

Chapter 4

THE GEOLOGY OF THE BASINS OF THE ARGENTINE CONTINENTAL MARGIN AND MALVINAS PLATEAU

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I. INTRODUCTION

The Argentine continental margin, which ranks among the most extensive in the world, has been the scene of intensive geologic and geophysical exploration during the last 15 years. The work was carried out by the Lamont–Doherty Geological Observatory of Columbia University, in collaboration with the Hydrographical Service of the Argentine Navy. This has led to very important contributions to our knowledge of the region (Ewing *et al.*, 1963, 1971; Ludwig *et al.*, 1965, 1968; Lonardi and Ewing, 1971), for through these studies the existence of several sedimentary basins has been found, some of which extend into the continental margin. During the last few years, thanks to this pioneering work, the Argentine government has offered several sectors of this region for petroleum exploration, which in turn has contributed to an increased knowledge of the offshore basins, through further seismic work and the drilling

of exploration wells. Detailed sedimentary and palaeontologic studies have been carried out on material from these wells.

Notwithstanding the important information already gained, there are still many problems to be solved. Knowledge of the structure, lithology, and development of the continental margin is still incomplete, yet it is essential for the understanding of the geologic processes at work.

The continental margin of southern Brazil and Argentina is of Atlantic type, characterized by stable continental blocks (without seismic activity). It has been subjected to little or no tectonic deformation since at least upper Paleozoic or lower Mesozoic times (Zambrano and Urien, 1970), despite the change in structural trends which took place in Late Jurassic or Early Cretaceous times. The relationship between the continental and oceanic crust is in general abrupt, with sedimentary accumulations occurring in marginal-type basins (San Pablo, Pelotas, the North Malvinas basins). This occurs along the Brazilian continental margin, but at lat 35° S the elongated marginal-type basins change from parallel to the shore to a new basin type perpendicular to the continental margin. These basins also enter the "continental block" (Ewing *et al.*, 1963; Zambrano and Urien, 1970; Urien and Zambrano, 1972). Examples of this type are the Salado and Colorado basins.

A third type of basin is represented by those developed entirely within the continental shelf, that is, basins which do not reach the continental margin. The San Jorge and Valdés basins are examples of this type. Finally, the Magallanes and the Malvinas basins are true geosynclines.

These trends have special relationships with the behavior of the continental block and its mobility. Geophysical surveys have already clarified certain of these aspects, particularly concerning the structural conditions beneath the continental block and their relationship with the nucleus of the continent (Ewing *et al.*, 1963; Ludwig *et al.*, 1968). The radiometric data of Stipanovic (1971), Linares (1969), Halpern *et al.* (1970, 1971), and Halpern and Linares (1970) have thrown considerable light on the history of the stable and semistable areas.

The object of this paper is to provide a review of the existing information and discuss the history of the geologic units since middle Mesozoic times. The authors are aware of the enormity of the task and of the difficulties still remaining in attempting to relate the history of the eastern South American continental margins to those of western Africa in an attempt to determine the evolution of the South Atlantic Ocean.

II. TOPOGRAPHIC OUTLINES

The Argentine continental plateau covers over 1,000,000 sq. km, ranging in width from 240 km at the latitude of the Rio de la Plata up to 500 km in the latitude of the Malvinas Islands (Fig. 1). The continental platform can be