

Application of Organic Maturity to Geology

JUN-CHIN SHEN

The information of organic maturity can be used not only for determining the timing and depth of hydrocarbon generation, but also as a tool for defining geological and tectonic setting. This talk will present several case studies on the application of this technique to our understandings of some structural problems of sedimentary basins in northwestern Taiwan. These include the eroded thickness of the Toukoshan Conglomerate, the penetrated depth of the Sanyi fault, the location of paleo-structural high, and the recognition of a thrust fault between metamorphic and non-metamorphic sedimentary rocks. The results of these case studies are summarized as follows:

(1) Hundreds meters of missing Toukoshan conglomerate were the overburden on Tiechanshan anticline. This conclusion is mainly based on the modeling results of the organic maturation using geological and geochemical data collected in three exploration wells.

(2) The Sanyi fault could penetrate down to Shiti Formation. The observation of high maturity (0.7%Ro) in the samples from its hanging wall suggests that part of Shiti formation has been uplift along the fault.

(3) A paleo-structural high could exist in the east of Chutun and Kuanshi. A significant contrast of buried depths of Shanfuchi Sandstone as revealed by two distinct maturities (0.25% Ro of and 0.6%Ro shale) in Hengshan outcrop, suggests that a topographic high during the deposition of the sandstone. The organic maturity profile in the Kuanshi-1 well confirms the observations from the outcrop.

(4) The high contrast of the organic maturity observed for the nearby sedimentary rocks shows that the metamorphic sedimentary rock overrides on non-metamorphic Lower Miocene Formations in the east of Wushihkeng. The fault boundary can be defined by this tool.

參考文獻

- 何春蓀, 1982, 台灣地體構造的演變 台灣地體構造圖明書, 中華民國經濟部, 110 頁。
- 楊耿明、丁信修、吳榮章、紀文榮、2000, 台灣西北部斷層復活之特性及力學分析, 中國地質學會八十九年年會暨學術研討會大會手冊暨論文摘要, 台北, 第 302-304 頁。
- 郭政隆, 1997, 鏡煤素反射率在台灣西北部油氣探勘的應用: 國立台灣大學地質學研究所博士論文。
- Huang, S. T., Chen, R.C., and Chi, W.R., 1993, Inversion tectonics and evolution of the northern Taihsi Basin Taiwan: *Petrol. Geol. Taiwan*, no.28, p. 15-46.
- Hung, J.H. and Wiltschko, D.V., 1993. Structure and kinematics of acute thrust faults in the Miaoli-Cholan area of western Taiwan: *Petrol. Geol. Taiwan*, no. p. 50-96.
- Hung, j.H., 1994. The study of the deformation mechanisms in the foothills areas central and western Taiwan: Final Report of Committed Research by the CPC. (unpublished)
- Kraig, D. H., Wiltschko, D. V., and Spang, J. H., 1987. Interaction of basement uplift and thin-skinned thrusting. Moxa arch and the western overthrust belt. Wyoming: A hypothesis: *Geol. Soc. Amer. Bull.*, v. 99. p. 654-662.
- Kuan, M.Y., 1970. The variation of the formation thickness and the evolution of the anticlinal structures in the Tiehchenshang gas field. Miaoli. Taiwan: *Petrol. Geol. Taiwan*. No. 7. p. 121-132.
- Lee, C.I., Chang, Y. L., Mao, E.W., and Tseng, C.S., 1993. Fault reactivation and structural inversion in the Hsinchu-Miaoli area of northern Taiwan: *Petrol. Geol. Taiwan*. No. 28. p. 47-58
- Meng, C., 1965. Lateral movement in northern of western Taiwan: *Petrol. Geol. Taiwan*. No. 4. p. 89-92..
- Suppe, J., 1984, Seismic interpretation of the compressively reactivated normal fault near Hsinchu, western Taiwan: *Petrol. Geol. Taiwan*, no. 20. p. 85-96.
- Suppe, J., 1980, Imbricated structure of western foothills belt, south central Taiwan: *Petrol. Geol. Taiwan*, no.30,p.163-176.
- Yang, K. M., Wu, J. C., Wickham, J. C., Ting, H. H., Wang, J. B. and Chi, W. R., 1996, Transverse structures in Hsinchu and Miaoli areas: Structural Mode and evolution in foothills belt, northwestern Taiwan: *Petrol. Geol. Taiwan*. No. 30, p. 111-150.
- Yang, K. M., Ting, H. H., Wu, J. C., and Chi, W. R., 1997, Geological model for complex structures and its implications for hydrocarbon exploration in Northwestern Taiwan: *Petrol. Geol. Taiwan*, no. 27, p. 1-42.