Effect of volcanic activity on hydrocarbon generation in China

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Three gas fields with reserve of billion cubic meters of gases and one oil field with a hundred million tons of oil were found related to volcanic rocks in China. Volcanic activity can not only form excellent reservoir rocks but also affect hydrocarbon generation of source rocks. These effect were discussed in this paper and shown as follows: Firstly, volcanic activity enhanced the entire region's palaeo- temperature and accelerated thermal evolution of the source rocks. For example, geothermal gradient reached high up to 65°C/1000 m in Songliao basin when volcano was erupting in large scale while the present-day geothermal gradient is only 37°C/1000 m. Hence the Shahezi source rocks in Cretaceous between two sets of volcanic rocks had high hydrocarbon generation rate. Maturity of the source rocks rapidly reached high to over mature (3.5% or above). Secondly, igneous intrusion make local source rocks generate hydrocarbons promptly even when the source rock was uplifting, it still could become high to over mature very quickly to generate large amounts of gases. In Qinshui basin, multiple areas were intruded by igneous rocks during Yanshanian and geothermal gradient was high up to 55°C/1000 m. The source rocks were still generating hydrocarbons when the entire basin was uplifted. The gas generated due to volcanic activity accounted for more than 70% and formed large Qinshui coal seam gas field. Thirdly, when source rock developed with concomitant volcanic eruption or igneous intrusion, these kinds of volcanic rocks were normally in small scale. Influence areas by igneous intrusion are small. Hot fluids and transition metals from volcanic activity catalyzed and accelerated thermal evolution of the source rocks and thus generated large amounts of low mature oil and gas.