

COUPLED FELDSPAR DISSOLUTION, MASS TRANSPORT AND SECONDARY MINERAL PRECIPITATION IN OPEN OR CLOSED SANDSTONE GEOCHEMICAL SYSTEMS: EXAMPLES FROM THREE SAGS IN BOHAI BAY BASIN, EAST CHINA

Guanghai Yuan

Geology Department, China University of Petroleum, Qingdao, China

yuan.guanghai86@gmail.com

Feldspar dissolution and precipitation of secondary minerals (kaolinite, quartz) are common diagenetic processes affecting reservoir quality in sandstones with detrital feldspars. Within Eocene sandstones in Shengtuo Sag, Minfeng Sag and Nanpu Sag of East China, I identified three types of mineral assemblages: (1) extensive leached feldspars with massive kaolinite and quartz cements, (2) extensive leached feldspars with massive kaolinite and few quartz cements, and (3) extensively leached feldspars with few kaolinite and quartz cements. The variations in mineral associations have inspired me to decipher how the mineral assemblages may characterize geochemical systems, indicating specific temperature, pore water chemistry and the openness versus closeness of diagenetic systems, thus to propose redistributinal models of feldspar dissolution products in different geochemical systems.

I utilized thin sections, SEM samples and X-ray analysis of clays to study diagenesis and quantize leached feldspars and related secondary minerals in sandstones. 3-D seismic data has been applied to characterize fractures in different sags. Fluid inclusions in quartz cements, $\delta^{18}\text{O}$ of quartz cements, and $\delta\text{D}-\delta^{18}\text{O}$ of kaolinite are being tested to investigate temperature and origin of paleo-fluids that leached feldspars and precipitated quartz and kaolinite. I am now using Geochemist's Workbench software to simulate feldspar dissolution and precipitation of quartz and kaolinite in respect of Al^{3+} and $\text{SiO}_2(\text{aq})$ transfer.

When completed, the study will clarify how factors (e.g. temperature, pore water chemistry) may control diagenetic reactions, and provide linking between mineral diagenetic textures and different (open, semi-open, closed) geochemical systems, significant for interpretation of other sandstones with similar diagenetic features.