

## P216 APPLICATION OF POTENTIAL FIELD DATA TO INTERPRETATION OF THE PORCUPINE BASIN, OFFSHORE IRELAND

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### Abstract

A compilation of magnetic and gravity data (ARK Geophysics Limited, 2000) covering the Porcupine Basin, located offshore west of Ireland, was carried out as a prelude to an interpretation study. The purpose of the study was to highlight deep and shallow crustal structure and provide a regional structural framework, incorporating the adjacent shelf and onshore areas. The aeromagnetic data incorporated a compilation of high-resolution surveys onshore, and a high-resolution survey offshore over the centre of the basin surrounded by surveys with widely spaced flightlines. The gravity compilation combined land data onshore, with offshore marine data in the east and satellite altimetry in the west.

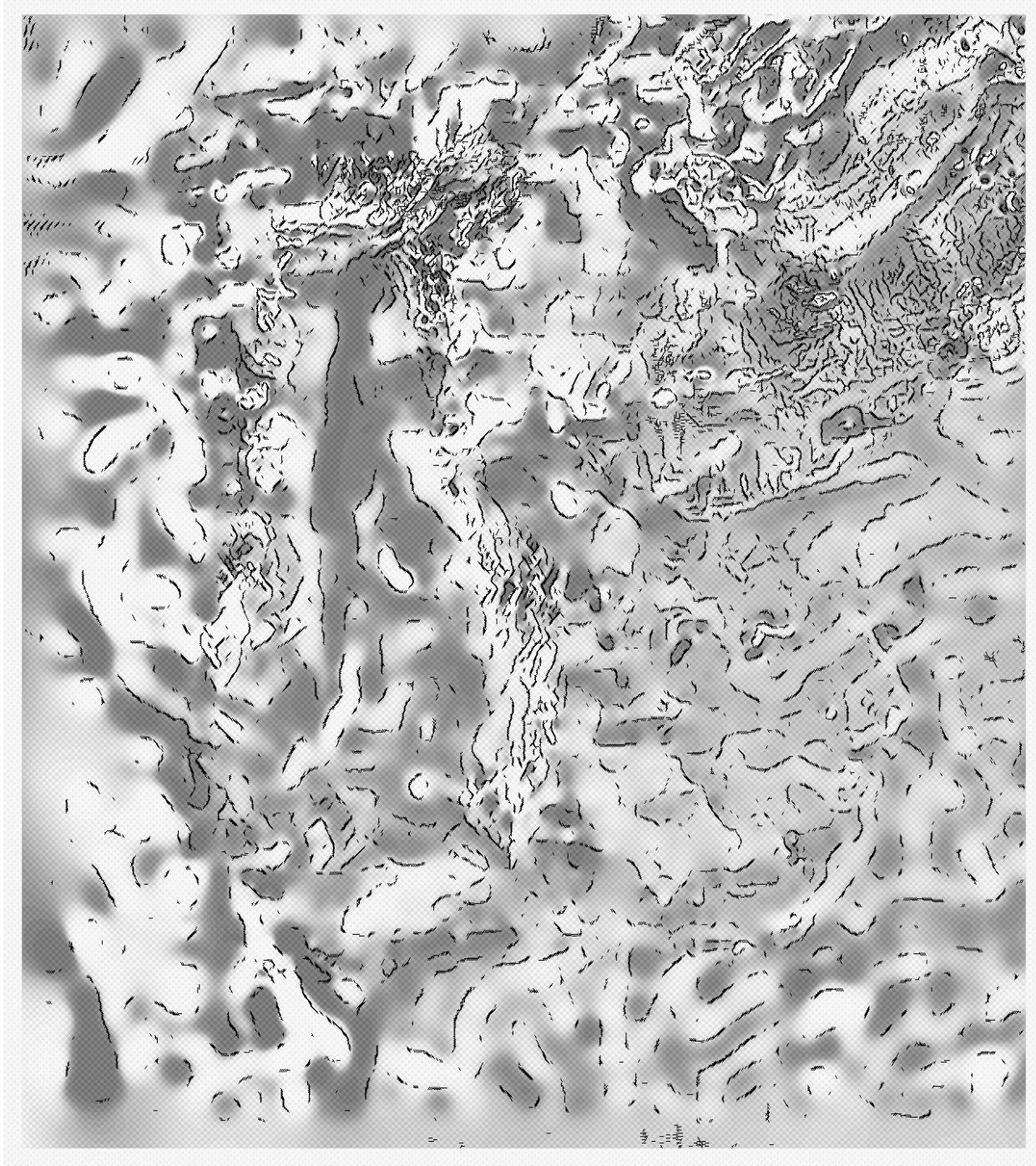
Twenty-eight map products were generated from the magnetic, gravity and bathymetry data to prepare the interpretation (Paterson, Grant & Watson Limited, 2001). Magnetic products included: total magnetic intensity, reduction-to-the-pole, first vertical derivative, pseudo-gravity, upward continuation, residual field, analytic signal, Compu-drape™ to the seafloor, Euler deconvolution, source edge detection and Source Parameter Imaging™. Gravity products included: free-air gravity, isostatically-corrected Bouguer gravity, horizontal gradients, upward continuation, residual field, Euler deconvolution and source edge detection.

Figure 1 shows the first vertical derivative of the pole-reduced magnetic field, with the results of source edge detection (after Blakely and Simpson, 1986) superimposed. The edges or boundaries of magnetic sources are located from local maxima in two, three or four directions extracted from the total horizontal gradient of the pole-reduced magnetic field. The dip symbol indicates the “down-gradient” direction in the pole-reduced magnetic field. The more intense clustering of source edges reflects sources that are shallow (e.g. onshore) or more variably magnetic (e.g. volcanics).

Figures 2 and 3 show the first vertical derivative of the pole-reduced magnetic field, and the residual Bouguer gravity field respectively, both shaded from the northeast. The residual gravity was computed by upward continuing the isostatically-corrected Bouguer gravity a distance of 10 km and subtracting it from the original. Each image shows the same simplified interpretation of the potential field data. The Porcupine Basin is outlined quite well by both sets of data. Numerous sub-basins and smaller adjacent basins are evident. The magnetic data delineate the intra-sedimentary volcanics and several igneous centres, the roots of which can be seen in the

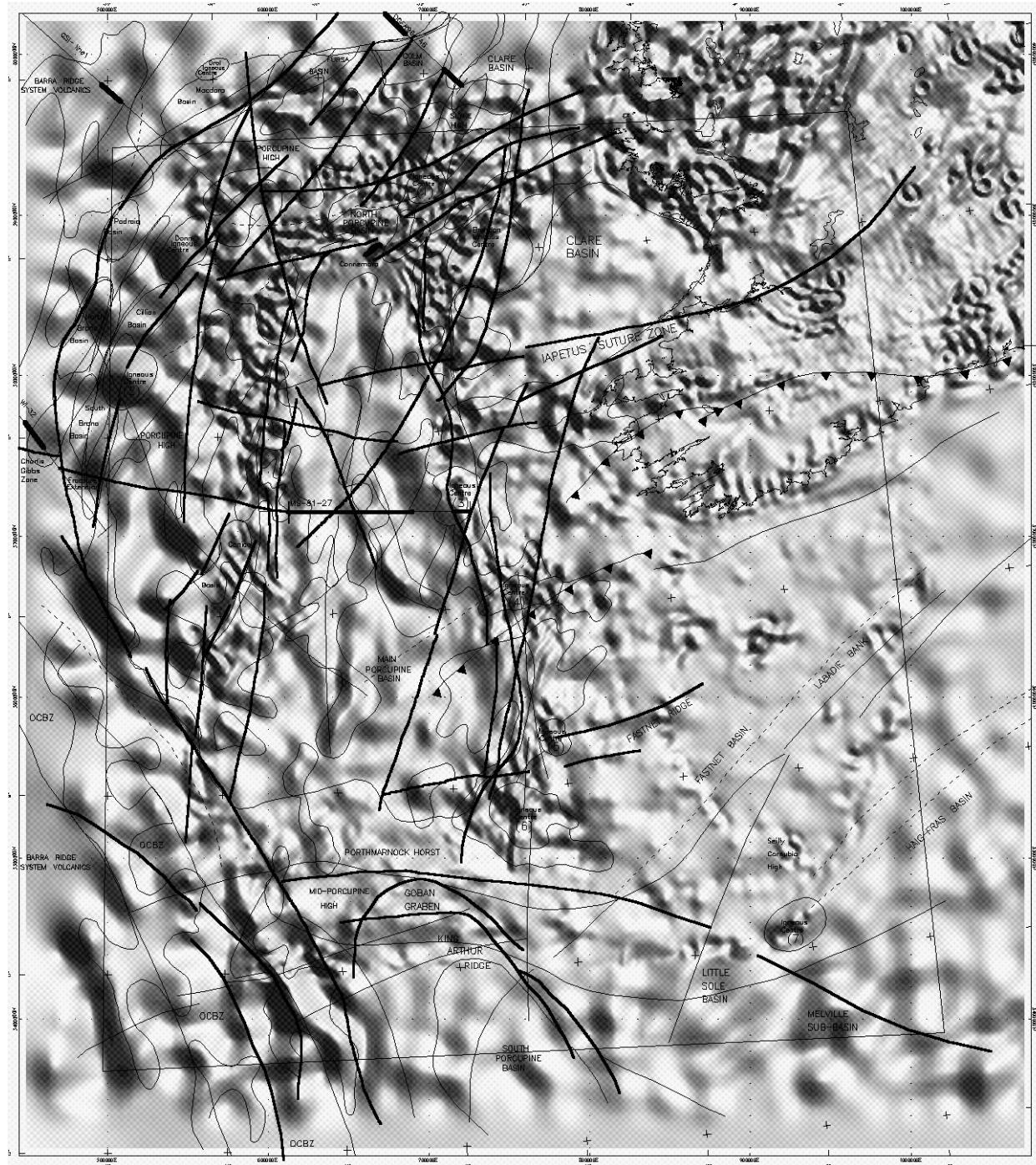
Compu-drape™ is a trademark of Paterson, Grant & Watson Limited.

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*Figure 1 Magnetic source edges (modified after Blakely and Simpson, 1986) superimposed on a grey-scale image of the first vertical derivative of the pole-reduced magnetic field, Porcupine Basin, Ireland.*

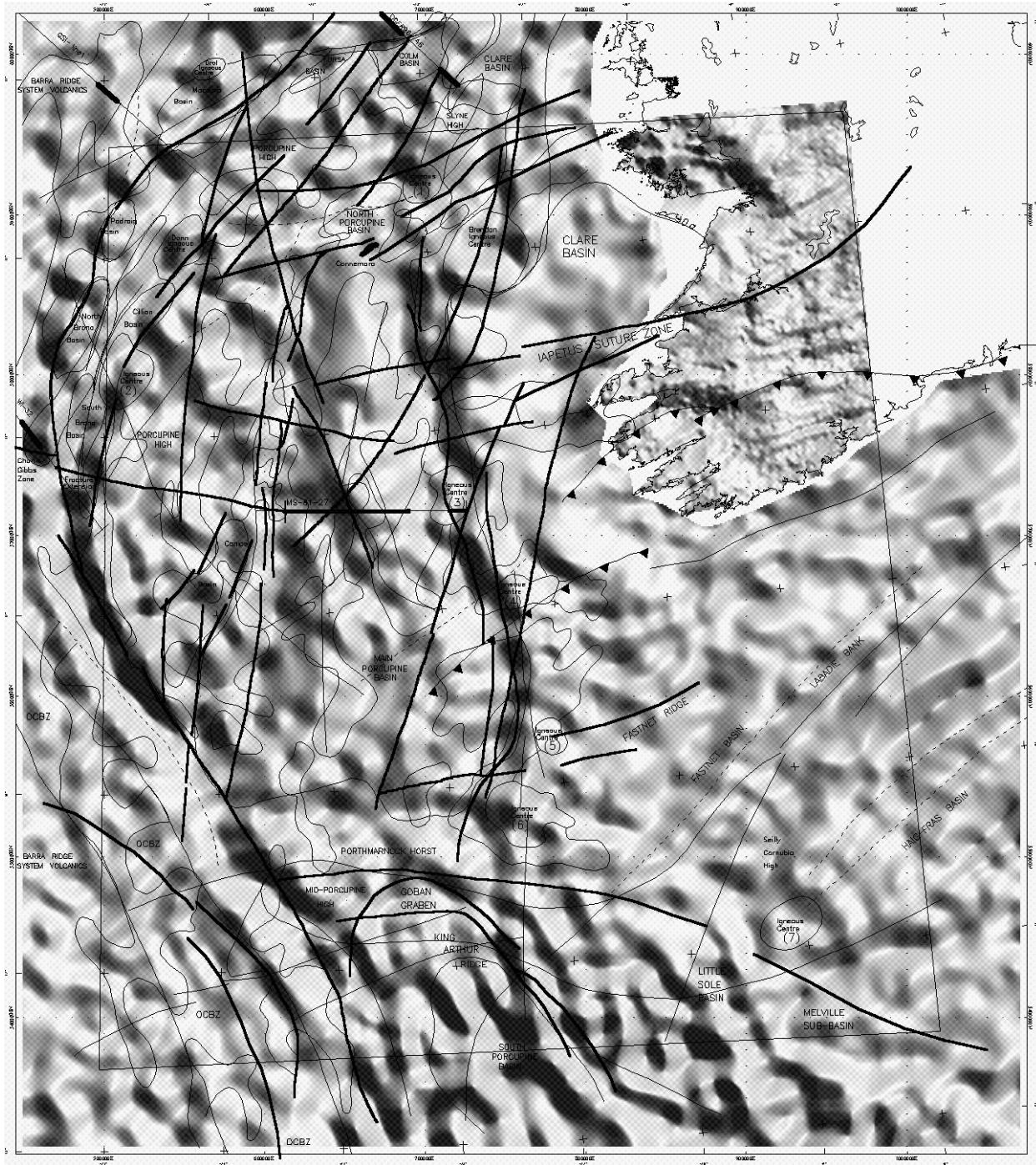
gravity data. Basin structures (e.g. horsts, grabens, ridges, highs) have been interpreted. Faults that control or cut these structures, as well as tectonic features, are also evident. The interpretation of the potential field data will provide significant input to the local interpretation of seismic lines, and to tie the seismic interpretation into the regional framework. Coincident modelling of the potential field data will lend further credence to the seismic results.



**Figure 2** Simplified magnetic and gravity interpretation superimposed on a grey-scale image of the first vertical derivative of the pole-reduced magnetic field, shaded from the northeast, Porcupine Basin, Ireland.

### Acknowledgements

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**Figure 3** Simplified magnetic and gravity interpretation superimposed on a grey-scale image of the residual Bouguer gravity field, shaded from the northeast, Porcupine Basin, Ireland.

## References

- ARK Geophysics Limited, 2000, Porcupine Basin Potential Field Study Compilation Report, prepared for Porcupine Studies Group Secretariat.
- Blakely, R. J. and Simpson, R. W., 1986, Approximating edges of source bodies from magnetic or gravity anomalies (short note): Geophysics, 51, no. 7, p. 1494-1498.
- Paterson, Grant & Watson Limited, 2001, Porcupine Basin Potential Field Study Interpretation Report, prepared for Porcupine Studies Group Secretariat.