[PS]3-D Exploration for Remaining Oil Using Historical Production Data*

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Abstract

3D and 4D (or time-lapse) seismics are techniques commonly used for exploration and reservoir exploitation. Increasingly, time-lapse seismic is becoming a more popular tool for reservoir development and management. However, its application is constrained by reservoir conditions, production mechanisms and seismic data repeatability. The technique of 3D exploration for remaining oil with historical production data (3.5D) uses high quality 3D seismic data, acquired after a certain period of reservoir production, and integrates it with historical production data to provide information for reservoir dynamics, such as the identification of additional resources and the delineation of remaining oil. In integrating the 3D seismic with historical production data, the 3D seismic data are time-stamped and then related to the reservoir dynamics. This enables 3D seismic data to represent reservoir dynamics in time. The method is applied to an onshore field in Western China. The result shows that the 3.5D seismic approach can identify reservoir potentials and remaining oil.
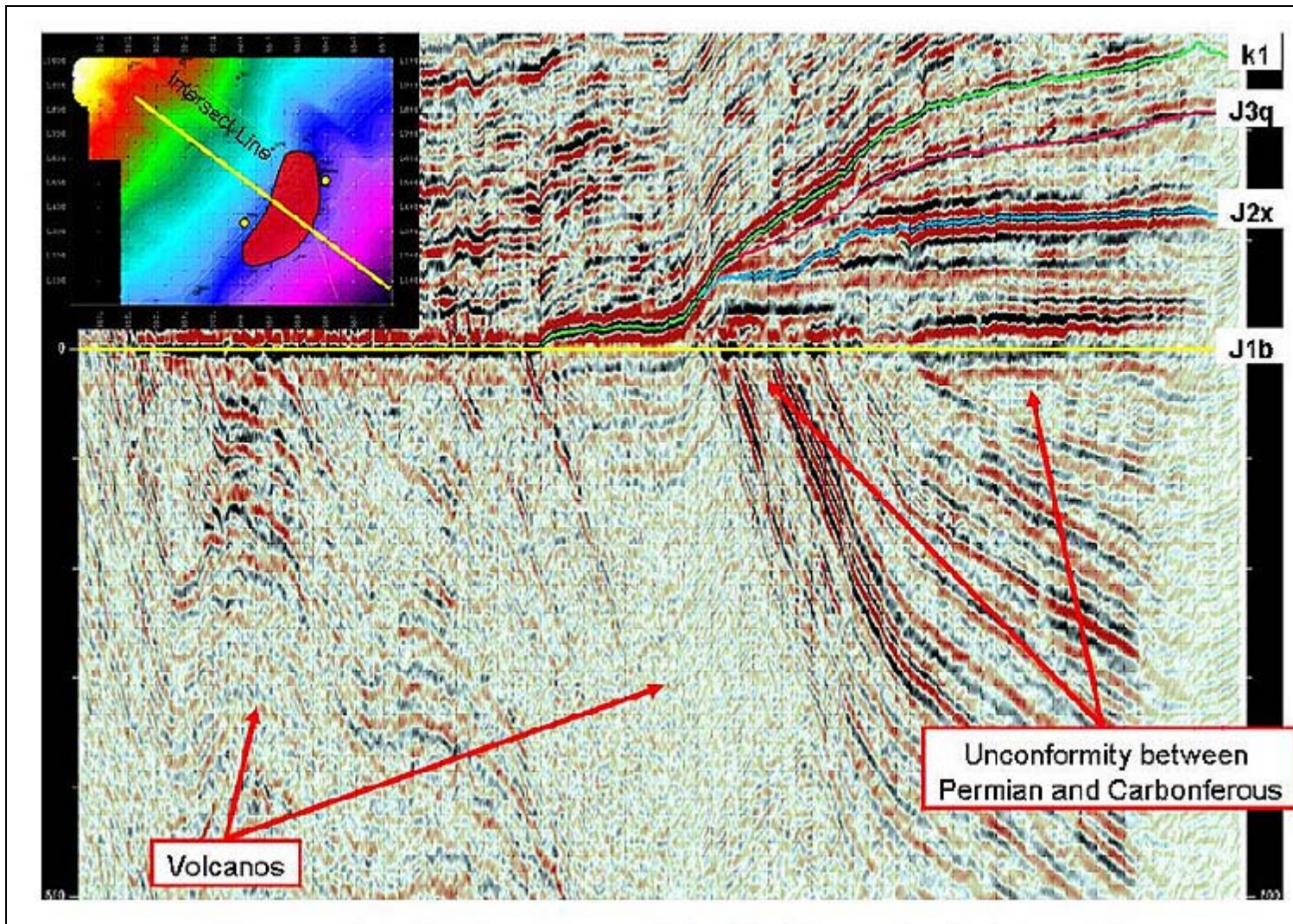
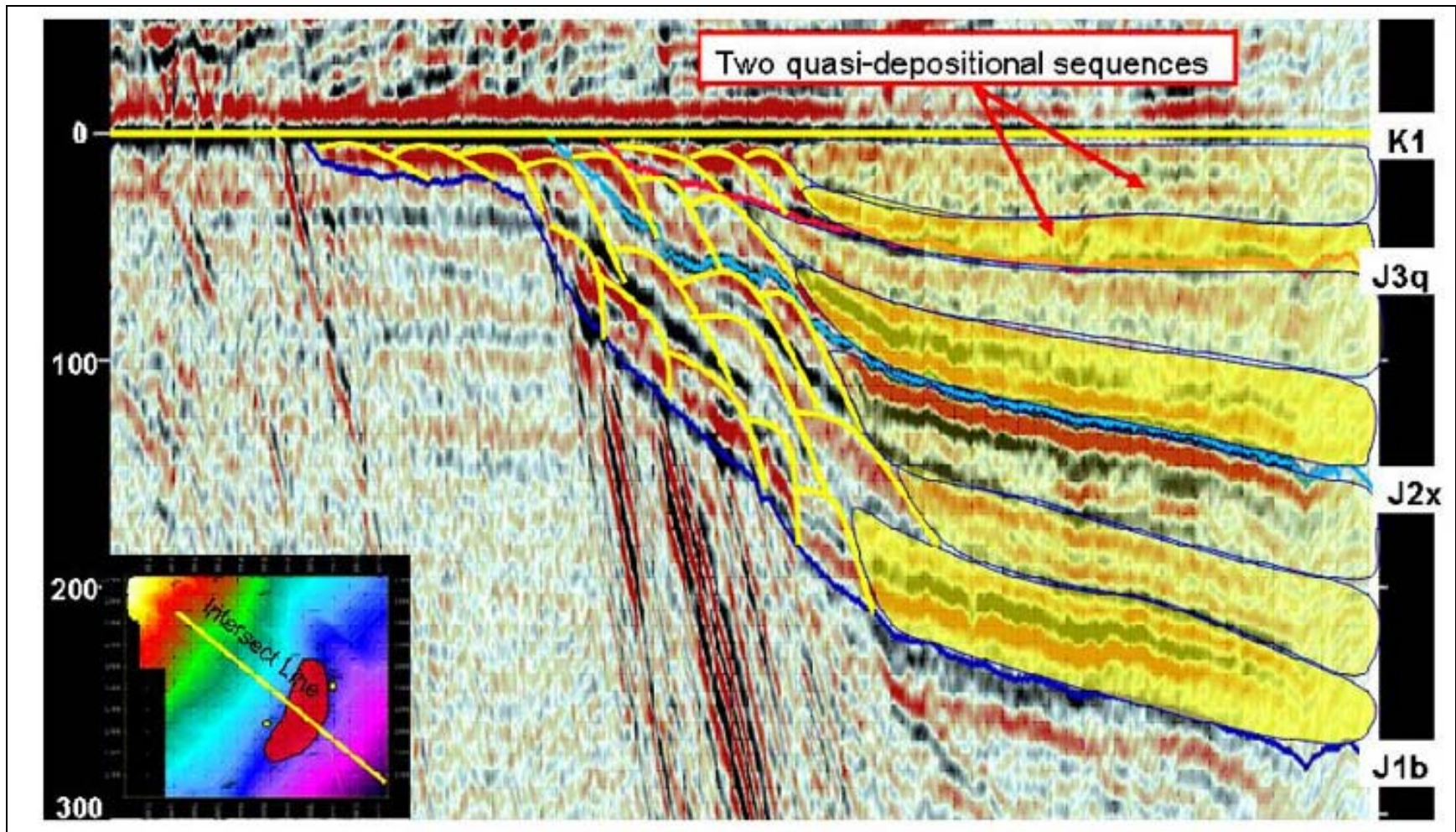Figure 1a. Seismic profile flattened at Jurassic.

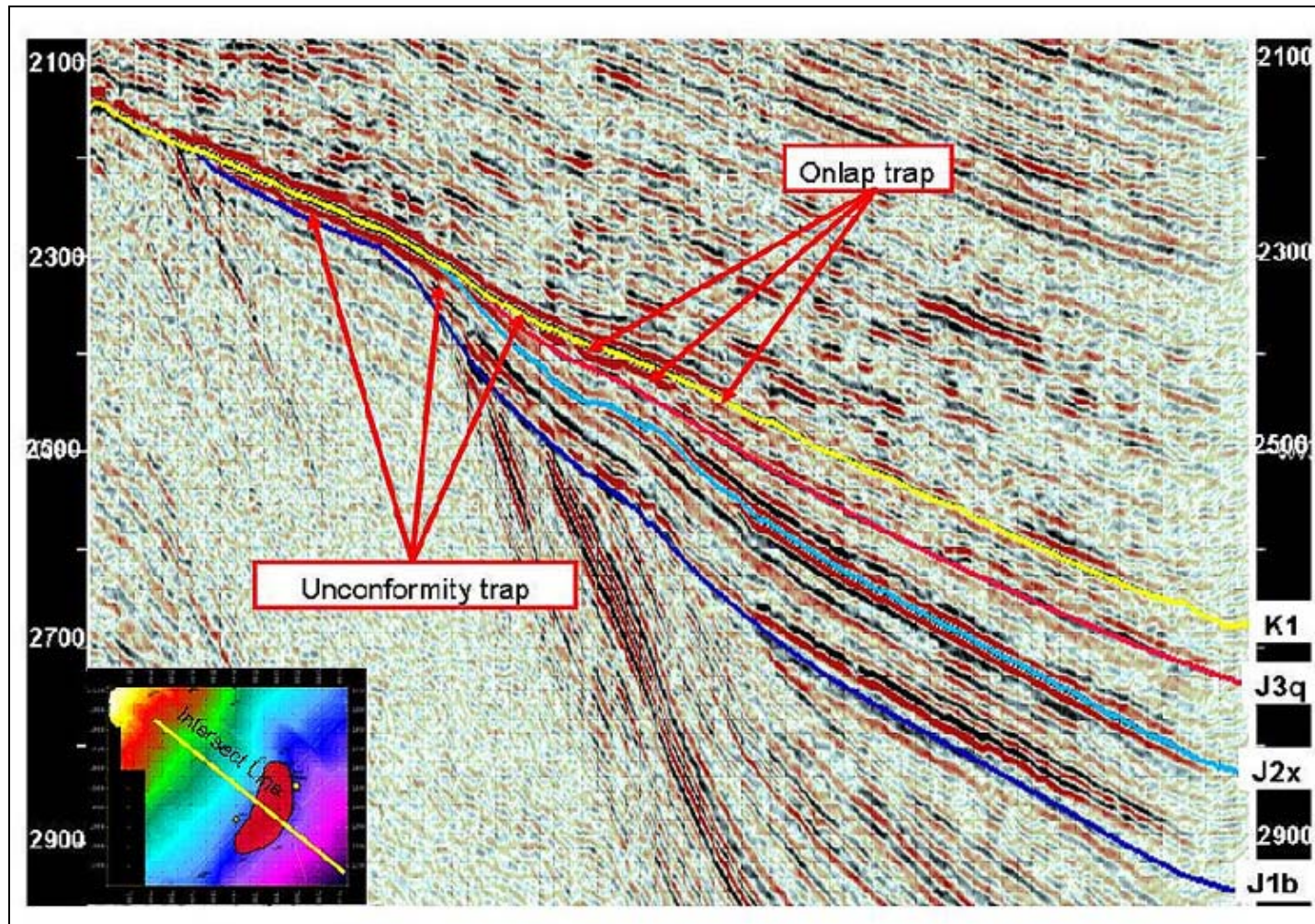Figure 1b. Seismic profile flattened at bottom of Cretaceous (Zoom).

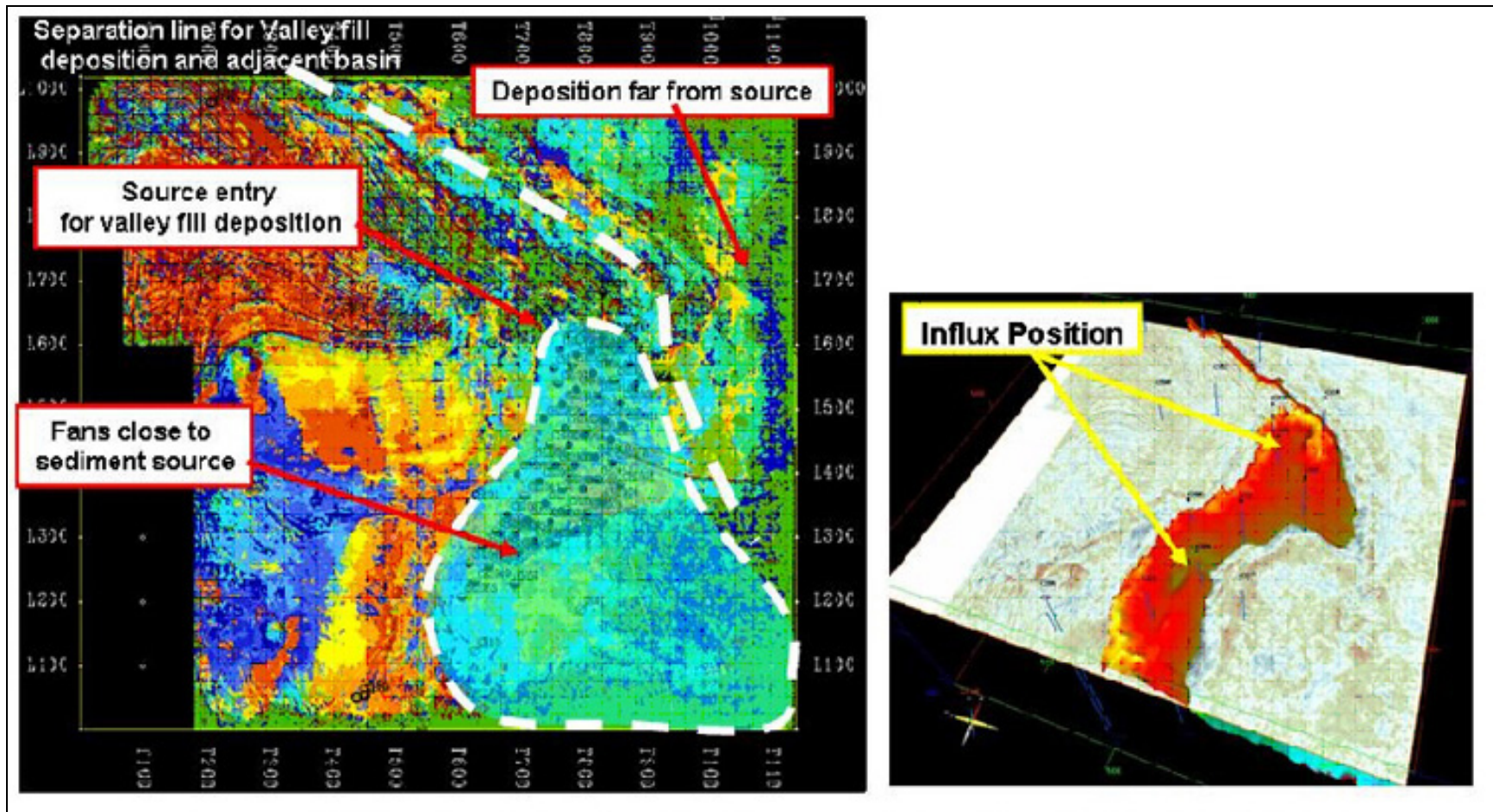Figure 1c. Present structure from seismic profile.

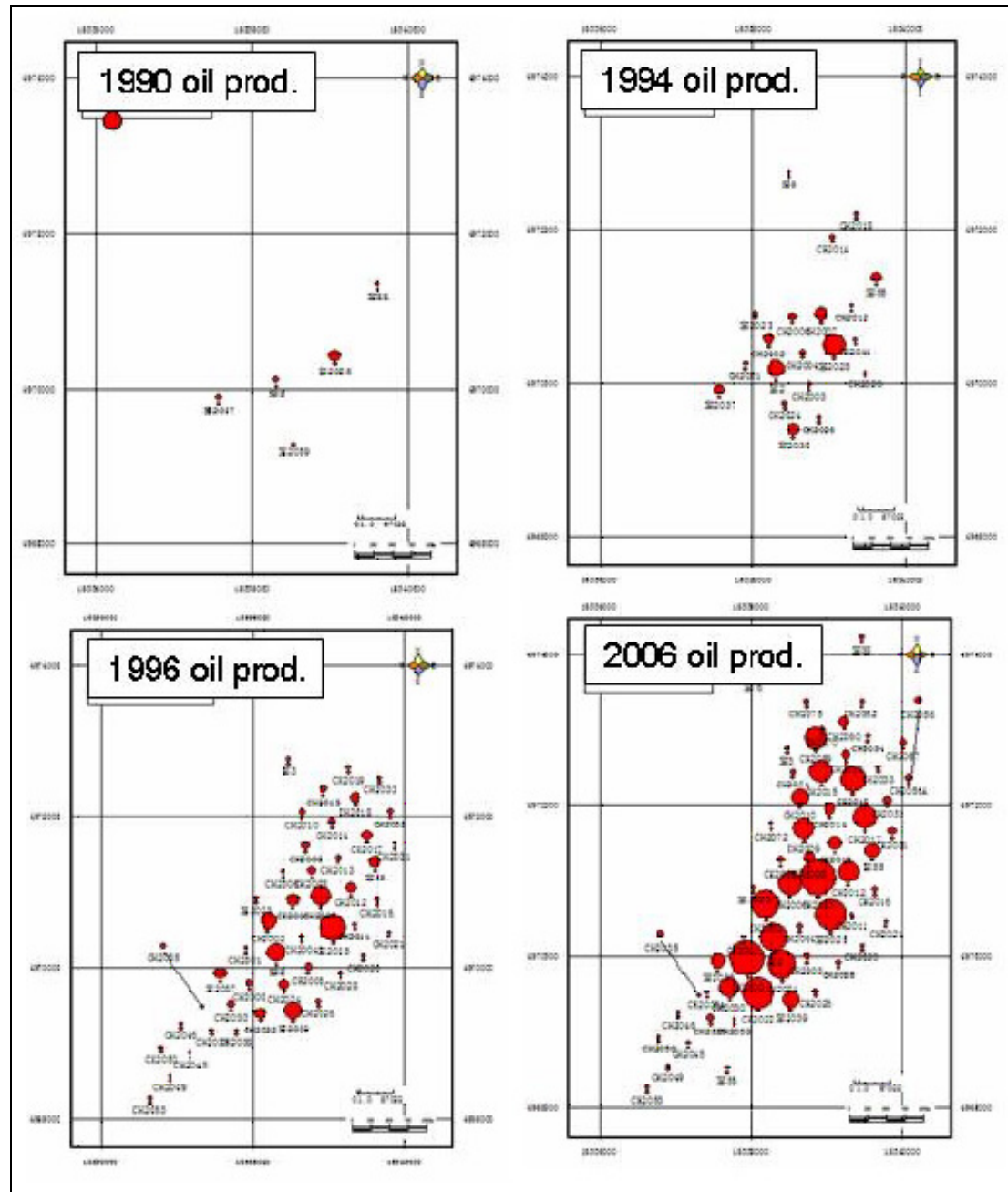Figure 2. Waveform clustering attribute along bottom of Cretaceous.
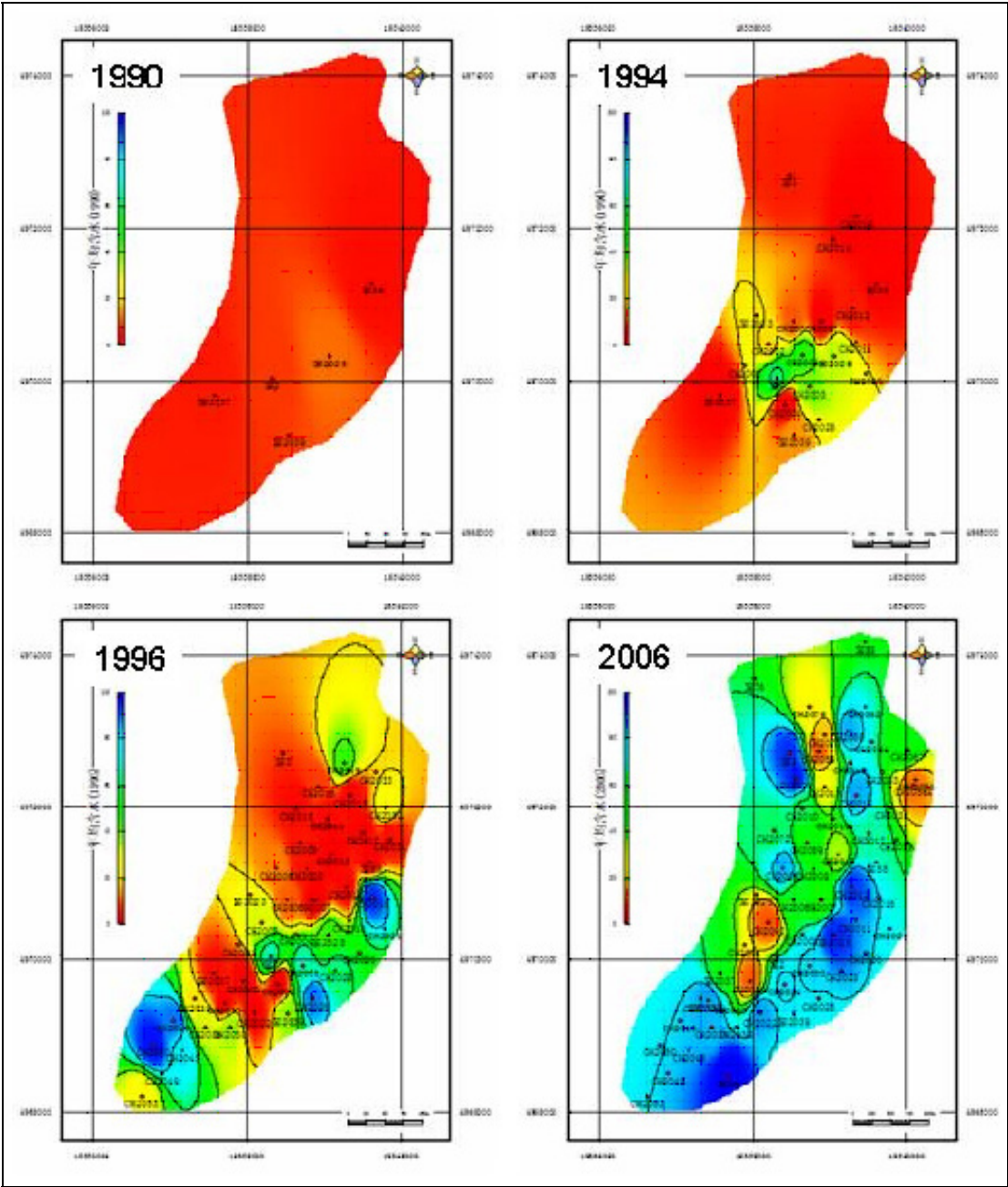
Figure 3. Evolution of oil production.
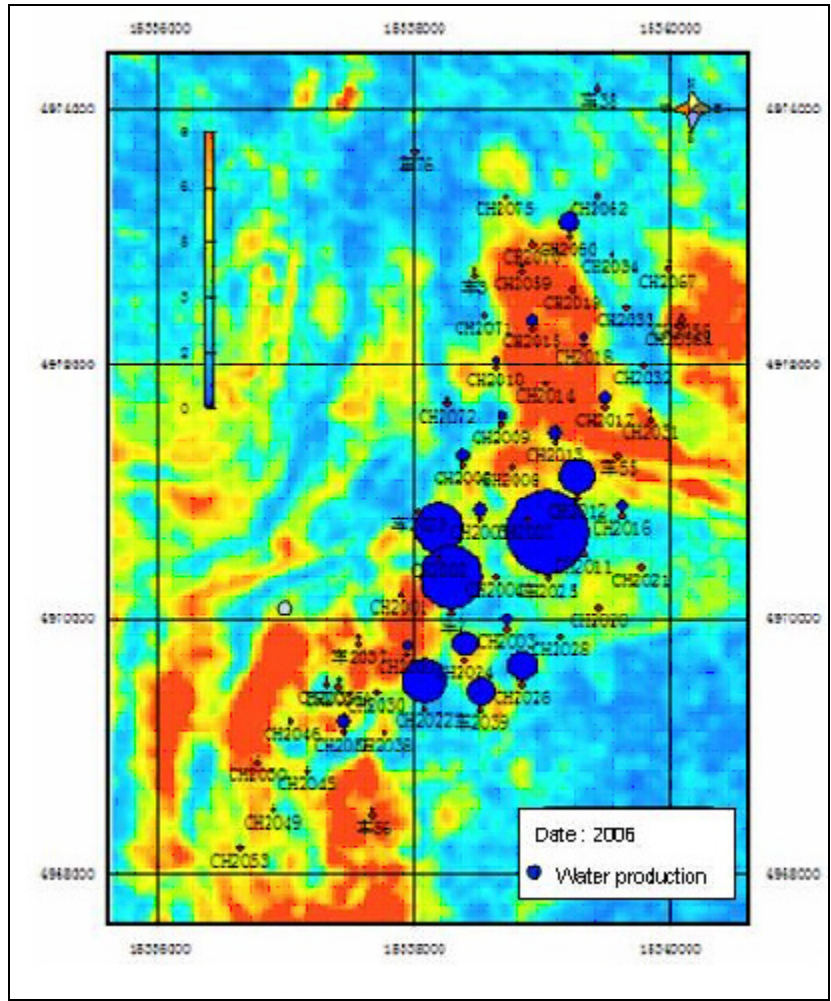
Figure 4. Spatial evolution of water-cut.

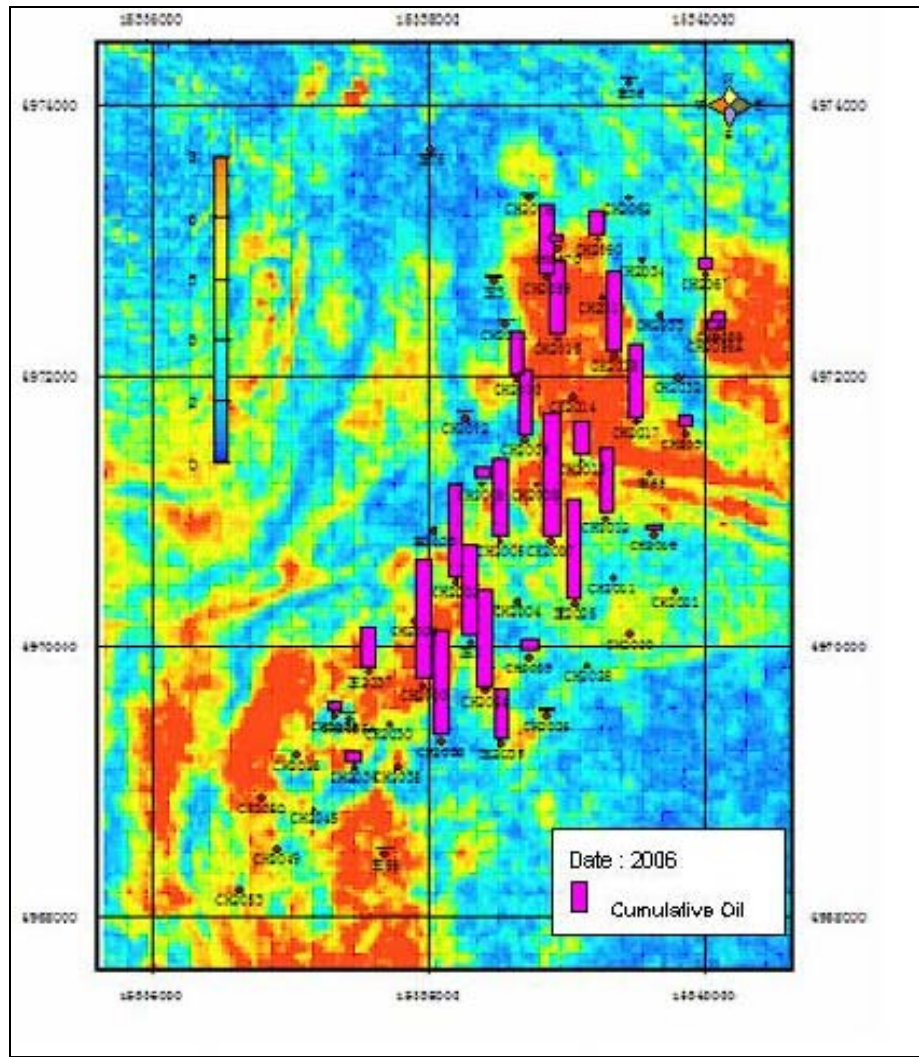Figure 5a. Amplitude and water producers at 2006.

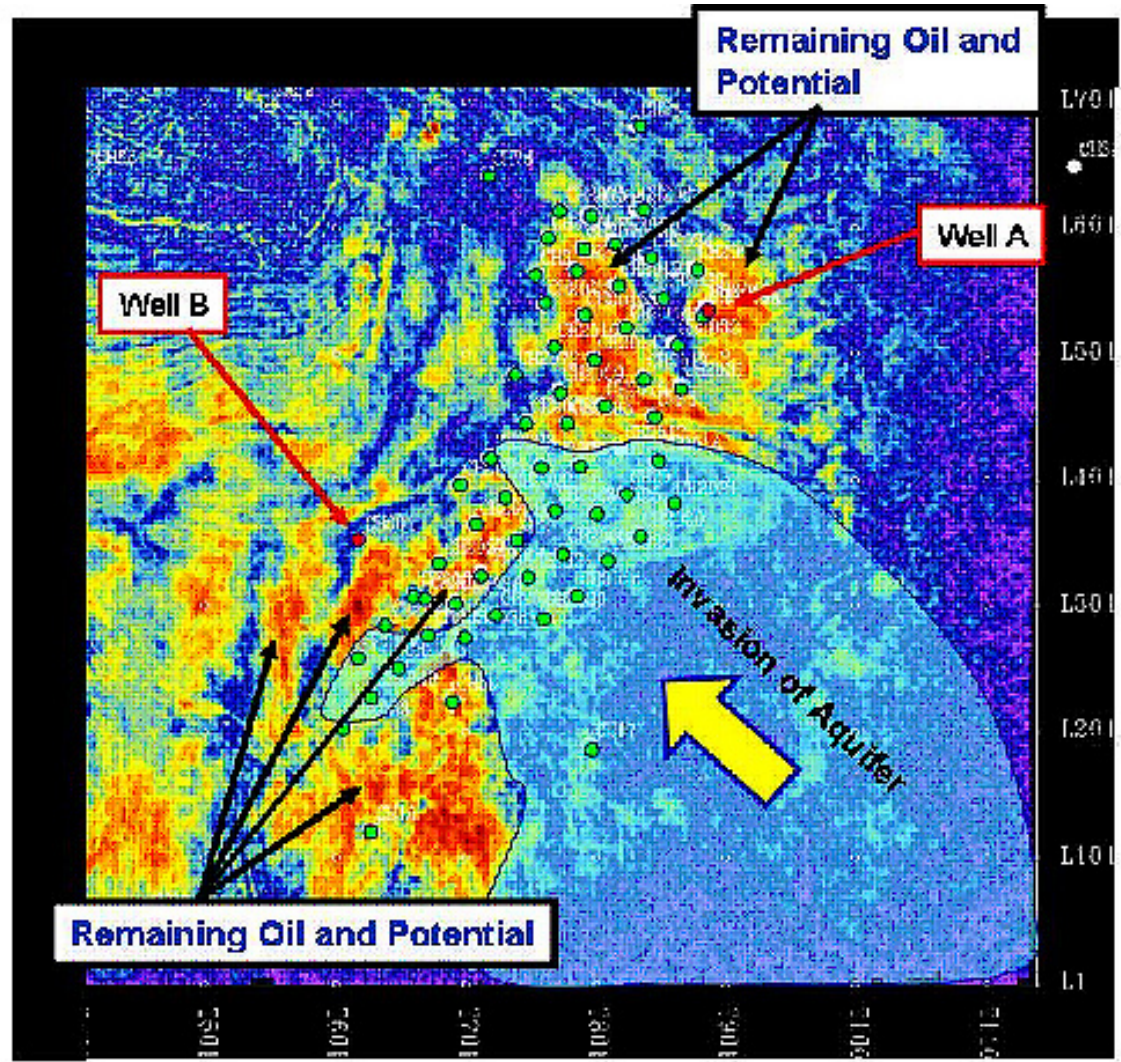Figure 5b. Amplitude at 2006 and cumulative oil before 2006.

Figure 6. Remaining potentials and aquifer movement.

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