

Northwest Atlantic



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Availability of Remote-sensing Data for the
Northwest Atlantic

by

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In looking at remote-sensing data available for the Northwest Atlantic, one can consider both satellite and aircraft systems. However, the very high cost and limited coverage of the latter has limited their deployment to meet specific operational needs such as ice reconnaissance, pollution detection, high resolution imagery, etc.

Remote sensing from space began with the deployment in the 1960's of meteorological satellites with low resolution optical sensors. Since then, there has been significant improvement in radiometric and geometric resolution, both for optical and microwave imaging systems. However, most of the systems deployed to date have been oriented towards meteorological and land applications. The primary operational systems are NOAA's polar-orbiting and the GOES geostationary satellites. The Advanced Very High Resolution Radiometer (AVHRR) has four channels (two visible and two infrared) which has been used for extensive oceanographic applications in the production of sea-surface temperature charts, ocean frontal analysis, ocean current analysis, and ice charts. The GOES satellite provides frequent synoptic pictures of the eastern half of North America and the Atlantic Ocean for weather forecasting purposes. Limited application of the GOES thermal infrared system for ocean temperature monitoring is developing, but the high latitudes of North America are seen only at very oblique angle. Generally the polar-orbiting satellites are preferred for imaging the northern latitudes.

The greatest activity has been in the USA experimental satellite programs. The NASA programs include the LANDSAT series from 1972 to the present, the NIMBUS series from 1970 to the present, and the SEASAT I launched in 1978 with a very short life span. The main sensors on board the LANDSAT-3 and NIMBUS-7 satellites are optical imaging sensors. The polar-orbiting LANDSAT Multispectral Scanner provides four channel line scanning resolutions in the visible range (500-1100 nm). Data are framed into scenes of 185 x 185 km with a resolution of 80 meters. LANDSAT is the highest resolution system, but it is designed mainly for land applications. The currently operational polar-orbiting NIMBUS-7 satellite has a six-channel Coastal Zone Color Scanner (CZCS) for measuring ocean sediment and chlorophyll concentrations in the sea-surface observable at a resolution of 800 meters. All six channels are registered for the most complete optical sensor available. In the North Atlantic, oceanographic utility of the optical sensors of satellites is limited by extensive cloud cover. Several satellite passes over several days are required to provide cloud-free observations of the Atlantic Ocean. The mosaicing of a time series of satellite observations obscures many details of surface ocean color variability and currents. However, the combination of data from ships and buoys with satellite data enables the weekly production and distribution of several oceanographic products for the North Atlantic region.

Future satellite systems are being designed to provide all-weather data acquisition by deploying microwave sensors, such as the Synthetic Aperture Radar, Scatterometer, and Scanning Microwave Radiometer. The SEASAT satellite launched by NASA in 1978 was a proof-of-concept test of the microwave sensors, but, unfortunately, it failed after only three months of operation, thus providing only a limited set of experimental data for analysis. The value of all-weather sensing from satellites was demonstrated and has led to definition of at least two satellite systems (ERS-1 and RADARSAT) for future deployment. The microwave sensors will provide synoptic observations of oceans, winds and waves, as well as high resolution images of ice.

Remote-sensing instruments for measuring oceanic parameters continue to be developed at the same rate as *in situ* measuring systems, resulting in an increasing amount of data to be processed. The user communities, such

as NAFO, can help in the development of the appropriate data-processing technology by defining data product requirements. In general, remote sensing has added a new dimension of information, which is potentially useful to NAFO fishery science studies. However, the high volume of accumulated data has saturated the ground-based data-handling facilities, thus resulting in many inadequacies in data distribution.

A list of suppliers, which can provide data products relevant to the NAFO region is given in Table 1. A summary of currently available products is given in Table 2. Lists of current and future satellite systems are given in Tables 3 and 4. Detailed lists of products available from the suppliers are given in Apendies, I, II, III and IV.

Suggested Literature

- | | |
|--|---|
| GOODY, R. <i>et al.</i> | OCEANUS (ISSN 0029-8182) Woods Hole Oceanographic Institution Woods Hole, Mass., USA 02543 |
| GOWER, J. F. R. | Passive Radiometry of the Ocean Proceedings of the 6th IUCRM Colloquium Patricia Bay, B.C., Canada |
| HAMILTON, G. D. | Satellite Data Requirements for Marine Meteorological Services, World Meteorological Organization Marine Science Affairs Report No. 14. |
| LEESE, J. A., A. L. BOOTH, and D. C. DISMACHEK | National Environmental Satellite Service Catalogue of Products, Third Edition NOAA Technical Memorandum NESS-109. |
| MADRID, C. R. | The NIMBUS-7 Users Guide. |

TABLE 1 - SUPPLIERS

User Assistance and Marketing,
Canada Centre for Remote Sensing,
2464 Sheffield Road,
Ottawa, Ontario.
K1A 0E6
See Appendix 1

United States Department of Commerce,
National Oceanic and Atmospheric Administration,
Environmental Data and Information Service,
National Climate Center,
Satellite Data Services Division,
World Weather Building, Room 100,
Washington, D.C. 20233
See Appendix 2

ESA-Earnet Data Services,
C.P. 64,
00044 Frascati.
Italy
See Appendix 3

Department of Electrical Engineering
and Electronics,
The University,
DUNDEE DD1 4HN
See Appendix 4

TABLE 2 CURRENT PRODUCTS AVAILABLE

| | | |
|--|--|--|
| GOSSTCOMP (Global Sea Surface Temperature Charts) | | |
| | - daily sea-surface temperature charts on 100 km grids | |
| GSAC | - Gulf Stream analysis charts weekly | |
| Imagery | - NOAA, LANDSAT, NIMBUS | |
| CCT | - NOAA, LANDSAT, NIMBUS | |
| Ice Maps | - Ice Central of Department of Environments | |
| Costs | | |
| Data Collection Platforms | - NOAA ARGOS | 105 French Francs per day |
| only environmental information and experimental tests | GOES LANDSAT | per platform No charge No charge |
| LANDSAT/NOAA | Pictures | Canada 185 mm B/W 10.50 Colour 17.50 U.S.A. B/W 8.50 |
| LANDSAT/NOAA | CCT | Canada \$230.00 USA/SDSD 112.00 ESA 300 IAU |
| GOSSTCOMP | SDSD | \$12.50 per yr. |
| GSAC | SDSD | 21.00 per yr. |

TABLE 3 CURRENT SATELLITES

| | | |
|------------------------------------|-------|---|
| Operational: | | |
| NOAA 6 & 7 - USA polar orbiting | AVHRR | 4 channel imager 5 800 meters |
| | TOVS | vertical profile of cloud temperature |
| | DCS | data collection and platform location ARGOS |
| SMS/GOES - USA | VISSR | 2 channels 30 minutes |
| | WEFAX | image retransmission |
| Research: | | |
| LANDSAT 3 - USA polar orbiting | MSS | 4 channel visible imager 80 meter resolution |
| | RBV | B/W 40 meter resolution |
| | DCS | 64 bit messages |
| NIMBUS 7 - USA | CZCS | 6 channel imager 800 meter resolution |
| | SMMR | 5 frequency μ wave radiometer |
| METEOR - USSR | | |

TABLE 4 FUTURE SATELLITES

| Research | Launch | Sensors |
|---------------|---------|--|
| ERS-1 | 1986-87 | SAR active μ wave 30 meters |
| ESA | | ALT ocean geoid |
| | | scatt wind/wave |
| LANDSAT D | 1982 | TM 7 channel 30 meters |
| NASA - USA | 1984 | MSS 4 channel at 80 meters |
| SPOT | | 3 channel at 20 meters |
| CNES - France | | 1 channel at 10 meters stereo imagery |
| RADARSAT | 1987-88 | SAR 30 meter resolution |
| CANADA | | ice monitoring NW Passage |
| | | SCATT wind data |
| NOAA E | 1982 | AVHRR visible and IR data |
| NOAA - USA | | TOVS cloud profile |
| | | DCS busy position and data |
| | | SARSAT search and rescue satellite aided tracking |
| METEDSAT-2 | 1981 | 3 channel cloud |
| ESA | | |



Energy, Mines and
Resources Canada

Énergie, Mines et
Ressources Canada

Canada Centre for Remote Sensing

APPENDIX 1

SATELLITE IMAGERY PRICE LIST (LANDSAT/NOAA/SEASAT SERIES)

Effective June 1, 1981

| IMAGE SIZE | TYPE | SCALE | FORMAT | B&W | COLOR |
|---------------|------------|-------------|-----------|----------------------|---------------------------------------|
| 185mm | MSS | 1:1,000,000 | Paper | \$10.50 | \$20.00 (CIR) \$17.50 (CIBACHROME) |
| 185mm | RBV | 1:500,000 | Paper | \$10.50 | |
| 185mm | NOAA/TIROS | Any | Paper | \$10.50 | |
| 185mm | NOAA/TIROS | Any | Film Pos. | \$12.80 | |
| 371mm | NOAA/TIROS | Any | Paper | \$25.75 | |
| 742mm | NOAA/TIROS | Any | Paper | \$45.00 | |
| 371mm | MSS | 1:500,000 | Paper | \$25.75 | \$48.00 |
| 371mm | RBV | 1:125,000 | Paper | \$25.75 | |
| 742mm | MSS | 1:250,000 | Paper | \$45.00 | \$90.00 |
| 742mm | RBV | 1:125,000 | Paper | \$45.00 | |
| 70mm | MSS | 1:3,369,000 | Film Pos. | \$41.00/4 band strip | |
| 70mm | MSS | 1:3,369,000 | Film Neg. | \$84.00/4 band strip | |
| 185mm | MSS | 1:1,000,000 | Film Pos. | \$12.80 | \$22.00 |
| 185mm | RBV | 1:500,000 | Film Pos. | \$12.80 | |
| 371mm | MSS | 1:500,000 | Film Pos. | \$32.00 | |
| 371mm | RBV | 1:250,000 | Film Pos. | \$32.00 | |

COMPUTER COMPATIBLE TAPES

| TYPE | TRACKS | BPI | FORMAT | PRICE |
|----------------|-------------------|------------------|----------|---|
| 4 Band MSS | 9 | 1,600 | Tape Set | \$230.00 (including tape reel and Band 5 print) |
| DICS | 9 | 1,600 | Tape | \$200.00 (per sub-scene with colour print) |
| NOAA (5 Bands) | 9 | 1,600 | Tape Set | \$100.00 (tape reel and Band 5 print) |
| SEASAT | 9 | 6250/1600 | Tape Set | \$250.00 (magnetic tape only) |
| | <u>Microfiche</u> | | | <u>Fax*</u> |
| \$220.00/month | \$2,200.00/year | (ORBITS 7 to 90) | | \$ 27.00/image |
| \$ 41.67/month | \$ 500.00/year | (ORBITS 1 to 9) | | \$ 100.00/day (limit of 4 images/day) |
| \$ 91.67/month | \$1,100.00/year | (ORBITS 1 to 30) | | \$ 2,900.00/month (up to 130 images) |
| | | | | \$33,000.00/year (up to 1500 images) |

SPECIAL SERVICES CHARGES

Handling Charges: \$5.00 per order

- RUSH ORDERS:
1. To the carrier within 24 hours of reception of the order: Unit price X 3
 2. For rush orders which cannot be handled under normal production conditions: Unit price X 2

DELIVERY AND HANDLING

1. Postage extra to customers outside Canada.
2. Registered mail and special delivery charged directly to customer.
3. Courier services charged directly to customer.

*Orders in excess of 1500 images are to be referred for pricing.

Please note: Prices are subject to change annually on 1 April.

Canada

UNITED STATES DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
ENVIRONMENTAL DATA AND INFORMATION SERVICE
NATIONAL CLIMATIC CENTER
SATELLITE DATA SERVICES DIVISION
WORLD WEATHER BUILDING, ROOM 100
WASHINGTON, D.C. 20233
(301) 763-8111 Commercial or FTS 763-8111

SATELLITE DATA PRODUCT PRICE LIST FY82
(subject to change without notice)

I. STANDARD PHOTOGRAPHIC PRODUCTS (BLACK & WHITE)

| ITEM# | DESCRIPTION | UNIT PRICE |
|-------|---|------------|
| 1 | 8 In. x 10 In. Contact Paper Print | \$ 8.50 |
| 2 | 10 In. x 10 In. Contact Paper Print | \$ 8.50 |
| 3 | 10 In. x 10 In. Paper Print Enlargement | \$ 14.00 |
| 4 | 16 In. x 20 In. Paper Print Enlargement | \$ 15.00 |
| 5 | 20 In. x 20 In. Paper Print Enlargement | \$ 16.00 |
| 6 | 30 In. x 30 In. Paper Print Enlargement | \$ 18.00 |
| 7 | 10 In. x 10 In. Contact Dupe Negative from Positive | \$ 10.75 |
| 8 | 10 In. x 10 In. Contact Positive Transparency from Negative | \$ 10.75 |
| 9 | 10 In. x 10 In. Contact Negative from Negative | \$ 14.50 |
| 10 | Duplicate 35mm Slide from a Slide | \$ 2.75 |
| 11 | 35mm Slide from Transparency, Print or Art | \$ 11.00 |
| 12 | 35mm Slide from Negative | \$ 13.50 |
| 13 | Duplicate 16mm Operation Film Loop (Positive or Negative) | \$ 14.75 |
| 14 | Duplicate 16mm TV Movie (50 Ft. strip) (Positive or Negative) | \$ 14.75 |
| 15 | Duplicate 16mm Hurricane/Seasonal Movie | \$ 75.00 |
| 16 | Construct Original 16mm Movie Loop (6 Hrs. of Data) | \$ 55.00 |
| 17 | Construct Original 16mm Movie Loop (12 Hrs. of Data) | \$ 76.00 |
| 18 | Construct Original 16mm Movie Loop (24 Hrs. of Data) | \$ 147.00 |
| 19 | Duplicate 35mm Microfilm, 100-Ft. (Positive or Negative) | \$ 23.50 |
| 20 | Duplicate Transparent Grid Overlays (GOES) | \$ 10.75 |
| 21 | Duplicate Transparent Grid Overlay (AVHRR) | \$ 10.75 |
| 22 | Geographic Gridding on GOES Imagery | \$ 1.00 |

II. SPECIAL PHOTOGRAPHIC PRODUCTS (BLACK & WHITE)

A. SEASAT SYNTHETIC APERTURE RADAR (SAR) DIGITALLY PROCESSED DATA

| ITEM# | DESCRIPTION | UNIT PRICE |
|-------|---|------------|
| 23 | 10 In. x 10 In. Paper Print Enlargement | \$ 14.00 |
| 24 | 10 In. x 10 In. Positive Transparency Enlargement | \$ 25.00 |
| 25 | 10 In. x 10 In. Duplicate Negative Enlargement | \$ 30.00 |

B. SAR 70mm OPTICALLY PROCESSED DATA (Reproduced from original 70mm negative strips of various lengths up to 200 feet. Requires four sub-swaths for entire 100 km swath width. Sample prices for one 5-Ft. 1/4 swath image are shown below. Contact SDSO directly for specific price quotations).

| ITEM# | DESCRIPTION | UNIT PRICE |
|-------|--|------------|
| 26 | 70mm Contact Paper Print (5-Ft. length, 1/4 swath) | \$ 30.00 |
| 27 | 70mm Positive Transparency (5-Ft. length, 1/4 swath) | \$ 35.00 |
| 28 | 70mm Duplicate Negative (5-Ft. length, 1/4 swath) | \$ 60.00 |

C. BRIEFING AIDS

ENVIRONMENTAL SATELLITES: Systems, Data Interpretation and Application
October 1976, 66 pages.

| ITEM# | DESCRIPTION | UNIT PRICE |
|-------|---|------------|
| 29 | Illustrated Document plus set of 43 slides (35mm) | \$ 20.00 |
| 30 | Document plus B/W Film Strip of Illustrations | \$ 9.50 |
| 31 | Document Only | \$ 2.00 |

D. SATELLITE DATA ANALYSIS CHARTS (paper copy)

| ITEM# | DESCRIPTION | UNIT PRICE |
|-------|---|------------|
| 32 | Weekly GOSSTCOMP (1 of 24) (Quarterly Subscription) | \$ 3.50 |
| 33 | Weekly GOSSTCOMP (1 of 24) (Annual Subscription) | \$ 12.50 |
| 34 | Weekly Regional SST (1 of 10) (Quarterly Subscription) | \$ 3.50 |
| 35 | Weekly Regional SST (1 of 10) (Annual Subscription) | \$ 12.50 |
| 36 | Monthly Mean GOSSTCOMP (1 of 18) (Semi-Annual Subscription) | \$ 1.75 |
| 37 | Monthly Mean GOSSTCOMP (1 of 18) (Annual Subscription) | \$ 3.00 |

| | | |
|----|---|----------|
| 38 | Gulf Stream (Oceanographic) Analysis (1 North & 1 South/Week) (Semi-Annual) | \$ 7.00 |
| 39 | Gulf Stream (Oceanographic) Analysis (1 North & 1 South/Week) (Annual) | \$ 12.00 |
| 40 | Gulf Stream (Oceanographic) Analysis (3 North & 2 South/Week) (Semi-Annual) | \$ 21.00 |
| 41 | Gulf Stream (Oceanographic) Analysis (3 North & 2 South/Week) (Annual) | \$ 37.50 |
| 42 | Great Lakes Ice & SST Charts (2 Charts/Week) (Semi-Annual) | \$ 7.00 |
| 43 | Great Lakes Ice & SST Charts (2 Charts/Week) (Annual) | \$ 12.50 |
| 44 | Northern Hemisphere Snow & Ice Charts (1 per week) | \$.30 |
| 45 | NAVY-NOAA Joint Ice Boundary Charts (1 per week) | \$.30 |
| 46 | River Basin Snow Coverage Charts (1 of 23) (1 per week) | \$.30 |
| 47 | Single Copy any of above (not subscription) | \$.30 |

(NOTE: MINIMUM CHARGE FOR ANY NON-SUBSCRIPTION ORDER IS \$5.00)

III. DIGITAL TAPE PRODUCTS

A. DIRECT ONE-FOR-ONE TAPE COPY (CCT TO CCT)

| ITEM# | DESCRIPTION | UNIT PRICE |
|-------|------------------------------|----------------------------|
| 41 | 7-track, 200, 566 or 800 bpi | \$ 72.00 (per output tape) |
| 42 | 9-track, 800 or 1600 bpi | \$ 72.00 (per output tape) |
| 50 | 9-track, 6250 bpi | \$112.00 (per output tape) |

B. SELECTIVE EXTRACTION (CCT TO CCT)

| ITEM# | DESCRIPTION | UNIT PRICE |
|-------|--------------------------|---|
| 51 | 9-track, 800 or 1600 bpi | \$ 20.00 per input tape plus \$72 per output tape |
| 52 | 9-track, 6250 bpi | \$ 20.00 per input tape plus \$112 per output tape |

C. AVHRR DATA SETS (TBM TO CCT)

| ITEM# | DESCRIPTION | UNIT PRICE |
|-------|--------------------------|---|
| 53 | 9-track, 800 or 1600 bpi | \$ 50.00 per input data set or \$72 per output tape whichever is greater. |
| 54 | 9-track, 6250 bpi | \$ 50.00 per input data set or \$112 per output tape, whichever is greater. |

D. TOVS DATA SETS (TBM TO CCT)

| ITEM# | DESCRIPTION | UNIT PRICE |
|-------|--------------------------|---|
| 55 | 9-track, 800 or 1600 bpi | \$ 10.00 per input data set or \$72, per output tape, whichever is greater. |
| 56 | 9-track, 6250 bpi | \$ 10.00 per input data set or \$112 per output tape whichever is greater. |

E. GOES FULL RESOLUTION DATA SETS (CASSETTE TO CCT)

| ITEM# | DESCRIPTION | UNIT PRICE |
|-------|---|---|
| 57 | 9-track, 800 or 1600 bpi (ODIS TAPE FORMAT) | \$ 30.00 per sector or \$75 per output tape whichever is greater. |
| 58 | 9-track, 800 or 1600 bpi (SAVE TAPE FORMAT) | \$ 35.00 per sector or \$75 per output tape whichever is greater. |

IV. HOW TO ORDER DATA FROM SDS

Users requesting satellite data from the Satellite Data Services Division (SDSD) should make every effort to supply as complete of a set of information as possible concerning their needs. Frequently, orders contain incomplete or ambiguous information which results in delays or improper filling of orders. The following points should be considered and such information be furnished in preparing orders for data to ensure timely, correct completion.

A. PHOTOGRAPHIC PRODUCTS

After identifying a particular image or set of images, the final product supplied to the requester can be in several forms. Specify as much as possible of the following:

- o Date(s) of interest
- o Time(s) in GMT
- o Type of Product: HRPT Frame, Mercator Mosaic, Pass-by-Pass, Polar Mosaic, etc.
- o Geographic Area
- o Satellite (if known)
- o Orbit Number (if known)
- o Visual and/or Infrared Sensor
- o Special Physical Feature(s) to be shown in imagery
- o Minimum Acceptable Size or Resolution
- o Geographic Gridding Desired or Not Desired
- o Final Product Format: Print, Transparency, Negative, Slide, Microfilm, etc.
- o Final Product Size
- o Finish of Photographic Prints: Matte or Glossy

B. COMPUTER TAPE PRODUCTS

Proper identification of desired data on magnetic tapes becomes even more important because of the high data densities frequently encountered and large tape volumes. Specify as much as possible of the following:

- o Date(s) of interest
- o Time(s) in GMT
- o Geographic Area and Coordinates
- o Type of Data Products: HRPT, Sea Surface Temperature, TOVS, etc.
- o Satellite (if known)
- o Orbit Number (if known)
- o Sensor Instrument
- o Channel Type or Numbers, if channel select option is desired
- o Density (9-track/1600 bpi, etc.)

C. GENERAL ORDERING PROCEDURES, SHIPPING, AND PAYMENTS

Telephone orders and inquiries can be taken by SDSD representatives from approximately 0730 to 1630 Eastern Time, Monday through Friday (except Holidays) at 301-763-8111 or FTS-763-8111. International inquiries, where time is critical, can be sent via International Telex specifying delivery to: "SATELLITE DATA SERVICES DIVISION, ROOM 100, WORLD WEATHER BUILDING." Our cable address is "NOAA, WASHINGTON, D.C."; our International Telex Numbers are RCA 248376 or ITT 440108.

Telephone orders will not be accepted for photographic products totalling more than \$100 (U.S.) or digital products totalling more than \$250 (U.S.) without written confirmation specifying the exact contents of the order. Any order, regardless of price, which is particularly lengthy or very detailed, should be submitted in writing.

Users associated with colleges and universities are required to furnish a Purchase Order with each request. U.S. Federal Government Agencies and contractors must also supply a Purchase Order or MIPR with each request. Industrial buyers should follow their usual purchasing procedures. Private individuals will be invoiced with shipment. Cost estimates will be provided upon request. Prepaid orders should have check made payable to "COMMERCE/NOAA/NCC". Specify if shipping and billing addresses are different.

Completed orders are sent via regular mail and via Air Mail to overseas customers; orders valued at more than \$250 (U.S.) are sent Registered or Certified Mail. We also have the capability to deliver orders to most areas of the United States, some Canadian locations, and major cities in most Foreign countries, by several different Express Delivery Companies (overnight or 2-3 days). If any of these Express Delivery services are requested by the data user, the customer will assume all delivery charges. Delivery to foreign nations can also be made through each nation's Scientific Attache located at their Embassy in Washington, D.C. Such formal arrangements must be requested by the user directly through their Scientific Attache.

Photographic products:

51. Quick-look print
Day (VIS + IR) or night (IR)
2 AU
52. Radiom. or geometrically corrected data
52.1 240mm print or film pos.
2 minutes of data
52.2 240mm film neg.
2 minutes of data
20 AU
30 AU
53. Night/day registered image
53.1 240mm print or film pos.
2 minutes of data
53.2 240mm film neg.
2 minutes of data
20 AU
30 AU
54. Temperature difference image
54.1 240mm print or film pos.
2 minutes of data
54.2 240mm film neg.
2 minutes of data
20 AU
30 AU
55. Thermal inertia map
55.1 240mm print or film pos.
2 minutes of data
55.2 240mm film neg.
2 minutes of data
20 AU
30 AU

Nimbus-7 CZCS data

Digital products

61. Raw data TRLI CCT
all 6 channels
61.1 First 2 minutes
61.2 Additional 2 minutes sections
on same CCT* - per section
75 AU
25 AU
62. Raw data CRT + radiometric tables
all 6 channels
62.1 First 2 minutes
62.2 Additional 2 minutes sections
on same CCT* - per section
75 AU
25 AU

63. Raw data CRT + radiometric tables
+ geometric location information
63.1 First 2 minutes
63.2 Additional 2 minutes
on same CCT* - per section
75 AU
25 AU
64. Shipment cost - airfreight collect
per CCT
8 AU

Photographic products:

71. Quick-look print
full station pass
3 bands
2 AU
72. Radiometrically corrected data
All 6 bands - aspect ratio 1:1
72.1 240mm print or film pos.
72.2 240mm film neg.
20 AU
30 AU
73. Geometrically located data
All 6 bands - aspect ratio 1:1
(including tick marks)
73.1 240mm print or film pos.
73.2 240mm film neg.
20 AU
30 AU

CZCS derived parameters : TBD
SMMR data : TBD

Earthnet User Services

Telex 616637 ESRIN Italy

Tel. 39 6 9491369

39 6 9491216

Mail address: C. P. 64
00044 Frascati
Italy

Price list of standard

Earthnet products SEP 4 1981

FILE

DOSSIER

Valid from 1 January 1981

Ordering: If there is a National Point of Contact in your country, please order from them. If there is no NPOC in your country, please order from the Earthnet User Services at Frascati. Twx 610 637 ESRIN Italy. For details on the availability of data contact your NPOC or the Earthnet User Service.

Invoicing: Users within the Member States of ESA will be invoiced in their national currency at the official ESA exchange rate at the time of invoicing. Users outside the Member States will be invoiced in USA dollars at the rate of 1 AU = 142304 US \$ (1981 exchange rate)

Landsat data

Digital products

01. MSS raw data CCT* prices
300 AU
02. MSS S/C CCT 300 AU
03. RBV CCT 1 subscene 300 AU
04. RBV set of 4 CCTs relating to 4 sub-scenes of 1 frame (same date) 900 AU
05. Copy CCT ordered together with 1st CCT 75 AU
06. Shipment cost 8 AU
- 06.1 airmail express per CCT 100 AU
- 06.2 airfreight collect 1-6 CCTs 140 AU
- 7 and more CCTs

* Kinuna as from 1/1/81
Fucino as from 15/4/81.

* 1 CCT can contain up to 3 sections.

Photographic products:

| | | |
|--|---------|--|
| 11. Quick-look prints MSS | | |
| 11.1 per print | 1 AU | |
| 11.2 per frame yearly subscription | 14 AU | |
| 12. Quick-look microfiche MSS | | |
| 12.1 per microfiche | 3 AU | |
| 12.2 backlog '75 - May '78 Fucino only 1 microfiche/cycle | 150 AU | |
| 12.3 backlog '75 - May '78 Fucino only full coverage 15 microfiche/cycle | 2000 AU | |
| 12.4 June '78 - Dec. '79 1 microfiche/cycle | 80 AU | |
| 12.5 June '78 - Dec. '79 28 microfiche/cycle full coverage | 1700 AU | |
| 12.6 Post '79 yearly coverage 1 microfiche/cycle | 80 AU | |
| 12.7 Post '79 yearly coverage 28 microfiche/cycle full coverage | 1250 AU | |
| 13. B+W MSS and RBV images (per band or subscene) | | |
| 13.1 240mm print or film pos. MSS scale 1:1,000,000 | 30 AU | |
| 13.2 Additional* copy of above | 20 AU | |
| 13.3 240mm film neg. MSS scale 1:1,000,000 | 40 AU | |
| 13.4 Additional* copy of above | 30 AU | |
| 13.5 480mm print MSS scale 1:500,000 | 40 AU | |
| 13.6 Additional* copy of above | 30 AU | |
| 13.7 480mm film pos. MSS scale 1:500,000 | 60 AU | |
| 13.8 Additional* copy of above | 48 AU | |
| 13.9 960mm print MSS scale 1:250,000 | 60 AU | |
| 13.10 Additional* copy of above | 48 AU | |
| 13.11 960mm film MSS scale 1:250,000 | 120 AU | |
| 13.12 Additional* copy of above | 90 AU | |

14. MSS colour composites - 3 bands (4.5.7 or 4.6.7)

| | |
|-----------------------------------|--------|
| 14.1 240mm print from catalogue** | 80 AU |
| 14.2 240mm print | 120 AU |
| 14.3 240mm film from catalogue** | 90 AU |
| 14.4 240mm film | 150 AU |
| 14.5 480mm print from catalogue** | 120 AU |
| 14.6 480mm print | 180 AU |
| 14.7 960mm print from catalogue** | 180 AU |
| 14.8 960mm print | 240 AU |

Sensor data

Digital products

| | |
|---|-------|
| 21. Non-SAR individual sensor data record 1 sensor, all passes of one day | 75 AU |
| 22. Raw data SAR CCT in CORRS-MDA format 100 Km in range - 15 Km in azimuth | 75 AU |
| 23. SAR image CCT in MDA format Digitally processed - source DFVLR 40 Km in azimuth - 40 or 50 Km in range | 75 AU |
| 24. SAR range compressed data CCT Digitally processed - source RAE Area, number of looks, orientation and resolution variable | 75 AU |
| 25. SAR final image CCT Digitally processed - source RAE Area, number of looks, orientation and resolution variable | 75 AU |
| 26. Shipment cost airmail express per CCT | 8 AU |

* The price - additional copy - applies to additional copies of a product ordered at the same time of the first copy. It also applies to different photographic product types of an identical scene ordered at the same time. In this case only the most expensive product will be invoiced at full price (e.g. a colour composite). All other products (e.g. B+W film) will be invoiced at the reduced price.

** The lower price refers exclusively to scenes included in the Earthnet catalogue of available MSS colour composites. It does not refer to composites already generated but not yet included in the catalogue. The lower price also applies to additional copies ordered at the same time of a full price colour composite.

Photographic products:

| | |
|---|-------|
| 31. Survey processed SAR film Optically processed - up to 1500mm long two subswaths | 15 AU |
| 32. Full resolution SAR film Optically processed - up to 1200mm long two subswaths | 15 AU |
| 33. Digitally processed SAR data 33.1 240mm print or film pos. source DFVLR or RAE | 20 AU |
| 33.2 240mm film neg. source DFVLR or RAE | 30 AU |
| 33.3 480mm print source DFVLR | 30 AU |
| 33.4 480mm film pos. or neg. source DFVLR | 48 AU |

HCMM data

Digital products

| | |
|--|-------|
| 41. Radiometrically corrected data Day (VIS or IR) - Night (IR) Two minutes of data, per channel | 25 AU |
| 42. Radiometrically and geometrically corrected data Day (VIS or IR) - Night (IR) Two minutes of data, per channel | 25 AU |
| 43. Night/day registration + temperature difference Superposition of night and day IR Two minutes of data | 50 AU |
| 44. Thermal inertia map Two minutes of data | 25 AU |
| 45. Shipment cost airmail express per CCT | 8 AU |

* Minimum charge per CCT will be 75 AU + shipment cost.

UNIVERSITY OF DUNDEE SATELLITE IMAGE DATA ACQUISITION AND ARCHIVING FACILITY

With the aid of a grant from the Natural Environment Research Council, Dundee University have been recording scanning radiometer data from several U.S. meteorological polar orbiters every day since August 1976.

All image data are recorded unprocessed, on magnetic tape and will be kept indefinitely. Also, at least one channel from each pass is placed on full size negative, used for producing contact prints.

VERY HIGH RESOLUTION RADIOMETER ARCHIVE

Recording commenced on 23rd August, 1976 and continued daily until the end of the second generation series on 28th February 1979. At least two recordings were taken per day, one from the morning closest to overhead pass and one from the evening. On some days, two successive passes were taken during the morning.

ADVANCED VERY HIGH RESOLUTION RADIOMETER

First of the third generation spacecraft to carry AVHRR was TIROS-N, launched on 13th October, 1978. Recordings at Dundee commenced soon after launch, from two successive passes each afternoon and continued until spacecraft failure on November 1st, 1980.

Second spacecraft in the series, NOAA-6 was launched on 23rd June, 1979. A single recording is taken each morning from the closest to overhead pass. Since the failure of TIROS-N AVHRR, recordings from two successive evening passes are taken in addition.

PRODUCTS AVAILABLE FROM THE VHRR/AVHRR ARCHIVE

1. HARD COPY

Primary output from the archive is hard copy photo-facsimile imagery, linearised to correct earth curvature distortion. Linearisation means that the scale of the images is very nearly (but not exactly) constant in all directions and at all points in the image.

Images are basically in one of two categories:

- 1) Full pass (x1), with or without latitude/longitude and land outline grids. These images are contact printed from full size negatives. They can also be supplied as Xerox copies, of reduced quality, which are quite readable in terms of major weather features and are much less costly.
- 2) Sectorised electronic enlargements. These images are electronic enlargements of selected sectors of the full pass image. They represent the best image quality available from the archive. Gridding of sectorised enlargements is not available, but they are linearised. Xerox copies can be supplied only if a photographic version is ordered first.

Sectorised enlargements can be grey scale enhanced to bring out such features as sea surface temperature in IR images.

A summary of sizes and areas covered is given in Table 1.

| Magnification | Lines/cm | Size cm | Total Lines | Grid | Area Coverage H x W |
|---------------|----------|---------|-------------|----------|---------------------|
| VHRR x 1 | 246 | 25 x 21 | 6250 | Optional | 5625 x 4400 Km |
| VHRR x 2 | 118 | 25 x 25 | 3000 | No | 2800 x 2700 Km |
| VHRR x 4½ | 59 | 25 x 25 | 1500 | No | 1350 x 1350 Km |
| VHRR x 6¼ | 39 | 25 x 25 | 1000 | No | 900 x 900 Km |
| AVHRR x 1 | 177 | 24 x 16 | 4275 | Optional | 4700 x 3000 Km |
| AVHRR x 1½ | 118 | 25 x 25 | 3000 | No | 3300 x 3300 Km |
| AVHRR x 3 | 59 | 25 x 25 | 1500 | No | 1650 x 1650 Km |
| AVHRR x 4½ | 39 | 25 x 25 | 1000 | No | 1100 x 1100 Km |
| AVHRR x 9 | 20 | 25 x 25 | 500 | No | 550 x 550 Km |

TABLE 1

2. BROWSE FILE

A full pass gridded image from at least one channel (usually IR) of every pass recorded in the archive, is placed in the station browse file. It may be consulted by any data user.

Periodically, the images in the file are photographed on to 35 mm film negative. These are then contact printed on to 20x25cm sheets with 36 images per sheet. The sheets can be normal positives or positive transparencies. Despite the small size of the images, cloud features can be seen with the aid of a magnifying glass.

These browse file sheets of miniature images are distributed regularly to users on the mailing list. Back copies are available. A complete set with instructions is maintained at the London Weather Centre for public access.

3. COMPUTER COMPATIBLE TAPES

CCT transcripts of raw data of selected scenes from the tape archive can be supplied. These data contain the output from all the spacecraft instruments and all channels of the AVHRR. Decommuation has to be performed by the user's software. The 10 bit words from the spacecraft are grouped in threes to form 4 8-bit words on the tape. Details of the tape format can be supplied on request. VHRR CCTs are not available.

COASTAL ZONE COLOUR SCANNER ARCHIVE

The NASA experimental satellite NIMBUS 7, launched in October 1978, carries the CZCS which is often but not always, switched on during daytime passes over European areas. Recording at Dundee commenced on August 3rd, 1979.

PRODUCTS AVAILABLE FROM THE CZCS ARCHIVE

1. HARD COPY

Any of the six channels may be hard copied in a photo-facsimile machine to produce an unlinearised image size 25 x 25 cm covering an area 1200 Km N-S x 1500 Km E-W. Alternatively 512 x 512 pixel scenes of any selected area can be produced on the same size photographic paper.

2. COMPUTER COMPATIBLE TAPES

CCT transcripts of raw data can be supplied as with AVHRR except that the data are already in 8-bit words.

NON-ROUTINE RECORDINGS

Extra recordings from satellite passes further to the east or west of the U.K. can be taken by prior arrangement, in support of scientific projects. These recordings are placed in the archive and products as described are made available to the project scientists. Dundee also have a METEOSAT Primary Data User Station which can be used to record data as required.

STATION EQUIPMENT

Meteosat data are not archived routinely. Most of the station equipment and systems were designed and constructed in-house. Some items can be duplicated under contract for other groups, wishing to set up their own facility.

Please note that all enquiries should be addressed to:

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