

## **Formation mechanism for the storage and percolation spaces in weathered volcanic reservoirs**

WANG JINGHONG\*, ZHU RUKAI AND MAO ZHIGUO

PetroChina Research Institute of Petroleum Exploration & Development, Beijing 100083, China

(\*correspondence: wangjh02@petrochina.com.cn)

The weathered volcanic rocks are the most common petroleum reservoirs discovered in the Carboniferous formation of North Xinjiang. We discovered the weathered volcanic reservoirs developed multiple pore-fracture combinations with effective reservoirs dominated by pore-fracture, fracture-pore and fracture types, using the latest exploration data and laboratory experiments (thin-section, physical properties test, dissolution test, triaxial compressive experiments and CT scanning). The storage and percolation spaces are formed by two mechanisms, storage spaces controlled by pore-forming mechanism and percolation spaces mainly by fracture-forming mechanism. The dissolution experiments indicated the surface area and pores volume increased under surface environment, deep thermal fluid, and deep-buried organic acid. Under surface environment, the pore diameters decreased, mainly small pores. Under deep-buried environment with thermal fluid dissolution, the pore diameters increased, mainly large pores; while that would decrease dominated with micro-pores by organic acid dissolution. Stress experiments indicated strains against the volcanic rocks of original, weak weathered, common weathered, and strong weathered decreased correspondingly, so the capabilities to form fractures increasing correspondingly. CT scanning showed fracture is main factor to connect dissolved pores, thus forming effective percolation spaces. The percolation spaces of the weathered volcanic reservoirs are controlled by weathering duration, differential weathering and tectonic factors.