



INTER-WELL FLOW PATTERN INTERPRETATION & MODEL IMPROVEMENT

ANY RESERVOIR MODEL REPRESENTS ONE OF MANY REALIZATIONS OF A REAL RESERVOIR. APPLICATION OF RESTRACK'S TRACER TECHNOLOGY REVEALS FALSE MODEL ASSUMPTIONS AND CONFIRM TRUE BEHAVIOR, THUS IMPROVING THE UNDERSTANDING OF THE RESERVOIR. IN THE EXAMPLE BELOW WATER TRACERS WERE USED TO REVEAL FLOW COMMUNICATION ACROSS CHANNELS, NOT ACCOUNTED FOR IN THE BASE MODEL.

CASE DESCRIPTION

In a North Sea reservoir (Figure 1), a significant tracer campaign was carried out to map flow and reveal communications between injectors and producers. The campaign included gas and water tracers, but here we focus on water tracers.

In a part of the reservoir dominated by fluvial channels, water was injected for pressure support through two injectors (Injector I-A and Injector I-B). Initially, the reservoir model assumed that communication along the channels was good, and that communication from channel to channel was difficult (see Figure 1).

MODEL RESPONSE TO TRACER DATA

Before the tracer campaign, available production data were used to verify the model assumptions. This resulted in a model able to predict the correct amount of produced water. However, the original model failed to predict the data from the tracer campaign. Figure 2 shows that the true tracer production curve, with a significant tracer production, disagrees with the base model tracer response.

The channel structures assumed in the original model thus predict correct production of water, but from the wrong source.

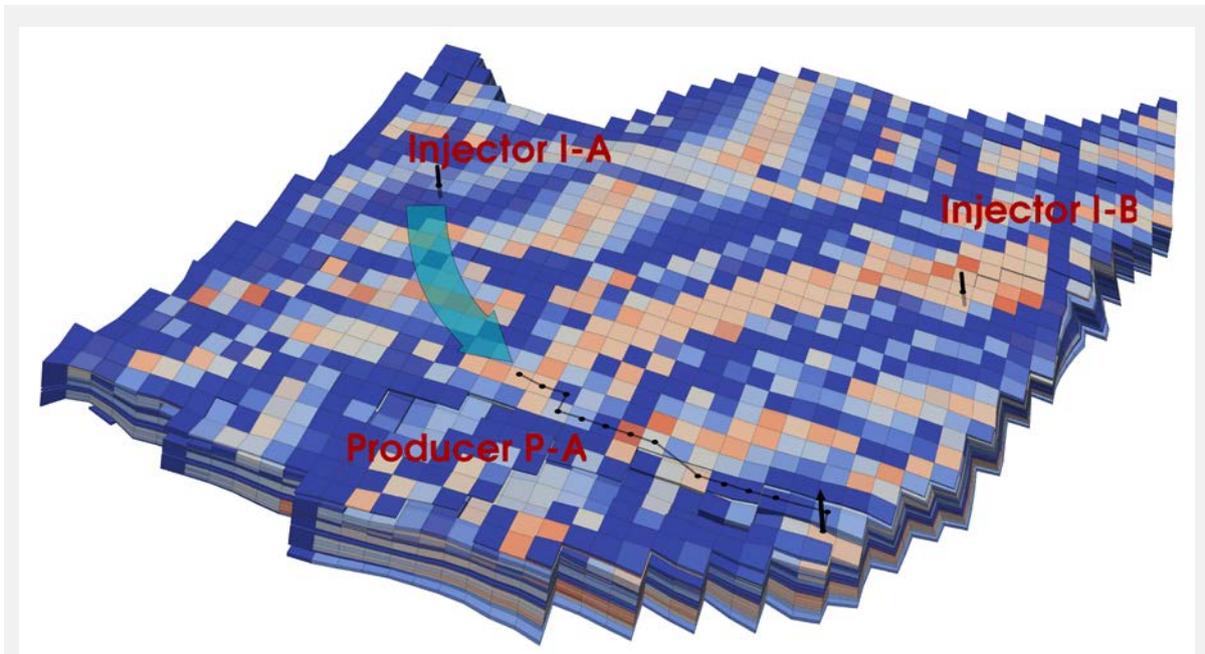
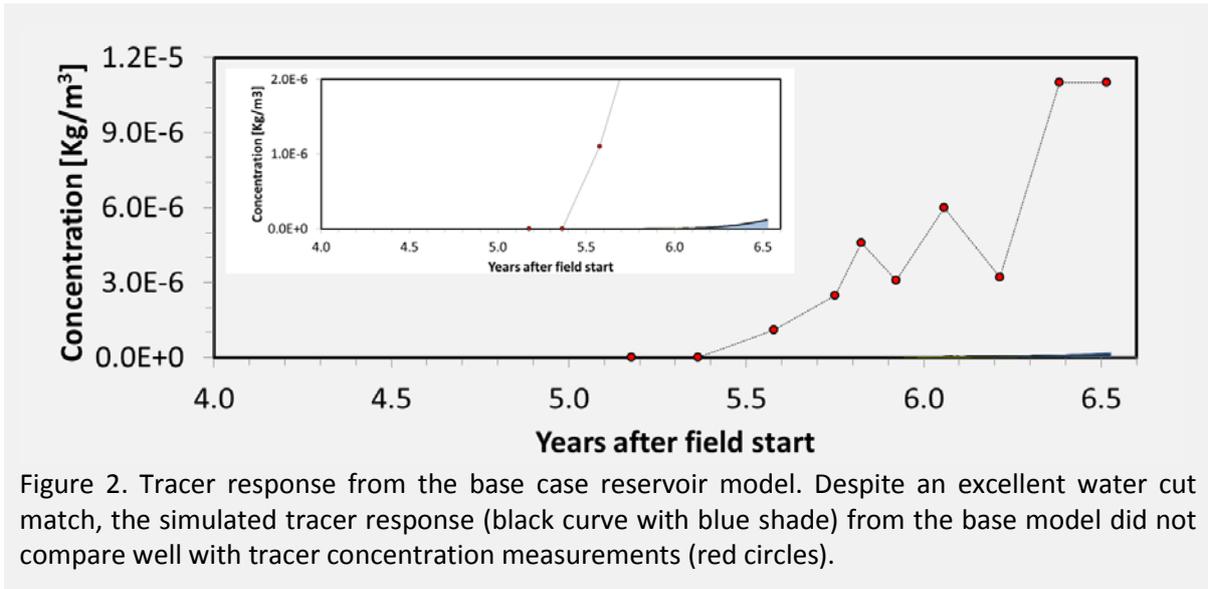


Figure 1. Channel structure in the base case reservoir model. In the base model water can only move from I-B along the channel towards P-A. Based on Restrack's tracer technology, information on water movement from I-A towards P-A (blue arrow) was obtained and the model improved.



TRACER INFORMATION IMPROVES MODEL

From inspection of the reservoir model in the relevant region, it is natural to attempt a modification of the fluvial channels. The main problem in the original model is that water cannot flow across the channels. The channel widths were therefore increased to enable water to flow across the channels. The result of this model modification on the simulated response can be seen in Figure 3. We now see that the model predicts a significant tracer production, in agreement with the true tracer production.

In conclusion we note that application of Restrack's tracer technology yields essential information about the reservoir. This information was not available in the other production data. A correct understanding of the channel structure in the reservoir was only possible by predicting the correct origin of water, in addition to the correct amount of water.

