



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

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The Zagros orogenicbeltis divided into the Simply Folded Belt (ZSFB), the Fold-and Thrust-Belt, the Zagros Thrust System and the Sanandaj-SirjanMetamorphic Belt. The ZSFBis characterized by therepetition of long and regular anticlinaland synclinal folds. The anticlines are normallymountain ridges, mostly consistof limestone, and the synclines are valleys and plains. The karsticrocks are composed of limestone, dolomite, anhydrite and halite. The main carbonate aquifers are in the Asmari-Jahrum, Tarbur, Sarvak, Darvian, Fahliyan, Surmeh, Dalanand KanganFormationsin south-central part ofIran, forming broad highlands. The karstic carbonate aquifers overlay and underlay the impermeable formations. Only the top of the anticlinesare bare, therefore exposing the carbonate formations. The typesof karstic aquifersareshallow 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 re 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 geometryand 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, faultbrecciated rocks, outcrop of the impermeable formations in the core of the anticline, superimposed river and local base of erosion.

About 130 salt diapirsemerged in southern Iran. The salt diapirsare poor aquifers with springsof 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 diaper regions are one of the main reasonsfordeteriorating the quality of the adjacent fresh-water karst and alluvium aquifers. The GachsaranFormation of the ZSFB consists of alternating units of anhydrite, marl and/orhalite. These lithological settings create small





independent sub-aquifers, directing the water flow parallel to the strike, except under specificconditions (Raeisi, et al., 2013). High-pressureoil 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 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 ZSFB geological settings is the main key elementtooptimum usage and protection of the karstic water resources.

References

- 1. Ashjari, J. and Raeisi, E. 2006. Influences of Anticlinal structures on regional flow, Zagros, Iran.. Journal of Caves and Karst Studies. Vol. 68, No. 3, pp. 118-127.
- Bagheri, R. Nadri, A. Raeisi, E. Shariati, A. and Mirbagheri, M and Bahadori, F. 2013. Chemical evolution of a gas-capped deep aquifer, Southwest of Iran. Environmental Earth sciences. DOI: 10.1007/s12665-013-2705-4 (Published on line, in press).
- 3. Nadri A, Bagheri R., Raeisi, E. Ayatollahi S. S. and Bolandparvaz-Jahromi, K. 2013. Hydrodynamic Behavior of Kangan Gas-Capped Deep Confined Aquifer in Iran. DOI 10.1007/s12665-013-2596-4 (published on line, in press)).
- Raeisi, E. 2008. Groundwater Storage Calculation in Karst Aquifers with Alluvium or no-flow boundaries, Journal of Cave and Karst Studies, Vol. 70, No. 1, pp. 62-70
- Raeisi, E. Zare, M and Aghdam, J. A. 2013. Hydogeology of gypsum formations in Iran, Journal of Cave amd Karst Studies, Vol. 75, No.1, p. 68–80.
- Zarei, M and Raeisi, E. 2010. Conceptual modelling of brine flow into aquifers adjacent to the Konarsiah salt diapir, Iran. Journal of Cave and Karst Science, Transactions of the British Cave Research Association Vol. 37, No.2, pp. 37-44.