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Title **Stepwise Compositional Simulation of a Multilayer, Giant Gas Condensate Field**
Authors T. Jimenez, I. Marruffo, J. Cabrera, PDVSA Gas; L. Cosentino, S. Caussade, Beicip-Franlab
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Abstract

The Oficina Formation, Eastern Venezuela, contains large amounts of gas reserves, which are strategic for the energetic policy of the country. In the Zapatos-Mata R field, these reserves are stored in a thick transgressive sequence of deltaic channels and shore bars (over 3000 ft), as rich gas condensate accumulations of various importance, from few to hundreds of Bcf. Over 400 wells have been drilled in the area since the 1950's, which in general have been selectively completed in progressively shallower intervals. Gas injection has been implemented in most of the main reservoirs since the early 1960's.

An integrated reservoir study was started during year 2000, with the aim of establishing a new exploitation strategy by means of a simulation model. However, early in the project, it became obvious that a straight full field simulation would have been a prohibitive task, given the complexity of the geology, the variation in the fluid type and properties, and the number of wells, completed intervals and reservoirs (almost 700 official reservoirs were reported in the study area). Still, the availability of a full field model was deemed critical to establish a representative exploitation plan in the prediction phase, especially because a commingled production option is being considered.

An original procedure was therefore defined, based on a stepwise approach. In a preliminary stage, simulation studies were carried out individually for the most important reservoirs. The modeling was performed using a full compositional formulation. Several of these models were built and partially history matched.

In a later stage, these individual models were lumped together in a progressive mode, while checking the quality of the history match. This process eventually led to the building of a full field model, including all the most important reservoirs and over 80% of the total reserves of the area. This model has about 65 layers and more than 300,000 active cells.

Conclusions of the study showed that this stepwise approach is an interesting option for the full scale simulation of giant multilayer gas condensate reservoirs, since it allows for the decoupling of the problems related to the model building and history match issues, which are faced and solved early in the simulation process. Moreover, individual models can be used for investigating the behavior of the single reservoirs, as well as for special tasks like well performance analysis and sensitivities studies.