

REGIONAL COMPILATION OF GRAVITY AND MAGNETIC DATA ACQUIRED OFFSHORE SOUTH AFRICA



The Petroleum Agency SA (PASA) acts as the regulator for petroleum exploration onshore and offshore South Africa. It also acts as the national archive for all data relating to the petroleum geology of South Africa. Figure 1 shows the extent of offshore geophysical data within the continental margin and its associated basins. The continental shelf of South Africa has a complex bathymetric morphology characterized by the presence of a number of submarine depressions and elevations.

Increased interest by international companies in petroleum ventures in the country's territorial waters has resulted in the need to re-evaluate the existing gravity and magnetic data, in order to assess the spatial distribution and completeness of the data within the territorial waters offshore mainland South Africa.

A substantial number of magnetic and gravity surveys have been carried out over the years as a result of offshore exploration and academic research. PASA compiled details of all the offshore gravity and magnetic data (digital, reports and maps) that were carried out simultaneously with SOEKOR (now PetroSA) marine seismic surveys. Recently, the geophysical surveys in the country's territorial waters have resulted in new data becoming available which can be incorporated into the broader grid of vintage and existing surveys in the deep water areas.

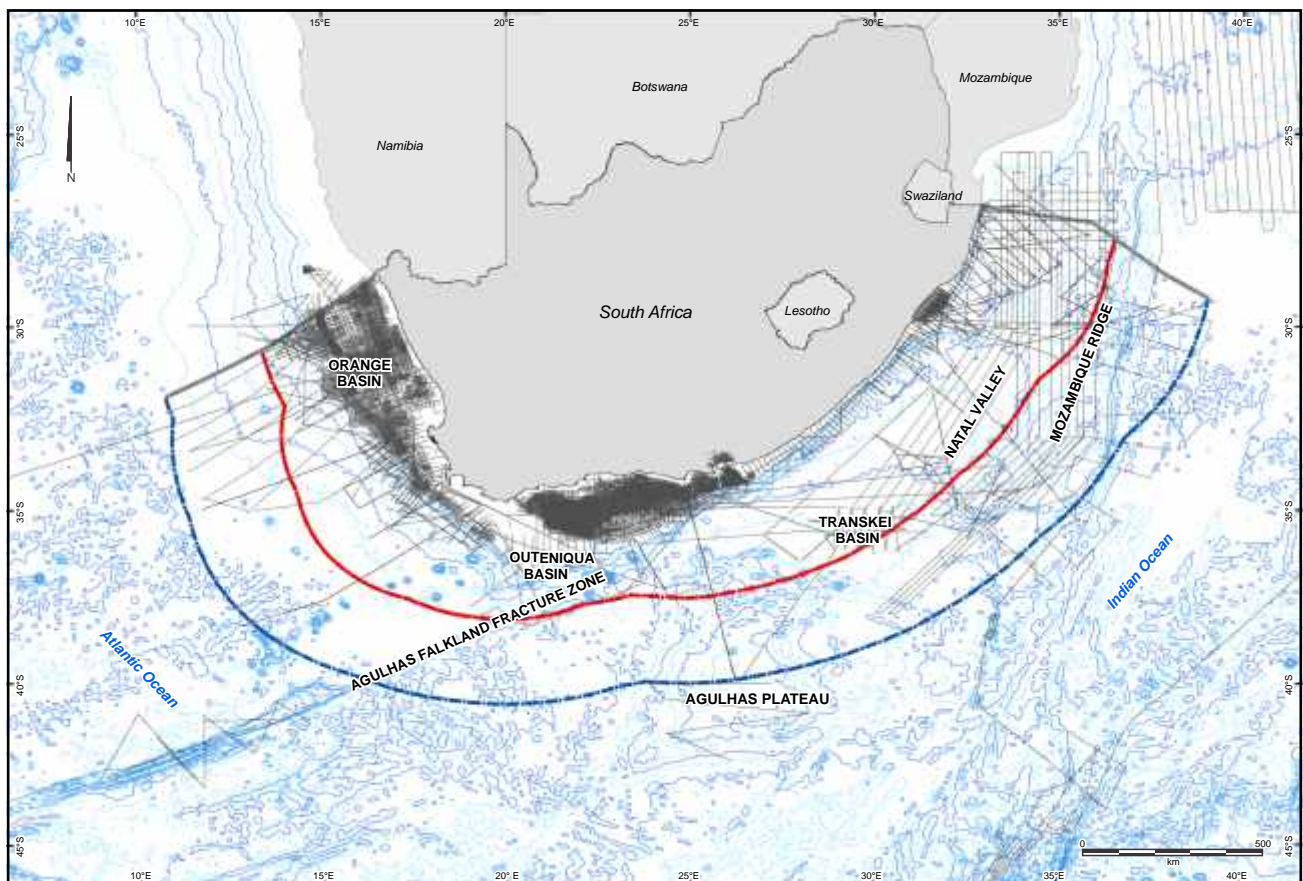


Figure 1: Map showing extent of offshore geophysical data within the continental margin and its associated basins.

DATA COMPILATION

PASA has undertaken numerous projects offshore South Africa together with both the academic and private sectors. A selection of gravity and magnetic data has been reprocessed and most of these datasets are well organized and accessible. The quality of the database varies considerably from area to area, however, as data coverage varies greatly in quantity from one area to another. This data, together with the data that is in the public domain, can be of great significance in the evaluation of basin evolution and development. Much of this data, within the database however has not been processed or interpreted.

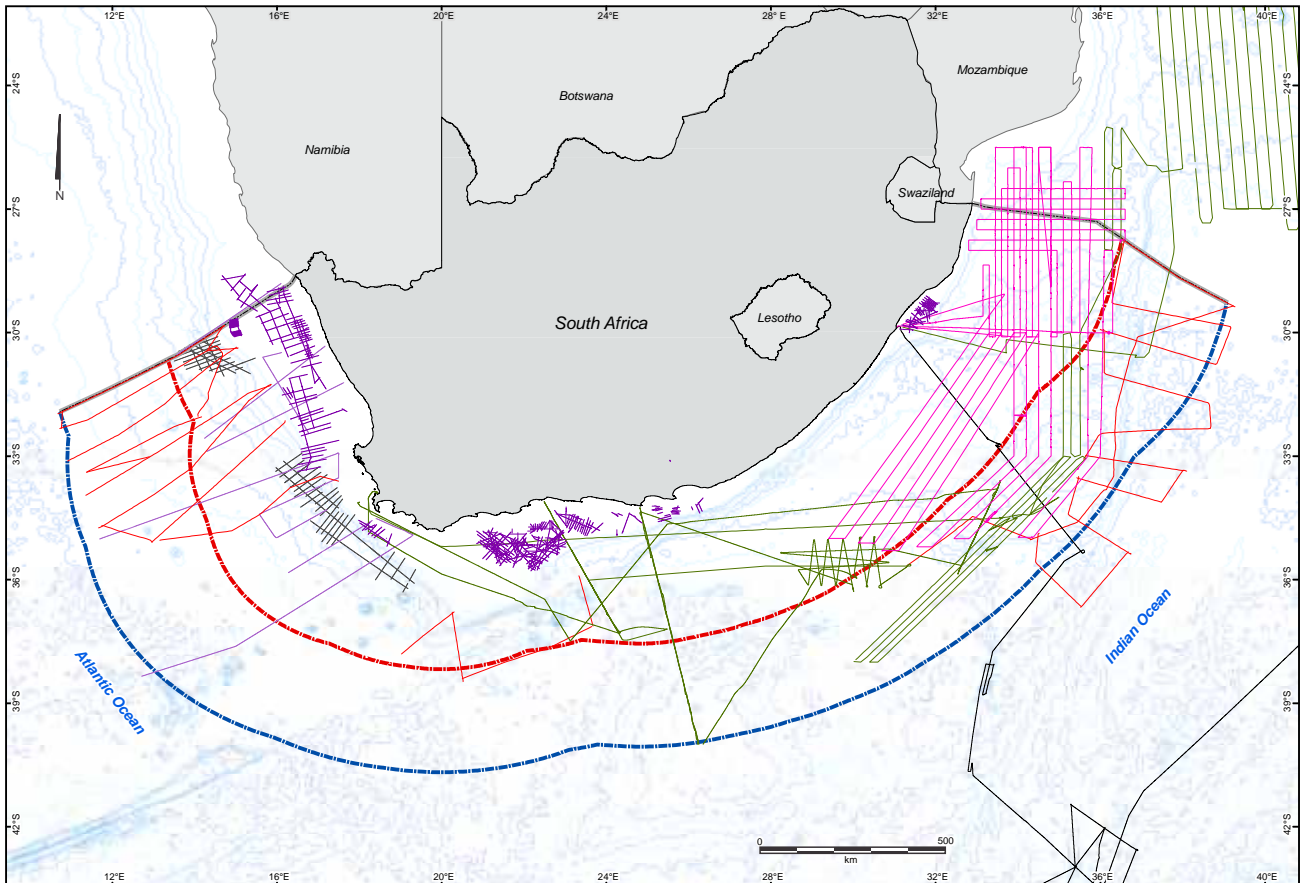


Figure 2: Extent of magnetic and gravity data offshore South Africa

The datasets available from the petroleum industry, academic institutions and also new surveys that were designed to acquire data relating to the extended continental shelf are shown on Figure 2. In recent years PASA has commissioned geophysical surveys and negotiated to acquire existing data on the South African continental Margin in support of the Extended Continental Shelf Claim Project. The acquired data extends the spatial distribution of the database to the deep-water regions of the South African continental margin.

A considerable amount of regional gravity and magnetic data is freely available in the public domain. For example, the National Geophysical Data Center (NGDC) world-wide marine trackline database contains geophysical data collected during marine surveys from 1953 to the present (Figure 3).

The Scripps Institution of Oceanography is also one of the marine institutes that provides free access to their marine database. The regional satellite free air gravity and other magnetic data extracted from various sources in the public domain can be used as reference point (Figure 4).

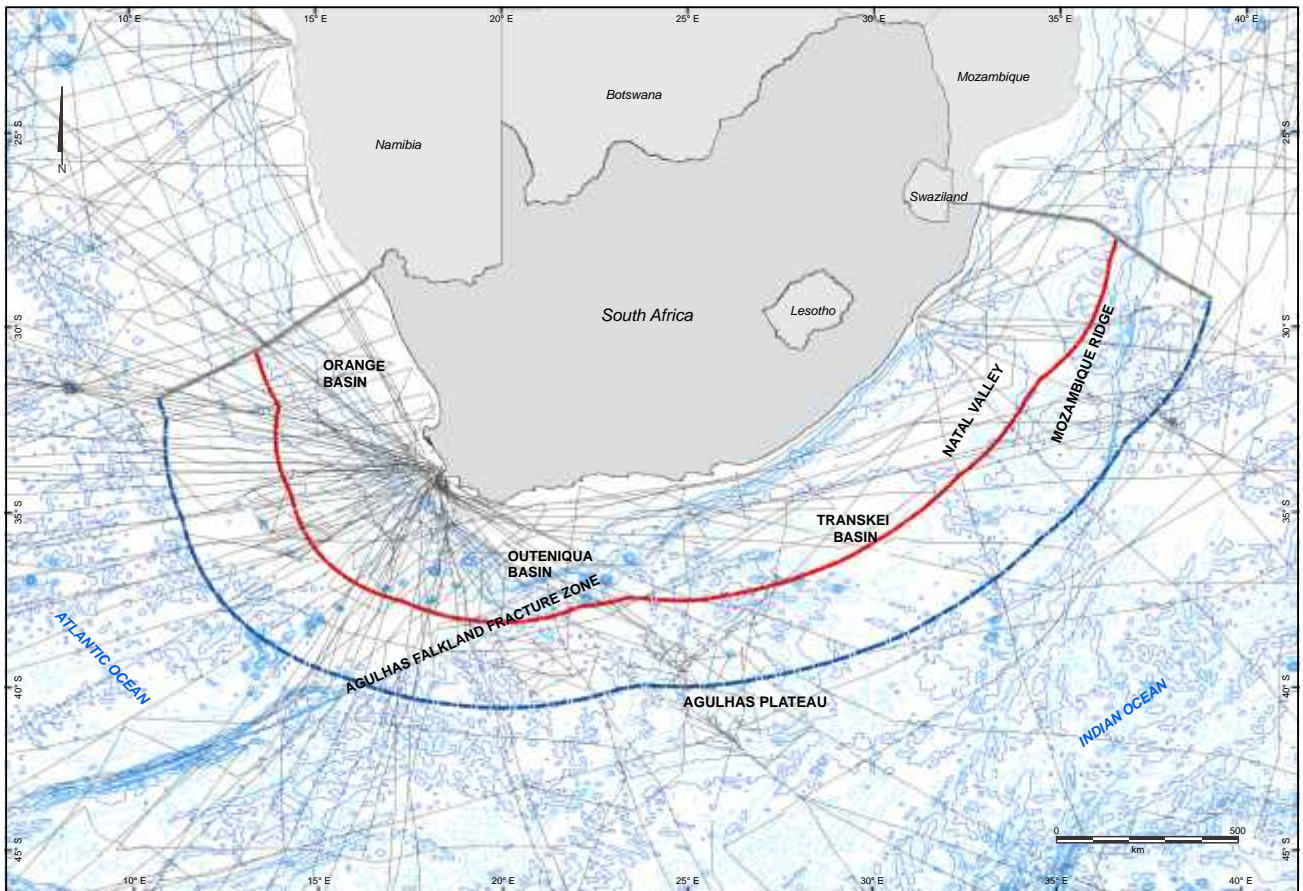


Figure 3. Map showing NGDC gravity and magnetic data coverage offshore South Africa (source: <http://www.ngdc.noaa.gov/ngdcinfo/onlineaccess.html>)

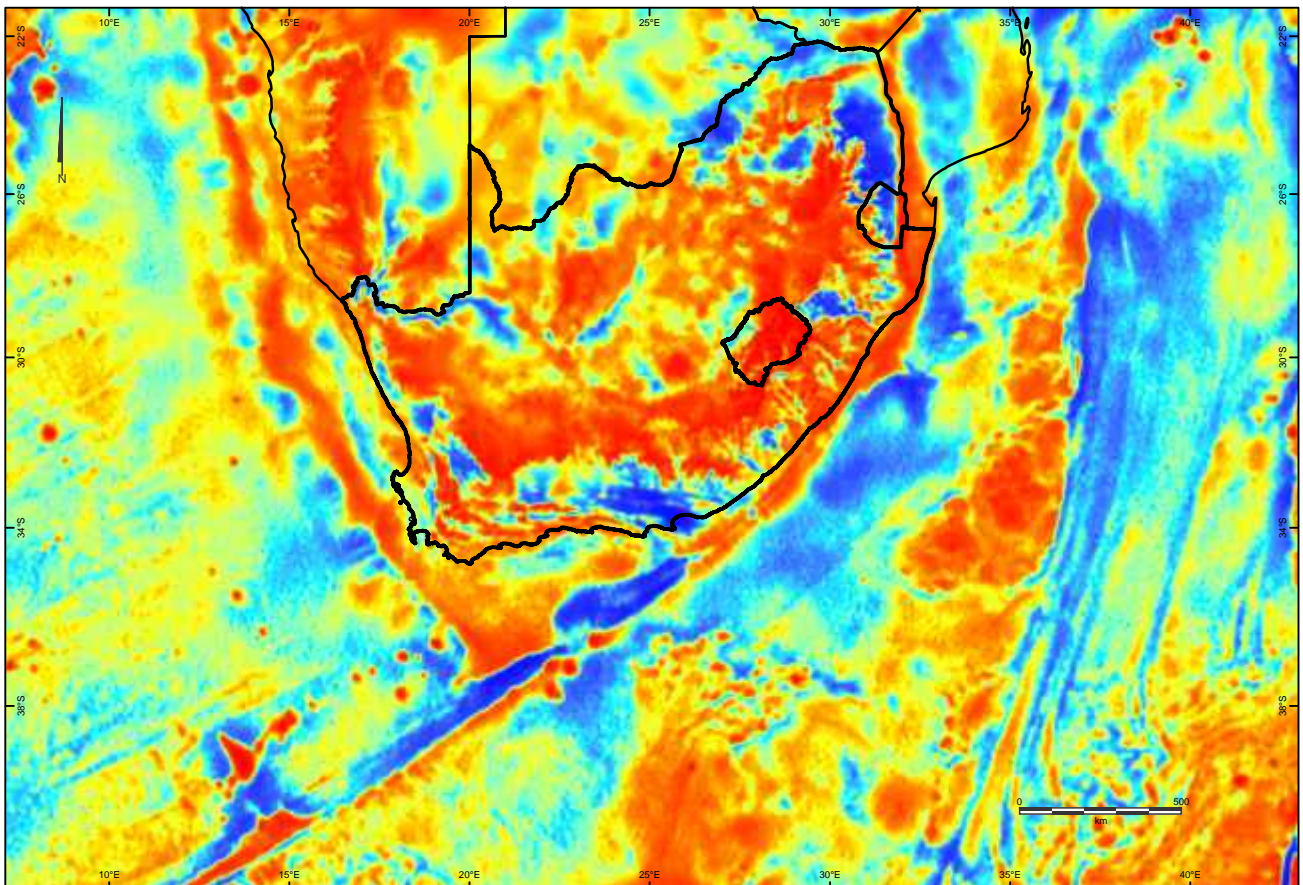
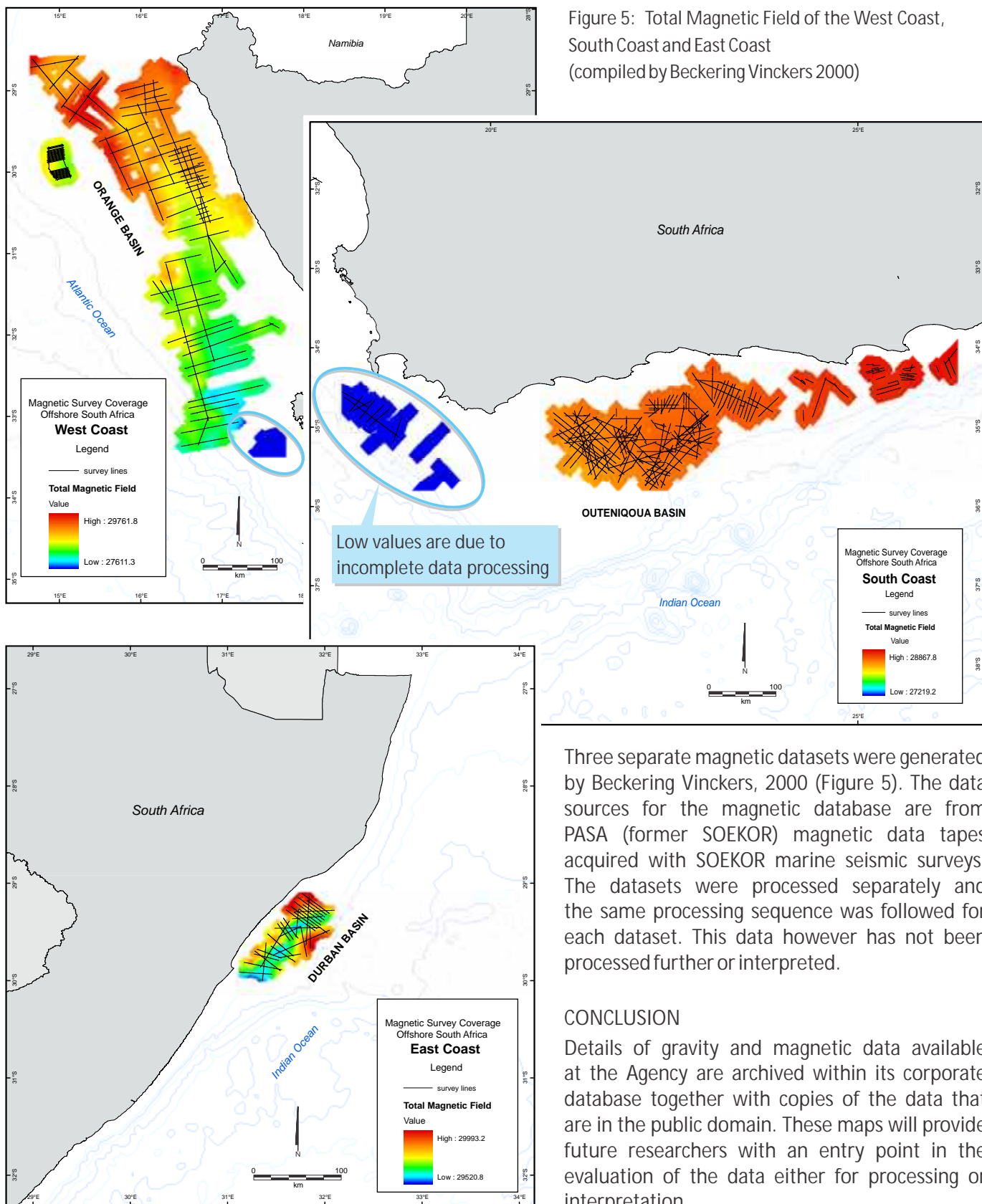


Figure 4. Regional satellite free air gravity generated from Sandwell and Smith (1997), (source: http://topex.ucsd.edu/mar_grav.html)

Figure 5: Total Magnetic Field of the West Coast, South Coast and East Coast (compiled by Beckering Vinckers 2000)



Three separate magnetic datasets were generated by Beckering Vinckers, 2000 (Figure 5). The data sources for the magnetic database are from PASA (former SOEKOR) magnetic data tapes acquired with SOEKOR marine seismic surveys. The datasets were processed separately and the same processing sequence was followed for each dataset. This data however has not been processed further or interpreted.

CONCLUSION

Details of gravity and magnetic data available at the Agency are archived within its corporate database together with copies of the data that are in the public domain. These maps will provide future researchers with an entry point in the evaluation of the data either for processing or interpretation.

REFERENCES

- Beckering Vinckers, J. 1999. Evaluation of the status of all gravity and magnetic data relevant to offshore South Africa. SOE-PLU-RPT-078, PASA, POF11587.
 Sandwell, D.T. and Smith, W.H.F., 1997. Marine gravity anomaly from Geosat and ERS-1 satellite altimetry. *Journal of Geophysical Research*, 102:10039-10054.
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