

The effects of the Zagros Simply Folded Belt on the characteristics of karst aquifers

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The Zagros orogenic belt is divided into the Simply Folded Belt (ZSFB), the Fold-and Thrust-Belt, the Zagros Thrust System and the Sanandaj-Sirjan Metamorphic Belt. The ZSFB is characterized by the repetition of long and regular anticlinal and synclinal folds. The anticlines are normally mountain ridges, mostly consist of limestone, and the synclines are valleys and plains. The karstic rocks are composed of limestone, dolomite, anhydrite and halite. The main carbonate aquifers are in the Asmari-Jahrum, Tarbur, Sarvak, Daryian, Fahliyan, Surmeh, Dalan and Kangan Formations in south-central part of Iran, forming broad highlands. The karstic carbonate aquifers overlay and underlay the impermeable formations. Only the top of the anticlines are bare, therefore exposing the carbonate formations. The types of karstic aquifers are shallow depth unconfined and confined, and oil or gas-capped deep confined. The characteristics of these aquifers are not unique. The exposed anticlines consist of only one main aquifer, two aquifers on each limb, or several sub-aquifers (Ashjari and Raeisi, 2006; Raeisi, 2008). The general flow directions are parallel to the strikes toward one or both plunges of anticlines, from one limb to the other, or toward adjacent aquifers. The general flow route may be less than one to tens of kilometers. The variability in geometry and number of aquifers, discharging points and general flow direction is dependent on the characteristics of the ZSFB, such as its lithological settings, folding, faulting, topography, rate of uplift, fault brecciated rocks, outcrop of the impermeable formations in the core of the anticline, superimposed river and local base of erosion.

About 130 salt diapirs emerged in southern Iran. The salt diapirs are poor aquifers with springs of very low discharge (Zarei and Raeisi, 2010). Large caves and conduits are developed in some of the salt diapirs, mainly transferring floodwaters. The geological settings of the salt diapir regions are one of the main reasons for deteriorating the quality of the adjacent fresh-water karst and alluvium aquifers. The Gachsaran Formation of the ZSFB consists of alternating units of anhydrite, marl and/or halite. These lithological settings create small

independent sub-aquifers, directing the water flow parallel to the strike, except under specific conditions (Raeisi, et al., 2013). High-pressure oil or gas-capped deep confined aquifers are trapped at the crest of some of the ZSFB anticlines. These types of aquifers were developed under special structural settings and have special characteristics in comparison to the shallow confined aquifers (Nadri, et al., 2013). The source of the brine is evaporated sea-water (Bagheri, et al., 2013). It can be concluded that the stratigraphy and structural settings are the main parameters, controlling characteristics of the ZSFB aquifers. Detailed knowledge of the ZSFB geological settings is the main key element to optimum usage and protection of the karstic water resources.

References

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