THE OUTER EDGE OF THE CONTINENTAL MARGIN OF ARGENTINA, AUSTRALIA AND RUSSIA BY THE GRAVIMETRIC TOMOGRAPHY DATA

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An outer edge of the continental mass is established by the foot of the continental slope in accordance with the UN Convention on the Law of the Sea (UNCLOS, article 76). It can be "visible" with the help of echo-sounding and seismic surveys.

It is obvious that the real continental margin extends under upper layers of the abyssal ocean floor more seaward than the visible foot. The gravimetric tomography method [1] developed by us allows to reconstruct the Earth's internal geological structure with the satellite altimeter and geoid data to determine the real outer edge of the continental mass and the breadth of the territorial sea along the coastal countries.

The method is based on using the observed gravitational potential of the Earth. Spherical harmonics of the EGM96 global geopotential model (geoid) are used as the input data for calculation of anomalous harmonic density.

Such an approach was used to determine the real boundary lines of the Argentine continental margin [2]. Figure 1 shows the vertical sections of the lithosphere along parallel 45°S. This is the natural geological outer edge of the Argentine continental mass which is situated more seaward up to 300 km from the foot point at a depth of approximately 25 km. Thus, the natural geological outer edge of the Argentine continental margin can be referred to the corresponding line as shown in Figure 2.

Australian continental margin along 124°E is situated more seaward up to 140 km from the foot point at a depth of 12 km.

Similar research for the Arctic Region of Russia shows a significant shift of the Siberian continental mass to North. This situation takes place because of the influence of the Pamir and Tien Shan mountain structures. There is a connection between continental mass and Lomonosov and Mendeleev Ridges, which is visible at the depth of 80-250 km.

The method of gravimetric tomography is based on using data from the highly-accurate geodetic geoid system. Its accuracy is comparable to the accuracy of the shore geodetic data and is even higher for the offshore ship-borne data, which is possible because of the high density of satellite altimetry data. This method could play a role in a solution for the problem of detecting continental edges and could become the sole tool for all countries. All the calculations could be conducted by a specialized international organization. At the same time laborious and expensive marine geophysical methods (seismic, bathymetry, gravimetry and magnetometry) could be used only within the separate complex cases.

1. Greku R.Kh., Usenko V.P., Greku T.R. (2006) Geodynamic Features and Density Structure of the Earth's Interior of the Antarctic and Surrounded Regions with the Gravimetric Tomography Method. In:. Fütterer

D.K., Damaske D., Kleinshmidt G., Miller H., Tessensohn F. (eds) Antarctica - Contributions to global earth sciences. Springer, Berlin Heidelberg New York, pp. 369-375.
2. R. Greku, D. Greku. "Determination of the Continental Margin Outer Edge by the Satellite Altimeter Data and the Geoid Gravity Model". Report of the ABLOS Conference 2001 "Accuracies and Uncertainties in Maritime Boundaries and Outer Limits". International Hydrographic Bureau, Monaco, 18-19 October 2001. http://www.gmat.unsw.edu.au/ablos/ablos01_papers.htm.

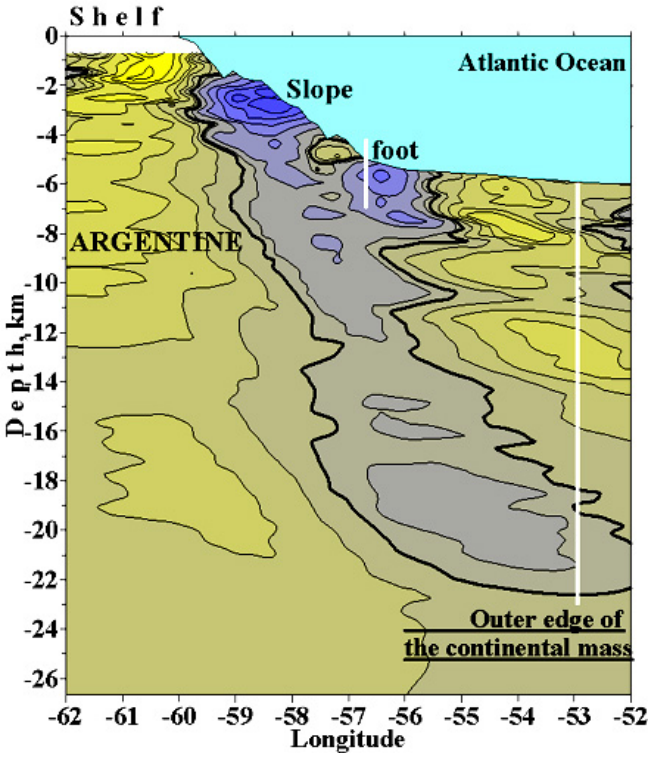

Figure 1. Vertical section of the South America continental margin (Argentine) along parallel 45°S. The isolines show the contours of the anomalous density inhomogeneities. The colour scale from blue to yellow corresponds to increasing of the density

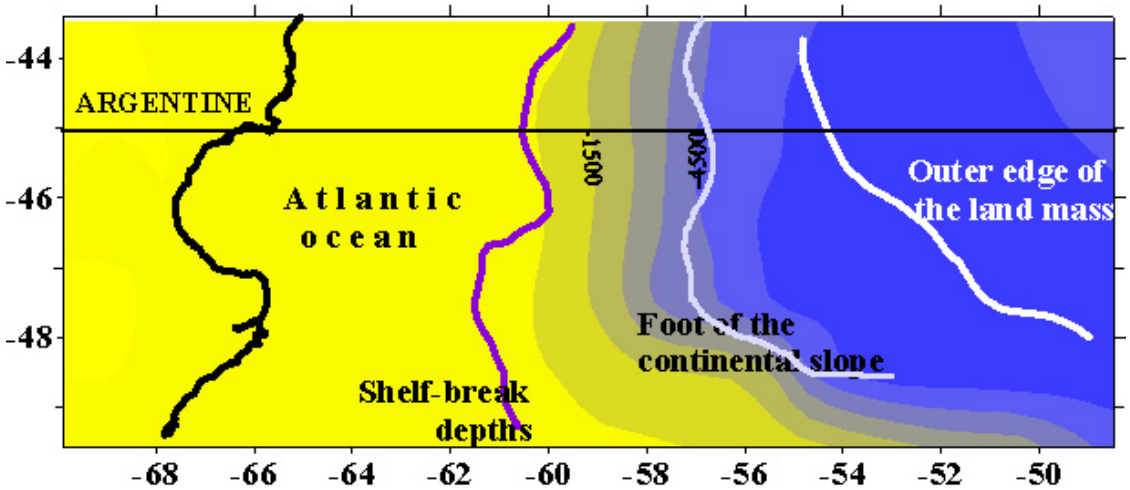

Figure 2. Location of the limit lines by the Gravimetric Tomography method. Background is the sea bottom topography by ETOPO5