

## Stratigraphy and facies architecture of the fluvial–aeolian–lacustrine Sergi Formation (Upper Jurassic), Recôncavo Basin, Brazil

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### Abstract

The Sergi Formation encompasses an upper Jurassic fluvial–aeolian–lacustrine succession deposited within a wide intracratonic basin. Its sand bodies represent the largest and more important reservoirs in the Recôncavo Basin, hosting 362 million m<sup>3</sup> of oil in place. The main goal of this paper is to provide a detailed stratigraphic analysis of the Sergi Formation based on core and outcrop data. It was achieved through the recognition and correlation of regional surfaces that have allowed the subdivision of this unit into distinct depositional sequences, and the reconstruction of its depositional history. The studied succession can be subdivided into three unconformity-bounded sequences. Sequence I is composed of lacustrine mudstone at its base, which is overlain by fine- to medium-grained sandstone related to aeolian dune and sand sheet and ephemeral fluvial stream deposits. Fluvial strata indicate northeastward-flowing streams whereas aeolian dune deposits suggest the action of southwestward-blowing winds. The regional unconformity bounding sequences I and II denotes both a climate change and tectonic rearrangement of the basin. This surface delineates a change in the depositional style, from fluvial–aeolian–lacustrine (Sequence I) to entirely fluvial (Sequence II). The latter includes coarse-grained to conglomeratic sandstone deposited within northwestward-flowing braided channel-belts. Changes in fluvial palaeocurrent, from sequence I to II, indicate rearrangement of the drainage system related to basin tectonism. Furthermore, a change in the fluvial discharge regime took place as a result of a change from a drier to a wetter climate. Fluvial deposition in Sequence I was related to ephemeral streams whereas fluvial facies architecture of the Sequence II deposits indicates perennial braided streams with significant discharge variation. Another regional unconformity, this time related to a stratigraphic base level fall and consequent widespread, basinwide aeolian deflation, separates the braided fluvial facies of Sequence II from the fine- to medium-grained sandstones ascribed to sheet-floods, aeolian dunes and aeolian sand sheets of Sequence III. The resumption of aeolian sedimentation indicates a return to drier conditions in the basin. The abrupt change from fluvial–aeolian deposits to the lacustrine deposits of the overlying Itaparica Formation suggest a rapid rise of the water table and consequent basinwide flooding.

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## 1. Introduction

The Upper Jurassic Sergi Formation contains the largest sandstone reservoirs of the Recôncavo Basin, with an original volume of 362 million m<sup>3</sup> of oil in place. This unit consists of fluvial–aeolian–lacustrine deposits accumulated in a wide intracratonic basin (Netto, 1978; Lanzarini and Terra, 1989).

Although the Sergi Formation has been extensively studied in last decades, few papers have focused in detail on its depositional architecture and controlling

mechanisms of sedimentation using a sequence stratigraphic approach (e.g. Dias Filho, 2002). Therefore, the main aims of this paper include (1) characterization and interpretation of the main facies associations; (2) elaboration of a sequence stratigraphic framework based on the identification and correlation of unconformities; and (3) proposition of a stratigraphic model for the fluvial–aeolian deposits of the Sergi Formation.

Log analysis, facies description and logging were carried out on cores from four wells (Fig. 1). Subsurface

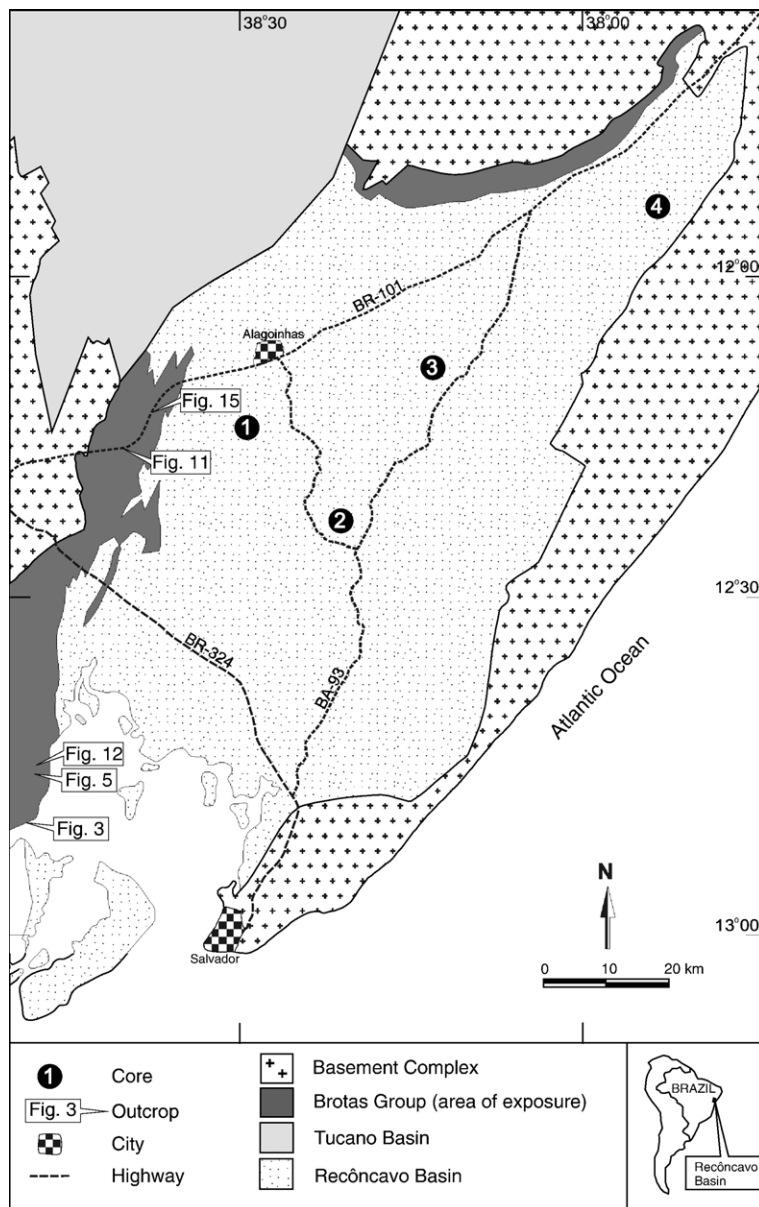


Fig. 1. Simplified geologic map of the studied area. Numbered black circles indicate the positions of the four logged cores presented in Fig. 2. The location of five outcrop panels are indicated by the numbered rectangles.

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