# Jurassic to Cretaceous Carbonate Margins in the Guyanas Basin: Integrating Regional Well and Seismic Facies to Generate Basin-Wide EOD Maps

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## Abstract

In addition to numerous hydrocarbon discoveries in Upper Cretaceous siliciclastics, the Guyanas Basin is characterized by extensive Jurassic to Early Cretaceous-aged shelfal carbonates and several prominent isolated carbonate build-ups with exploration potential. The authors have integrated seismic facies analysis with regional well and gravity data to create a suite of basin-wide carbonate environment of deposition (EOD) maps that chronicle the evolution of the carbonate margin in the basin. As the Guyanas Basin opened, a shallow carbonate seaway was established on top of and adjacent to Central Atlantic Magmatic Province (CAMP) related volcanics on the Demerara Rise. The Demerara A2-1 well penetrated these sediments which are Middle to Late Jurassic-aged muddy carbonate shelf deposits. Outboard of the Jurassic carbonate margin, isolated carbonate build-ups began to grow on basement highs composed of CAMP basalts and interbedded sediments. There is seismic evidence of a large graben under the Guyana margin which may be conjugate to Jurassic-aged rift systems beneath the Bahamas Platform. By the very latest Jurassic, the future Bahamas Bank migrated to the northwest, resulting in the creation of proto-oceanic crust in western Suriname and Guyana. The exit of the Bahamas Bank resulted in a unique basin geometry where the Suriname margin is dominantly extensional, and the Guyana margin is dominantly transform. The difference in basin geometry controlled the subsequent development of the Upper Jurassic to Lower Cretaceous carbonate shelf. Suriname

carbonates are dominantly retrogradational, with the primary control on their geometry being the general increase in sea level through the Early Cretaceous. Guyana carbonates are dominantly aggradational, due to shearing of the Guyana margin by the transform boundary. Seismic geometries internal to the margin show a progression from parallel continuous within the platform interior to more mounded/chaotic at the platform margin. The carbonate mound relief also reduces from the Jurassic into the Cretaceous, possibly reflecting a change in frame-building species (i.e., a rise in the rudists). A global flooding event in the Cenomanian-Turonian resulted in the demise of the basin's extensive Lower Cretaceous-Jurassic carbonate shelf and isolated platforms.