



Characterization of hydrogeologic behavior of a relict karst aquifer, Turkey

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The Turkish karst is mostly known by its large scale aquifers as well as its well developed morphological features in the Taurus mountain belt extending along the Mediterranean coast. However, the northwestern part of the country exhibits a distinct type of karst owing to the different neotectonic regime and the coeval palaeogeographical development. Karstification of the Jurassic age carbonate rock masses cropping out at the Central Sakarya River Basin is attributed to pre-Pliocene periods when terrestrial-erosional faces has dominated the region. Emplacement and rapid incision of the Sakarya river, associated with a continental uplift has drastically changed the surface and consequently subsurface drainage. Re-orientation of the surface drainage has dissected the large karstic carbonate masses which were uplifted and significantly eroded. Dissection by streams and rivers has reduced the size and the continuity while the uplift has resulted in reduction in the thickness of the carbonate rock-masses. The effects of these geologic events were also reflected in the occurrence and hydrogeologic behavior of the karst aquifer.

The authors attempt to characterize the hydrogeological behavior of such a dissected-relict karst aquifer studying the morphology, hydrology and hydrochemistry of one of the largest part of the dissected formerly large karst aquifer. This part is called the Harmankoy-Beyayla Karst System and has an area of about 50 km². The system is hydrologically isolated and the recharge occurs only through infiltration from precipitation onto the outcrop. The precipitation was recorded on monthly basis at three pluviometers installed on the outcrop. The outflow was measured at the springs

discharging the system, again on monthly basis. In situ physical and chemical measurements and sampling were also performed during hydrological observations. All observations were carried out along two years. Speleological and tracing techniques were applied to obtain information on the flow and storage properties of the aquifer. Hydrographs and chemographs were then interpreted together with the detailed knowledge of the geomorphologic setting at the recharge area. The results have revealed that, in spite of its small scale dimensions, the aquifer hydrogeologically can be divided into three subsections, each have different recharge, flow-storage and outflow character: 1) allogenic-concentrated recharge/conduit flow/low storage/high variation in rate and chemistry of discharge 2) allogenic-concentrated recharge/conduit -dispersed flow/high storage/lower variation in rate and chemistry of discharge and authogenic-dispersed and concentrated recharge/conduit flow/low storage/high variation in rate and chemistry of discharge.