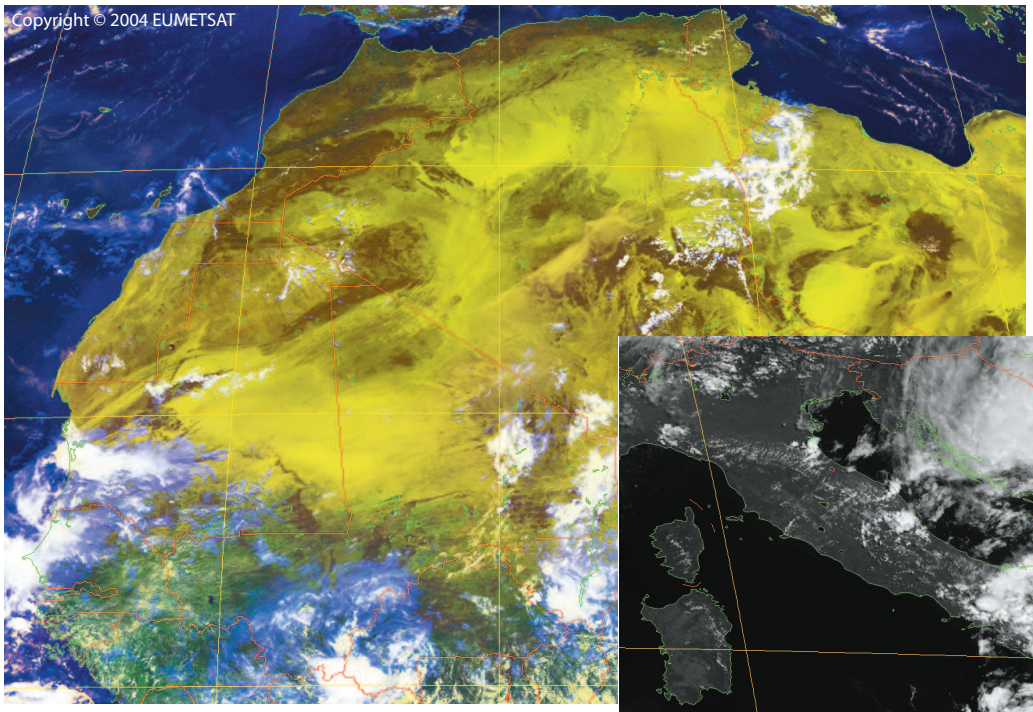
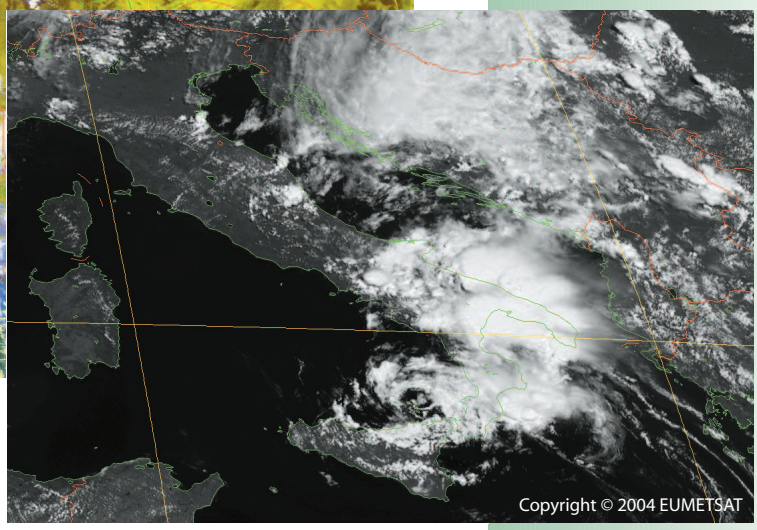
LRIT/HRIT systems

Acquisition, processing and display systems for LRIT and HRIT data from EUMETCast, MSG, GOES and MTSAT



▲ *Section of a multi-plane MSG HRIT image composed of VIS006 (0.6µm), VIS008 (0.8µm) and IR108 (10.8µm) bands showing northern Africa*



► *Section of a single-plane MSG high-resolution visible (HRV) image showing a group of thunderstorms over southern Italy*

The Dartcom LRIT/HRIT systems receive, archive, display and process digital LRIT and HRIT data from EUMETCast*, MSG direct broadcast*, GOES and MTSAT.

LRIT and HRIT data is an important source of information for nowcasting, numerical weather prediction, climate monitoring and research. The latest MSG HRIT imagery is available every 15 minutes – twice the frequency of the previous generation WEFAX and HRI systems. Coupled with the high quality and wide range of data available, this allows major improvements in the forecasting of severe weather.

The types of data available include:

- High-resolution digital images with up to 12 spectral bands and up to 1km spatial resolution.
- Products such as atmospheric motion vectors, cloud analysis, cloud height, global instability index, total ozone and tropospheric humidity.
- MDD, DCP, DCS, EMWIN and GTS messages.
- Rebroadcast foreign satellite images.

Dartcom offers systems for EUMETCast (Ku-band and C-band) and MSG direct broadcast, GOES and MTSAT (L-band) comprising:

- Dish antenna and LNB/downconverter.
- DVB receiver for EUMETCast, or new USB LRIT receiver or combined LRIT/HRIT receiver rack for MSG direct broadcast, GOES and MTSAT.
- **Dartcom XRIT Ingester** software to automatically acquire, decrypt, decompress, archive and output LRIT and HRIT data in real time.
- **Dartcom MacroPro** automatic processing software to automatically enhance, mask, print, animate, reproject and create products from ingested LRIT and HRIT data.
- **Dartcom iDAP** display and processing software offering facilities such as image enhancement, product creation, projection transformation, land and sea masking, printing and exporting.

For a complete, turnkey solution Dartcom can also supply the computer hardware and provide installation services and training courses.

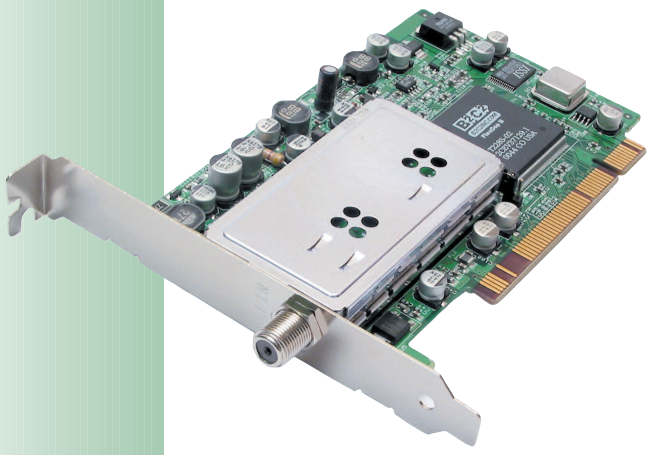
* Reception of data from EUMETCast and MSG direct broadcast requires the purchase of an annual licence from EUMETSAT – see *http://www.eumetsat.int*

DARTCOM

LRIT/HRIT systems EUMETCast hardware



▲ *85cm Ku-band dish antenna and LNB range*



▲ *TechniSat SkyStar 2 DVB receiver PCI card*



▲ *TechniSat SkyStar 2 DVB receiver USB unit*

Ku-band hardware

Required for Ku-band EUMETCast LRIT/HRIT reception. See the *Service availability and requirements* section for the areas covered.

85cm, 1.2m or 1.8m offset dish and LNB

- High-quality powder-coated aluminium (85cm, 1.2m) or glass-fibre reinforced compression moulded polyester (1.8m) reflector.
- Supplied with azimuth/elevation mounting bracket (85cm, 1.2m), 50m of CT100 75Ω co-axial cable and F-type connectors.
- 1.8m dish requires 4" tubular pedestal (can be supplied).
- State-of-the-art weatherproof LNB with a noise figure of 0.3dB.

DVB receiver and software

- TechniSat SkyStar 2 DVB receiver (recommended by EUMETSAT) available as an internal PCI card or external USB unit.
- Supplied with drivers and T-Systems Business TV-IP software.

Dish size	Dark grey	Beige	Green	Red	Smiley yellow	Light grey
85cm	✔	✔	✔	✔	✔	
1.2m	✔	✔		✔		
1.8m						✔

▲ *Colour availabilities for Ku-band dish antennas*

Feed type	Scalar horn
Polarisation	Linear
RF input	10.7GHz to 12.75GHz
Noise figure	0.3dB typical
Total gain	50dB to 60dB
LO frequency	Low: 9.75GHz High: 10.6GHz
RF output	950MHz to 2150MHz

▲ *Specifications of Ku-band LNB*

RF input frequency	950MHz to 2150MHz
RF input connector	75Ω F-type
Symbol rates	2Msps to 45Msps
Data rates	Up to 90Mbps

▲ *Specifications of TechniSat SkyStar 2 PCI card and USB unit*

	85cm	1.2m	1.8m
Reflector type	21˚ offset	21.3˚ offset	Offset
Reflective material	Solid aluminium, powder coated	Solid aluminium, powder coated	Glass-fibre reinforced polyester
Diameter	0.85m	1.2m	1.8m
F/D ratio	0.67	0.66	0.66
Gain	38.2dBi	41.3dBi	45.5dBi
Polarisation	Linear	Linear	Linear
G/T @ 5˚ elevation	17.2dB/K	19.2dB/K	26dB/K
Operational wind speed	80km/h	80km/h	72km/h
Survival wind speed	120km/h	120km/h	201km/h

▲ *Specifications of Ku-band dish antennas*

C-band hardware

Required for C-band EUMETCast LRIT/HRIT reception. See the *Service availability and requirements* section for the areas covered.

2.4m, 3.0m or 3.7m parabolic dish and LNB

- Three-segment (2.4m) or eight-segment (3.0m, 3.7m) glass-fibre reinforced precision compression moulded polyester reflector.
- Supplied with galvanised steel azimuth/elevation mount and pedestal, and 50m of CT100 75Ω co-axial cable.
- Phase locked loop LNB in weatherproof powder-coated housing.

DVB receiver and software

- V@Box Satellite Express 2030 PCI+ internal DVB receiver card (recommended by EUMETSAT).
- Supplied with drivers and data acquisition software.



▲ *3.0m/3.7m C-band dish antenna and LNB*

Feed type	Scalar horn
Polarisation	Circular
RF input	3.4GHz to 4.2GHz
Noise figure	0.35dB typical
Total gain	>60dB
RF output	950MHz to 1750MHz

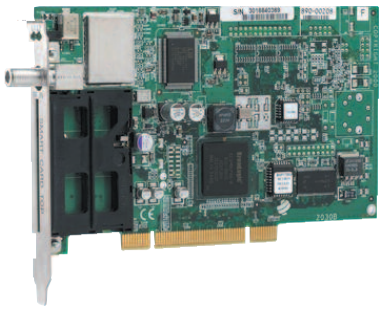
▲ *Specifications of C-band LNB*



▲ *2.4m C-band dish antenna and LNB*

RF input frequency	950MHz to 2150MHz
RF input connector	75Ω F-type
Symbol rates	1.5Msps to 45Msps
Data rates	Up to 60Mbps

▲ *Specifications of V@Box Satellite Express 2030 PCI+ DVB receiver*



► *C-band LNB*

◄ *V@Box Satellite Express 2030 PCI+ DVB receiver*



	2.4m	**3.0m**	**3.7m**
Reflector type	Prime focus parabolic	Prime focus parabolic	Prime focus parabolic
Reflective material	3-segment glass-fibre reinforced polyester	8-segment glass-fibre reinforced polyester	8-segment glass-fibre reinforced polyester
Diameter	2.4m	3.0m	3.7m
F/D ratio	0.37	0.30	0.37
Gain	37.5dBi	40.0dBi	40.9dBi
Polarisation	Circular	Circular	Circular
G/T @ 5˚ elevation	17.7dB/K	19.8dB/K	21.7dB/K
Operational wind speed	80km/h	72km/h	72km/h
Survival wind speed	201km/h	201km/h	201km/h

▲ *Specifications of C-band dish antennas*

LRIT/HRIT systems MSG, GOES and MTSAT hardware



▲ *3.0m/3.7m L-band dish antenna and LNB*



▲ *1.2m/1.8m/2.4m L-band dish antenna and LNB*



L-band hardware

Required for L-band MSG LRIT/HRIT, GOES LRIT and MTSAT LRIT/HRIT reception. See the *Service availability and requirements* section for the areas covered by each service.

1.2m, 1.8m, 2.4m, 3.0m or 3.7m parabolic dish

- Solid powder-coated aluminium (1.2m, 1.8m) or glass-fibre reinforced precision compression moulded polyester reflector with three segments (2.4m) or eight segments (3.0m, 3.7m).
- Supplied with galvanised steel azimuth/elevation mount and pedestal, and up to 100m of RG213 50Ω co-axial cable.

Feed, LNA and downconverter

- Feed horn (1.2m, 1.8m) or scalar feed horn (2.4m, 3.0m, 3.7m) with N-type output to downconverter.
- LNA/downconverter designed for harsh radio environments with pre-select filter to reduce cellular phone and radar interference.
- Low noise figure of 1.2dB (92K) typical.
- Weatherproof O-ring sealed machined case and connectors.

Feed type	Horn (1.2m/1.8m dishes) Scalar horn (2.4m/3.0m/3.7m dishes)
Polarisation	Linear
RF input	1691MHz ±25MHz
LNA noise figure	1.2dB typical
Pre-LNA filter	3-pole, –3dB ±60MHz
Total gain	>50dB
LO frequency	1553.5MHz
RF output	137.5MHz ±25MHz

▲ *Specifications of L-band feed and LNA/downconverter*

► *L-band scalar feed (2.4m/3.0m/3.7m dishes)*

◄ *L-band LNA and downconverter*



	1.2m	1.8m	2.4m	3.0m	3.7m
Reflector type	Prime focus parabolic	Prime focus parabolic	Prime focus parabolic	Prime focus parabolic	Prime focus parabolic
Reflective material	Solid aluminium, powder coated	Solid aluminium, powder coated	3-segment glass-fibre reinforced polyester	8-segment glass-fibre reinforced polyester	8-segment glass-fibre reinforced polyester
Diameter	1.2m	1.8m	2.4m	3.0m	3.7m
F/D ratio	0.38	0.42	0.37	0.30	0.37
Gain	24dBi	27.5dBi	30.3dBi	32.2dBi	34.1dBi
Polarisation	Linear	Linear	Linear	Linear	Linear
G/T @ 5˚ elevation	2.2dB/K	6dB/K	9.6dB/K	11.7dB/K	13.5dB/K
Operational wind speed	112km/h	112km/h	80km/h	72km/h	72km/h
Survival wind speed	201km/h	201km/h	201km/h	201km/h	201km/h

▲ *Specifications of L-band dish antennas*

USB LRIT receiver

- High-quality, low-cost receiver for LRIT transmissions from MSG direct broadcast, GOES and MTSAT.
- Housed in a sleek, compact, durable extruded aluminium case with styled ABS bezels.
- USB interface for fast, reliable data transfer to the host computer.
- Fully software controlled, with detailed status reports available.
- Built-in time-stamped fault logging.
- 20-LED real-time signal level display for easy dish alignment and operational signal monitoring.
- Status LEDs for LNB power, signal lock, USB ready, control communications, data buffer status and frame synchronisation.
- Available with 70MHz or 137.5MHz fixed frequency RF input, or 950–1450MHz tuneable RF input.
- Adjustable RF attenuator to accommodate LNB signal inputs between –15dBm and –75dBm.
- Supports QPSK and BPSK demodulation.
- Built-in hardware Viterbi decoding.
- Supplies power to the LNB via the RF input.
- Powered by an external switch mode PSU (supplied).
- DC–DC converter PSU also available for battery or portable operation (input 10.6–15V DC).
- Can be supplied without a dish antenna or LNB for upgrading WEFAX systems if existing components are suitable. Please contact us to discuss this.



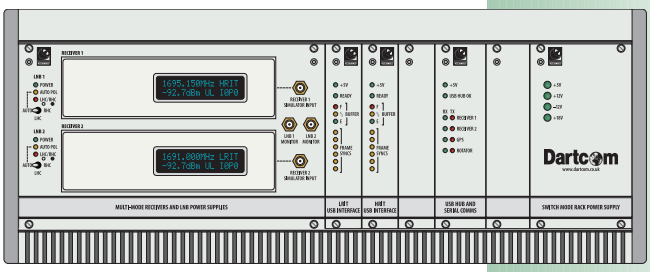
▲ *Dartcom USB LRIT receiver*

RF input frequency	70MHz or 137.5MHz fixed, or 950MHz to 1450MHz tuneable
RF input connector	Fixed: 50Ω BNC Tuneable: 75Ω F-type
RF input level	–15dBm to –75dBm
Symbol rates	64kSPS to 300kSPS
Viterbi decoding	½, K=7, G1=171, G2=133
Demodulator modes	QPSK, BPSK
Data encodings	NRZ-S, NRZ-M, NRZ-L
Digital interface	USB port
Power requirements	15V DC @ 2A
LNB power	14–15V DC nominal @ 0.75A via RF input
PSU	External switch mode, input 100–240V AC 47–63Hz @ 1.2A, output 15V DC @ 3.4A
Dimensions (W×H×D)	175×60×240mm
Weight	1.7kg (including PSU)

▲ *Specifications of Dartcom USB LRIT receiver*

USB LRIT/HRIT receiver rack

- High quality, high performance, professional grade receiver for LRIT and HRIT transmissions from MSG direct broadcast, GOES and MTSAT.
- Available in LRIT, HRIT or combined LRIT/HRIT configurations.
- Rugged 4U-high 19" rack.
- Plug-in modules for ease of maintenance and to allow for future upgrades.
- USB interface for fast, reliable data transfer to the host computer.
- Fully software controlled, with detailed status reports available.
- Comprehensive LED and character matrix status displays and diagnostic points on the front panel.
- Supplied with up to two state-of-the-art multi-mode DSP receiver modules and USB interface modules.
- Each receiver module supplies power to the LNB via its RF input.
- Supports QPSK, BPSK and PSK demodulation.
- Built-in hardware Viterbi decoding.
- Rack or desk mount versions available.
- Powered by 100–240V AC mains, 50–400Hz.
- Upgradable to support HRPT or AHRPT/LRD by purchasing additional plug-in modules together with a tracking antenna system and associated ingest software.

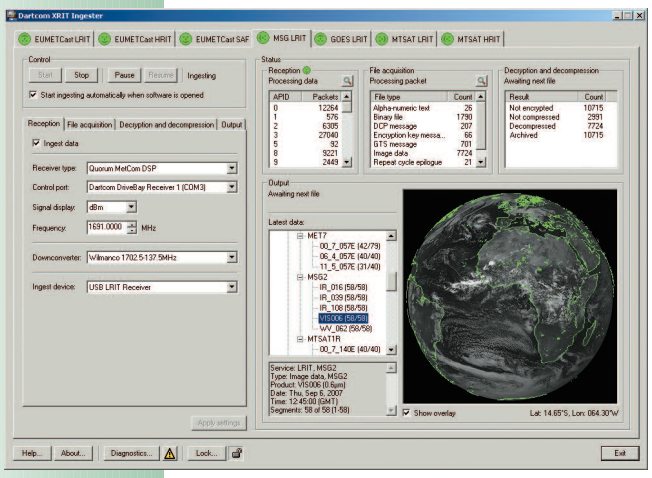


▲ *Dartcom USB LRIT/HRIT receiver rack*

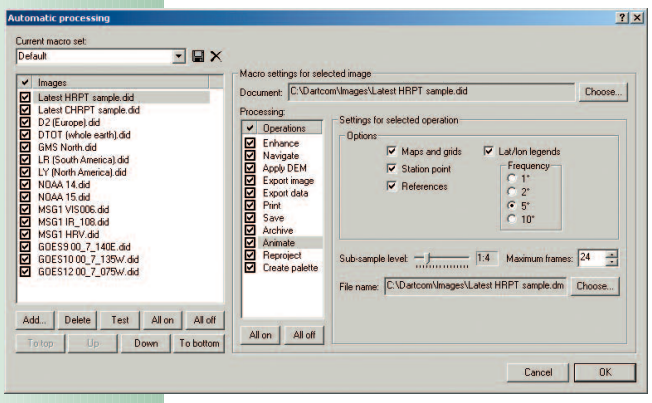
RF input frequency	126MHz to 154MHz
RF input connector	50Ω N-type
IF conversion	Direct, 70MHz, 50MSPS, 10-bit
Frequency resolution	25kHz
Symbol rates	0.1MSPS to 3.5MSPS
Viterbi decoding	½, K=7, G1=171, G2=133, 5.2dB coding gain at 10^{-5} BER
Demodulator modes	QPSK, BPSK, PSK
Data encodings	NRZ, NRZ-S, NRZ-M, Biphase-L
Performance	QPSK/BPSK within 1dB of theoretical, 0.5dB typical
Digital interface	USB port
Power requirements	100–240V AC 50–400Hz

▲ *Specifications of Dartcom USB LRIT/HRIT receiver rack*

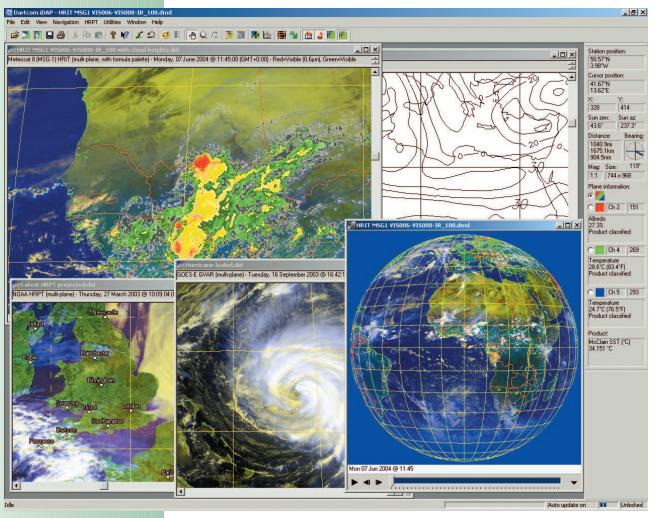
LRIT/HRIT systems software features



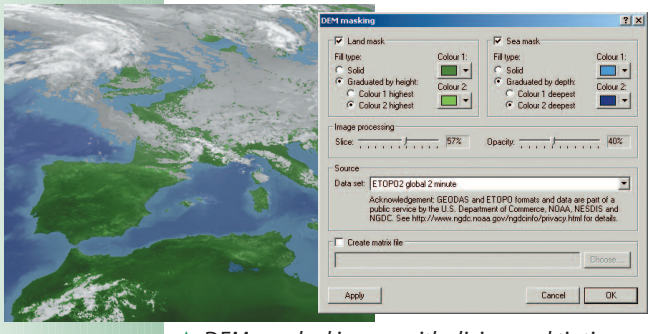
▲ *Dartcom XRIT Ingester software*



▲ *Dartcom MacroPro configuration window*



▲ *Dartcom iDAP display and processing software*



▲ *DEM-masked image with slicing and tinting*

XRIT Ingester software

- Handling of all LRIT and HRIT data from EUMETCast, MSG direct broadcast, GOES and MTSAT.
- Fully automatic operation with no user intervention required.
- Multi-threaded, layered architecture allowing simultaneous ingest from different services and scaling to multiple processors.
- Designed to meet CGMS and EUMETSAT specifications.
- Automatic data acquisition, decryption, decompression and output, with rolling archiving at each stage if required.
- Output of image data as single plane or multi-plane iDAP images (navigated and calibrated†, and with vector map overlays) for automatic processing in MacroPro and display and processing in iDAP, with area selection, sub-sampling and rolling archiving.
- Activity logging and disk space monitoring with on-screen alarms plus e-mail alarms‡ for remote monitoring.

MacroPro automatic processing software

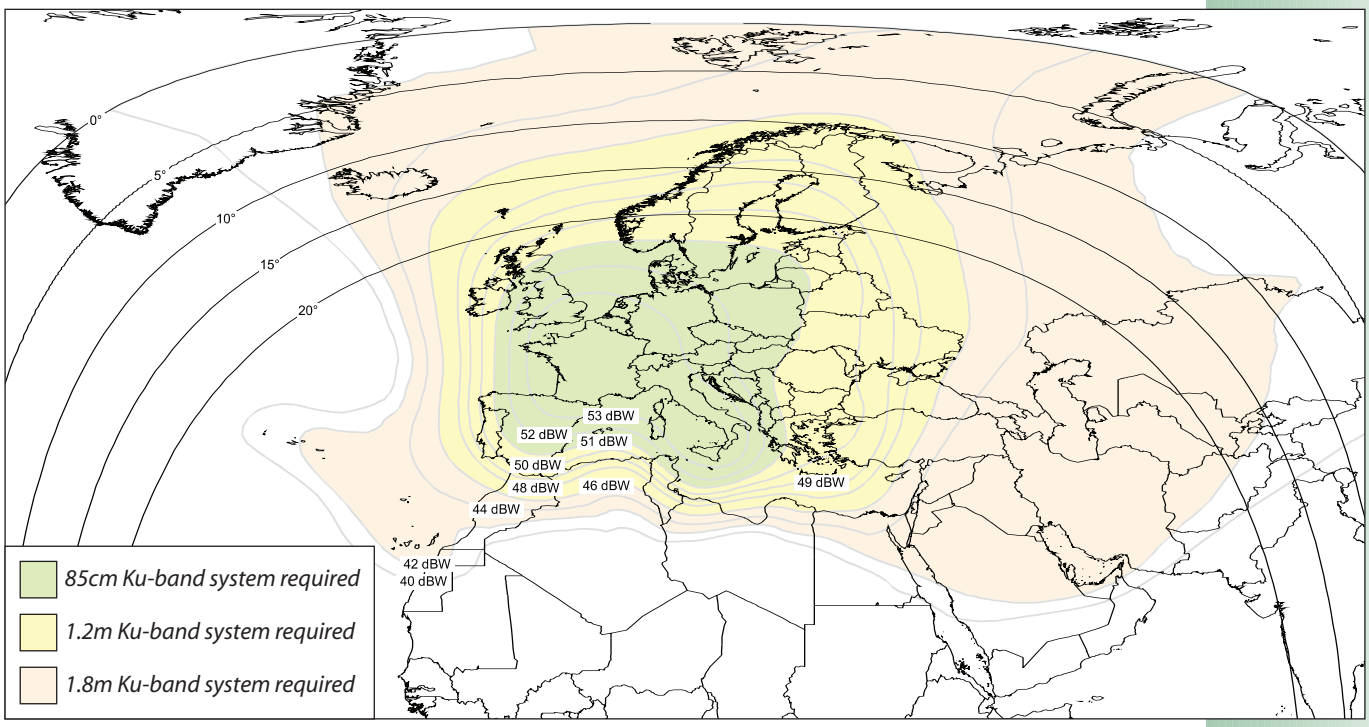
- Automates the powerful processing facilities provided by iDAP.
- Allows processing to be performed on images automatically each time new data is received by the XRIT Ingester software.
- Automatic enhancement, navigation, DEM masking, exporting, printing, archiving, reprojection and product creation.
- Automatic animation with sub-sampling, adjustable maximum frames and overlaying of maps and grids if required.
- Macros can be grouped into sets for different jobs.

iDAP display and processing software

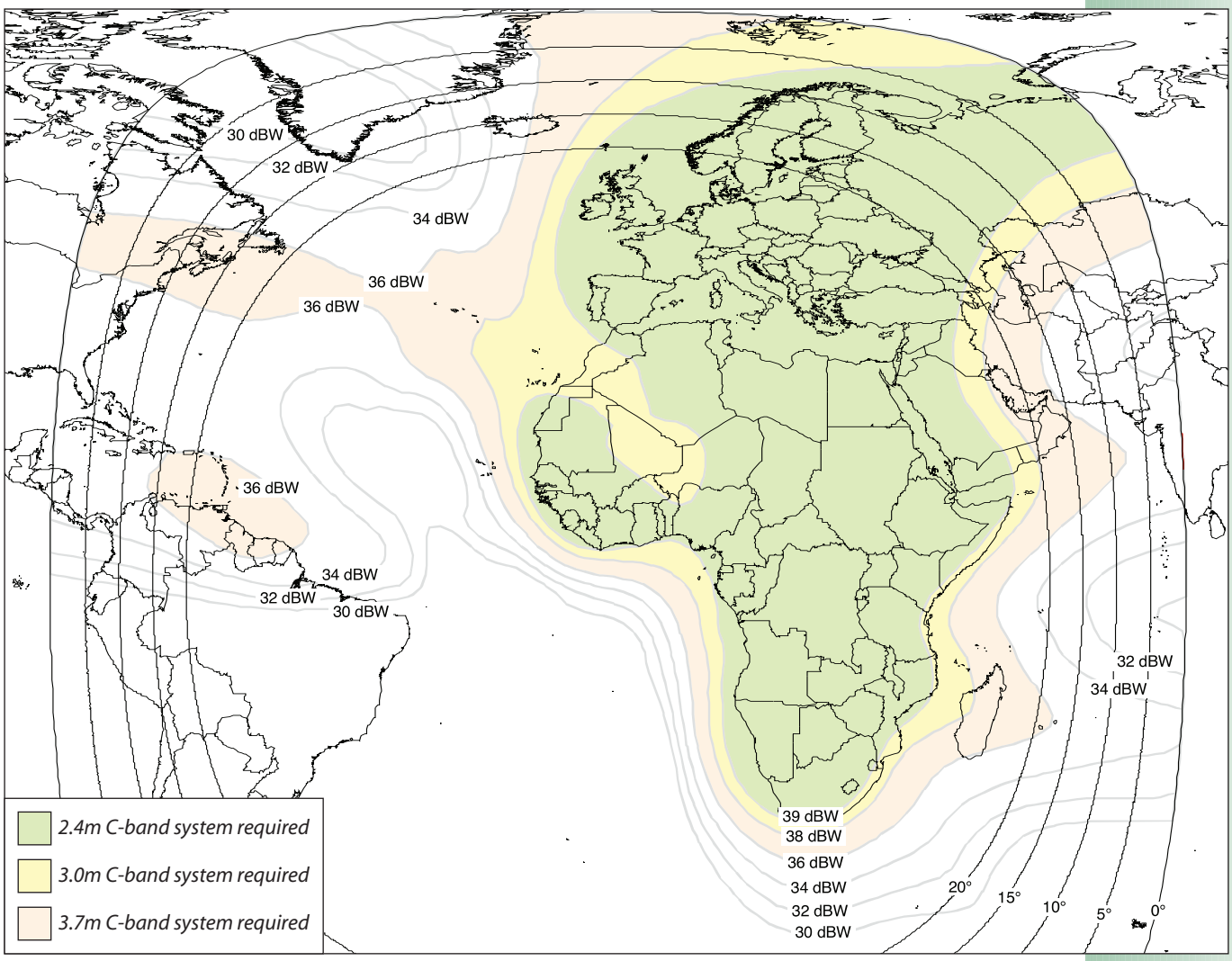
- Includes a wide range of professional-quality facilities for displaying, processing, printing and exporting images.
- Multiple Document Interface with dockable tool bar, status bar, dockable read-outs panel and context-sensitive on-line help.
- Comprehensive image enhancement facilities.
- Creation of formula-based products (such as sea surface temperature and cloud height).
- Cartographic reprojection with masking, slicing to extract clouds and mosaic creation.
- DEM land and sea masking with slicing to extract clouds and variable opacity to allow colour tinting.
- Multiple animation windows using QuickTime to provide high-quality playback with adjustable speed, looping, resizing, selection of range of frames to play and removal of unwanted frames.
- Printing and exporting of user-defined areas of images, with map overlays, labelled grid lines and reference points if required.
- Exporting of data (pixel, raw and calibrated values†, latitudes, longitudes, solar and nadir angles, and formula values) from user-defined areas of images in textual or binary formats.
- Automatic updating of open document windows with latest data received by the XRIT Ingester software or produced by MacroPro.
- Up to 500 user-defined reference points displayed on images.

† Calibrated where possible. Some data is lossy JPEG compressed and cannot be calibrated.
‡ Access to SMTP server required.

LRIT/HRIT systems service availability and requirements

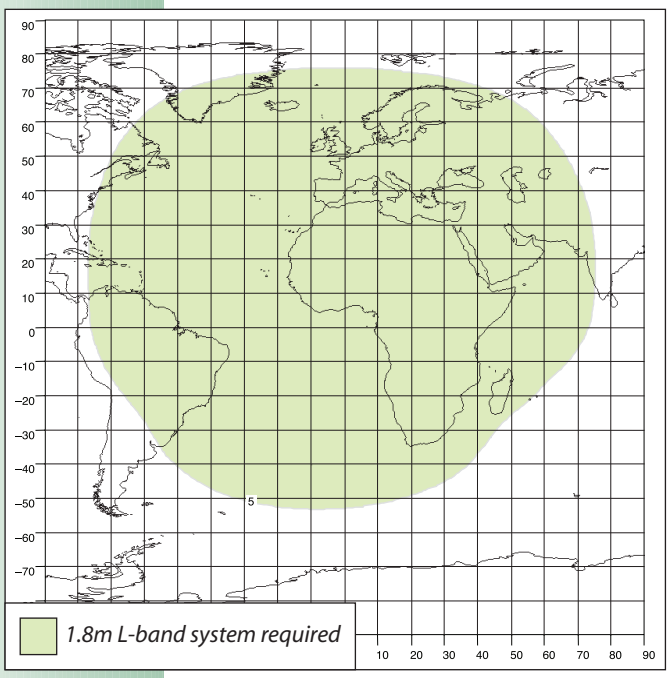


▲ *EUMETCast Ku-band service availability and hardware requirements*

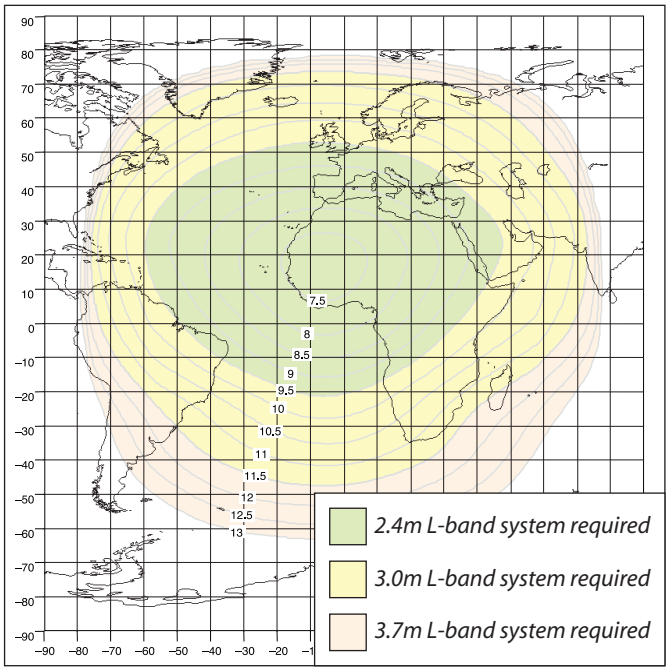


▲ *EUMETCast C-band service availability and hardware requirements*

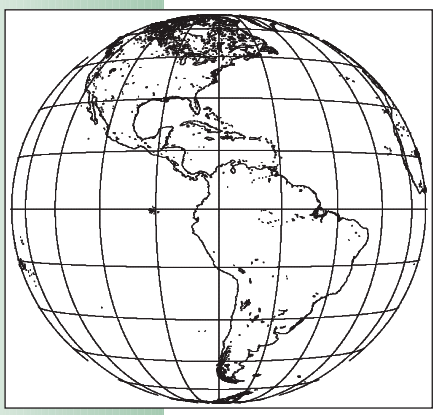
LRIT/HRIT systems service availability and requirements



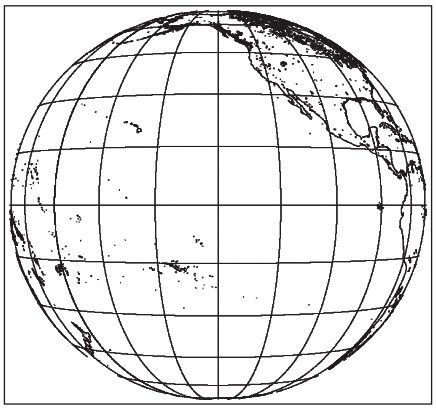
▲ *MSG LRIT L-band direct broadcast service availability and hardware requirements*



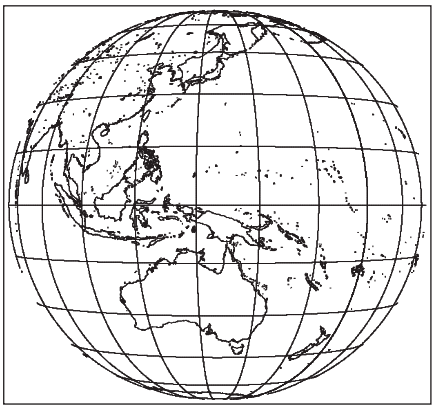
▲ *MSG HRIT L-band direct broadcast service availability and hardware requirements* ***(service not planned to be offered by EUMETSAT at the time of writing)***



▲ *GOES 12 LRIT L-band coverage area, centred on 75˚W – 1.2m L-band system required*



▲ *GOES 10 LRIT L-band coverage area, centred on 135˚W – 1.2m L-band system required*



▲ *MTSAT LRIT and HRIT L-band coverage area, centred on 140˚E – 1.2m L-band system required for LRIT, 3.0m/3.7m L-band system required for HRIT*

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