PDVSA
INTEVEP

QUICK-LOOK PETROPHYSICAL DIPMETER

PART 2

Click here to go to fourth poster.

General structural geometry can be easily defined by the "Quick Look petrophysical dipmeter":

Abnormally thick units correspond to general folding when mapping is coherent.

Abnormally thin units can correspond to missing sections associated with faults.

Any combination of fault and fold can be assessed if the well control is good enough.

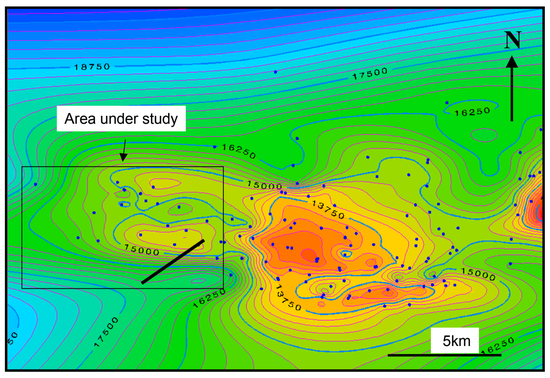


Fig. 9 Location of the area of interest

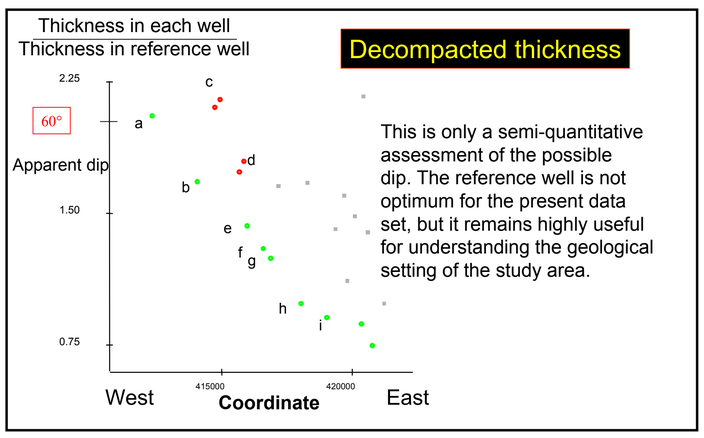


Fig.10 Quick-Look dipmeter analysis indicating general folding

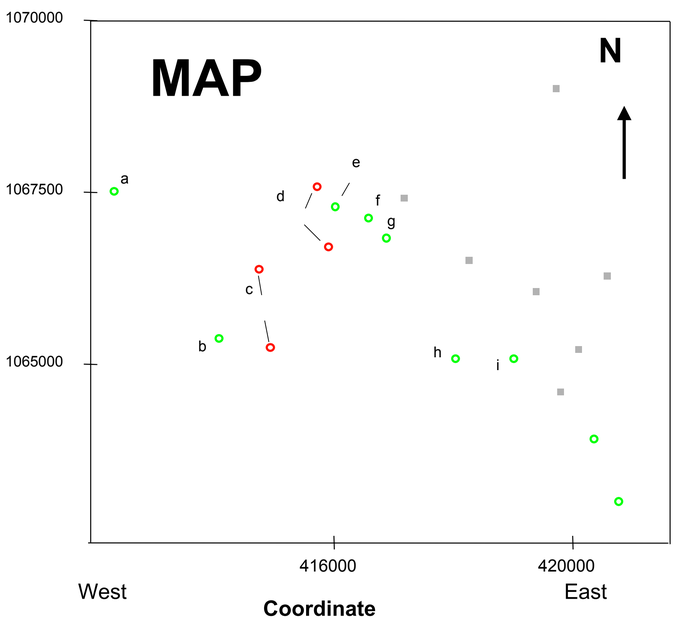
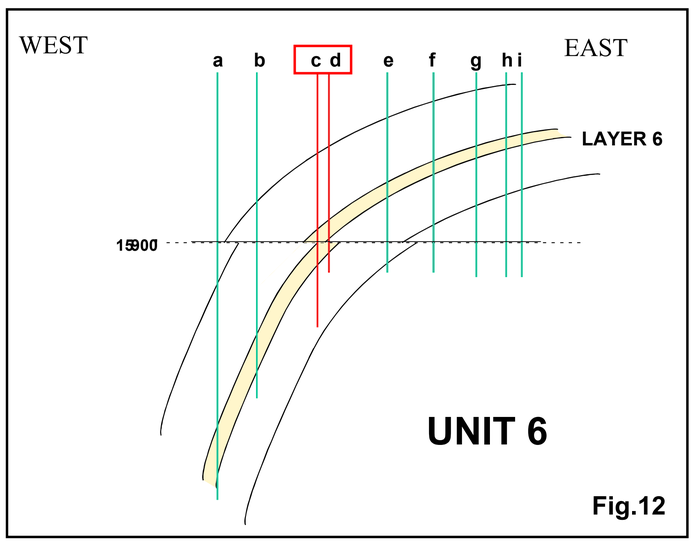


Fig.11 Location map of the wells under study

MODEL



Thickness increase due to folding, but also

Thickness increase due to repetition linked to a detachment at 15,900ft (Fig. 12)

The cores show some 40 meters of intense fracturing around the detachment plane at 15,900ft TVDss (Fig. 13)

Note the high density of low-angle and horizontal open fractures (Fig. 14)

Figures 10 to 12 after Chatellier et al. 2001

Highly fractured shales at the level of the detachment

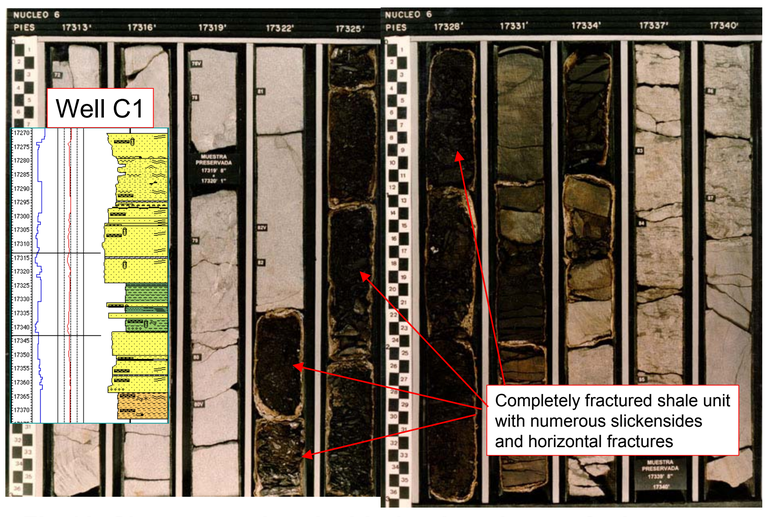


Fig.13 Shear associated with the detachment fault

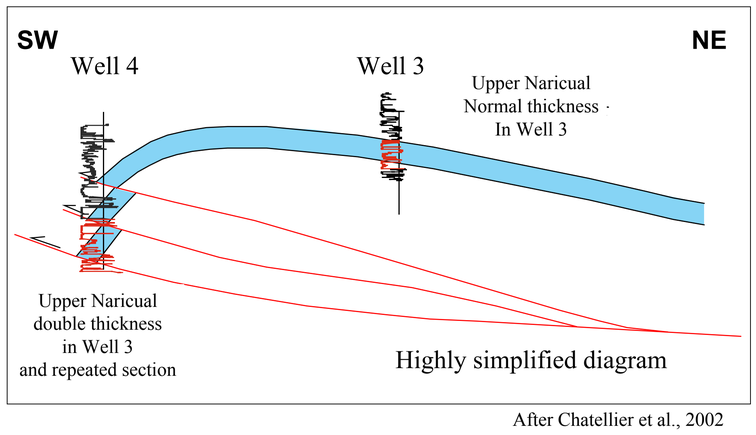
Fracturing associated with the Detachment

Oil-stained fractures

Stylolitic low-angle fractures

CONFIRMATION

Folding, faulting, and thickness changes



After Chatellier et al., 2002

Fig.15 Analog within the Santa Barbara Field

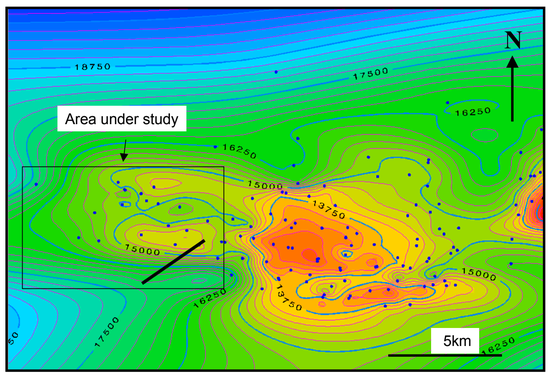


Fig.16 Location of section in Fig.15

Summary of the analysis

The chosen example for the Quick Look Dip Evaluation is the southwestern part of the Santa Barbara Field (Fig. 9). The reference for decompacted thickness has been derived from statistics and has been chosen as the 25 percentile value of all of the wells belonging to Santa Barbara. Note that, in the present case, one single reference well was used for the whole field as a first approach; that has implied the use of statistics. A reference well can be chosen deterministically when working exclusively on a small well defined area. Despite the fact that the reference value is not the most suitable for the present example due to local variations, there is a perfect trend of thickness increase towards the West (Fig. 10). Thus, for the selected stratigraphic unit, all but four of the wells in the area of interest fall on a linear trend (a location map is given in Figure 11). The trend is too good not to be meaningful. In one of the anomalous wells (well D), the interval under study which was cored, exhibits horizontal faulting and fracturing over some 40 meters (Figs. 13 & 14).

The core observations and the Quick-Look dip evaluation can be simply understood within a simple fold associated with a detachment plane, the latter increasing the measured thickness because of repetition (Fig.12).

Note that without understanding the folding and faulting described here and derived from the Quick-Look dip evaluation method, an isochore map would have indicated a north-south trending channel direction, whereas the thickening is due to folding and repetition by a low-angle fault.

Other types of observations corroborate the validity of the proposed model based on the Quick-Look dip evaluation and of the method used (Figs. 15 and 16).