Multistage refertilization of an Archean peridotite massif, N. Qaidam orogen (NE Tibet, China)

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A garnet (Gt) -facies peridotite massif [1] was involved in the early Paleozoic North Qaidam orogeny that generated ultrahigh-pressure (UHP) rocks during the collision between the Qaidam and Qilian blocks, NE Tibet (China) [2]. Original dunite and harzburgite now enclose fertile lherzolite zones, secondary clinopyroxene (Cpx)-rich lherzolite/wehrlite layers and rare clinopyroxenite dykes. Re-Os isotopic analyses of Fe-Ni-sulfides from the peridotite give Re-depleted model ages up to 3.0 Ga, indicating an Archean origin.

Hf-Nd-Sr-O mineral isotopic data support multiple refertilization episodes for this Archean massif. Lu-Hf isotopic ratios of Gt and Cpx in the dunites distant from the fertile rocks give an isochron age of ~1.5 Ga, similar to their Hf depleted-mantle model ages, suggesting early Mesoproterozoic melt addition from depleted asthenosphere. Parallel layers of Cpx-rich peridotites and pods of Gt+Cpx occur within harzburgite and dunite. Lu-Hf and Sm-Nd isotopic signatures indicate the formation of these secondary peridotite layers and pods was related to a refertilization by basaltic melts from the asthenosphere at ~1.1-0.7 Ga. All peridotitic minerals have moderately evolved initial Sr isotopes (0.70358-0.70873), relative to primitive mantle. Whole-rock and mineral elemental compositions of phlogopite-bearing garnet pyroxenite dykes suggest derivation from arc-related melts. Their mineral Nd-Sr-O isotopic compositions imply an evolved source, probably from subducted continental crust. However, Lu-Hf isotopic data reflect an early Paleozoic depleted-mantle origin. U-Pb ages of zircon and Lu-Hf isochrons and model ages of Gt+Cpx both show that the intrusion of the pyroxenitic melts, derived from asthenosphere contaminated by continental crust, occurred in the ealy Paleozoic, related to the coeval North Qaidam orogeny.

[1] Xiong *et al*. (2011) *Precambrian Research* **187**, 33-57. [2] Xiong *et al*. (2012) *Lithos* **155**, 125-145.

Gas and Water Distributed Patterns and Influential Factors in the Tight Sandstone Gas Reservoirs of Upper Triassic Xujiahe Formation in Hechuan Area of Sichuan Basin, China

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The gas and water distribute complicatedly within the Upper Triassic Xujiahe-2 tight sandstone in the Hechuan area of Sichuan basin. The origin and formation of water in the gas reservoir is complex. Generally, the wells released gas initially but produced water instead or shut down soon after, and that affected the gas production.Understanding distributed pattern of gas-water and its main influential facters is benefit to the development solutions-making of gas reservoir, enhanced reserves estimation and exploitation profits of such gas reservoir. This paper discusses the correlation of gas-bearing capability with pore-throat size, permeability and porosity, on the basis of reservoir rock research, combined with core mercury injection experiment, gas relative permeability experiment, nuclear magnetic resonance and gas-driving water percolation experiment. We also carried out typical gas reservoir dynamic analysis and synthetic geology research, using single well testing and pilot production data. The conclusions are followings, 1) the pore structures of the Xujiahe-2 tight sandstone are dominated by fine or micro-throats, with strong heterogeneity; 2) the gas saturation relates with permeability and pore throat size in the Xujiahe-2 gas reservoirs; 3) the Xujiahe-2 gas and water have four distribution patterns, i.e. gas reservoir, upper gas with lower water, upper water with lower gas, and gas and water at the same zone; 4) the main controls on the Xujiahe-2 gas-water occurrence are gentle-slope setting, pervasively near-source gas charging and heterogeneity of the pore throat.

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