SEA SURFACE TEMPERATURE OF THE COASTAL ZONES OF FRANCE

Heat Capacity Mapping Mission - HCMM

Investigation n° 15

Progress report n° 2.

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Laboratoire d'Optique Atmosphérique

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1 - INTRODUCTION

The objectives of this investigation are to map the various thermal gradients in the coastal zones of France with regard to natural phenomena and man-made thermal effluents : to study and map the mesoscale thermal features in the English Channel, the Bay of Biscay and the North Western Meditarranean Sea ; to study and map the evolution of the thermal gradients generated by the main estuaries of the french coastal zones ; and to contribute to the modelling of diurnal heating of the sea surface and its influence on the oceanic surface layers.

The investigation is conducted by the followings : Dr P.Y. DESCHAMPS (Principal investigator) and Dr M. CREPON, Mr J.M. MONGET and Professor F. VERGER (Co-Investigators). Attachment A give related organizations and addresses.

This progress report was established after reporting by Professor F. VERGER. We are sorry that contributions by Dr M. CREPON and J.M. MONGET did not arrive in time to be incorporated in the present report. Consequently, some aspects and results of the investigation in the Mediterranean Sea are missing and will be only included in the final report.

2 - TECHNIQUES

Techniques have been extensively discussed in progress report 1 and there has been no basic change in these techniques since that report.

Nevertheless, Fig. 3 and Fig. 4 of progress report 1 are eroneous and should be replaced by Fig. 1 and 2 of the present progress report. These figures are concerned with examples of the temperature variance density as a function of the wavenumber and of the structure function as function of distance, for HCMR data as compared to VHRR data.

3 - ACCOMPLISHMENTS

3.1.1. - Routine observations

Periodical sea surface temperature measurements have been performed by the "Réseau National d'Observation de la Qualité du Milieu Marin", in the coastal and estuaries zones of the french coasts. As an example, six stations are performed every week in the Loire estuary (see Fig. 3). Some of these measurements are simultaneous with some HCMM data (09/15/78 ; 05/28/79 ; 06/18/79).

The "Etablissement d'Etudes et de Recherches Météorologiques" at the "Centre Océanologique de Bretagne", Brest, performs a statistic treatment of the sea surface temperature field from the routine observations of the merchant ships in the Bay of Biscay, the Celtic Sea and the Western English Channel. As a result of this analysis, a thermal map (SST-GASC) is produced three times a month with a temperature accuracy of about 0.5 C.

Lighthouseboats also routinely observe sea surface temperature at some locations in the Eastern British Channel and the Southern North Sea. They report these observations through the meteorological network.

3.1.2. - Specific cruises

Apart from the routine collection of observations, several oceanographic experiments have been conducted by various french organizations more or less in relation with the investigations objectives :

. LION 78 (june to september 1978) is a summer experiment in the Gulf of Lions, Mediterranean Sea, for the study of coastal upwellings.

. PHYGAS 78 (8 november 1978 to 2 december 1978) in the Bay of Biscay. Fig. 4 gives a map of hydrological stations for the first part of this cruise.

. A drifting buoy experiment in the Bay of Biscay, starting february 1979, for the study of ocean dynamics.

. PROLIFIC (5 to 24 march 1979), an experiment in the Ligurian Sea, to support remotely sensed data of sea surface temperature and ocean color.

. Several cruises in the British Channel to support remotely sensed data of sea surface temperature and ocan color :

- 19 to 29 june 1979, in the "Golfe de Saint Malo"
- 20 to 28 july 1979, in the "Golfe de Saint Malo"
- 4 to 14 september 1979, in the "Golfe de Saint Malo"
- SATIR 1, 17 to 27 july 1979, in the Celtic Sea
- SATIR 2, 3 to 22 september 1979, in the Celtic Sea.

3.2. - Comparison of HCMR versus VHRR

The quality of HCMR has been evaluated from a few digital data products. The spatial and thermal radiometric resolutions correspond to the nominal performances, respectively 500 m and 0.3 K. In some occasions, the thermal radiometric resolution has been found to be considerably affected by the existence of a periodic noise in the data, at a length of several α km. HCMR derived temperatures are in accordance with routine observations of sea surface temperature within the accuracy of the atmospheric correction and of the routine observations.

Comparison of the HCMM with VHRR performances shows a definite improvment of the quality of the restituted thermal field. Examples have been given in the progress report 1. Fig. 5 to 7 give

a further example of a comparison between HCMR (10/28/78 at 13.18 TU) and VHRR (10/28/78 at 08.44 TU) data obtained over the Gironde estuary.

3.3. - Studies of the mesoscale oceanic thermal field

By that time we have received a rather complete data set of photographic products for the period may 1978-december 1978. About all the areas of the investigation are covered by these data at least several times at different periods centered around the 1978 summer, but there is a lack of data during the winter period. The corresponding digital data have been requested and a few of them have been received.

Most of the evaluation has been done up to that time on photographic products. Several interesting thermal features have been exhibited when the photographic products have a contrast suitable to detect the weak temperature changes of the oceanic field. Upwellings along the Coast of the Gulf of Lions, tidal fronts in the Western English Channel and Southern North Sea, appearance of colder waters along the continental shelf break in the Celtic Sea and Bay of Biscay, are frequently shown. Nevertheless, further work on digital data is necessary to fully assess the impact of HCMM data for the study of such features.

3.4. - Studies of estuarine thermal gradients

The same previous remark may be done for this objective. The received photographic products cover a variety of different situations of the estuarine regime, except for the winter season. A few digital data have been received.

3.5. - Diurnal heating

A rather large number of cloud free day-night HCMM data within 12 hours have been identified from the photographic products. Up to that time, we have restricted our request orders of day-night temperature difference data to a very small amount (2 scenes) : because we do not have really good sea truth data to support this objective. We are waiting for the requested day-night temperature differences to make a first evaluation of the usefulness of this type of data over oceanic aeras.

4 - SIGNIFICANT RESULTS

4.1 - Mesoscale studies

Three different types of structures have been successfully investigated when using the HCMM photographic products :

. cooler water at the shelf break bordering the Celtic Sea and the shelf of the Bay of Biscay,

. tidal fronts in the western part of the English Channel and the southern part of the North Sea,

. cooling of the shelf water in the Bay of Biscay during the fall months.

The two first processes are schematically illustrated in Fig. 8, after PINGREE (*1*). Fig. 9 and 10 give two examples of these two processes on the 15 september and 28 october, 1978. (HCMM image ID : A-A0142-02220-3 and A-A0185-13180-2, A-A0185-13200-2).

Also showing on Fig. 10 is the cooling of the shelf water in the Bay of Biscay which produces several successive fronts from the coastline associated with considerable eddy structures.

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(1) PINGREE, R.D. - Baroclinic eddies bordering the Celtic Sea in late summer, J. Mar. Biol. Ass. U.K., 1979, 59, 689-698.

Tidal fronts on the shelf seas are produced by tidal mixing of the water column. They occur when the depth of water is small enough, and when the turbulence induced by the tidal currents, is large enough to destroy the seasonal thermocline. Consequently the tidal fronts separate the unstratified condition with cold surface water from the stratified condition with warmer surface water (GRALL et al. *(2)*, PINGREE and GRIFFITHS *(3)*).

Thermal fronts have been identified from the photographic products and plotted on Fig. 11 to 14, for the period may to october 1978. The Ushant tidal front, a tidal front surrounding the western part of Britain has been systematically located during this period. The southern and western boundaries of the front are rather stable while the northern boundary between Britain and Conrwalls seems more variable. Starting at the end of august other thermal fronts developped, south of Britain on the shelf of the Bay of Biscay,and seem to be related to the cooling of the shelf waters during the fall months. An other tidal front was detected and located from the HCMM data in the southern part of the North Sea between England and the Netherlands : the position of this tidal front corresponds also to the one given by PINGREE and GRIFFITHS *(3)*, but was not previously clearly detected from the VHRR data.

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(2) GRALL, J.R., LEFEVRE-LEHOERFF, G. and LEFEVRE, J. - Observations sur la distribution du plancton à proximité d'Ouessant en juin 1969 et ses relations avec le milieu physique, Cah. Océanogr., 1971, 23, 145-170.

(3) PINGREE, R.D. and GRIFFITHS, R.D. - Tidal fronts on the Shelf Seas around the British Isles, J. Geophys. Res., 1978, 83, 4615-4622.

4.2 - Diurnal heating

Strong diurnal heatings associated with shallow water structures have been identified on several images in the Mediterranean Sea and the North Sea. In some occasions, the sun glitter in the visible channel allows the identification of diurnal heating to be very closely related with calm surface water aeras. Such sun glint mainly occured in the Mediterranean Sea, in june, when the azimuth of the sun is close to 270° at the time of HCMM overflights. Sun glint usually increase in such geometrical conditions where the observation angle is close enough to the specular reflexion conditions. Nevertheless, a sudden decrease of sun glint is observed for the calm aeras because it is very unlikely that the observations angles of the sea would meet exactly the angular conditions for the specular reflexion on a flat surface.

More detailed evaluation of this diurnal heating features are still going to be evaluated on the digital products.

5 - PUBLICATIONS

. DESCHAMPS, P.Y. - Determination of sea surface temperature by AVHRR/TIROS-N - presented at the ICES Remote Sensing Working group Meeting "Applications of Remote Sensing to Fisheries Research", 13-14 june 1979, Valbonne, France.

. DESCHAMPS, P.Y., PHULPIN, T. - Measurement of sea surface temperature using AVHRR/TIROS-N - presented at the 6th Annual Conference, Remote Sensing Society, 17-19 december 1979, Dundee, Scotland.

6 - PROBLEMS

Problems concerning the data geometry, the periodic noise on the data, and the thermal contrast of photographic products have been identified in the previous report 1 and remain important by the time of the present report.

7 - IMAGE QUALITY AND DELIVERY

7.1 - Image quality

Image quality is usually good except for the periods where the periodic noise is too high. In some cases, for the goal of oceanic investigations,the interpretation of photographic products would be helped by a more appropriate enhancement of the grey scale of the infrared channel in the range of the sea surface temperature.

7.2 - Test site coverage

A list of the received data, photographic and digital products, is given in the attachment B.

A rather complete data set of photographic products has been received for the period may to december 1978. Test site coverage is thus excellent for all parts of the test sites of the investigation, except during the winter period. Day-Night cloudfree coverage within 12 hours occured also several times during the summer period and is now satisfactory.

7.3 - Delivery

Timeliness of photographic products is good. A few percentage of them is too much cloudy, or only land surfaces, or outside the test site aeras. The received data set has now been completed, particularly during early months of the investigation.

We start receiving more systematically the digital data requested. The delay of the procedure remains of several months between the time where the request order is sent and the time where the digital data is received by the investigator.

Some HCMM data have now been received from the european distribution network EARTHNET of the European Space Agency ESA. By that time these data include quick-look imageries from january 1979 and a few digital data, geometrically uncorrected.

8 - RECOMMANDATIONS

To enhance the contrast of photographic products in the infrared channel by an appropriate and constant expansion of the grey scale within the typical sea surface temperature range for the specific applications to oceanography.

9 - CONCLUSIONS

The following conclusions may be tentatively established by the time of this report :

. The quality of HCMM radiometer performances ground resolution and temperature resolution shows a definite improvement compared to the previous VHRR/NOAA radiometers for the studies of sea surface temperatures and applications to oceanography,

. HCMM data analysis is showing some oceanic mesoscale features which were previously expected to occur : summer coastal upwellings in the Gulf of Lions, tidal fronts bordering the English Channel, cooler surface waters at the continental shelf break,

. The analysis of the spectral variance density spectra show that the interpretation of the data usually is limited by the HCMM radiometric performances (noise level) at wavenumbers below 5 km in the oceanic aeras ; from this analysis it may also be concluded that a decrease of the radiometric noise level down to 0,1 k against an increase of the ground resolution up to 2 km would give a better optimum of the radiometric performances in the oceanic aeras,

. HCMM data appear to be potentially very useful for a detailed analysis of the sea surface temperature field, particularly in the very coastal area with making profit of the HCMM ground resolution of 500 m.

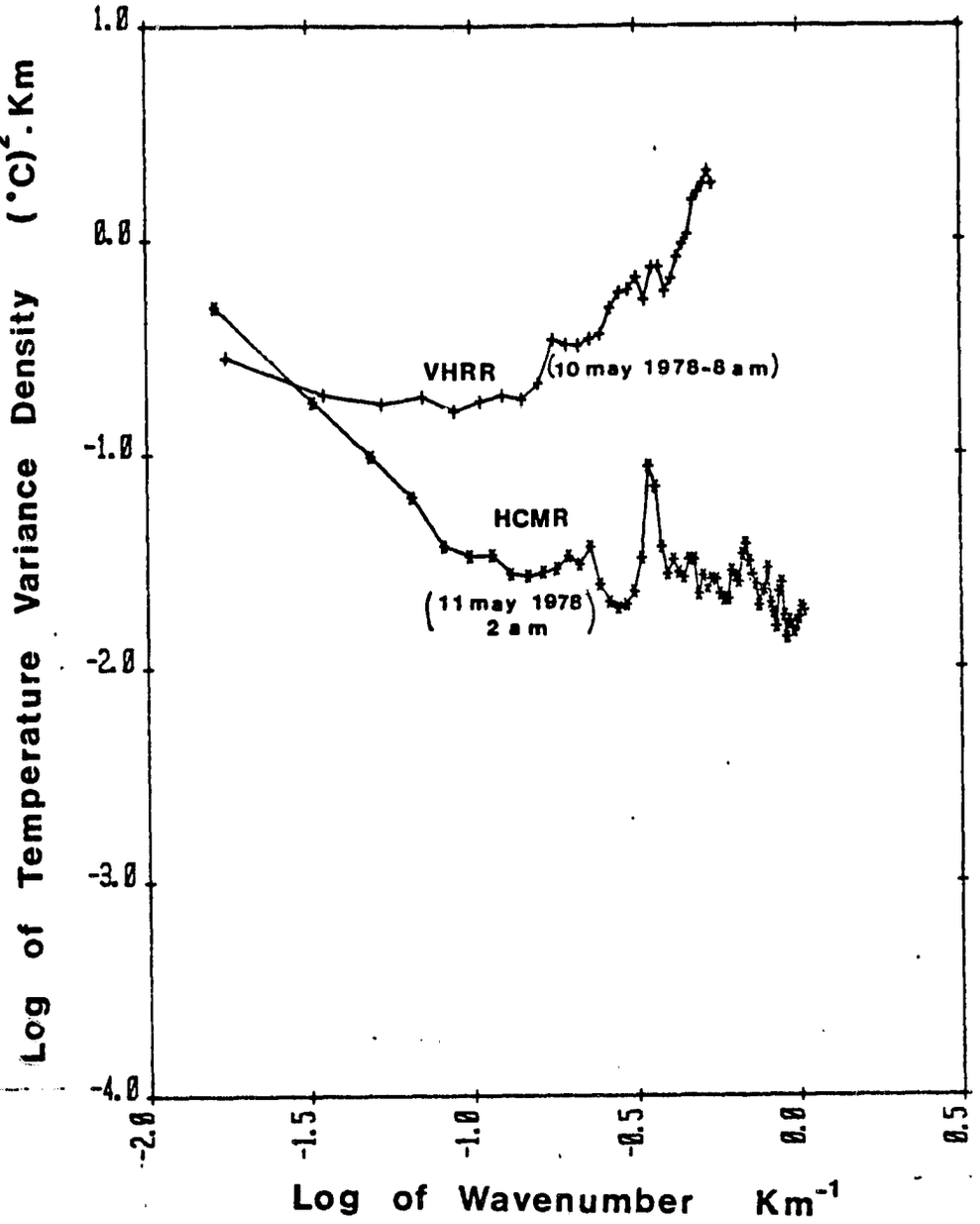

Fig. 1 : Comparison of the one dimension (downline) variance density spectra of spatial temperature fluctuations computed from HCMR and VHRR data, over the same location and at about the same time. The example given is for a 64 x 64 km square area (HCMM scene ID : A-A0015-02550-3).

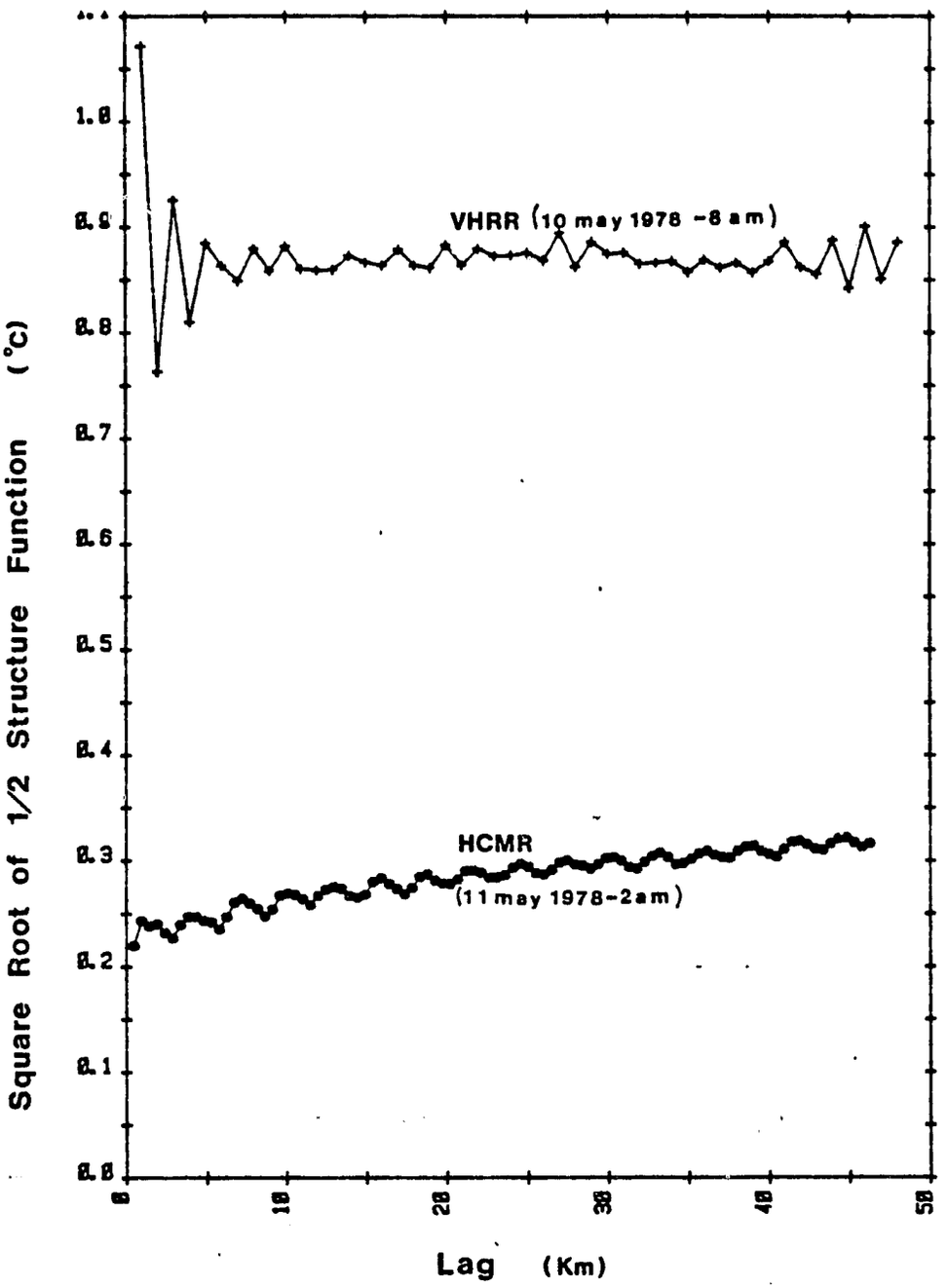

Fig. 2 : Comparison of the one dimension (downline) structure function of spatial temperature fluctuations computed from HCMR and VHRR data, over the same location and at about the same time. The example given is for a 64 x 64 km square area (HCMM scene ID : A-A0015-02550-3).

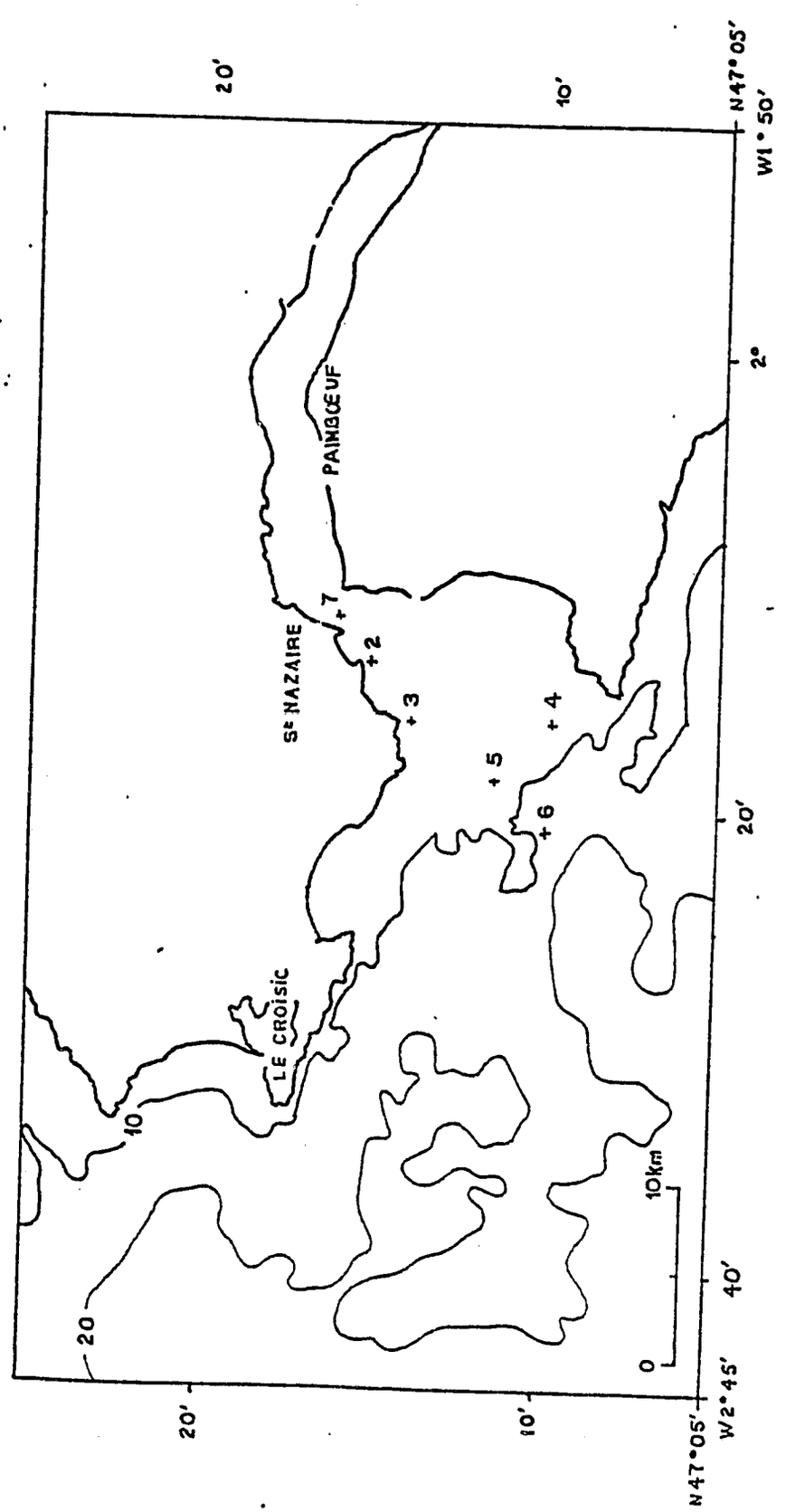

Fig. 3 : R.N.O. stations in the Loire Estuary.

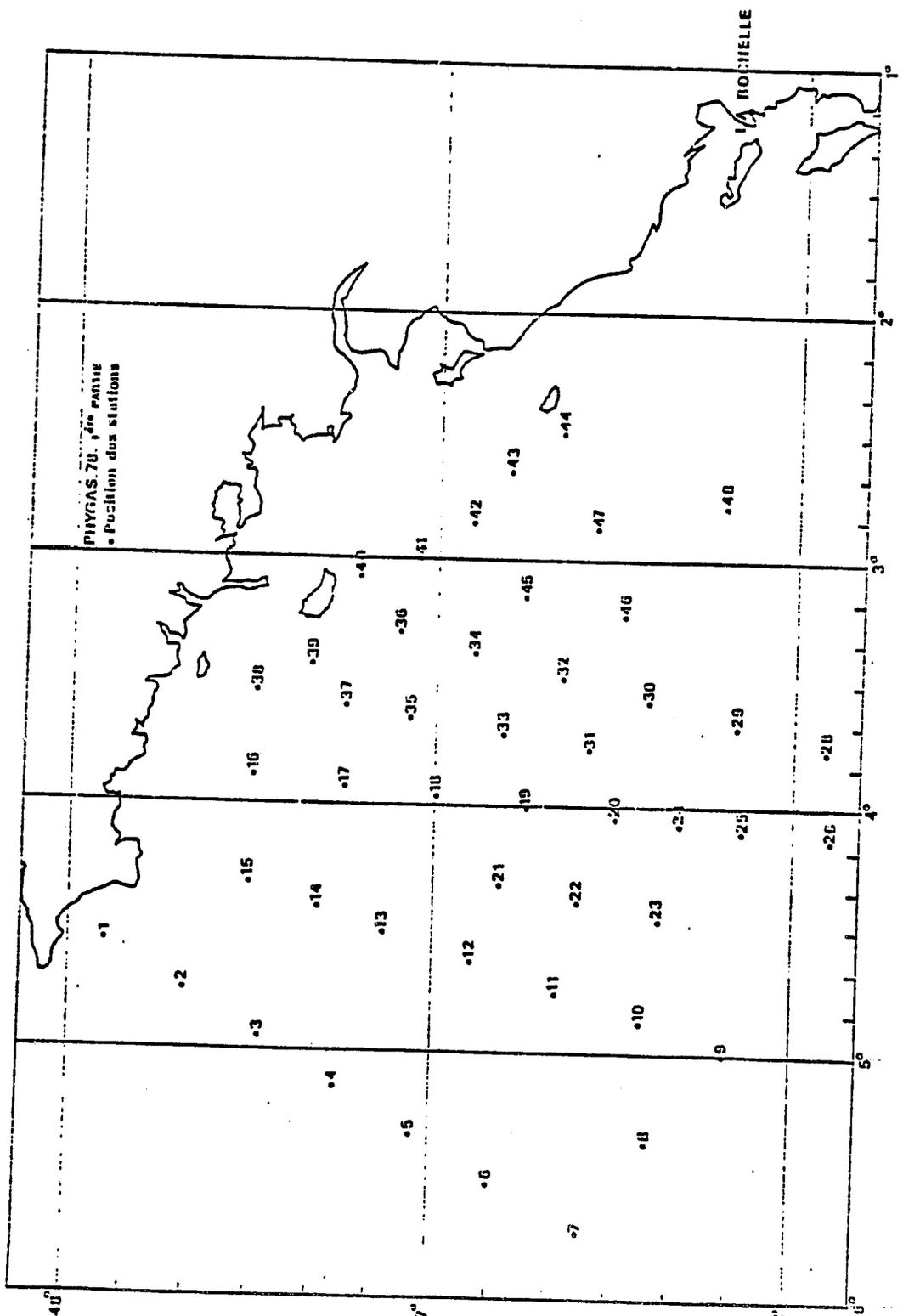

Fig. 4 : Phygas 78 cruise first part : stations in the Bay of Biscay.

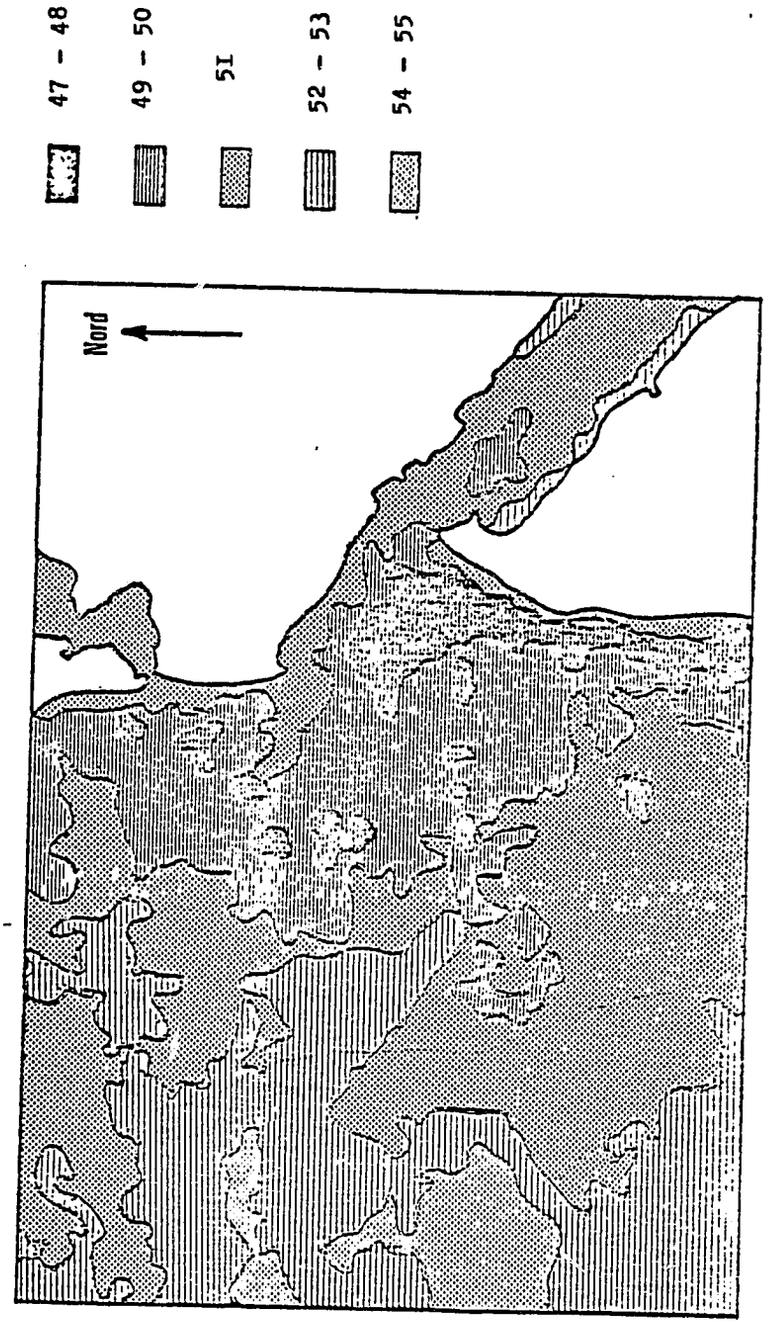

Fig. 5 : HCMM thermography of the Gironde Estuary (28.10.78, 13.18 TU).

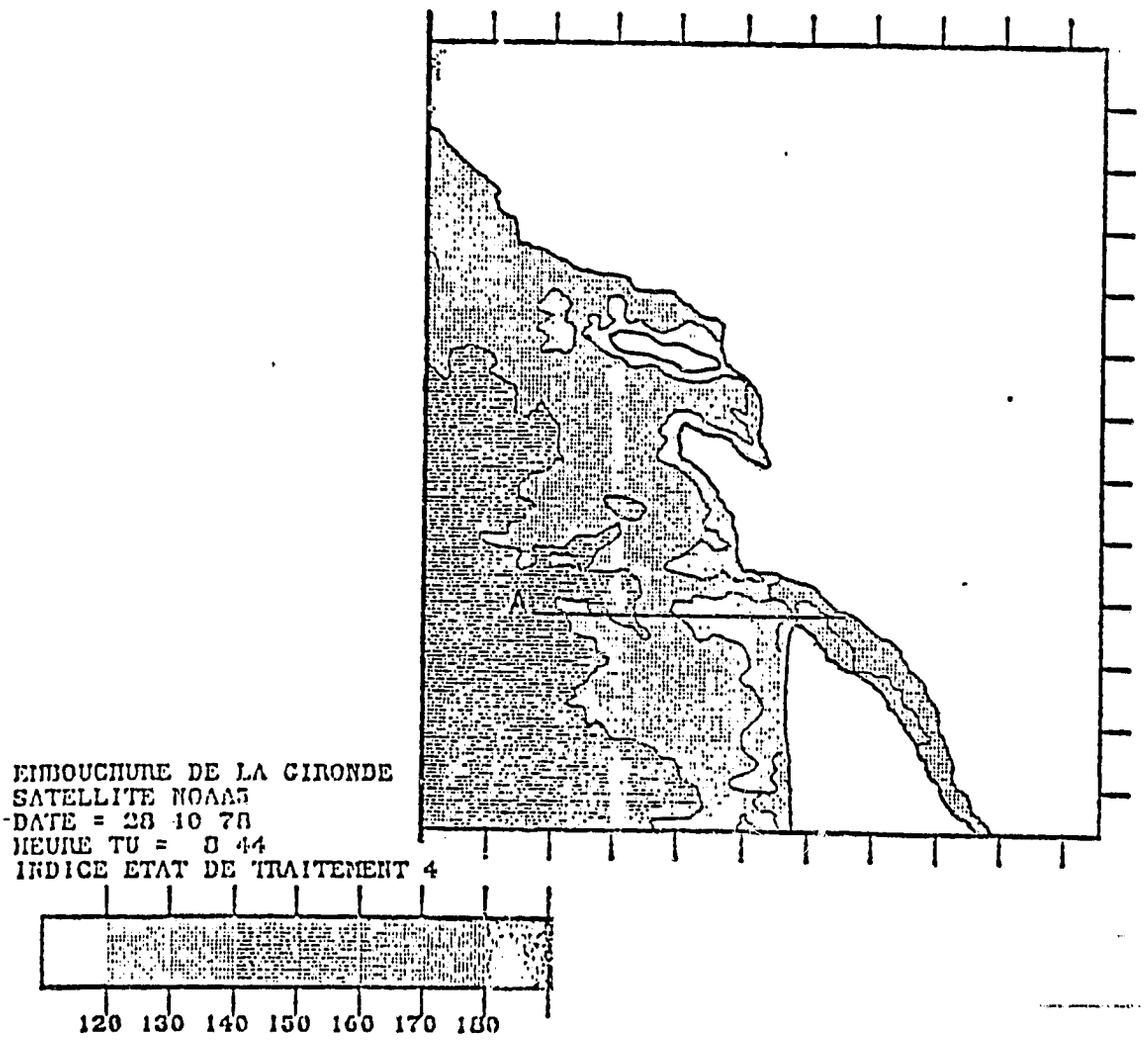

Fig. 6 : VHRR/NOAA-5 thermography of the Gironde Estuary (28.10.78, 08.44 TU).

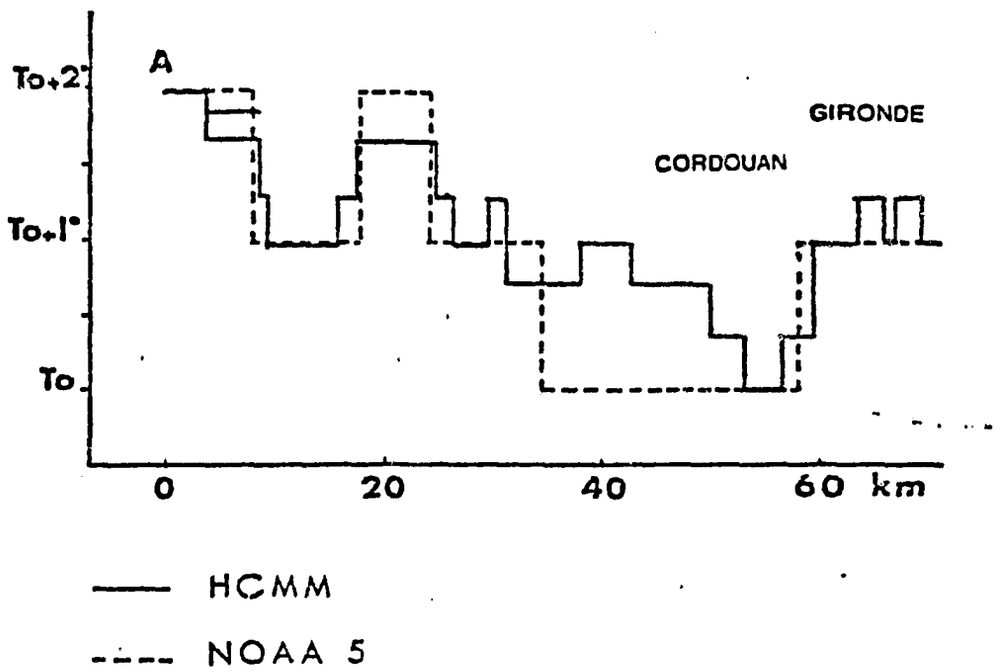

Fig. 7 : Sea surface temperature comparison of HCMM and VHRR/NOAA-5 data along the section shown in Figure 6.

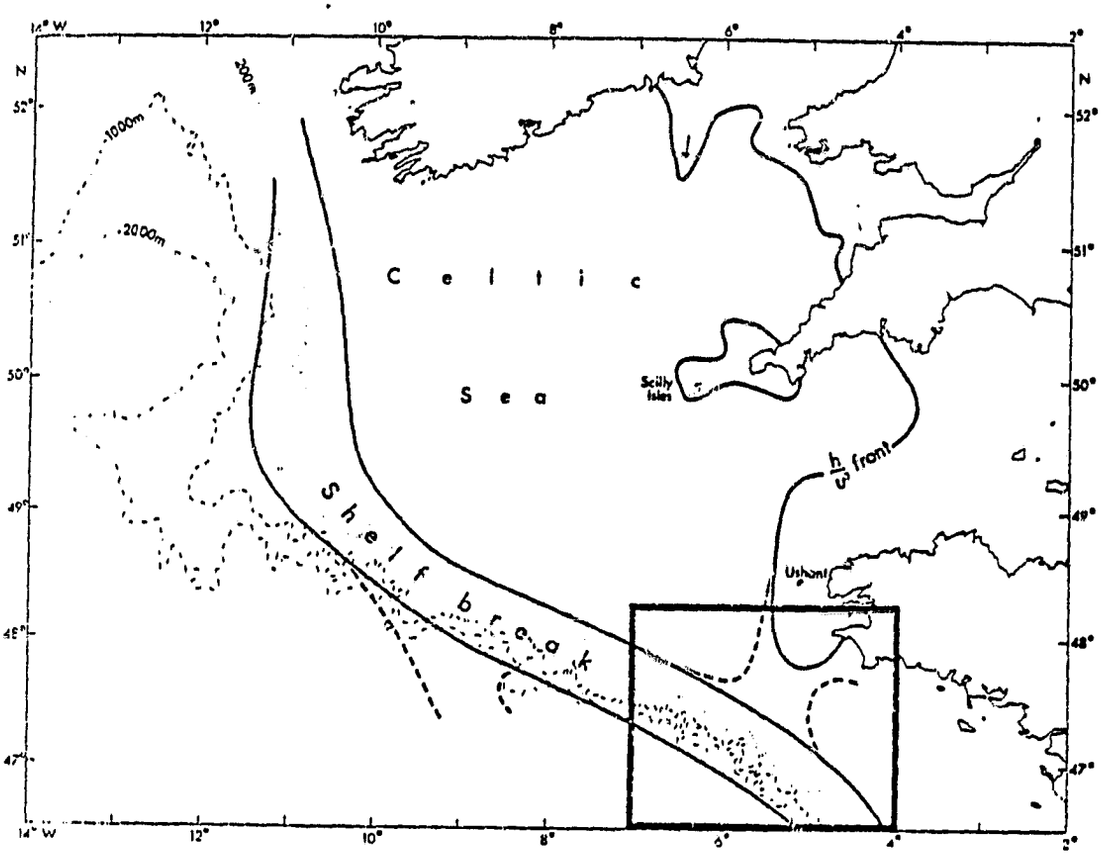

Fig. 8 : Schematic of the mean temperature structure bordering the Celtic Sea according to PINGREE (*1*).

Fig. 9 : HCMM thermal infrared imagery of the Bay of Biscay and of the Celtic Sea, 15 september 1978, 02.22 TU, HCMM image ID A-A0142-02220-3. Darker tones are cooler surfaces, lands and clouds are black ; dark grey corresponds to the cooler waters, between the Britain and the Ushant tidal front, and at the continental shelf break.

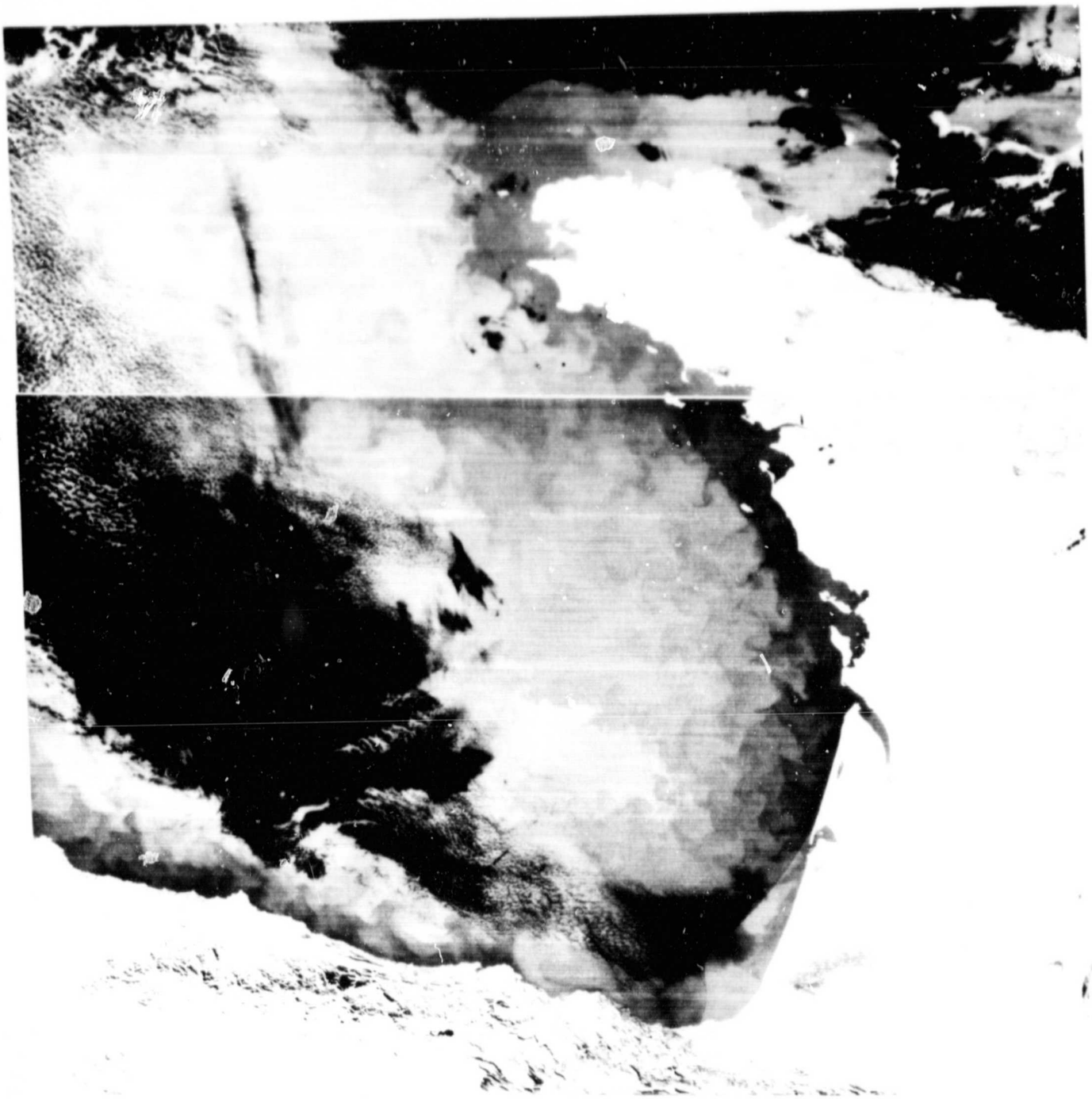

Fig. 10 : HCMM thermal infrared imagery of the Bay of Biscay and of the Celtic Sea, 28 october 1978, 13.18 TU, image ID A-A0185-13180-2 and A-A0185-13200-2. Darker tones are cooler surfaces, lands are white, clouds are black. Dark grey corresponds to the cooler shelf water from Britain to Spain.

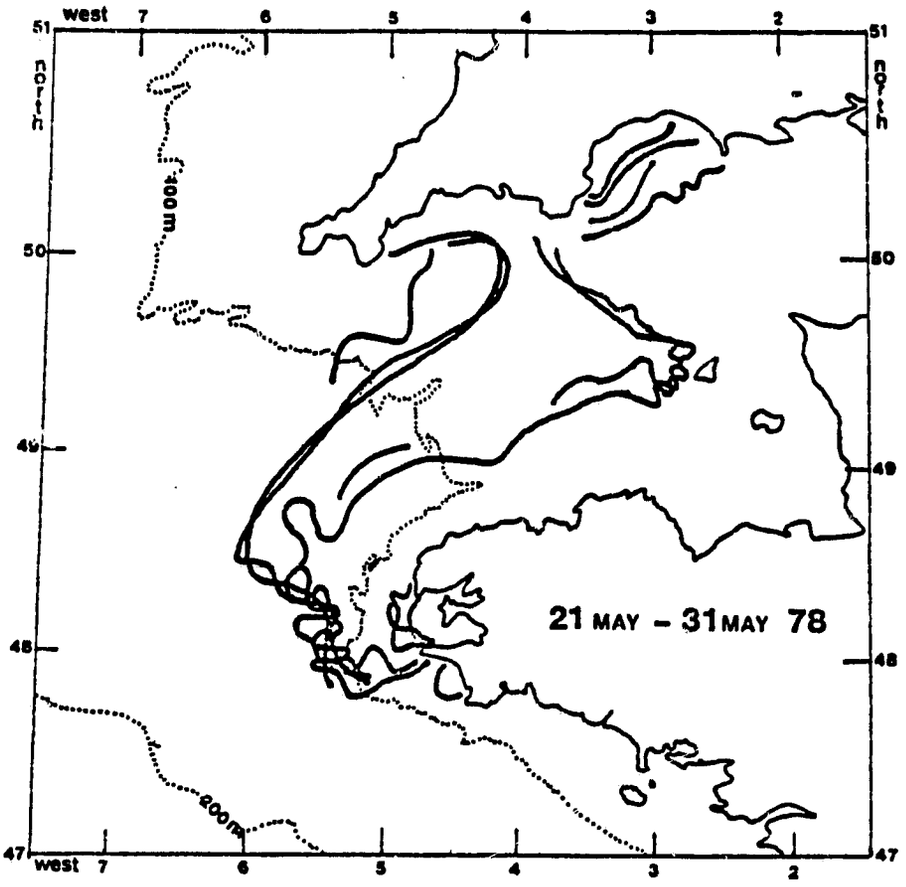

Fig. 11 : The Ushant tidal front offshore Britain during the period from 21 may to 31 may 1978.

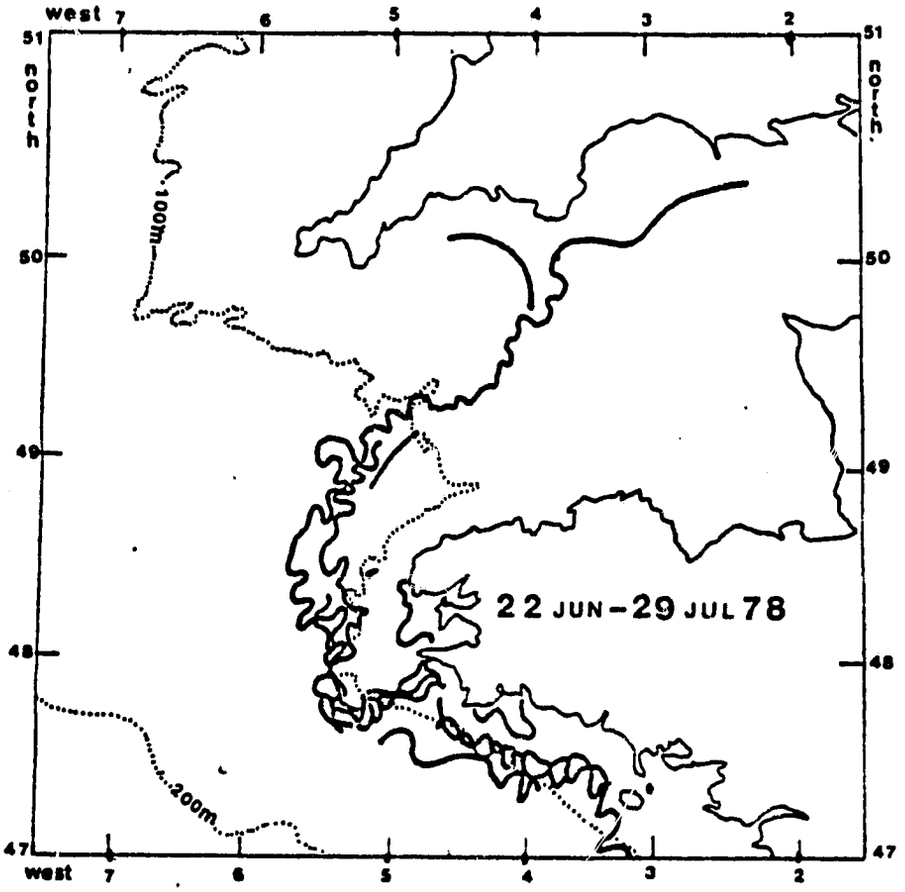

Fig. 12 : Same as Figure 11, from 22 june to 29 july 1978.

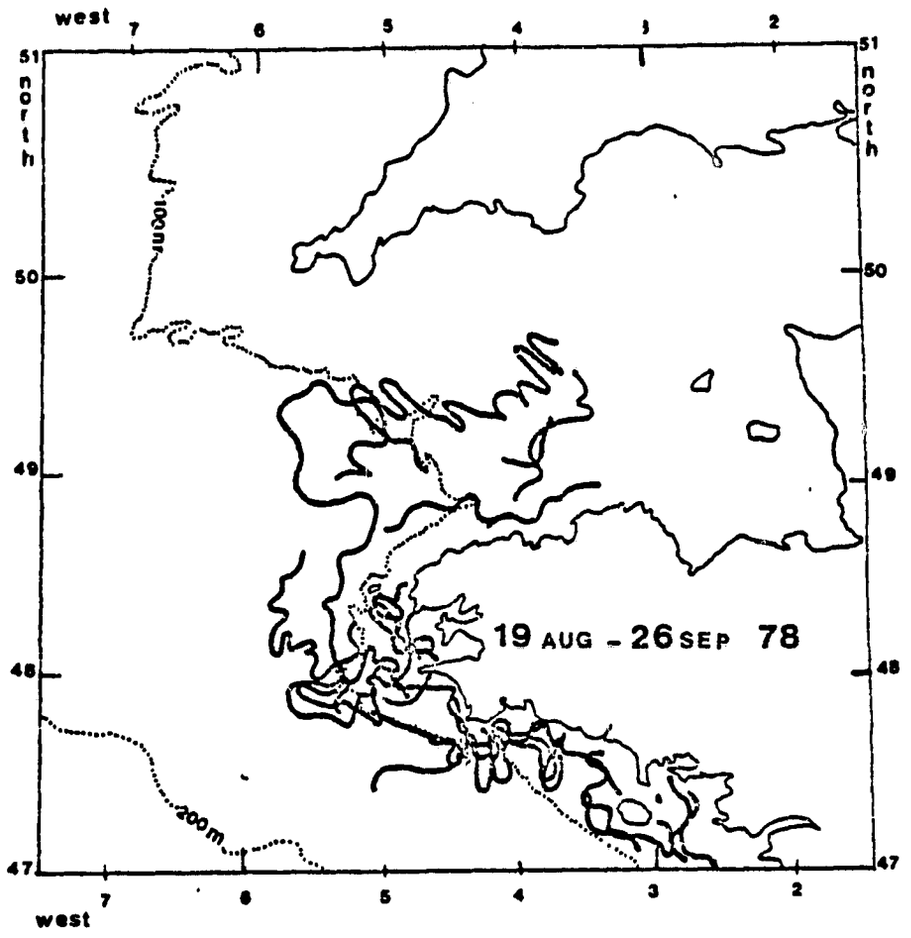

Fig. 13 : Same as Figure 11, from 19 august to 26 september 1978.

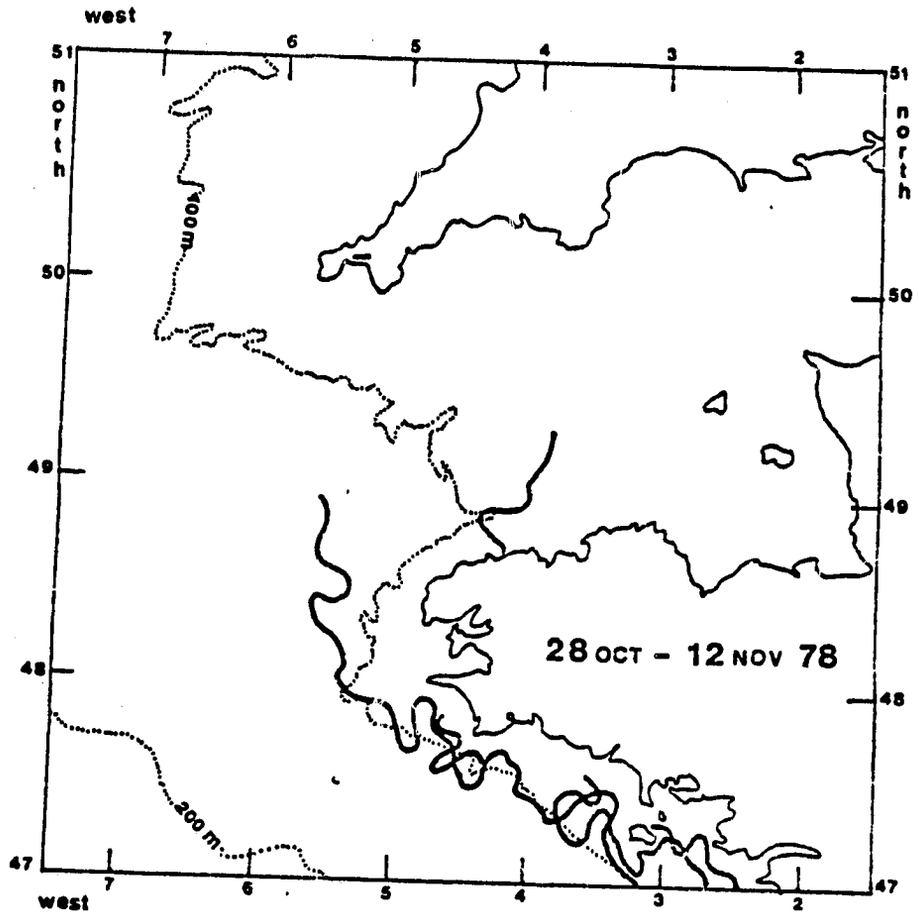

Fig. 14 : Same as Figure 11, from 28 october to 12 november 1978.

ATTACHMENT A

Permanent addresses and organizations of the investigators

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ATTACHMENT B

List of the received data

0 ..... Date

1 ..... Type of data
- DIR : Day IR
- NIR : Night IR
- DVI : Day VIS

2 ..... Scene ID

3 ..... Location of the center of image

4 ..... Remarks

0	1	2	3	4

Photographic data products

11 may 1978	NIR	A-A0015-02540-3	53.32N-003.43W
	NIR	A-A0015-02550-3	47.29N-006.08W
	NIR	A-A0015-02560-3	45.29N-006.08W
	NIR	A-A0015-02570-3	41.26N-008.08W
	DVI	A-A0015-13510-1	40.35N-004.53W
	DIR	A-A0015-13510-2	40.35N-004.53W
	DVI	A-A0015-13530-1	46.38N-006.52W
	DIR	A-A0015-13530-2	46.38N-006.52W
	DVI	A-A0015-13550-1	52.40N-009.14W
	DIR	A-A0015-13550-2	52.40N-009.14W
13 may 1978	NIR	A-A0017-01570-3	38.02N-005.56E
	DVI	A-A0017-12510-1	41.29N-009.56E
	DIR	A-A0017-12510-2	41.29N-009.56E
	DVI	A-A0017-12540-1	53.34N-005.29E
	DIR	A-A0017-12540-2	53.34N-005.29E
14 may 1978	DVI	A-A0018-13080-1	39.07N-006.02E
	DIR	A-A0018-13080-2	39.07N-006.02E
	DVI	A-A0018-13100-1	45.11N-004.08E
	DIR	A-A0018-13100-2	45.11N-004.08E
16 may 1978	NIR	A-A0020-02480-3	51.39N-003.11W
	NIR	A-A0020-02500-3	45.36N-005.28W
18 may 1978	DVI	A-A0022-12460-1	44.55N-010.11E
	DIR	A-A0022-12460-2	44.55N-010.11E
	DVI	A-A0022-12470-1	50.58N-007.57E
	DIR	A-A0022-12470-2	50.58N-007.57E
20 may 1978	DVI	A-A0024-13200-1	38.07N-003.07E
	DIR	A-A0024-13200-2	38.07N-003.07E
	DVI	A-A0024-13200-1	36.32N-003.34E
	DIR	A-A0024-13200-2	36.32N-003.34E
	DVI	A-A0024-13220-1	44.11N-001.15E
	DIR	A-A0024-13220-2	44.11N-001.15E
	DVI	A-A0024-13230-1	48.40N-000.19E
	DIR	A-A0024-13230-2	48.40N-000.19E
	DVI	A-A0024-13250-1	54.40N-002.52W
	DIR	A-A0024-13250-2	54.40N-002.52W
21 may 1978	DVI	A-A0025-13380-1	35.53N-000.52E
	DIR	A-A0025-13380-2	35.53N-000.52E
	DVI	A-A0025-13390-1	41.58N-002.38W
	DIR	A-A0025-13390-2	41.58N-002.38W
	DVI	A-A0025-13410-1	48.01N-004.41W
	DIR	A-A0025-13410-2	48.01N-004.41W
	DVI	A-A0025-13430-1	54.04N-007.08E
	DIR	A-A0025-13430-2	54.04N-007.08E
23 may 1978	NIR	A-A0027-03180-3	52.55N-010.27W
	NIR	A-A0027-03200-3	46.52N-012.50W

0	1	2	3	4
24 may 1978	NIR	A-A0028-02020-3	43.47N-005.49E	
	NIR	A-A0028-02030-3	37.41N-003.58E	
	DVI	A-A0028-12550-1	36.16N-009.35E	
	DIR	A-A0028-12550-2	36.16N-009.35E	
	DVI	A-A0028-12570-1	42.40N-007.47E	
	DIR	A-A0028-12570-2	42.40N-007.47E	
25 may 1978	NIR	A-A0029-02210-3	39.37N-000.=2E	
26 may 1978	NIR	A-A0030-02370-3	48.31N-001.41W	
	NIR	A-A0030-02380-3	42.26N-003.45W	
27 may 1978	NIR	A-A0031-02540-3	50.25N-005.32W	
	NIR	A-A0031-02560-3	44.21N-007.44W	
28 may 1978	DVI	A-A0032-12350-1	50.08N-011.02E	
	DIR	A-A0032-12350-2	50.08N-011.02E	
	DVI	A-A0032-12350-1	51.38N-010.26E	
	DIR	A-A0032-12350-2	51.38N-010.26E	
	DVI	A-A0032-12360-1	56.08N-008.22E	
	DIR	A-A0032-12360-2	56.08N-008.22E	
29 may 1978	NIR	A-A0033-01550-3	43.35N-007.08E	
	NIR	A-A0033-01570-3	37.29N-005.18E	
	DVI	A-A0033-12500-1	39.56N-009.57E	
	DIR	A-A0033-12500-2	39.56N-009.57E	
	DVI	A-A0033-12520-1	46.01N-007.59E	
	DIR	A-A0033-12520-2	46.01N-007.59E	
	DVI	A-A0033-12530-1	52.03N-005.40E	
	DIR	A-A0033-12530-2	52.03N-005.40E	
30 may 1978	NIR	A-A0034-02120-3	50.41N-005.06E	
	NIR	A-A0034-02130-3	44.37N-002.53E	
	NIR	A-A0034-02130-3	50.05N-004.30E	
	NIR	A-A0034-02140-3	44.37N-002.53E	
	NIR	A-A0034-02150-3	38.31N-001.02E	
	DVI	A-A0034-13070-1	36.17N-006.25E	
	DIR	A-A0034-13070-2	36.17N-006.25E	
	DVI	A-A0034-13080-1	38.50N-005.41E	
	DIR	A-A0034-13080-2	38.50N-005.41E	
	DVI	A-A0034-13090-1	44.55N-003.47E	
	DIR	A-A0034-13090-2	44.55N-003.47E	
	DVI	A-A0034-13090-1	42.22N-004.37E	
	DIR	A-A0034-13090-2	42.22N-004.37E	
	DVI	A-A0034-13100-1	48.26N-002.32E	
	DIR	A-A0034-13100-2	48.26N-002.32E	
	DVI	A-A0034-13110-1	50.58N-001.33E	
	DIR	A-A0034-13110-2	50.58N-001.33E	
	DVI	A-A0034-13120-1	54.27N-000.01E	
	DIR	A-A0034-13120-2	54.27N-000.01E	
31 may 1978	NIR	A-A0035-02280-3	56.13N-003.00E	
	NIR	A-A0035-02300-3	50.11N-000.19E	
	NIR	A-A0035-02320-3	44.07N-001.50W	
	NIR	A-A0035-02330-3	38.01N-003.41W	

0	1	2	3	4
1 june 1978	NIR	A-A0036-02480-3	51.25N-003.44W	
	NIR	A-A0036-02490-3	45.21N-006.00W	
	DVI	A-A0036-13440-1	38.45N-003.23W	
	DIR	A-A0036-13440-2	38.35N-003.23W	
	DVI	A-A0036-13460-1	44.40N-005.17W	
	DIR	A-A0036-13460-2	44.40N-005.17W	
	DVI	A-A0036-13470-1	50.43N-007.31W	
	DIR	A-A0036-13470-2	50.43N-007.31W	
3 june 1978	NIR	A-A0038-01490-3	41.46N-007.56E	
	NIR	A-A0038-01510-3	35.39N-006.11E	
	DVI	A-A0038-12440-1	40.54N-011.04E	
	DIR	A-A0038-12440-2	40.54N-011.04E	
	DVI	A-A0038-12460-1	46.59N-009.04E	
	DIR	A-A0038-12460-2	46.59N-009.04E	
	DVI	A-A0038-12470-1	53.01N-006.40E	
	DIR	A-A0038-12470-2	53.01N-006.40E	
8 june 1978	DVI	A-A0043-12370-1	34.45N-014.15E	
	DVI	A-A0043-12380-1	41.20N-012.20E	
	DIR	A-A0043-12380-2	41.20N-012.20E	
9 june 1978	DVI	A-A0044-12550-1	38.41N-008.34E	
	DIR	A-A0044-12550-2	38.41N-008.34E	
	DVI	A-A0044-12570-1	44.46N-006.40E	
	DVI	A-A0044-12570-1	44.46N-006.40E	
	DVI	A-A0044-12580-1	50.50N-004.26E	
	DIR	A-A0044-12580-2	50.50N-004.26E	
10 june 1978	DVI	A-A0045-13130-1	36.36N-004.35E	
	DIR	A-A0045-13130-2	36.36N-004.35E	
	DVI	A-A0045-13140-1	42.41N-002.46E	
	DIR	A-A0045-13140-2	42.41N-002.46E	
	DVI	A-A0045-13160-1	48.46N-000.40E	
	DIR	A-A0045-13160-2	48.46N-000.40E	
	DVI	A-A0045-13180-1	54.47N-001.52W	
	DIR	A-A0045-13180-2	54.47N-001.52W	
16 june 1978	NIR	A-A0051-02270-3	56.20N-002.44E	
	NIR	A-A0051-02320-3	38.07N-003.59W	
18 june 1978	DVI	A-A0053-14030-1	46.05N-010.34W	
	DIR	A-A0053-14030-2	46.05N-010.34W	
	DVI	A-A0053-14050-1	52.00N-012.54W	
	DIR	A-A0053-14050-2	52.09N-012.54W	
19 juin 1978	NIR	A-A0054-01470-3	45.45N-008.58E	
	NIR	A-A0054-01490-3	39.40N-007.02E	
	DVI	A-A0054-12430-1	42.46N-010.16E	
	DIR	A-A0054-12430-2	42.46N-010.16E	
	DVI	A-A0054-12450-1	48.51N-008.10E	
	DIR	A-A0054-12450-2	48.51N-008.10E	
	DVI	A-A0054-12470-1	54.53N-005.35E	
	DIR	A-A0054-12470-2	54.53N-005.35E	

0	1	2	3	4
20 june 1978	NIR	A-A0055-02030-3	52.58N-007.11E	
	NIR	A-A0055-02040-3	52.00N-006.46E	
	NIR	A-A0055-02050-3	46.54N-004.47E	
	NIR	A-A0055-02070-3	39.49N-002.30E	
	DVI	A-A0055-13000-1	39.00N-006.50E	
	DIR	A-A0055-13000-2	39.00N-006.50E	
	DVI	A-A0055-13020-1	45.05N-004.55E	
	DIR	A-A0055-13020-2	45.05N-004.55E	
	DVI	A-A0055-13040-1	51.10N-002.39E	
	DIR	A-A0055-13040-2	51.10N-002.30E	
21 june 1978	NIR	A-A0056-02210-3	56.11N-004.04E	
	NIR	A-A0056-02220-3	50.09N-001.26E	
	NIR	A-A0056-02240-3	44.04N-000.43E	
	NIR	A-A0056-02260-3	37.58N-002.34W	
22 june 1978	DVI	A-A0057-13350-1	35.02N-001.10W	
	DIR	A-A0057-13350-2	35.02N-001.10W	
	DVI	A-A0057-13370-1	41.08N-002.56W	
	DIR	A-A0057-13370-2	41.08N-002.56W	
	DVI	A-A0057-13390-1	47.13N-004.58W	
	DIR	A-A0057-13390-2	47.13N-004.58W	
	DVI	A-A0057-13400-1	53.17N-007.23W	
	DIR	A-A0057-13400-2	53.17N-007.23W	
24 june 1978	NIR	A-A0059-01410-3	42.31N-009.22E	
	NIR	A-A0059-01430-3	36.24N-007.35E	
	DVI	A-A0059-12370-1	42.34N-011.47E	
	DIR	A-A0059-12370-2	42.34N-011.47E	
	DVI	A-A0059-12400-1	54.41N-007.07E	
	DIR	A-A0059-12400-2	54.41N-007.07E	
26 june 1978	NIR	A-A0061-02160-3	49.14N-002.34E	
	NIR	A-A0061-02170-3	43.10N-000.27E	
	NIR	A-A0061-02190-3	37.01N-001.20W	
	DVI	A-A0061-13110-1	36.55N-004.21E	
	DIR	A-A0061-13110-2	36.55N-004.21E	
	DVI	A-A0061-13130-1	43.01N-002.32E	
	DIR	A-A0061-13130-2	43.01N-002.32E	
	DVI	A-A0061-13150-1	49.06N-002.25E	
	DIR	A-A0061-13150-2	40.06N-002.25E	
	DVI	A-A0061-13160-1	55.08N-002.10W	
	DIR	A-A0061-13160-2	55.08N-002.10W	
27 june 1978	DVI	A-A0062-13290-1	35.01N-000.19E	
	DIR	A-A0062-13290-2	35.01N-000.19E	
	DVI	A-A0062-13300-1	41.08N-001.25W	
	DIR	A-A0062-13300-2	41.08N-001.25W	

0	1	2	3	4
28 june 1978	NIR	A-A0063-02510-3	51.35N-005.36W	
	NIR	A-A0063-02530-3	45.32N-007.52W	
	DVI	A-A0063-13490-1	43.33N-006.46W	
	DIR	A-A0063-13490-2	43.33N-006.46W	
30 june 1978	NIR	A-A0065-01500-3	54.07N-010.39E	
	NIR	A-A0065-01530-3	45.59N-006.08E	
	NIR	A-A0065-01550-3	35.53N-004.23E	
	DVI	A-A0065-12470-1	39.22N-009.43E	
	DIR	A-A0065-12470-2	39.22N-009.43E	
	DVI	A-A0065-12490-1	45.29N-007.47E	
	DIR	A-A0065-12490-2	45.49N-007.47E	

0	1	2	3	4
2 july 1978	NIR	A-A0067-02270-3	50.36N-000.02E	
	NIR	A-A0067-02280-3	44.32N-002.09W	
	NIR	A-A0067-02300-3	38.26N-004.01W	
4 july 1978	DVI	A-A0069-14000-1	41.18N-009.05W	
	DIR	A-A0069-14000-2	41.18N-009.05W	
5july 1978	NIR	A-A0070-01460-3	43.16N-008.04E	
	NIR	A-A0070-01460-3	42.29N-007.49E	
	NIR	A-A0070-01470-3	37.10N-006.15E	
	NIR	A-A0070-01480-3	36.23N-006.02E	
	DVI	A-A0070-12410-1	43.01N-010.08E	
	DIR	A-A0070-12410-2	43.01N-010.08E	
	DVI	A-A0070-12410-1	43.34N-009.58E	
	DIR	A-A0070-12410-2	43.34N-009.58E	
	DVI	A-A0070-12450-1	55.09N-005.25E	
	DIR	A-A0070-12450-2	55.09N-005.25E	
	DVI	A-A0070-12450-1	55.41N-005.08E	
	DIR	A-A0070-12450-2	55.41N-005.08E	
6 july 1978	NIR	A-A0071-02020-3	48.26N-005.17E	
	NIR	A-A0071-02040-3	42.22N-003.13E	
	NIR	A-A0071-02060-3	36.16N-001.27E	
	DVI	A-A0071-12570-1	36.10N-007.38E	
	DIR	A-A0071-12570-2	36.10N-007.38E	
	DVI	A-A0071-12590-1	42.16N-005.49E	
	DIR	A-A0071-12590-2	42.16N-005.49E	
7 july 1978	NIR	A-A0072-02210-3	46.31N-000.02E	
	NIR	A-A0072-02230-3	40.25N-001.54W	
	DVI	A-A0072-13170-1	40.08N-001.54E	
	DIR	A-A0072-13170-2	40.08N-001.54E	
	DVI	A-A0072-13170-1	40.05N-001.55E	
	DIR	A-A0072-13170-2	40.05N-001.55E	
	DVI	A-A0072-13180-1	46.14N-000.=3E	
	DIR	A-A0072-13180-2	46.14N-000.=3E	
	DVI	A-A0072-13180-1	46.11N-000.=2E	
	DIR	A-A0072-13180-2	46.11N-000.=2E	
8 july 1978	NIR	A-A0073-02370-3	52.33N-002.10W	
	DVI	A-A0073-13350-1	40.53N-002.50W	
	DIR	A-A0073-13350-2	40.53N-002.50W	
	DVI	A-A0073-13360-1	46.59N-004.51W	
	DIR	A-A0073-13360-2	46.59N-004.51W	
10 july 1978	NIR	A-A0075-01390-3	42.20N-009.21E	
	NIR	A-A0075-01410-3	36.14N-007.35E	
	DVI	A-A0075-12350-1	45.02N-011.01E	
	DIR	A-A0075-12350-2	45.02N-011.01E	
	DVI	A-A0075-12370-1	51.07N-008.46E	
	DIR	A-A0075-12370-2	51.07N-008.46E	

0	1	2	3	4
11 july 1978	NIR	A-A0076-01540-3	52.29N-008.27E	
	NIR	A-A0076-01550-3	49.03N-007.04E	
	NIR	A-A0076-01560-3	46.26N-006.07E	
	NIR	A-A0076-01580-3	40.22N-004.10E	
	NIR	A-A0076-01590-3	36.53N-003.10E	
12 july 1978	NIR	A-A0077-02130-3	51.37N-003.33E	
	NIR	A-A0077-02140-3	45.34N-001.17E	
	NIR	A-A0077-02160-3	39.29N-000.37E	
13 july 1978	NIR	A-A0078-02310-3	51.45N-000.56E	
	NIR	A-A0078-02320-3	45.42N-003.13W	
16 july 1978	NIR	A-A0081-01500-3	45.08N-007.15E	
	NIR	A-A0081-01510-3	39.04N-005.22E	
17 july 1978	NIR	A-A0082-02060-3	51.24N-005.02E	
	NIR	A-A0082-02080-3	45.21N-002.47E	
	NIR	A-A0082-02090-3	39.17N-000.53E	
	DVI	A-A0082-13020-1	39.22N-005.15E	
	DIR	A-A0082-13020-2	39.22N-005.15E	
	DVI	A-A0082-13040-1	45.29N-003.19E	
	DIR	A-A0082-13040-2	45.29N-003.19E	
	DVI	A-A0082-13060-1	51.33N-001.02E	
	DIR	A-A0082-13060-2	51.33N-001.02E	
21 july 1978	NIR	A-A0086-01450-3	36.18N-006.12E	
	DVI	A-A0086-12380-1	42.55N-010.17E	
	DIR	A-A0086-12380-2	42.55N-010.17E	
22 july 1978	NIR	A-A0087-02000-3	47.02N-004.59E	
	NIR	A-A0087-02020-3	40.58N-003.00E	
23 july 1978	NIR	A-A0088-02200-3	40.08N-001.47W	
25 july 1978	NIR	A-A0090-02530-3	51.47N-006.47W	
	NIR	A-A0090-02540-3	51.44N-009.04W	
26 july 1978	NIR	A-A0091-01370-3	41.00N-009.14E	
27 july 1978	NIR	A-A0092-01510-3	54.28N-009.41E	
	NIR	A-A0092-01530-3	48.27N-001.11E	
	NIR	A-A0092-01540-3	42.23N-005.07E	
	NIR	A-A0092-01560-3	36.19N-003.20E	
28 july 1979	NIR	A-A0093-02100-3	50.54N-003.35E	
	NIR	A-A0093-02120-3	44.52N-001.22E	
	NIR	A-A0093-02130-3	38.47N-000.30E	
	DVI	A-A0093-13060-1	37.03N-004.29E	
	DIR	A-A0093-13060-2	37.03N-004.29E	
	DVI	A-A0093-13070-1	43.10N-002.40E	
	DIR	A-A0093-13070-2	43.10N-002.40E	
	DVI	A-A0093-13090-1	49.14N-000.33E	
	DIR	A-A0093-13090-2	49.14N-000.33E	
	DVI	A-A0093-13110-1	55.17N-002.01W	
	DIR	A-A0093-13110-2	55.17N-002.01W	

0	1	2	3	4
29 july 1978	NIR	A-A0094-02280-3	51.50N-000.31E	
	NIR	A-A0094-02290-3	45.48N-002.49W	
	DVI	A-A0094-13230-1	36.00N-000.16E	
	DVI	A-A0094-13250-1	42.07N-001.29W	
	DIR	A-A0094-13250-2	42.07N-001.29W	
	DVI	A-A0094-13270-1	48.11N-003.34W	
	DIR	A-A0094-13270-2	48.11N-003.34W	
	DVI	A-A0094-13280-1	54.14N-006.04W	
	DIR	A-A0094-13280-2	54.14N-006.04W	
30 july 1978	NIR	A-A0095-02470-3	46.04N-007.16W	
31 july 1978	NIR	A-A0096-03040-3	51.54N-009.34W	
	NIR	A-A0096-03050-3	45.42N-011.52W	
	DVI	A-A0096-12260-1	50.27N-010.45E	
	DIR	A-A0096-12260-2	50.27N-010.45E	
	DVI	A-A0096-12280-1	56.28N-008.01E	
	DIR	A-A0096-12280-2	56.28N-008.01E	

1	2	3	4
NIR	A-A0097-01470-3	43.46N-007.11E	
NIR	A-A0097-01480-3	37.42N-005.21E	
NIR	A-A0107-01320-3	42.53N-010.11E	
NIR	A-A0107-01340-3	36.48N-008.23E	
NIR	A-A0108-01510-3	41.31N-005.13E	
NIR	A-A0108-01530-3	35.26N-003.28E	
DVI	A-A0108-12450-1	40.34N-008.19E	
DIR	A-A0108-12450-2	40.34N-008.19E	
DVI	A-A0108-12470-1	46.39N-006.21E	
DIR	A-A0108-12470-2	46.39N-006.21E	
DVI	A-A0113-12380-1	40.49N-009.54E	
DIR	A-A0113-12380-2	40.49N-009.54E	
DVI	A-A0113-12380-1	42.16N-009.27E	
DIR	A-A0113-12380-2	42.16N-009.27E	
DVI	A-A0113-12390-1	46.53N-007.55E	
DIR	A-A0113-12390-2	46.53N-007.55E	
DVI	A-A0113-12410-1	52.55N-005.31E	
DIR	A-A0113-12410-2	52.55N-005.31E	
DVI	A-A0114-12550-1	37.48N-006.16E	
DIR	A-A0114-12550-2	37.48N-006.16E	
DVI	A-A0114-12570-1	43.53N-004.25E	
DIR	A-A0114-12570-2	43.53N-004.25E	
NIR	A-A0115-02180-3	45.56N-000.42E	
NIR	A-A0115-02200-3	39.52N-002.39W	
DVI	A-A0115-13130-1	37.32N-001.49E	
DIR	A-A0115-13130-2	37.32N-001.49E	
DVI	A-A0115-13140-1	43.37N-000.00E	
DIR	A-A0115-13140-2	43.37N-000.00E	
DVI	A-A0115-13160-1	49.40N-002.09W	
DIR	A-A0115-13160-2	49.40N-002.09W	
DVI	A-A0117-13500-1	43.35N-009.04W	
DIR	A-A0117-13500-2	43.35N-009.04W	
DVI	A-A0117-13520-1	49.38N-011.13W	
DIR	A-A0117-13520-2	49.38N-011.13W	
NIR	A-A0118-01350-3	45.16N-009.47E	
DVI	A-A0118-12310-1	41.30N-011.21E	
DIR	A-A0118-12310-2	41.30N-011.21E	
DVI	A-A0118-12340-1	53.35N-006.53E	
DIR	A-A0118-12340-2	53.35N-006.53E	
DVI	A-A0120-13060-1	40.34N-002.34E	
DIR	A-A0120-13060-2	40.34N-002.34E	
DVI	A-A0120-13080-1	46.38N-000.36E	
DIR	A-A0120-13080-2	46.38N-000.36E	
NIR	A-A0123-01290-3	44.15N-010.58E	
NIR	A-A0123-01300-3	38.10N-009.05E	

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28 august 1978	NIR	A-A0124-01460-3	49.26N-008.13E	
	DVI	A-A0124-12410-1	39.00N-009.00E	
	DIR	A-A0124-12410-2	39.00N-009.00E	
	DVI	A-A0124-12430-1	45.05N-007.07E	
	DIR	A-A0124-12430-2	45.05N-007.07E	
	DVI	A-A0124-12450-1	51.07N-004.52E	
	DIR	A-A0124-12450-2	51.07N-004.52E	
31 august 1978	DVI	A-A0127-13380-1	45.05N-006.39W	
	DIR	A-A0127-13380-2	45.05N-006.39W	

0	1	2	3	4
1 september 1978	DVI	A-A0128-12220-1	56.23N-008.22E	
	DIR	A-A0128-12220-2	56.23N-008.22E	
2 september 1978	NIR	A-A0129-01410-3	45.22N-008.06E	
	NIR	A-A0129-01420-3	39.17N-006.11E	
3 september 1978	DVI	A-A0130-12540-1	38.57N-005.48E	
	DIR	A-A0130-12540-2	38.57N-005.48E	
	DVI	A-A0130-12550-1	45.01N-003.54E	
	DVI	A-A0130-12570-1	51.04N-001.39E	
4 september 1978	NIR	A-A0131-02150-3	51.40N-001.19E	
	NIR	A-A0131-02170-3	45.37N-000.58E	
6 september 1978	DVI	A-A0133-13490-1	43.30N-009.20W	
	DIR	A-A0133-13490-2	43.30N-009.20W	
7 september 1978	NIR	A-A0134-01370-3	35.29N-006.31E	
	NIR	A-A0134-03090-3	53.38N-011.36W	
	DVI	A-A0134-12300-1	43.29N-010.21E	
	DIR	A-A0134-12300-2	43.29N-010.21E	
	DVI	A-A0134-12300-1	43.44N-010.16E	
	DIR	A-A0134-12300-2	43.44N-010.16E	
	DVI	A-A0134-12340-1	55.32N-005.35E	
	DIR	A-A0134-12340-2	55.32N-005.35E	
	DVI	A-A0134-12340-1	55.47N-005.29E	
	DIR	A-A0134-12340-2	55.47N-005.29E	
12 september 1978	NIR	A-A0139-01290-3	42.48N-009.59E	
	NIR	A-A0139-01300-3	36.41N-008.11E	
13 september 1978	NIR	A-A0140-01450-3	51.05N-008.26E	
14 september 1978	NIR	A-A0141-02050-3	41.38N-000.28E	
	DVI	A-A0141-12580-1	36.02N-004.49E	
	DIR	A-A0141-12580-2	36.02N-004.49E	
	DVI	A-A0141-12580-1	36.10N-004.47E	
	DIR	A-A0141-12580-2	36.10N-004.47E	
	DVI	A-A0141-13000-1	42.07N-003.02E	
	DIR	A-A0141-13000-2	42.07N-003.02E	
	DVI	A-A0141-13000-1	42.15N-003.00E	
	DIR	A-A0141-13000-2	42.15N-003.00E	
	DVI	A-A0141-13020-1	48.11N-000.59E	
	DIR	A-A0141-13020-2	48.11N-000.59E	
	DVI	A-A0141-13020-1	48.18N-000.56E	
	DIR	A-A0141-13020-2	48.18N-000.56E	
	DVI	A-A0141-13030-1	54.12N-001.30W	
	DIR	A-A0141-13030-2	54.12N-001.30W	
	DVI	A-A0141-13030-1	54.19N-001.33W	
	DIR	A-A0141-13030-2	54.19N-001.33W	
15 september 1979	NIR	A-A0142-02210-3	52.02N-000.22E	
	NIR	A-A0142-02210-3	51.55N-000.25E	
	NIR	A-A0142-02220-3	45.52N-002.43W	
	DVI	A-A0142-13180-1	40.21N-000.58E	
	DIR	A-A0142-13180-2	40.41N-000.58E	

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15 september 1978	DVI	A-A0142-13190-1	46.25N-002.55W	
	DIR	A-A0142-13190-2	46.25N-002.55W	
	DVI	A-A0142-13210-1	52.27N-005.16W	
	DIR	A-A0142-13210-2	52.27N-005.16W	
16 september 1978	NIR	A-A0143-02390-3	52.49N-004.34W	
	NIR	A-A0143-02400-3	46.46N-006.57W	
17 september 1978	DVI	A-A0144-12210-1	55.17N-008.33E	
	DIR	A-A0144-12210-2	55.17N-008.33E	
	DVI	A-A0144-13570-1	52.08N-014.17W	
	DIR	A-A0144-13570-2	52.08N-014.17W	
	DVI	A-A0144-13560-1	46.05N-011.58W	
	DIR	A-A0144-13560-2	46.05N-011.58W	
18 september 1978	DVI	A-A0145-12360-1	42.16N-009.00E	
	DIR	A-A0145-12360-2	42.16N-009.00E	
	DVI	A-A0145-12370-1	48.19N-006.56E	
	DIR	A-A0145-12370-2	48.19N-006.56E	
	DVI	A-A0145-12390-1	54.20N-004.26E	
	DIR	A-A0145-12390-2	54.20N-004.26E	
21 september 1978	NIR	A-A0148-02340-3	45.48N-005.52W	
22 september 1978	DVI	A-A0149-13480-1	40.49N-008.49W	
	DIR	A-A0149-13480-2	40.49N-008.49W	
	DVI	A-A0149-13490-1	46.53N-010.48W	
	DIR	A-A0149-13490-2	46.53N-010.48W	
23 september 1978	DVI	A-A0150-12300-1	46.19N-009.07E	
	DIR	A-A0150-12300-2	46.19N-009.07E	
	DVI	A-A0150-12320-1	52.22N-006.47E	
24 september 1978	DVI	A-A0151-12460-1	39.07N-006.50E	
	DIR	A-A0151-12460-2	39.07N-006.50E	
	DVI	A-A0151-12480-1	45.11N-004.56E	
	DIR	A-A0151-12480-2	45.11N-004.56E	
	DVI	A-A0151-12500-1	51.14N-002.41E	
	DIR	A-A0151-12500-2	51.14N-002.41E	
26 september 1978	DVI	A-A0153-13220-1	37.49N-001.54W	
	DIR	A-A0153-13220-2	37.49N-001.54W	
	DVI	A-A0153-13240-1	43.54N-003.45W	
	DIR	A-A0153-13240-2	43.54N-003.45W	
	DVI	A-A0153-13260-1	49.57N-005.55W	
	DIR	A-A0153-13260-2	49.57N-005.55W	
27 september 1978	NIR	A-A0154-02450-3	49.29N-007.38W	
	NIR	A-A0154-02460-3	43.25N-009.47W	
28 september 1978	NIR	A-A0155-01280-3	42.18N-009.35E	
	NIR	A-A0155-01290-3	36.11N-007.48E	
	DVI	A-A0155-12230-1	42.50N-011.44E	
	DIR	A-A0155-12230-2	42.50N-011.44E	
	DVI	A-A0155-12260-1	54.55N-007.05E	
	DIR	A-A0155-12260-2	54.55N-007.05E	
30 september 1978	NIR	A-A0157-02050-3	38.10N-000.47E	

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)78	DVI	A-A0160-13530-1	43.29N-011.13W
	DIR	A-A0160-13530-2	43.29N-011.13W
	DVI	A-A0160-13550-1	49.32N-013.21W
	DIR	A-A0160-13550-2	49.32N-013.21W
)78	DVI	A-A0162-12520-1	40.38N-004.49E
	DIR	A-A0162-12520-2	40.38N-004.49E
	DVI	A-A0162-12530-1	46.43N-002.50E
	DIR	A-A0162-12530-2	46.43N-002.50E
.978	DVI	A-A0167-12450-1	39.56N-006.35E
	DIR	A-A0167-12450-2	39.56N-006.35E
	DVI	A-A0167-12460-1	46.02N-004.38E
	DIR	A-A0167-12460-2	46.02N-004.38E
.978	DVI	A-A0170-13390-1	41.38N-007.32W
	DIR	A-A0170-13390-2	41.38N-007.32W
	DVI	A-A0170-13410-1	47.43N-009.34W
	DIR	A-A0170-13410-2	47.43N-009.34W
.978	DVI	A-A0172-12380-1	41.04N-007.50E
	DIR	A-A0172-12380-2	41.04N-007.50E
	DVI	A-A0172-12400-1	47.09N-005.50E
	DIR	A-A0172-12400-2	47.09N-005.50E
.978	DVI	A-A0174-13140-1	39.54N-000.53E
	DIR	A-A0174-13140-2	39.54N-000.53E
	DVI	A-A0174-13170-1	52.04N-005.08W
	DIR	A-A0174-13170-2	52.04N-005.08W
978	DVI	A-A0181-13430-1	42.10N-008-57W
	DIR	A-A0181-13430-2	42.10N-008.57W
	DVI	A-A0181-13450-1	48.15N-011.01W
	DIR	A-A0181-13450-2	48.15N-011.01W
.978	DVI	A-A0182-12231-1	41.37N-010.58E
	DIR	A-A0182-12231-2	41.37N-010.58E
	DVI	A-A0182-12250-1	48.04N-008.48E
	DVI	A-A0182-12251-1	47.42N-008.56E
	DIR	A-A0182-12551-2	47.42N-008-56E
	DVI	A-A0182-12270-1	54.07N-006.19E
	DIR	A-A0182-12270-2	54.07N-006.19E
	DVI	A-A0182-12271-1	53.46N-006.28E
	DIR	A-A0182-12271-2	53.46N-006.28E
978	NIR	A-A0184-12590-3	40.45N-002.11E
	NIR	A-A0184-13010-3	46.51N-000.13E
	NIR	A-10184-13020-3	52.55N-002.10W
.978	DVI	A-A0185-13160-1	37.49N-001.26W
	DIR	A-A0185-13160-2	37.49N-001.26W
	DVI	A-A0185-13180-1	43.56N-003.17W
	DIR	A-A0185-13180-2	43.56N-003.17W
	DVI	A-A0185-13200-1	50.01N-005.27W
	DIR	A-A0185-13200-2	50.01N-005.27W
.978	DVI	A-A0187-12170-1	44.34N-011.44E
	DIR	A-A0187-12170-2	44.34N-011.44E
	DVI	A-A0187-12180-1	50.38N-009.31E

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2 november 1978	DVI	A-A0190-13090-1	40.23N-000.26E	
	DIR	A-A0190-12090-2	40.23N-000.26E	
	DVI	A-A0190-13110-1	46.29N-002.24W	
	DIR	A-A0190-13110-2	46.29N-002.24W	
	DVI	A-A0190-13130-1	52.33N-004.46W	
	DIR	A-A0190-13130-2	52.32N-004.46W	
3 november 1978	DVI	A-A0191-13280-1	45.13N-006.28W	
	DIR	A-A0191-13280-2	45.13N-006.28W	
5 november 1978	DVI	A-A0193-12260-1	40.37N-010.16E	
	DIR	A-A0193-12260-2	40.37N-010.16E	
	DVI	A-A0193-12270-1	46.43N-008.17E	
	DIR	A-A0193-12270-2	46.43N-008.17E	
	DVI	A-A0193-12290-1	52.47N-005.55E	
	DIR	A-A0193-12290-2	52.47N-005.55E	
7 november 1978	NIR	A-A0195-02050-3	48.50N-000.41E	
	NIR	A-A0195-02070-3	42.47N-001.24W	
	NIR	A-A0195-02080-3	36.41N-003.13W	
	DVI	A-A0195-13010-1	40.49N-001.13E	
	DIR	A-A0195-13010-2	40.49N-001.13E	
	DVI	A-A0195-13030-1	46.55N-000.45E	
	DIR	A-A0195-13030-2	46.55N-000.45E	
	DVI	A-A0195-13050-1	52.59N-003.09W	
	DIR	A-A0195-13050-2	52.59N-003.09W	
9 november 1978	NIR	A-A0197-02400-3	52.53N-006.38W	
	NIR	A-A0197-02420-3	46.52N-009.02W	
10 november 1978	NIR	A-A0198-01240-3	40.59N-008.43E	
	DVI	A-A0198-12190-1	42.10N-011.25E	
	DIR	A-A0198-12190-2	42.10N-011.25E	
	DVI	A-A0198-12210-1	48.14N-009.21E	
	DIR	A-A0198-12210-2	48.14N-009.21E	
11 november 1978	NIR	A-A0199-01420-3	44.27N-005.11E	
	NIR	A-A0199-01430-3	38.22N-003.19E	
	DVI	A-A0199-12360-1	36.19N-008.31E	
	DIR	A-A0199-12360-2	36.19N-008.31E	
	DVI	A-A0199-12370-1	42.25N-006.43E	
	DIR	A-A0199-12370-2	42.25N-006.43E	
	DVI	A-A0199-12390-1	48.31N-004.38E	
	DIR	A-A0199-12390-2	48.31N-004.38E	
	DVI	A-A0199-12410-1	54.33N-002.07E	
	DIR	A-A0199-12410-2	54.33N-002.07E	
12 november 1978	NIR	A-A0200-02000-3	44.50N-000.43E	
	NIR	A-A0200-02010-3	38.46N-001.10W	
	DVI	A-A0200-12540-1	35.33N-004.07E	
	DIR	A-A0200-12540-2	35.33N-004.07E	
	DVI	A-A0200-12550-1	41.40N-002.21E	
	DIR	A-A0200-12550-2	41.40N-002.21E	
	DVI	A-A0200-12570-1	47.46N-000.19E	
	DIR	A-A0200-12570-2	47.46N-000.19E	

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16 november 1978	NIR	A-A0204-01340-3	49.53N-008.28E	
	NIR	A-A0204-01360-3	43.50N-006.17E	
	NIR	A-A0204-01380-3	37.46N-004.26E	
17 november 1978	NIR	A-A0205-01520-3	51.40N-004.35E	
	NIR	A-A0205-01540-3	45.37N-002.17E	
21 november 1978	NIR	A-A0209-01310-3	39.49N-006.22E	
28 november 1978	DVI	A-A0216-12540-1	36.39N-003.17E	
	DIR	A-A0216-12540-2	36.39N-003.17E	
	DVI	A-A0216-12560-1	42.47N-001.24E	
	DIR	A-A0216-12560-2	42.47N-001.24E	
	DVI	A-A0216-12570-1	48.50N-000.39E	
	DIR	A-A0216-12570-2	48.50N-000.39E	
	DVI	A-A0216-12590-1	54.52N-003.12W	
	DIR	A-A0216-12590-2	54.52N-003.12W	
30 november 1978	DVI	A-A0218-13320-1	42.13N-007.32W	
	DIR	A-A0218-13320-2	42.13N-007.32W	
	DVI	A-A0218-13340-1	48.17N-009.35W	
	DIR	A-A0218-13340-1	50.46N-010.33W	
	DIR	A-A0218-13340-2	50.46N-010.33W	
	DIR	A-A0218-13340-2	48.17N-009.35W	

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6 december 1978	DVI	A-A0224-12090-1	49.58N-010.45E	
	DIR	A-A0224-12090-2	49.58N-010.54E	
	DVI	A-A0224-12100-1	55.59N-008.14E	
	DIR	A-A0224-12100-2	55.59N-008.14E	
	DVI	A-A0224-13440-1	43.20N-011.02W	
	DIR	A-A0224-13440-2	43.20N-011.02W	
	DVI	A-A0224-13460-1	49.24N-013.10W	
	DIR	A-A0224-13460-2	49.24N-013.10W	
7 december 1978	DVI	A-A0225-12230-1	37.05N-010.32E	
	DIR	A-A0225-12330-2	37.05N-010.32E	
	DVI	A-A0225-12250-1	42.01N-009.05E	
	DIR	A-A0225-12250-2	42.01N-009.05E	
	DVI	A-A0225-12250-1	43.11N-008.44E	
	DIR	A-A0225-12250-2	43.11N-008.44E	
	DVI	A-A0225-12260-1	48.05N-007.02E	
	DIR	A-A0225-12260-2	48.05N-007.02E	
	DVI	A-A0225-12270-1	49.14N-006.37E	
	DIR	A-A0225-12270-2	49.14N-006.37E	
	DVI	A-A0225-12280-1	54.07N-004.34E	
	DIR	A-A0225-12280-2	54.07N-004.34E	
8 december 1978	DVI	A-A0226-12410-1	36.38N-006.06E	
	DIR	A-A0226-12410-2	36.38N-006.06E	
9 december 1978	DVI	A-A0227-12590-1	35.49N-001.46E	
	DIR	A-A0227-12590-2	35.49N-001.46E	
	DVI	A-A0227-13010-1	41.54N-000.00E	
	DIR	A-A0227-13010-2	41.54N-000.00E	
	DVI	A-A0227-13030-1	47.58N-002.01W	
	DIR	A-A0227-13030-2	47.58N-002.01W	
	DVI	A-A0227-13040-1	54.00N-004.29W	
	DIR	A-A0227-13040-2	54.00N-004.29W	
14 december 1978	DVI	A-A0232-12530-1	35.27N-003.20E	
	DIR	A-A0232-12530-2	35.27N-003.20E	
	DVI	A-A0232-12540-1	41.33N-001.35E	
	DIR	A-A0232-12540-2	41.33N-001.35E	
	DVI	A-A0232-12560-1	47.37N-000.25E	
	DIR	A-A0232-12560-2	47.37N-000.25E	
	DVI	A-A0232-12580-1	53.38N-002.50W	
	DIR	A-A0232-12580-2	53.38N-002.50W	
16 december 1978	DVI	A-A0234-13320-1	48.27N-009.50W	
	DIR	A-A0234-13320-2	48.27N-009.50W	
17 december 1978	NIR	A-A0235-02520-3	50.40N-011.35W	
	NIR	A-A0235-02530-3	44.37N-013.49W	
	DVI	A-A0235-12120-1	42.37N-011.53E	
	DIR	A-A0235-12120-2	42.37N-011.53E	
	DVI	A-A0235-12130-1	48.41N-009.49E	
	DIR	A-A0235-12130-2	48.41N-009.49E	
	DVI	A-A0235-12150-1	54.42N-007.17E	
	DIR	A-A0235-12150-2	54.42N-007.17E	

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20 december 1978	DIR	A-A0238-04380-2	37.20S-138-04E	
21 december 1978	DVI	A-A0239-13250-1	45.08N-007.04W	
	DIR	A-A0239-13250-2	45.08N-007.04W	
23 december 1978	DVI	A-A0241-12230-1	42.34N-008.55E	
	DIR	A-A0241-12230-2	42.34N-008.55E	
25 december 1978	NIR	A-A0243-02040-3	44.19N-001.42W	
	DVI	A-A0243-12580-1	39.57N-000.37E	
	DIR	A-A0243-12580-2	39.57N-000.37E	
	DVI	A-A0243-13000-1	46.01N-001.18W	
	DIR	A-A0243-13000-2	46.01N-001.18W	
	DVI	A-A0243-13020-1	52.04N-003.36W	
	DIR	A-A0243-13020-2	52.04N-003.36W	
26 december 1978	NIR	A-A0244-02210-3	45.24N-005.53W	
29 december 1978	NIR	A-A0247-12360-3	48.43N-003.51E	
	NIR	A-A0247-12370-3	54.44N-001.19E	
30 december 1978	DVI	A-A0248-12500-1	35.55N-003.20E	
	DVI	A-A0248-12520-1	42.01N-001.36E	
	DIR	A-A0248-12520-2	42.01N-001.36E	

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13 january 1979	NIR	A-A0262-01170-3	41.26N-008.50E	
	NIR	A-A0262-01190-3	35.19N-007.04E	
	NIR	A-A0262-02520-3	50.31N-012.05W	
14 january 1979	NIR	A-A0263-01320-3	52.05N-008.13E	
	NIR	A-A0263-01360-3	39.55N-003.55E	
25 january 1979	DIR	A-A0274-12340-2	40.39N-005.33E	
	DVI	A-A0274-12360-1	46.44N-003.34E	
	DIR	A-A0274-12360-2	46.44N-003.34E	
	DVI	A-A0274-12370-1	52.47N-001.11E	
	DIR	A-A0274-12370-2	52.47N-001.11E	
26 january 1979	NIR	A-A0275-01590-3	38.38N-002.57W	
	DVI	A-A0275-12520-1	39.40N-001.14E	
	DIR	A-A0275-12520-2	39.40N-001.14E	
	DVI	A-A0275-12550-1	51.49N-002.58W	
	DIR	A-A0275-12550-2	51.49N-002.58W	

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DVI	A-A0340-13010-1	37.32N-002.13W	
DIR	A-A0340-13010-2	37.32N-002.13W	
DVI	A-A0340-13030-1	43.37N-004.04W	
DIR	A-A0340-13030-2	43.37N-004.04W	
DVI	A-A0340-13050-1	49.40N-006.14W	
DIR	A-A0340-13050-2	49.40N-006.14W	
NIR	A-A0247-00590-3	41.38N-010.23E	
DVI	A-A0350-12460-1	39.40N-000.11E	
DIR	A-A0350-12460-2	39.40N-000.11E	
DVI	A-A0350-12480-1	45.45N-001.44W	
DIR	A-A0350-12480-2	45.45N-001.44W	
DVI	A-A0352-11490-1	50.39N-011.28E	
DIR	A-A0352-11490-2	50.39N-011.28E	
DVI	A-A0352-11510-1	56.40N-008.43E	
DIR	A-A0352-11510-2	56.40N-008.43E	

Digital Data Products

11 may 1978	NIR	A-A0015-02550-3	
	NIR	A-A0015-02560-3	
	NIR	A-A0015-02570-3	
29 may 1978	NIR	A-A0033-01550-3	
30 may 1978	NIR	A-A0034-02120-3	
	NIR	A-A0034-02130-3	
	DVI	A-A0034-13090-1	
	DIR	A-A0034-13090-2	
	DVI	A-A0034-13100-1	
	DIR	A-A0034-13100-2	
	DVI	A-A0034-13100-1	
	DIR	A-A0034-13100-2	
31 may 1978	DVI	A-A0035-21320-1	
	DIR	A-A0035-21320-2	
3 june 1978	DVI	A-A0038-12440-1	
	DIR	A-A0038-12440-2	Listed on the product list as sent, but not received.
	DVI	A-A0038-12460-1	
	DIR	A-A0038-12460-2	
	DVI	A-A0038-12470-1	
	DIR	A-A0038-12470-2	
18 june 1978	DVI	A-A0053-14030-1	
	DIR	A-A0053-14030-2	
	DVI	A-A0053-14050-1	
	DIR	A-A0053-14050-2	
19 june 1978	NIR	A-A0054-01470-3	
	NIR	A-A0054-01490-3	
30 june 1978	NIR	A-A0065-01530-3	
6 july 1978	NIR	A-A0071-02040-3	
24 october 1978	DVI	A-A0181-13430-1	
	DIR	A-A0181-13430-2	
28 october 1978	DVI	A-A0185-13160-1	
	DIR	A-A0185-13160-2	Listed on the product list as sent, but not received.
	DVI	A-A0185-13180-1	
	DIR	A-A0185-13180-2	
	DVI	A-A0185-13200-1	
	DIR	A-A0185-13200-2	
7 december 1978	DVI	A-A0225-12250-1	
	DIR	A-A0225-12250-2	
	DVI	A-A0225-12280-1	
	DIR	A-A0225-12280-2	