Geotectonics and structures of the Arabian Peninsula

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Arabian Peninsula is an area, which is characterized by poor seismic activities. While for the Arabian Shield and Arabian Platform are aseismic, the area is ringed with regional seismic sources in the tectonically active areas of Iran and Turkey to the northeast, the Red Sea Rift bordering the Shield to the southwest, and the Dead Sea Transform fault zone to the north. Red Sea is considered one of the few places in the world undergoing active continental rifting and formation of new oceanic lithosphere. We determined the seismic velocity structure of the crust and upper mantle of the Arabian Shield and Red Sea using a variety of analysis techniques on broadband seismic waveform data recorded by KACST and SGS seismographic networks. Teleseismic P- and S-wave travel time tomography provided an image of upper mantle compressional and shear velocities related to thermal variations. Regional Pn tomography delineated compressional velocity structure of the shallow mantle. Modeling of teleseismic P-wave receiver functions estimated crustal and upper mantle discontinuity structure. Finally, measurements of teleseismic shear-wave splitting estimated upper mantle anisotropy. Generally speaking, new results for the lithosphere suggest that the mantle lithosphere is thin and the LVZ is significant near the Red Sea, where rifting is active. The mantle lid thickens away from the Red Sea in the Arabian interior. Furthermore our results indicate the presence of polarization anisotropy in the lithospheric upper mantle, in the vicinity, as well as farther away from the Red Sea. Our modeling suggests vSV>vSH in the southern part of the Red Sea, consistent with vertical flow, and vSH>vSV in the northern part of the Red Sea and the continental interior, as is commonly reported in the continents. We would suggest that low velocity beneath the Gulf of Aqabah and southern Arabian Shield and Red Sea at depths below 200 km are related to mantle upwelling and seafloor spreading. Low velocities beneath the northern Arabian Shield below 200 km may be related to volcanism. The low velocity feature near the eastern edge of the Arabian Shield and western edge of the Arabian Platform could be related to mantle flow effects near the interface of lithosphere of different thickness.

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In this study, the qualities of surface water bodies feeding the lower Jordan River from its eastern side were studied and found reflected in the types of aquatic species of macrofauna surviving in them. Water, especially, in semi-arid countries such as Jordan with unpredictable seasonal rainfall are subjected to scarcity of water due to increasing demand as a result of population growth. This represents a great problem and challenge for scientists, planners and policy-makers. Surface water resources in Jordan have been during the last few decades negatively impacted by development through the addition of urban, industrial and sewage wastes to the environment. The prevailing conditions make it imperative to protect Jordan’s surface water resources in order to keep these aquatic systems in healthy and productive conditions. This must also apply to other countries with similar environmental conditions. Different aquatic fauna were studied on their types, sizes and species and were identified and correlated with the chemical and physical properties of the water they are living in. It is concluded that aquatic macrofauna can easily be used as indicators of water quality and it is a fast and trustful way of indicating changes taking place in the water quality, especially water salinity, trace elements contents and pollution parameters.