Natural Gas Geochemistry in Tarim Basin, China and Its Application to Gas Filling History

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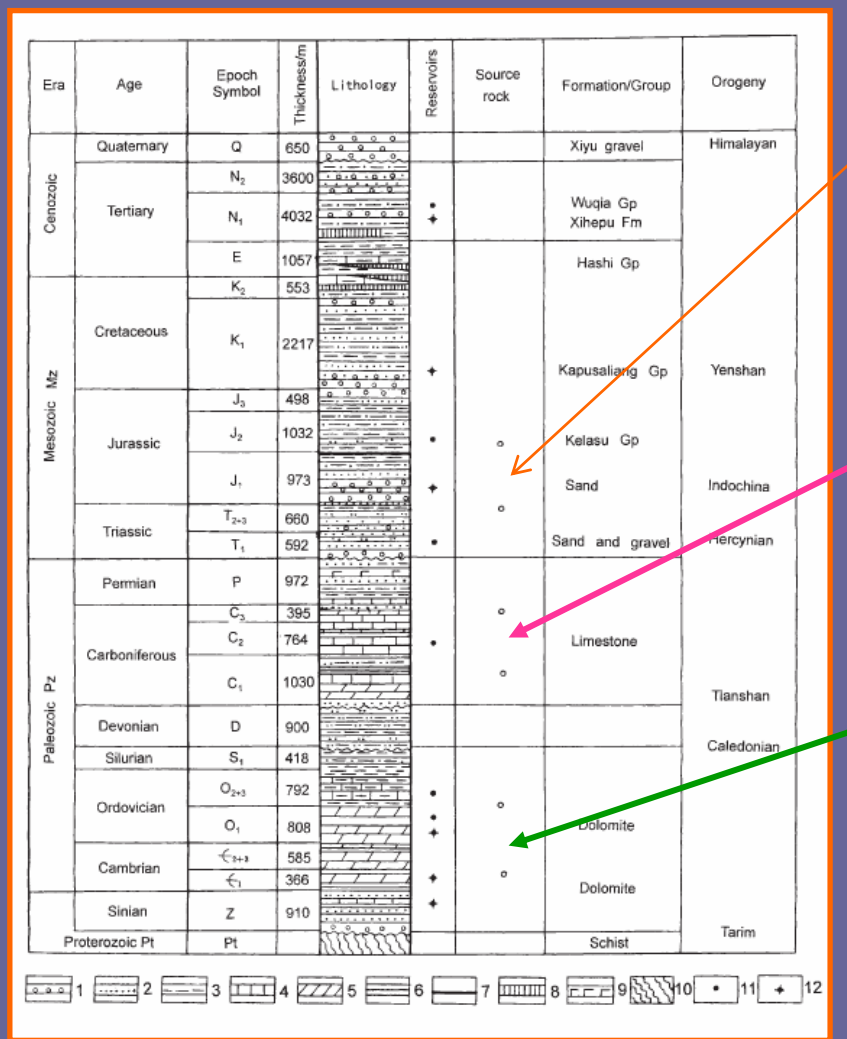
Introduction

- *For more than 20 years petroleum and natural gas exploration, Chinese geologists have discovered two family groups of natural gas in the Tarim basin, China*
  - *Coal-type gas: derived from Jurassic coal measures of type-III kerogen, $\delta^{13}C_2$ >-28‰;*
  - *Oil-type gas: derived from Ordovician ,Cambrian marine sources of type-II and type-I kerogens; or oil secondary cracking. $\delta^{13}C_2$ <-28‰.*
- *Gas filling history is an important issue for natural gas exploration, and quantitative gas generation model is an useful tool to address the following issues:*
  - *Gas generation and expulsion from sources*
  - *Gas thermal maturity*
  - *Gas filling history and gas charging time*
  - *Gas reserves evaluation*

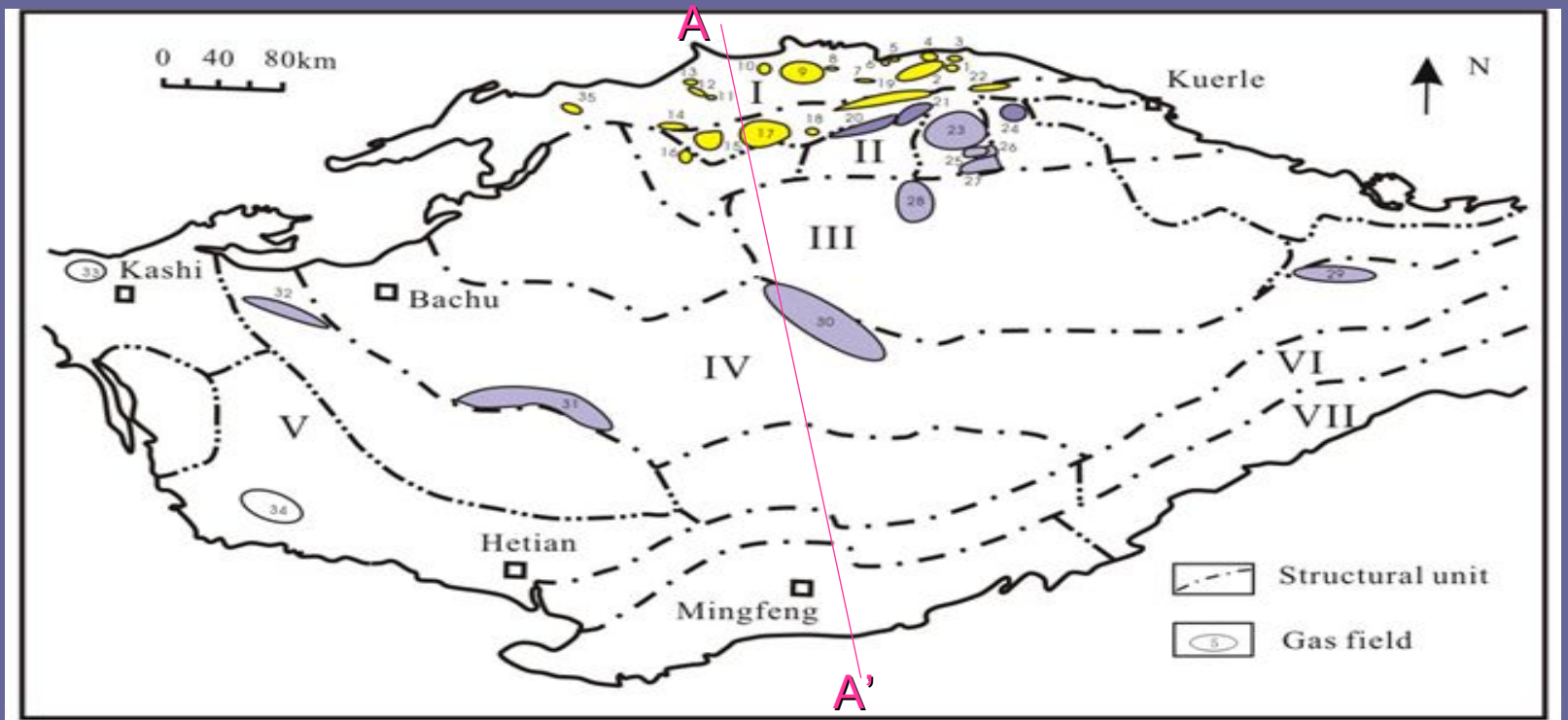
Three Sets of Potential Source Rocks in the Tarim Basin, China



- Triassic- Jurassic continental source rocks
  - Type III kerogen (humic) with an average TOC of 1.8% to 67%.
- Carboniferous –Permian source rocks
  - Type II and III kerogen with TOC = 0.47% - 5%.
- Sinian-Ordovician marine source rocks
  - Type I kerogen (sapropelite) with TOC = 0.2-3.4%.

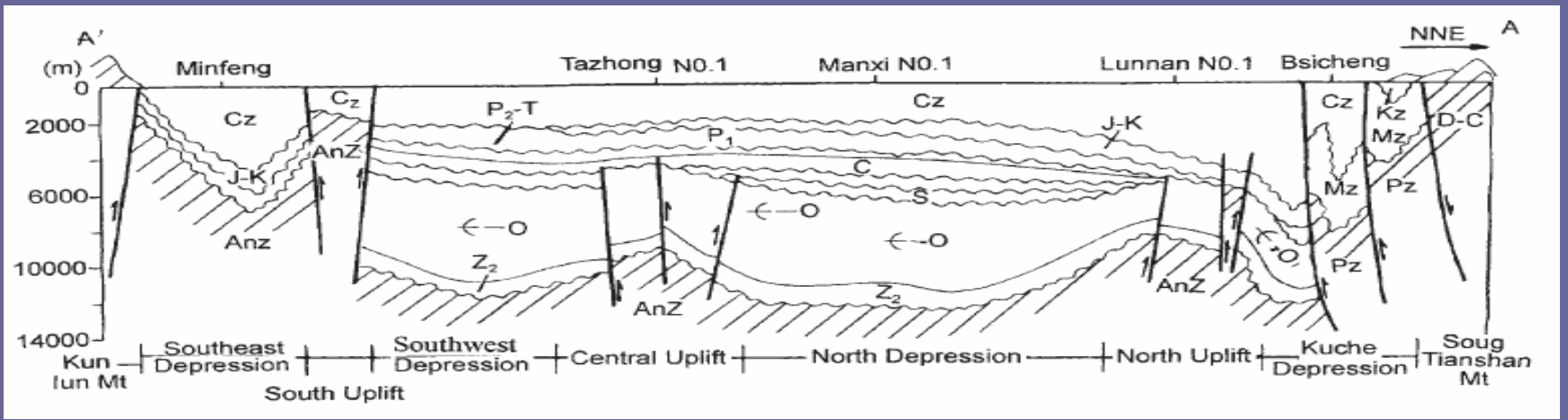
Modified from Chen et al., 2000

Tectonic Elements and Gas Fields in the Tarim Basin, China



1-DN1,2-DN2,3-Tuizi,4-Yinan,5-Yixi,6-Kezi,7-DQ5,8-Kela3,9-Kela2,
10-Kela1,11-DWQ,12-DB,13-Tubei,14-Quele,15-YTK,16-YD,17-YM7,
18-HQ,19-YH,20-YKL,21-DH,22-TRG,23-LN,24-Caohu,25-STM,26-JF,
27-JLK,28-HD,29-Yingnan2,30-TZ,31-HTH,32-Qu3,33-AK1,34-KKY,35-WC1
I-Kuqa Depression,II-Taibei Uplift,III-North Depression, IV-Tazhong Uplift,
V-Southwest Depression,VI-Tanan Uplift, VII-Southeast Depression

Structure Cross Section of the Tarim Basin



- *Sinian-Lower Paleozoic Unit*

  highly-mature to post-mature marine carbonate sediments with thickness >9500m
- *Upper Paleozoic Unit*

  mature to highly mature clastic deposits with a maximum thickness of 4500m.
- *Mesozoic-Cenozoic Unit*

  terrestrial clastic deposits up to thickness of 11,000m in thickness in the sedimentary center.

According to Chen et al., 2000