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Cover illustration: geophysical model through the Brabant Massif, from Chacksfield et al., 1993. A new look at Belgian aeromagnetic and gravity data through image - based display and integrated modelling techniques. Geological Magazine vol. 130, N. 5.

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# IMAGE-BASED DISPLAY OF BELGIAN DIGITAL AEROMAGNETIC AND GRAVITY DATA


## Abstract

Digital processing and image-based display techniques have been used to generate contour and shaded-relief maps of Belgian aeromagnetic data, and a Bouguer anomaly contour map, for the whole of Belgium. The techniques used to obtain the maps are explained in this paper, and photographically reduced colour maps are presented.

## Samenvatting

Digitale verwerking en beeldverwerkingstechieken werden toegepast om isogamma- en schaduwkaarten van de Belgische aeromagnetische gegevens te genereren, alsmede een Bouguer anomaliekaart, voor heel België. De technieken om de kaarten te produceren worden in deze publicatie beschreven en fotografisch verkleinde kleurenkaarten worden voorgesteld.

## Résumé

Un traitement digital et des techniques de traitement d'images ont été appliqués aux données aéromagnétiques belges pour générer des cartes isogammes et des cartes ombragées pour toute la Belgique, ainsi qu'aux données gravimétriques pour générer une carte d'anomalies Bouguer. Dans cette publication, les techniques employées pour obtenir les cartes sont expliquées, et des photos réduites des cartes principales sont présentées.


## 1. INTRODUCTION

This paper describes digital processing and image-based display of Belgian aeromagnetic and gravity data by the British Geological Survey (BGS) on behalf of the Belgische Geologische Dienst (BGD, Belgian Geological Survey) as part of a joint Belgian-British research project.

The main part of the work carried out by this project concerns the processing and display of the Belgian national **aeromagnetic** survey executed in 1963 and digitised by the BGD in 1990. The digitised data were validated by BGS, and digital processing and image-based display techniques were used to generate contour and colour/grey shaded-relief maps at a scale of 1 : 300 000. These highlight the important anomalies and structural trends, particularly over the Brabant Massif. The principal magnetic lineaments were then identified by the BGD from the shaded-relief plots and digitised by BGS. A composite lineament map of Belgium showing digitised lineaments overlaying the magnetic field has been produced at a scale of 1 : 300 000. Three more maps, representing an enlargement

at a scale of 1 : 106 000 of the Stavelot area, were produced.

A limited set of colour contour and grey shaded-relief maps were produced of the Belgian 1948 regional **gravity** survey at a scale of 1 : 300 000, and of a more detailed survey of the Ardooie area at a scale of 1 : 50 000.

This paper is based mainly on a technical report by Chacksfield et al. (1990) which accompanied the maps. The most important results of this work were presented at the meeting "Caledonides of the Anglo-Brabant Massif and adjacent areas" at Keyworth in September 1992 (Chacksfield et al., 1993). The latter publication includes a discussion of geophysical modelling results, and a broad structural analysis of Belgium.

The major aim of this additional publication is to allow a wide diffusion of the colour maps produced during this Belgian-British research project and covering the whole Belgian territory. For this purpose the nine most important maps, six of them in colour, were photographically reduced to A4 size. A second aim of this publication is to present some details of the procedures followed in the elaboration of the maps.

All maps at the original scale and size can be consulted at BGD, along with the original technical report.

## 2.TECHNIQUES AND SOFTWARE

The application of image-based techniques to the display and analysis of aeromagnetic and gravity data has led to the recognition that traditional forms of presentation such as contour maps display only part of the total information content of the data. Presentations such as grey shaded-relief maps treat the field as topographic surfaces illuminated from a certain direction and are particularly effective for conveying information on anomaly gradients. They also have the property of enhancing features which trend roughly perpendicular to the direction of illumination. This has the effect of enhancing subtle, but structurally important lineaments which are often not apparent on standard contour maps. Colour-shaded images have the added advantage of showing both anomaly amplitude (as colour) and anomaly gradients (as relief).

The main purpose of the work described in this paper was to apply these digital processing and image-based display techniques to the aeromagnetic and gravity datasets and produce a set of maps for further study. Processing of the data comprised the following steps:

(a) Validation of the data by generating coloured data point plots and trial shaded relief images. Identification, correction and/or deletion of erroneous points.

(b) Transformation of data point coordinates from the original digitised values to the Belgian Lambert system and to Lat/Long values (via the UTM system).

(c) Interpolation of the data onto a square grid.

(d) Application of a reduction to pole algorithm (only for the aeromagnetic data).

(e) Generation of grey shaded-relief, colour shaded-relief and contour maps from the gridded data.

(f) Incorporation of the data into the BGS databank and provision of access via the BGS data retrieval system.

Several different software packages were used during the course of the processing. The majority of the maps (colour contour, shaded-relief and data point maps) were generated using the BGS COLMAP package (Green 1989). COLMAP generates grey shaded-relief maps by treating the gridded data as a topographic surface and calculating the Lambertian reflectance of each grid cell assuming illumination from a particular direction. The reflectance values, which vary from 0 for slopes parallel to the illumination direction to 1 for slopes perpendicular to the illumination direction, are then mapped onto a grey scale (where 0 = black and 1 = white). In the case of the colour shaded-relief maps the amplitude of each grid cell is also mapped onto a colour scale. Reduction to pole of the gridded aeromagnetic data was performed using the BGS program SGUPCONT which is based on standard frequency-domain filtering techniques.

Conversion of datapoint coordinates from the original digitised values to the Belgian-Lambert system was carried out using a Fortran utility based on a formula discussed below.

The primary coordinate system of the BGS Geophysical Databank is Lat/Long. The datapoint coordinates were, therefore, converted to Lat/Long by first transforming to the international UTM system using a FORTRAN utility based on another formula discussed below, and then to Lat/Long values, using BGS software.
The validated data were deposited in the BGS Geophysical Databank using a format which allowed both the Belgian-Lambert and Lat/Long coordinates to be stored for each data point.

Subsequent retrieval of the data was performed using the BGS Geophysical Database utilities, which enable the user to extract the data by survey name or area (on either local or Lat/Long coordinates) and include programs for conversion of coordinates from Lat/Long to a number of other systems, including UTM.

Grids were generated using subroutines from the Interactive Surface Modelling (ISM) package (Dynamic Graphics Inc. 1986). ISM uses the minimum surface tension method which produces well behaved grids particularly suitable for subsequent processing and map production. The ISM package was also used to plot line contour maps.

Processing of the data was carried out on the VAX mainframe computers at the BGS Keyworth site.

## 3.VALIDATION AND DISPLAY OF AEROMAGNETIC DATA

### Origin of data

The aeromagnetic data were acquired in February and March 1963 in analog mode by Compagnie Générale de Géophysique (CGG), on behalf of the BGD, Belgian Shell Cy and S.C.R.E.M.
The survey was flown at a height of 2000 feet above sea-level in the western part of the country (to the west of line A-B on map 1) and 3000 feet above sea-level in the eastern part. Flight lines were spaced 2.5 km apart and orientated NE-SW. Perpendicular tie-lines were flown 10 km apart.
A set of twelve total field contour map sheets (see map 1) was produced by CGG at a scale of 1 : 100 000, and one synthesis contour map for the whole of Belgium at a 1 : 300 000 scale.

### Digitised data files

For the present project, the contour map sheets at 1 : 100 000 were digitised at BGD and provided to BGS as source files, containing a total of 112767 points, with the following parameters for each point:
Cn = contour reference number, referring to an individual hand-drawn aeromagnetic contour along which selected magnetic data point values were digitised;
X = Easting grid coordinate in metres;
Y = Northing grid coordinate in metres; the X,Y grid coordinates were calculated relative to the minimum X,Y coordinates for each 100 000 map sheet, and the sheets were themselves related to a single grid origin at the intersection of the western margin of map sheets 1 and 4, and the southern margin of sheets 11 and 12 (map 1);
H = Flying height above mean sea-level in metres, recorded as 600 m and 900 m respectively;
Mag = Total magnetic field anomaly value in nanotesla; these were derived from a single reference field with no compensation for the difference in flying height between the two surveys.

### Validation of data

Validation of the data at BGS involved the following steps:
(a) Generating colour data point plots at 1 : 500 000 on a Versatec electrostatic plotter to locate position errors and magnetic values outside the specified data range.
(b) Initial gridding of the data to produce a transparent contour overlay at 1 : 300 000 to compare with the published aeromagnetic map at the same scale.
(c) Produce trial shaded-relief plots to locate subtle data errors of magnitude 20 nT or less which were only revealed by this technique.
(d) Analysing screen data point plots of selected areas to identify and check individual contour lines.

Three main sources of data error were identified:
(1) x,y coordinates with zero magnetic value where the coordinates

referred to map sheet boundaries and not contour data.
(2) digitised contours where the wrong magnetic value had been assigned, notably across map sheet boundaries.
(3) All data within map 7, where a scale error occurred in the x direction during digitisation.
In addition, some datapoints outside the aeromagnetic survey area were deleted.

Final validation was jointly undertaken by BGS and BGD staff at Keyworth in October 1990. Of the original source files, 112304 records were retained and 463 records were deleted.

Map 2 shows a plot of validated digitised aeromagnetic data points.

Coordinate conversion

In order to compile aeromagnetic maps of Belgium on the Belgian-Lambert grid system it was necessary to convert the original digitised coordinates to Belgian-Lambert coordinates. This was done by using the following formula:

$$X = X + Cx$$
$$Y = Y + Cy$$

with $Cx = 34300$
$Cy = -1560$

Another conversion to Universal Transverse Mercator zone 31 (UTM31) grid coordinates was also undertaken to provide a link with the BGS database system.

The conversion from Belgian-Lambert to UTM31 grid coordinates was carried out using the following formula supplied by the Belgian Nationaal Geografisch Instituut:

**Constants to convert Belgian-Lambert coordinates to UTM31:**

A = 449681.702
B = 5460505.326
C = 0.999286253498
D = 0.018588407076
E = -5.45041827E-10
F = -1.69680987E-09
G = 4.07831676E-15
H = 2.19309902E-16

Calculation (FORTRAN notation):

```
Xtr=A+C*X-D*Y+E*(X**2-Y**2)-F*2*X*Y+G*(X**3-3*X*Y**2)
    -H*(3*X**2*Y-Y**3)

Ytr=B+C*Y+D*X+E*2*X*Y+F*(X**2-Y**2)+G*(3*X**2*Y-Y**3)
    +H*(X**3-3*X*Y**2)
```

where X and Y = Belgian Lambert coordinates in metres,
and Xtr and Ytr = UTM31 coordinates in metres.

Finally, the UTM31 coordinates were converted to Latitude/Longitude, which the BGS Aeromagnetic Database uses as a universal coordinate system, using the BGS utility program UTMCONV with the following parameters:

**Parameters for UTM Zone 31: 1924 International Spheroid**

| | |
|---|---|
| longitude of central meridian: | 3 |
| latitude of true origin: | 0.00 |
| easting of false origin: | 500000.00 |
| northing of false origin: | 0.00 |
| scale factor on central meridian: | 0.99960000 |
| A axis diameter (m): | 6378388.00 |
| B axis diameter (m): | 6356912.00 |
| flattening: | 297.001 |

## Display as contour maps

The maps of Belgium cover the area easting 18 to 298 km, northing 18 to 240 km. The coastline and national boundary were digitised at BGD from national topographic maps and supplied to BGS as a vector data file. Grid lines in Belgian-Lambert coordinates define Belgian topographic map sheet boundaries.
The aeromagnetic survey was flown at 2000 feet above mean sea level to the west of line A-B and 3000 feet above sea level to the east of line A-B.

The contour maps were derived from point data interpolated onto a regular grid using the ISM gridding routine. The grid size was chosen to derive the maximum information from the data within the constraints of COLMAP and ISM.

Gridded data were subsequently reduced to the pole using a declination and inclination of -5.5 and 66.17 degrees respectively. A digital data mask was created and applied to the gridded data to remove grid values interpolated beyond the data, and to mask an artificial gradient created by a datum shift at the join between adjacent surveys with different flying heights.

Maps 3 and 4 were derived from a 0.4 x 0.4 km square grid. This grid was further interpolated to produce smooth colour fill contours at 30 nT interval using a 30 colour rainbow scale display to cover the data range.

**Map 3** displays the aeromagnetic total field anomaly, and **map 4** the reduced to pole anomaly.

## Shaded relief plots

The shaded relief plots were produced to the same format as the contour maps. To optimise the plot resolution the 0.4 km reduced-to-pole grid of Belgium was further interpolated to produce maps based on a 0.2 km cell size.

The **greyscale plots** (maps 5, 6 and 7) were based on 32 shades of grey to produce high resolution 'pseudo relief' images of the magnetic field utilising the maximum number of reflectance values. The illumination direction enhances magnetic gradients perpendicular to the light source.

In **map 5** the north was chosen as the illumination direction, to enhance primarily east-west gradients. In **map 6** the south-west direction was chosen to enhance northwest-southeast gradients. Both directions are complementary, and together they provide a strong visual impression of the magnetic features of the subsoil, especially in the Brabant Massif.

**Map 7** shows vertical illumination, which has no directional bias. It shows steep gradients as dark shades and flat areas as light shades, giving an effect similar to that of a horizontal gradient map.

The **colour equal-area shaded relief plots** (maps 8 and 9) were produced with an 18 colour/ 19 shade display option to show the anomaly amplitude (as colour) as well as the gradient. Contour intervals were calculated to produce an equal area of each colour over the map, rounded to produce contours at whole numbers.

**Map 8** is a colour equal-area shaded relief plot illuminated from the north. **Map 9** shows illumination from the southwest.

Magnetic lineaments

**Map 10** is a composite lineament map showing digitised lineaments overlaying a colour reduced-to-pole map. The contour interval and colours are the same as those used for the colour shaded plots but the contour boundary lines have been omitted for clarity.

The lineaments were interpreted at BGD from the shaded relief maps and provided to BGS as an overlay which was subsequently digitised by BGS. The digital lineaments were combined with the digital coastline and national boundary file to produce a single vector overlay file.

For a discussion of the lineaments, we refer to Chacksfield et al. (1993).

## 4. GRAVITY DATA

Digital data for the 1948 regional gravity survey of Belgium were made available by the Belgian Royal Observatory and validated by this institution.

The validated data file contains 373 gravity observations. The Bouguer gravity anomaly was calculated using a reduction density of 2.74 g/cm$^3$. The data are held in the form X Y BA STA EL where:

X = Easting (km) in Lambert coordinates

Y = Northing (km) in Lambert coordinates
BA = Bouguer anomaly in milligal (reduction density 2.74 $Mg/m^3$)
STA = station identifier
EL = elevation in metres

**Map 11** shows the location of the 373 gravity observations.

**Map 14** is a colour contour map of the Bouguer gravity anomaly, produced in much the same way as the equivalent aeromagnetic maps, and to the same format. The data were interpolated onto a 4 km grid which was deemed the most appropriate for the data distribution. This grid was interpolated to produce smooth colour fill contours at 2 mgal interval using a 30 colour rainbow scale.

The gravity data are much more widely distributed than the aeromagnetic data and are not suited for plotting as shaded-relief maps.
Nevertheless, two plots were produced at a scale of 1 : 300 000, one with illumination from the north, and one from the southwest. It was not found useful to photographically reduce them for this paper.

For a structural analysis based on the geophysical potential field maps, we again refer to Chacksfield et al. (1993).

**Acknowledgements**

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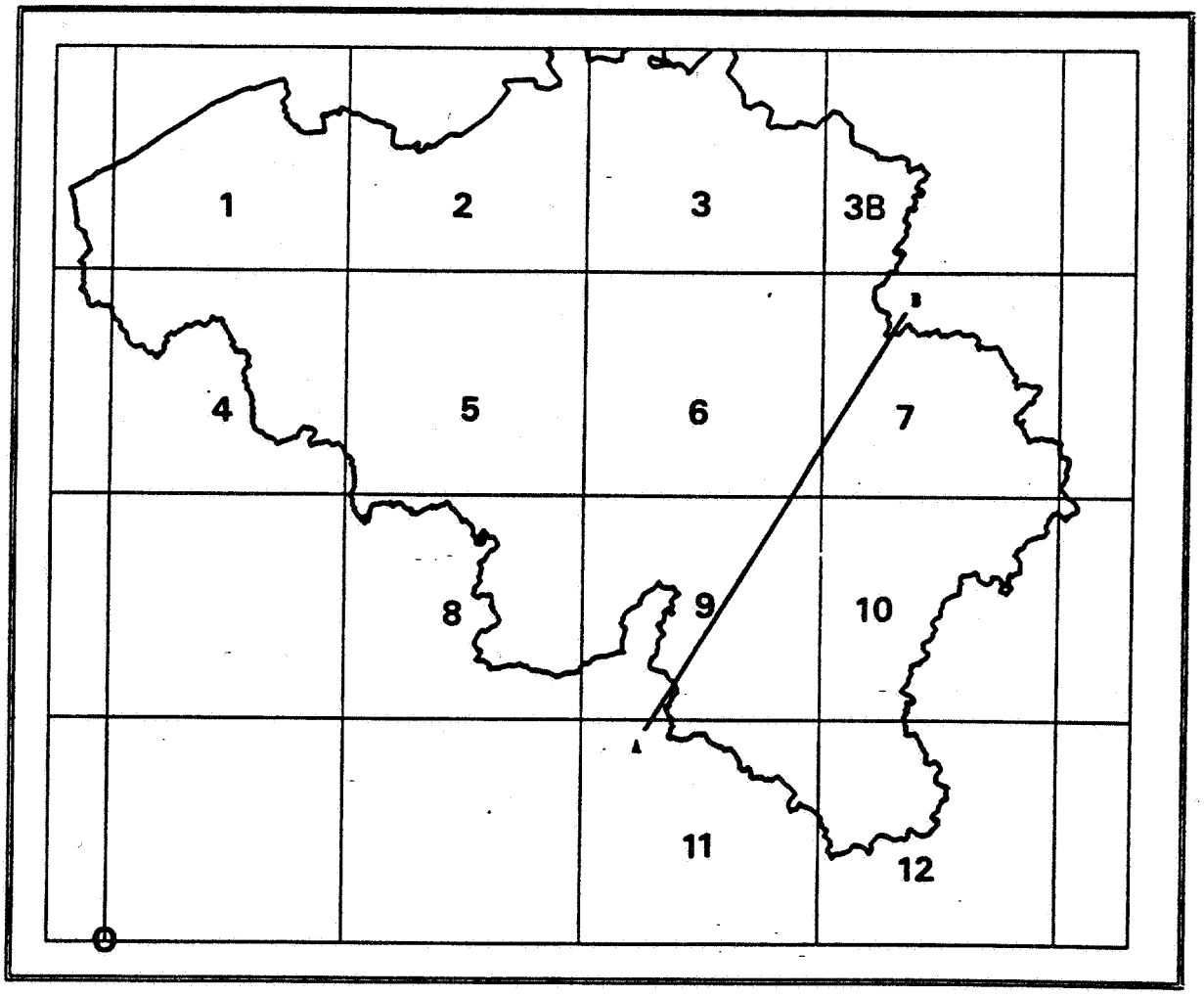
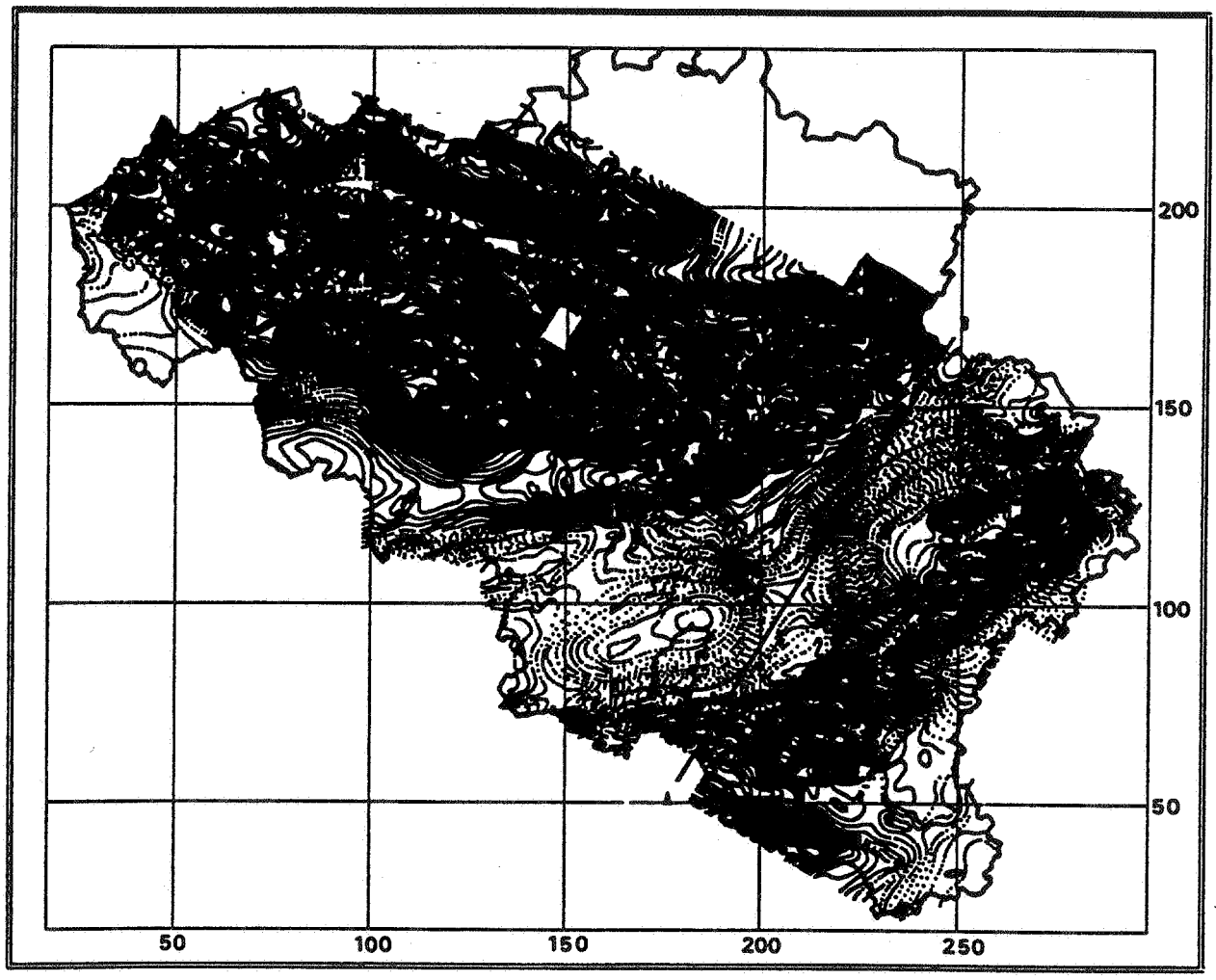
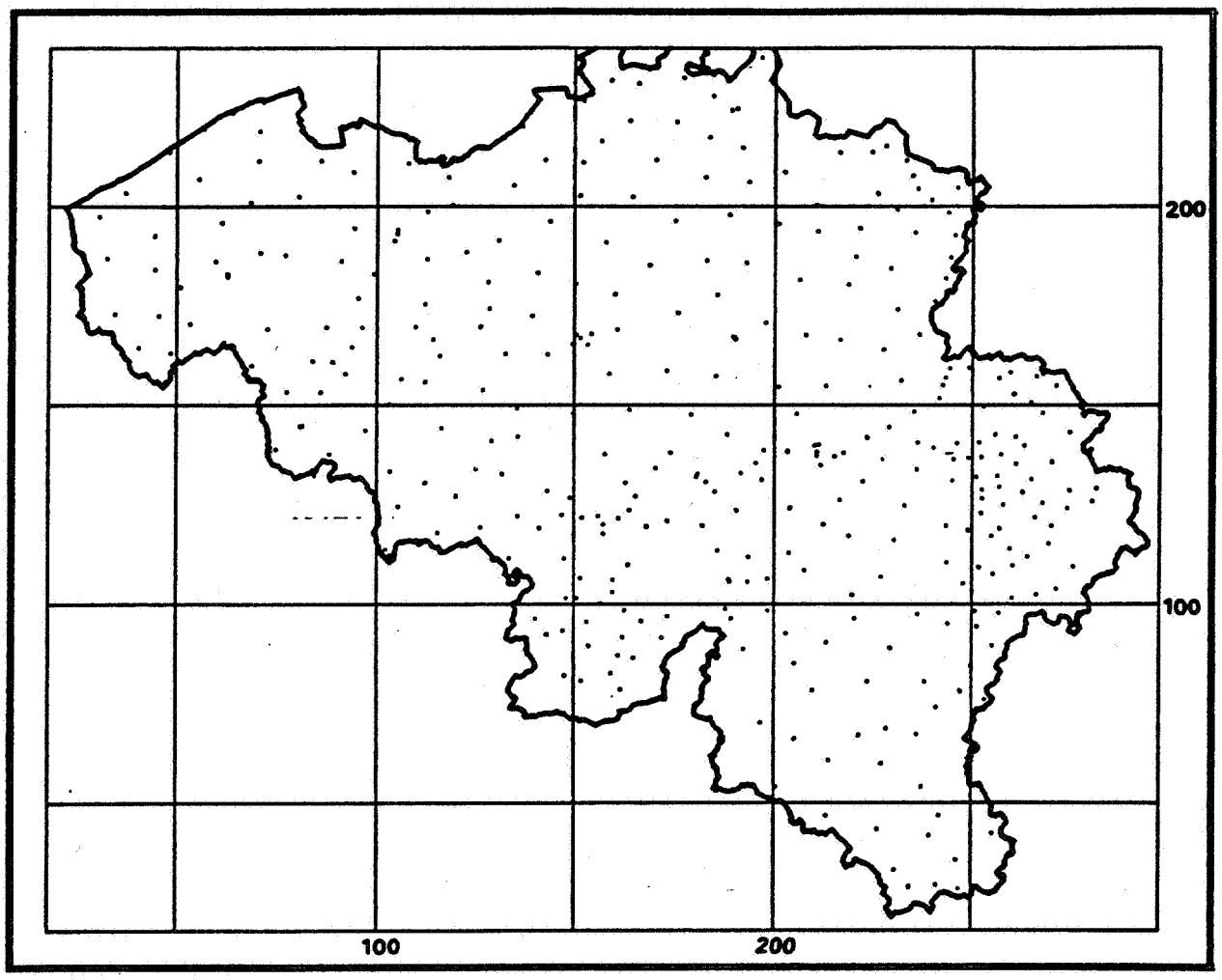


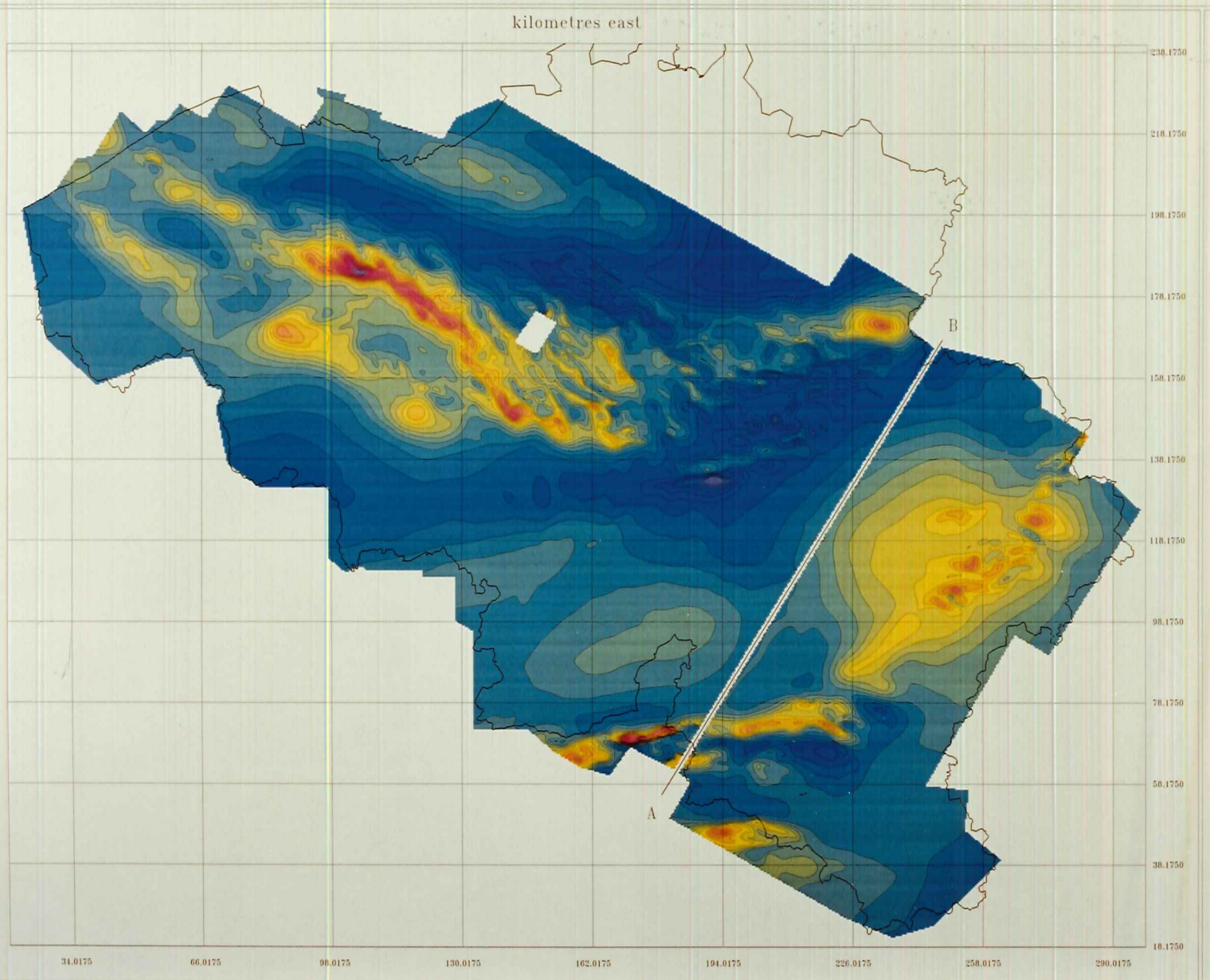

Map 1. Aeromagnetic survey 1:100K map sheets.




Map 2. Digitised (validated) aeromagnetic data points.




Map 11. Regional gravity survey data points.




# BELGIUM AEROMAGNETIC MAP TOTAL FIELD ANOMALY

nT

3700.0
3600.0
3570.0
3540.0
3510.0
3480.0
3450.0
3420.0
3390.0
3360.0
3330.0
3300.0
3270.0
3240.0
3210.0
3180.0
3150.0
3120.0
3090.0
3060.0
3030.0
3000.0
2970.0
2940.0
2910.0
2880.0
2850.0
2820.0
2790.0
2760.0
2600.0

The colour contour map was derived from digital aeromagnetic data points interpolated onto a 0.1km square grid. This was further interpolated to generate a map based on a 0.2km square cell size.

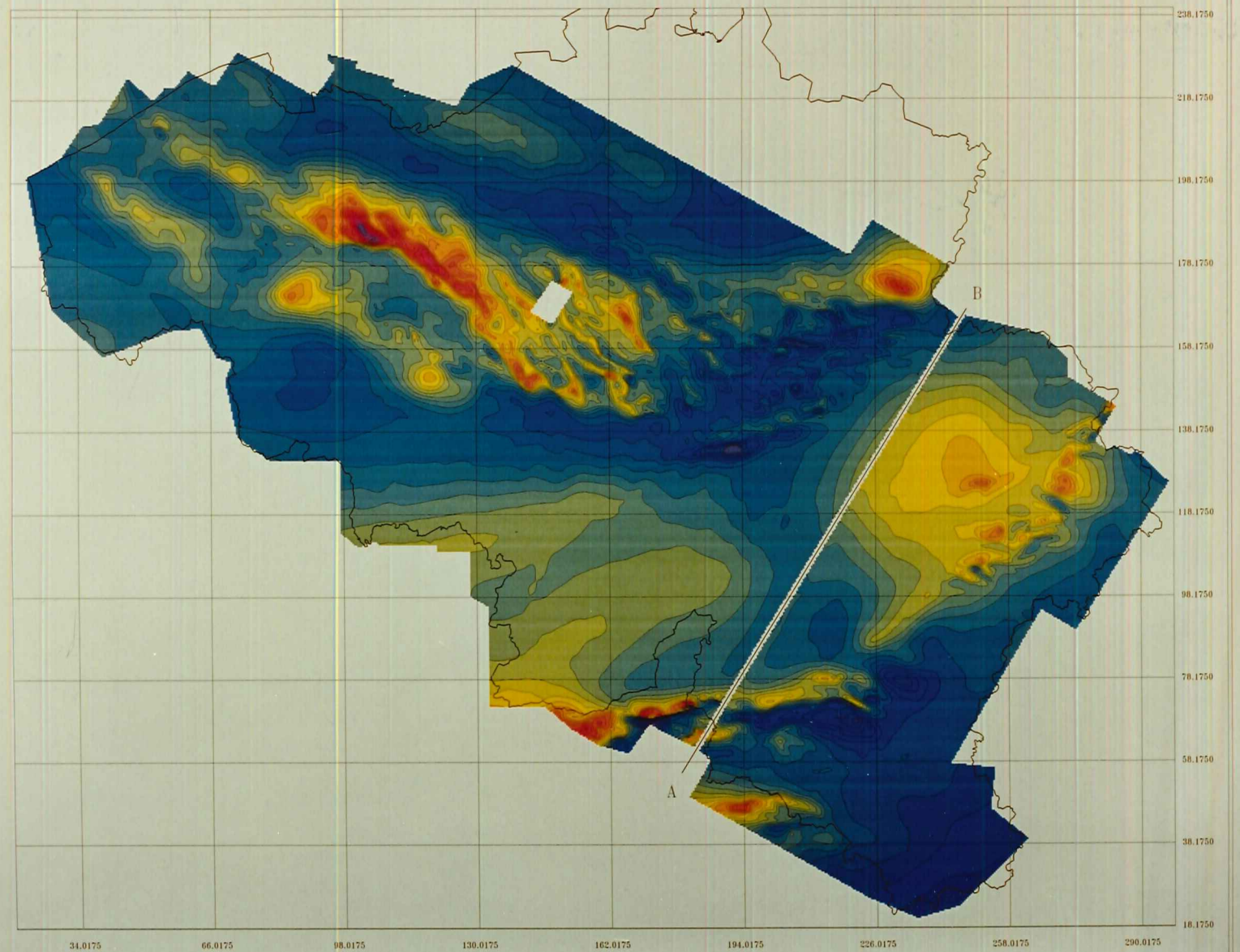
The digital dataset was generated by digitising contours of total field anomaly from 1:100000 scale base maps.The original aeromagnetic survey was flown at a height of 2000 feet above sea level to the west of line A-B and 3000 feet above sea level to the east. Digital magnetic data and the National Boundary were supplied by the Belgian Geological Survey. Grid lines in Belgian Lambert coordinates define map boundaries.

Compiled by B.C Chacksfield British Geological Survey 1990 using the COLMAP mapping package.

SERVICE GEOLOGIQUE DE BELGIQUE
BELGISCHE GEOLOGISCHE DIENST

BGS
1835

MAP 3




# BELGIUM AEROMAGNETIC MAP REDUCED TO POLE

nT

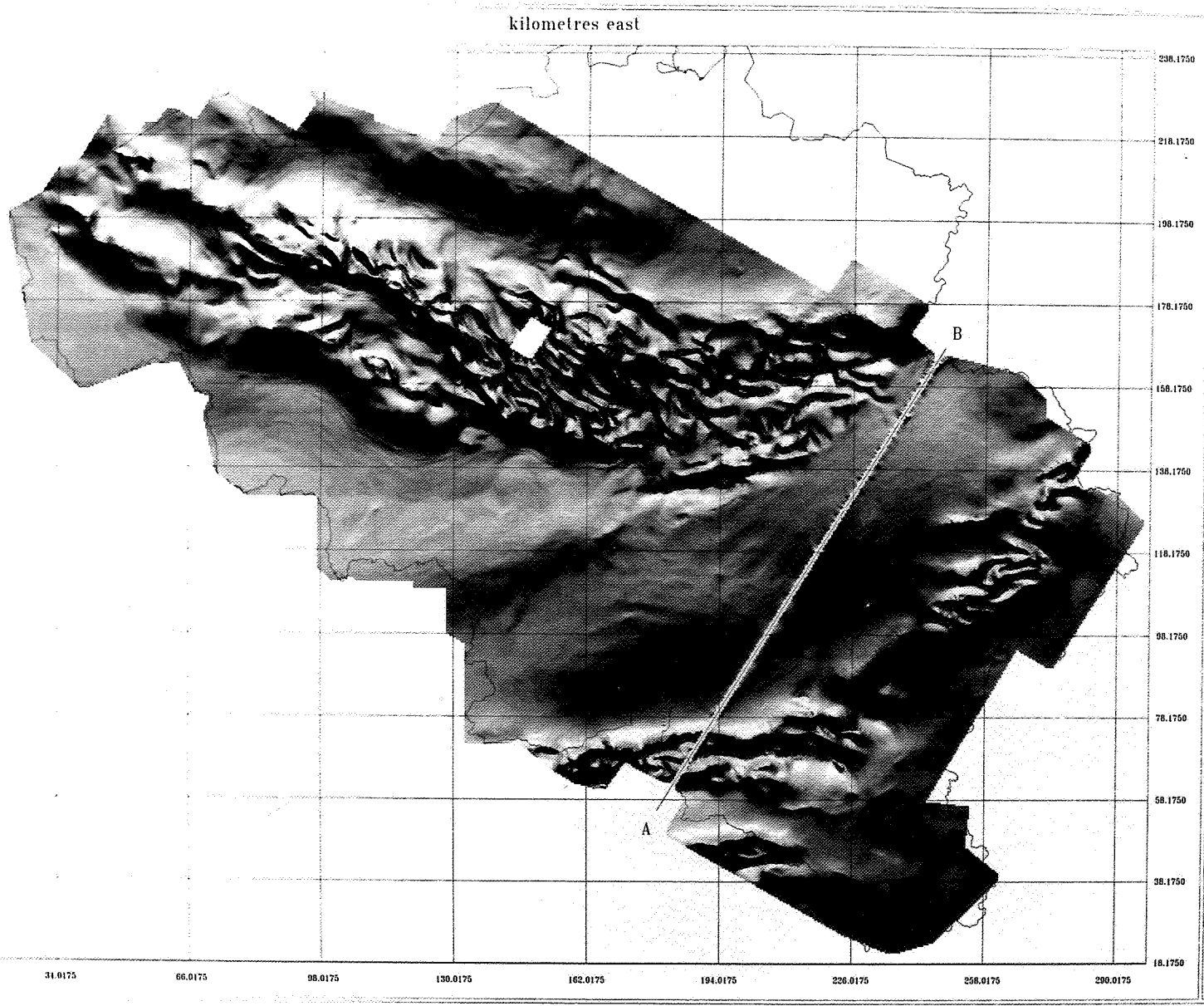
3700.0
3600.0
3570.0
3540.0
3510.0
3480.0
3450.0
3420.0
3390.0
3360.0
3330.0
3300.0
3270.0
3240.0
3210.0
3180.0
3150.0
3120.0
3090.0
3060.0
3030.0
3000.0
2970.0
2940.0
2910.0
2880.0
2850.0
2820.0
2790.0
2760.0
2600.0

The colour contour map was derived from digital aeromagnetic data points interpolated onto a 0.4km square grid. This was further interpolated to generate a map based on a 0.2km square cell size. Data were reduced to the pole using a declination and inclination of −5.5 and 66.17 degrees respectively.

The digital dataset was generated by digitising contours of total field anomaly from 1:100000 scale base maps.The original aeromagnetic survey was flown at a height of 2000 feet above sea level to the west of line A–B and 3000 feet above sea level to the east. Digital magnetic data and the National Boundary were supplied by the Belgian Geological Survey. Grid lines in Belgian Lambert coordinates define map boundaries.

Compiled by B.C. Chacksfield British Geological Survey 1990 using the COLMAP mapping package.

MAP 4




# BELGIUM AEROMAGNETIC MAP REDUCED TO POLE NORTH ILLUMINATION

nT

3646.8

2652.7

LIGHT SOURCE (DEGREES) : ALTITUDE 45 AZIMUTH 0

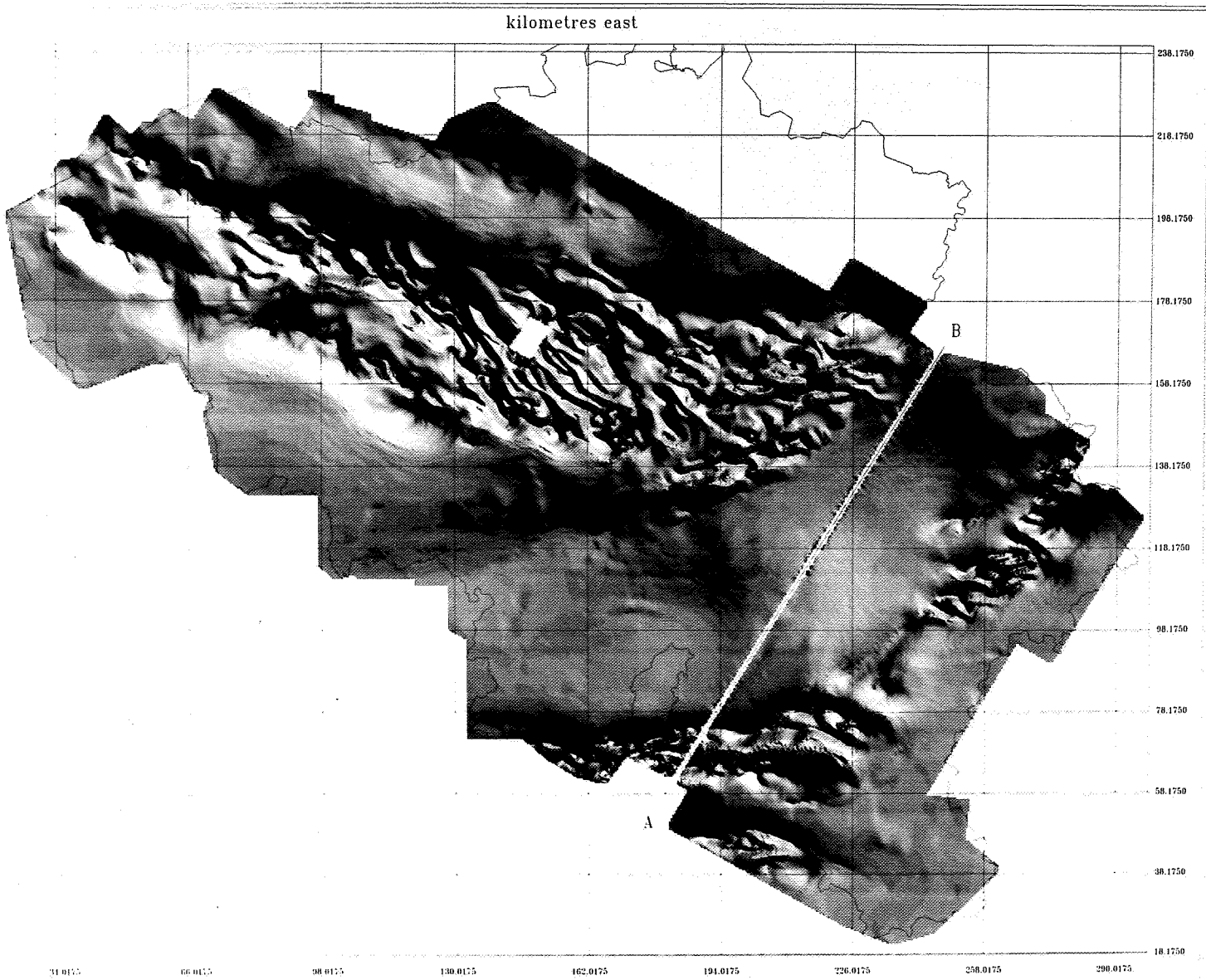
The greyscale shaded-relief map was derived from digital aeromagnetic data points interpolated onto a 0.4km square grid. This was further interpolated to generate a map based on a 0.2km square cell size. Data were reduced to the pole using a declination and inclination of -5.5 and 66.17 degrees respectively.

The digital dataset was generated by digitising contours of total field anomaly from 1:100000 scale base maps.The original aeromagnetic survey was flown at a height of 2000 feet above sea level to the west of line A-B and 3000 feet above sea level to the east. Digital magnetic data and the National Boundary were supplied by the Belgian Geological Survey. Grid lines in Belgian Lambert coordinates define map boundaries.

Compiled by B.C. Chacksfield British Geological Survey 1990 using the COLMAP mapping package.

BGS 1835

MAP 5




# BELGIUM AEROMAGNETIC MAP REDUCED TO POLE SOUTH-WEST ILLUMINATION

nT

3646.8

2652.7

LIGHT SOURCE (DEGREES) : ALTITUDE 45 AZIMUTH 225

The greyscale shaded-relief map was derived from digital aeromagnetic data points interpolated onto a 0.4km square grid. This was further interpolated to generate a map based on a 0.2km square cell size. Data were reduced to the pole using a declination and inclination of -5.5 and 66.17 degrees respectively.

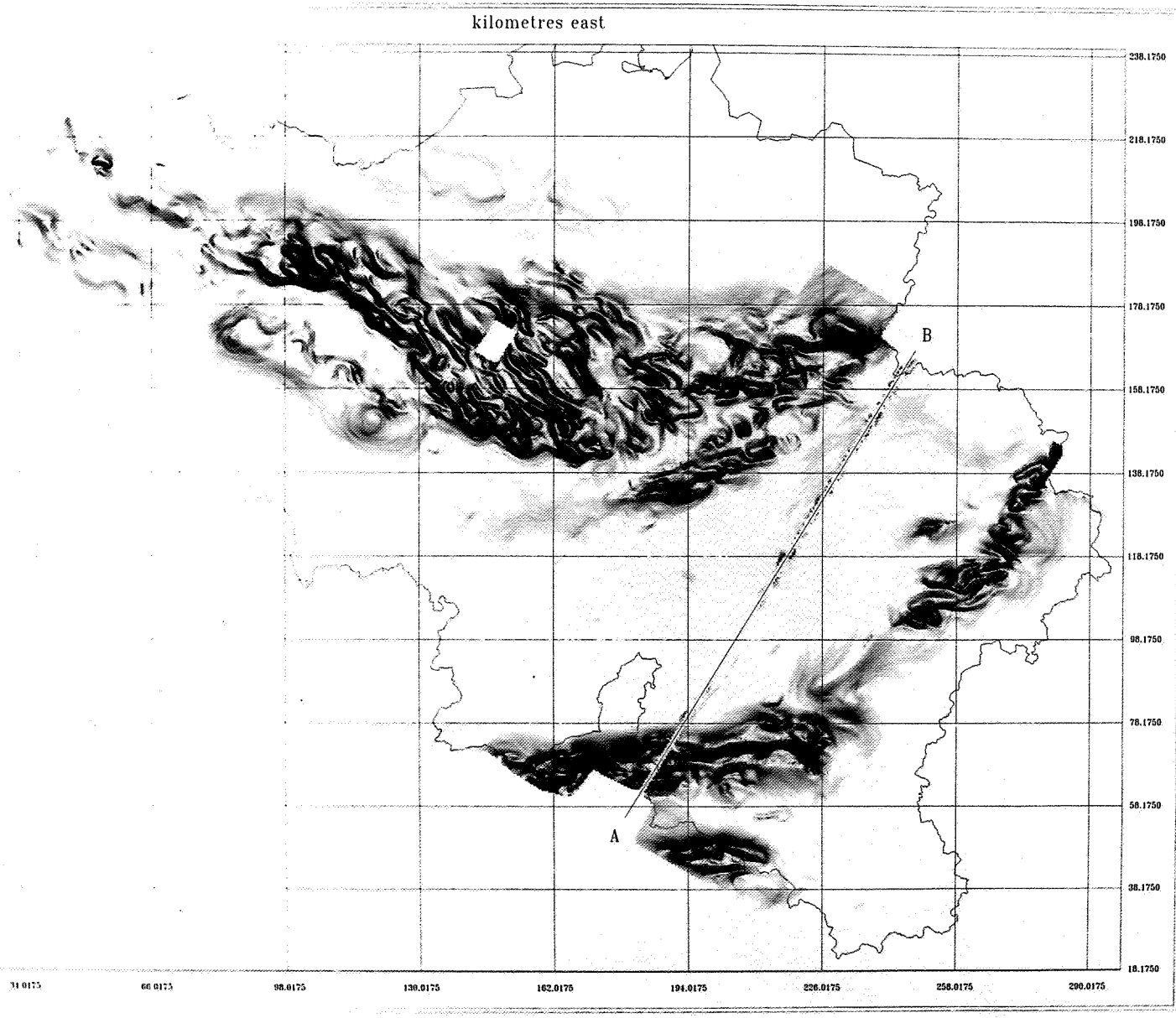
The digital dataset was generated by digitising contours of total field anomaly from 1:100000 scale base maps.The original aeromagnetic survey was flown at a height of 2000 feet above sea level to the west of line A-B and 3000 feet above sea level to the east. Digital magnetic data and the National Boundary were supplied by the Belgian Geological Survey. Grid lines in Belgian Lambert coordinates define map boundaries.

Compiled by B.C. Chacksfield British Geological Survey 1990 using the COLMAP mapping package.

SERVICE GÉOLOGIQUE DE BELGIQUE
BELGISCHE GEOLOGISCHE DIENST

BGS
1835

MAP 6




kilometres north

# BELGIUM AEROMAGNETIC MAP REDUCED TO POLE VERTICAL ILLUMINATION

nT

3646.8

2652.7

LIGHT SOURCE (DEGREES) : ALTITUDE 90 AZIMUTH 0

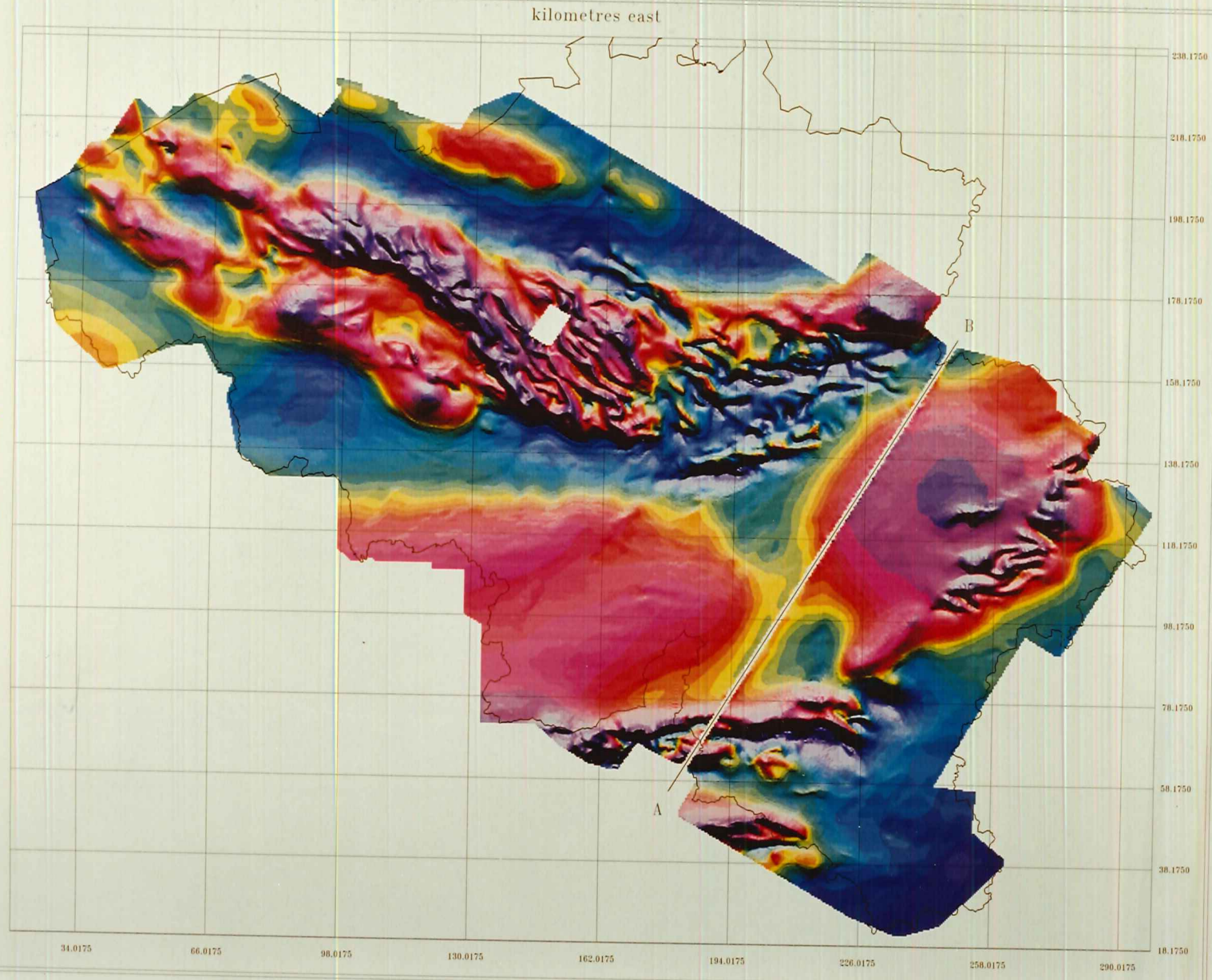
The greyscale shaded-relief map was derived from digital aeromagnetic data points interpolated onto a 0.4km square grid. This was further interpolated to generate a map based on a 0.2km square cell size. Data were reduced to the pole using a declination and inclination of -5.5 and 66.17 degrees respectively.

The digital dataset was generated by digitising contours of total field anomaly from 1:100000 scale base maps.The original aeromagnetic survey was flown at a height of 2000 feet above sea level to the west of line A-B and 3000 feet above sea level to the east. Digital magnetic data and the National Boundary were supplied by the Belgian Geological Survey. Grid lines in Belgian Lambert coordinates define map boundaries.

Compiled by B.C. Chacksfield British Geological Survey 1990 using the COLMAP mapping package.

BGS 1835

MAP 7




# BELGIUM AEROMAGNETIC MAP REDUCED TO POLE NORTH ILLUMINATION

nT

3700.0
3200.0
3140.0
3100.0
3080.0
3060.0
3050.0
3040.0
3030.0
3020.0
3010.0
3000.0
2990.0
2980.0
2970.0
2960.0
2940.0
2900.0
2600.0

LIGHT SOURCE (DEGREES) : ALTITUDE 45 AZIMUTH 0

The colour equal-area shaded-relief map was derived from digital aeromagnetic data points interpolated onto a 0.4km square grid. This was further interpolated to generate a map based on a 0.2km square cell size. Data were reduced to the pole using a declination and inclination of −5.5 and 66.17 degrees respectively.

The digital dataset was generated by digitising contours of total field anomaly from 1:100000 scale base maps.The original aeromagnetic survey was flown at a height of 2000 feet above sea level to the west of line A–B and 3000 feet above sea level to the east. Digital magnetic data and the National Boundary were supplied by the Belgian Geological Survey. Grid lines in Belgian Lambert coordinates define map boundaries.

Compiled by B.C. Chacksfield British Geological Survey 1990 using the COLMAP mapping package.

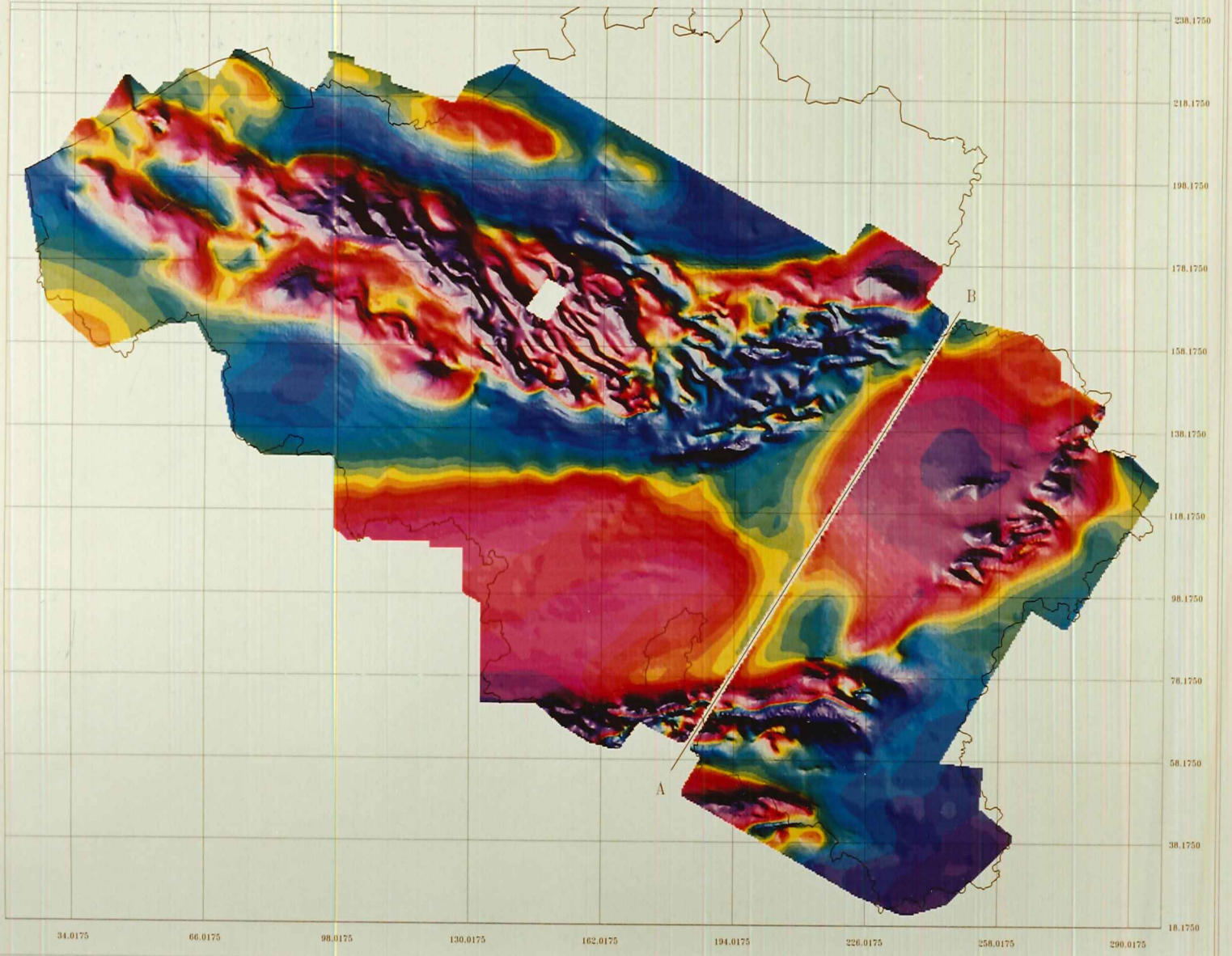
SERVICE GEOLOGIQUE DE BELGIQUE
BELGISCHE GEOLOGISCHE DIENST

BGS
1835

MAP 8

kilometres east

kilometres north




# BELGIUM AEROMAGNETIC MAP REDUCED TO POLE SOUTH-WEST ILLUMINATION

nT

3700.0
3200.0
3140.0
3100.0
3080.0
3060.0
3050.0
3040.0
3030.0
3020.0
3010.0
3000.0
2990.0
2980.0
2970.0
2960.0
2940.0
2900.0
2600.0

LIGHT SOURCE (DEGREES) : ALTITUDE 45 AZIMUTH 225

The colour equal-area shaded-relief map was derived from digital aeromagnetic data points interpolated onto a 0.4km square grid. This was further interpolated to generate a map based on a 0.2km square cell size. Data were reduced to the pole using a declination and inclination of -5.5 and 66.17 degrees respectively.

The digital dataset was generated by digitising contours of total field anomaly from 1:100000 scale base maps.The original aeromagnetic survey was flown at a height of 2000 feet above sea level to the west of line A-B and 3000 feet above sea level to the east. Digital magnetic data and the National Boundary were supplied by the Belgian Geological Survey. Grid lines in Belgian Lambert coordinates define map boundaries.

Compiled by B.C. Chacksfield British Geological Survey 1990 using the COLMAP mapping package.

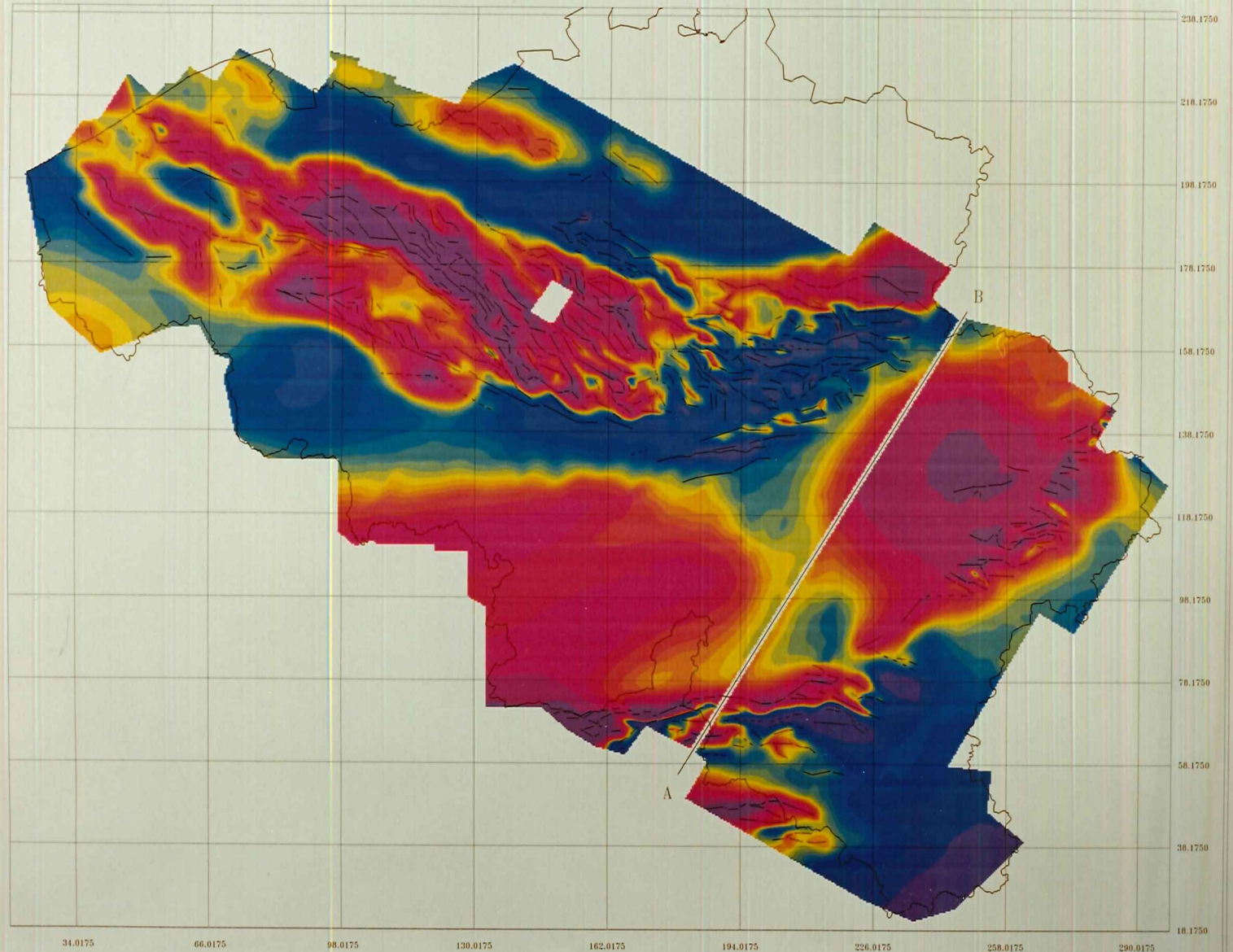
SERVICE GEOLOGIQUE DE BELGIQUE
BELGISCHE GEOLOGISCHE DIENST

BGS
1835

MAP 9

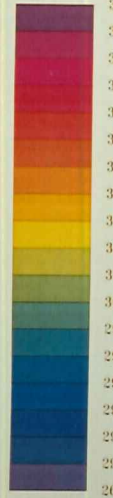
kilometres east

kilometres north




# REDUCED TO POLE AEROMAGNETIC LINEAMENT MAP OF BELGIUM

nT

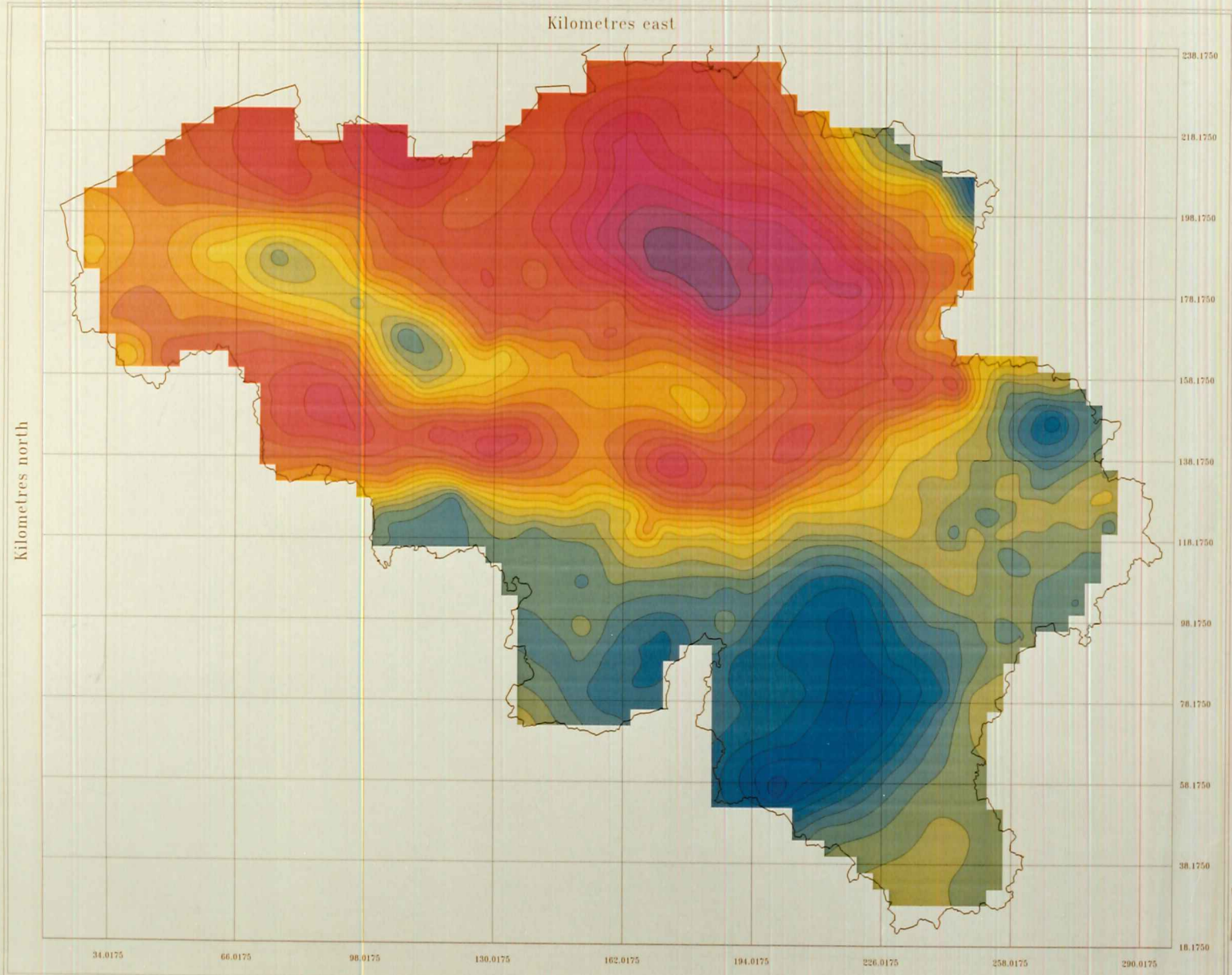



The magnetic lineament map with equal-area colour contours was generated from digital aeromagnetic data. Data were reduced to the pole using a declination and inclination of −5.5 and 66.17 degrees respectively.

The digital magnetic data and the National Boundary were supplied by the Belgian Geological Survey. The lineaments were interpreted from shaded maps of the reduced to the pole field and subsequently digitised. Grid lines in Belgian Lambert coordinates define map boundaries.

Compiled by B.C. Chacksfield British Geological Survey 1990 using the COLMAP mapping package.

MAP 10




# BOUGUER GRAVITY ANOMALY MAP OF BELGIUM COLOUR CONTOURS

mGal

10.00
8.00
6.00
4.00
2.00
0.00
-2.00
-4.00
-6.00
-8.00
-10.00
-12.00
-14.00
-16.00
-18.00
-20.00
-22.00
-24.00
-26.00
-28.00
-30.00
-32.00
-34.00
-36.00
-38.00
-40.00
-42.00
-44.00
-46.00
-48.00
-50.00

The colour contour map at 2 mGal interval was generated from digital data interpolated onto a 4km grid. The Bouguer anomaly was derived using a reduction density of 2.74 Mg/m**3.

Digital gravity data and the National Boundary were supplied by the Belgian Geological Survey. Grid lines in Belgian Lambert coordinates define map boundaries.

Compiled by B.C. Chacksfield British Geological Survey 1990 using the COLMAP mapping package.

OBSERVATOIRE ROYAL DE BELGIQUE

KONINKLIJKE STERRENWACHT VAN BELGIE

BGS 1835

MAP 14