Abstract
The Opón structure is a large, north-plunging antiform located along the Las Salinas fault at the western flank of Colombia’s Cordillera Oriental. It comprises a wedge bounded by upper and lower detachments with opposing vergence. Efforts to characterize the structural geometry based on seismic profiling have generally failed due to very steep bedding attitudes and rugged topography at the surface introducing unacceptable noise levels into the data. Surface geologic mapping, well tops, and dipmeter information, and a new wide-line seismic profile were used to constrain the construction of 21 restorable 2-D structural cross-sections. These were interactively combined to generate a 3-D model.

Key 3-D characteristics of the structure include associated thrust fault geometries, reservoir closure, and implied structural evolution. Geologic maps show the target Eocene La Paz Fm. reservoir outcrops at the southern termination of the feature. The 3-D model suggests that these exposures lie in a hanging-wall syncline that is separated from the productive footwall anticline by a thrust fault. The productive trap geometry at the La Paz level is dependent on the anticline’s northerly-plunge and on westerly-dip closure. To the south and east, this closure relies on the sealing capacity of at least two large fault surfaces. The evolution of the Opón structural complex involves initial westward movement on two thrusts; a delamination of a lower rock package by a responding eastward translating thrust; additional eastward directed thrusting; and finally emplacement of the cross-cutting, regional scale Las Salinas fault which tightened and uplifted the entire structure.

Introduction
Location and Geological Setting
The Opón anticline is located in the southeastern portion of the Middle Magdalena Valley, approximately 200 kilometers north of Bogotá, Colombia (Fig. 1). The structural complex is expressed by a series of curvilinear ridges which comprise a portion of the western foothills of the Cordillera Oriental.

A regional scale NE-SW trending surface feature, 12 x 35 kilometers in size, the Opón anticline and a nested syncline in the core of the complex, are bounded on the east by the Las Salinas Fault which obliquely truncates the structure by juxtaposing Cretaceous strata against the Tertiary section’s elliptical outcrop, and on the west by the relatively low relief Pliocene to Recent sediments of the Magdalena River valley. The structure plunges to the north, and is truncated to the south by a thrust fault. This geometry is readily observed on radar image (Fig. 2).

In terms of the mechanical stratigraphy, the Opón structure backthrusts primarily synorogenic mollase of Tertiary age over a more indurated, earlier deformed complex of Cretaceous marine rocks (Fig. 3).

Stratigraphically as well as structurally complex, the Opón anticline’s multiple thrust faults, steep to overturned surface dips and pronounced topographic expression have combined to hinder seismic acquisition and imaging by introducing unacceptable levels of broadband, backscatter noise to the data. Signal is up to 20 db. below noise at the objective horizon. Seismic modeling studies indicate that imaging of this feature is very velocity sensitive, presenting a challenge even without the signal to noise problem.