

A RAPID SCREENING METHOD FOR ESTIMATING SOURCE ROCK MATURITY FROM CORE AND CUTTING SAMPLES

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A rapid and cost-effective method for estimating the maturity of source rocks using fluorescence spectrophotometry has been developed. The method involving the direct analysis of hydrocarbon extracts from source rocks using the Total Scanning Fluorescence (TSF; Barwise and Hay 1996) technique. Prior to the solvent extraction core and cutting samples were cleaned using a standardised procedure with a water based weak oxidising agent to ensure the removal of contaminants while retaining the indigenous hydrocarbons sealed in the micro-pores.

Investigation of a number of wells from two basins in China and Australia on both Type I and II source rocks indicates that the method can be used to effectively estimate the maturity levels of source rocks, which are comparable to that obtained using vitinite reflectance (V_r) and Rock Eval data (Figure 1) with a correlation coefficient (R^2) between V_r and TSF maturity parameter, R_1 , greater than 0.90 for V_r values of >0.55 .

As exemplified by the Paqualin-1 well (Figure 1), the oil generation window is characterised by high (maximum) and constant TSF intensity and increasing of TSF maturity indicator (reducing R_1 values) with depth; whereas the onset of the gas generation window is marked by an abrupt drop of the TSF intensity and continued increasing of TSF maturity indicator with depth and a characteristic condensate TSF spectrogram.

Compared with conventional maturity indicators such as Vitrinite Reflectance (V_r) and Rock Eval data the new method is relatively rapid and cost-effective, and can detect the onset of immature hydrocarbons and maturity variations within the gas window (Figure 1).

REFERENCES

- Barwise, T. and Hay, S., 1996. Predicting oil properties from core fluorescence. In: Schumacher, D., Abrams, M.A. (Eds), Hydrocarbon Migration and its Near Surface Expression. AAPG Memoir 66, 363-371.

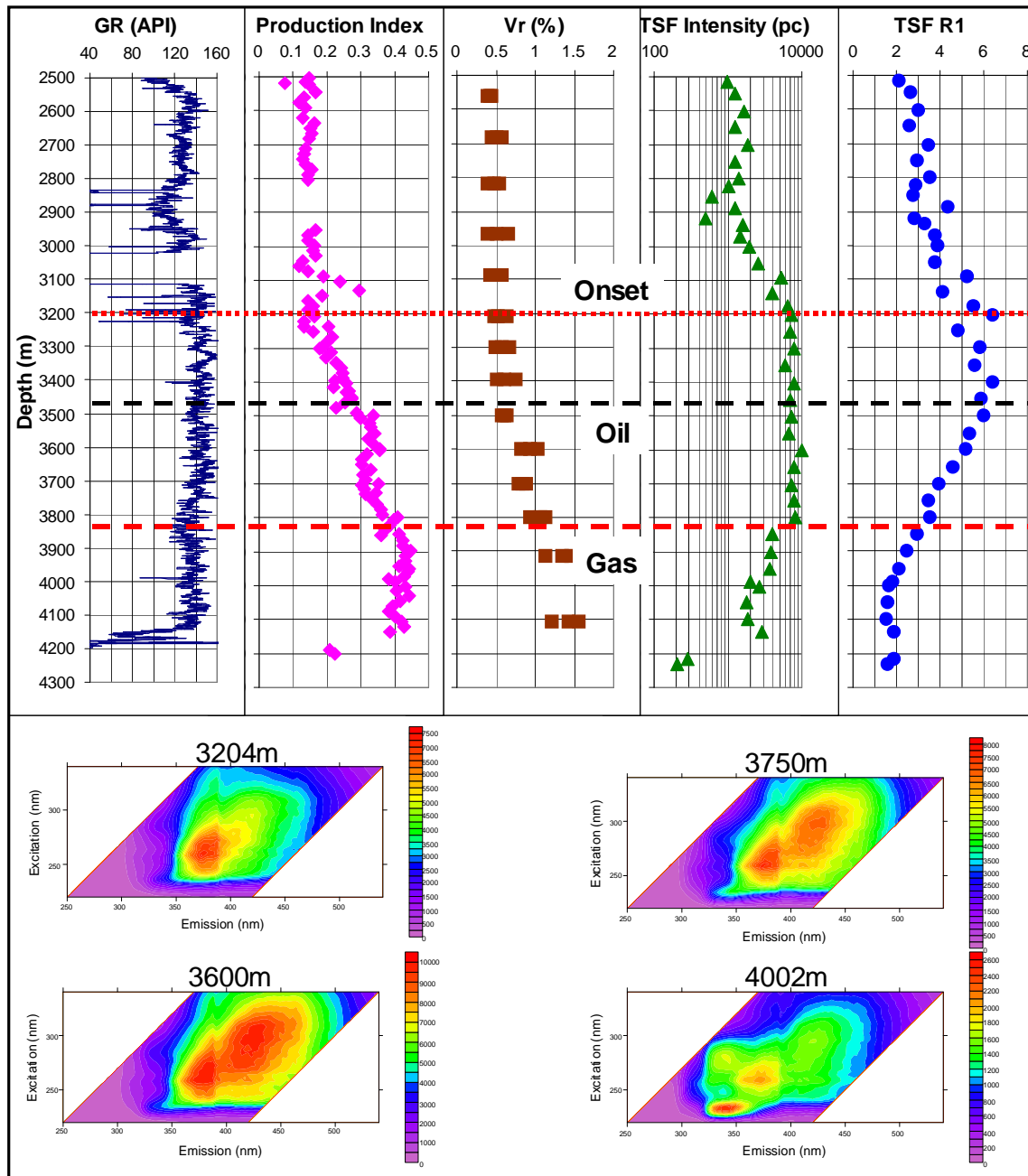


Figure 1. Selected TSF spectrograms and depth profiles of TSF Intensities, TSF R1 parameter of Paqualin-1 well, Vulcan Sub-basin, Timor Sea, Australia in comparison with depth profiles of Production Index (Rock Eval data) and Vitrinite Reflectance values. The inferred depths of the onset of immature hydrocarbon generation and the modelled depths of the oil and gas windows are indicated.