ECHELON

CASE STUDY // MARACUYA

STONE RIDGE TECHNOLOGY | eni

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SEAMLESS COUPLING OF MULTIPLE RESERVOIR MODELS WITH SHARED PRODUCTION TARGETS AND GATHERING NETWORK

3

RESERVOIRS

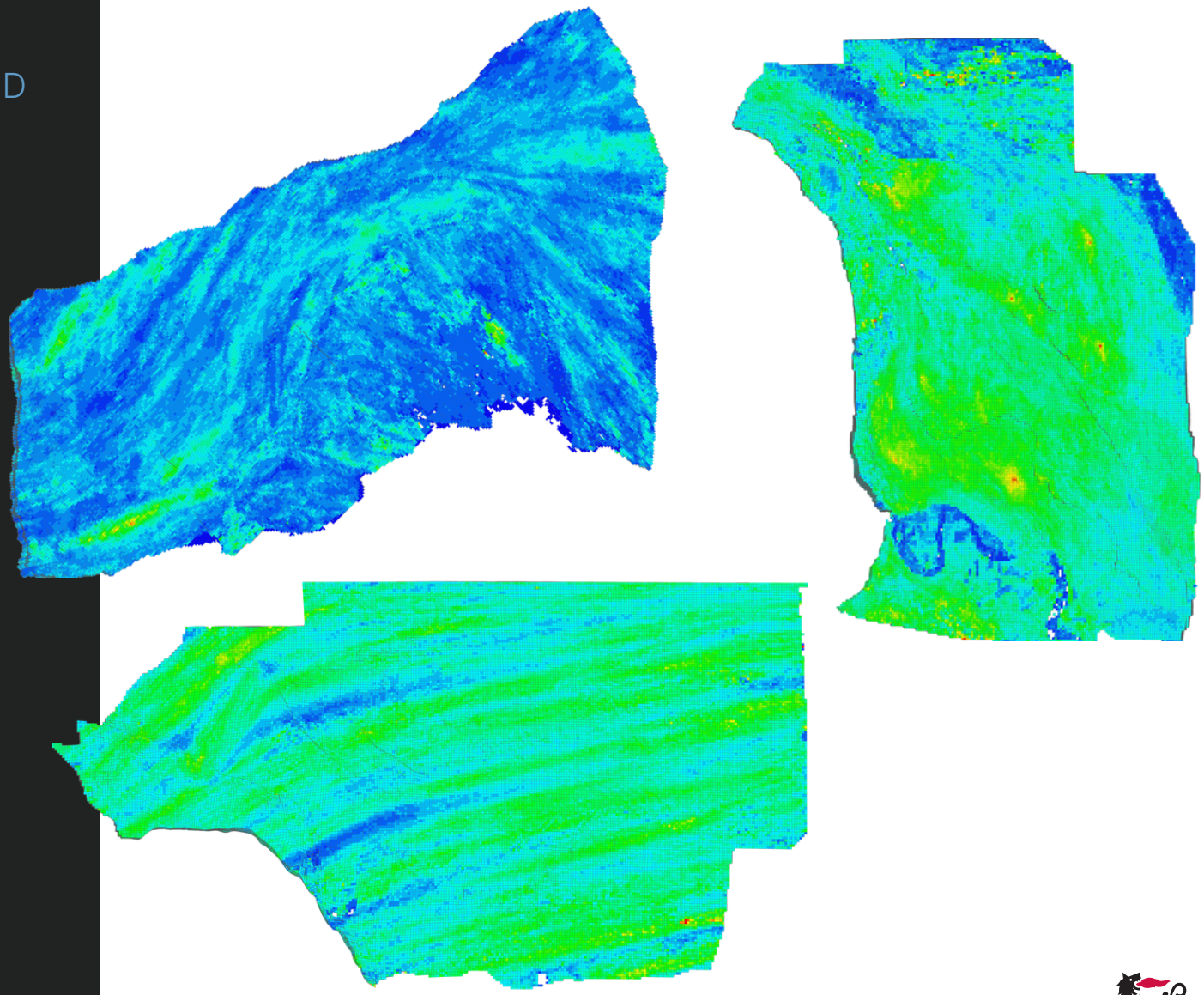
68

WELLS

1

PRODUCTION NETWORK

ECHELON CASE STUDY: MARACUYA

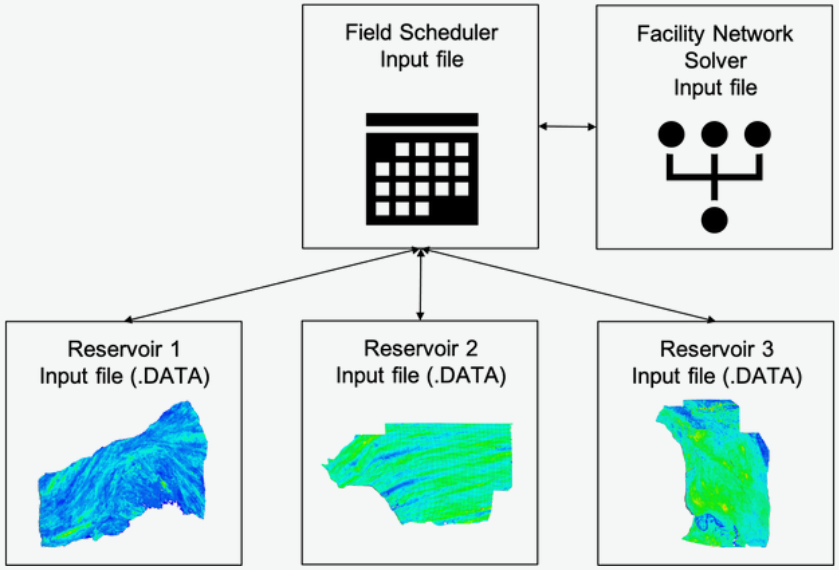


Quality maps of the three stacked reservoir models of the Maracuya field.

CHALLENGE

Maracuya is a greenfield consisting of three dry gas reservoirs characterized by good petrophysical properties, with homogeneous and well connected sands. The three models have approximately 1M cells each, and use a simple two-component (water-gas) black-oil model. Wells use nonlinear inflow models, and are subject to maximum drawdown limits. Field production is managed by assigning a different plateau target rate to three groups combining wells perforated in different reservoirs, i.e., a multi-reservoir simulation capacity is needed.

Furthermore, all wells are produced through the same gathering network, and the impact of network backpressure on the production needs to be accounted for.



Standalone ECHELON simulation models can easily be coupled through the field scheduler to balance groups producing from multiple reservoirs. No change to the static and well properties parts of the .DATA files is required. The field scheduler seamlessly connects to the integrated facility network solver, to self-consistently model the impact of network backpressure on the wells.

SOLUTION

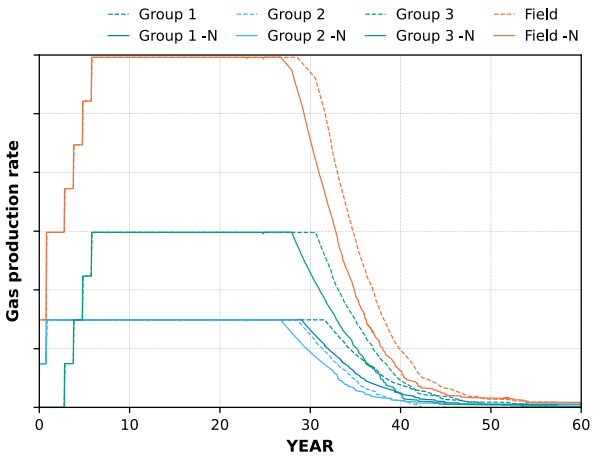
The solution is to use ECHELON 2.0, the first reservoir simulator developed from the ground up to run on Graphics Processing Units (GPUs).

ECHELON supports multi-reservoir coupling by delegating well allocation tasks to an independent field scheduler, able to balance groups producing from multiple reservoirs.

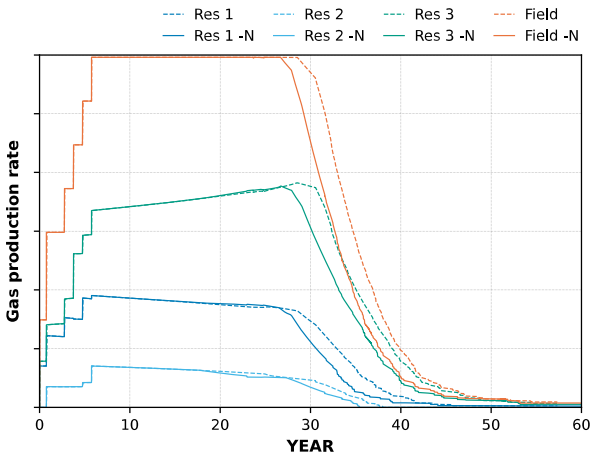
ECHELON comes with its own integrated facility network solver (FNS) for seamless inclusion in reservoir engineering workflows.

FNS can model complex production and injection network topologies including bifurcations, where pressure losses in pipes are interpolated from precomputed hydraulic tables.

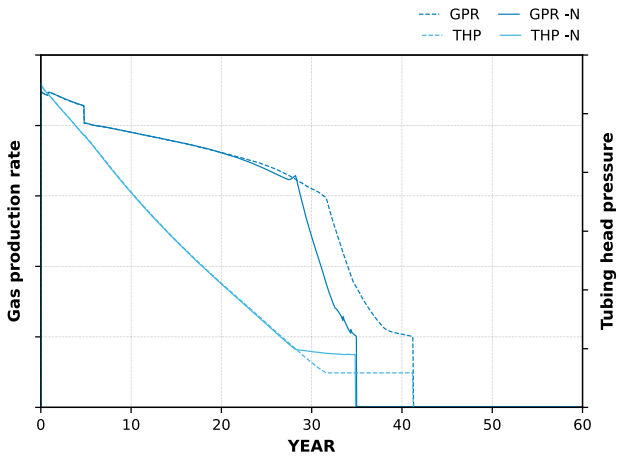
RESULTS



Gas production rate per group.



Gas production rate per reservoir.



Gas production rate and tubing head pressure for a representative well.

Dashed-lines have been obtained with multi-reservoir coupling of the field balancing logic, while solid lines include, in addition, coupling to FNS

The Figures above show ECHELON is able to honor the gas production target and respective plateaus of each group, while gas production for each reservoir adapts to their differential depletion.

It can be seen that coupling to the facility network solver (FNS) results in a shorter plateau, due to an underestimation of network backpressure in the model without network. This is more easily seen in the figure on the right, where the tubing-head pressure and the gas production rate of a representative well are shown; the well stops producing earlier when the network is accounted for.

We thank Eni S.p.A for the permission to publish the data contained in this case study.

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