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Observations and preliminary results of hydrothermal activity on the shallowing coastlines of the Dead Sea, Israel

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The Dead Sea basin, the lowest and one of the saltiest places in the world, is a tectonically active 150 km long and 15–17 km wide terminal pull-apart basin located along the southern Dead Sea plate boundary. As a result of the combined effect of climate change and anthropogenic intervention, lake levels have been dropping at an alarming rate of over 1 m per year during the last few decades. Due to this rapid decline, a number of hydrothermal springs have become exposed on land along the western shore of the lake. However, once subaerial they are typically categorized as sinkholes, despite the fact that they are a different geological feature that results from a different mechanism. Generally, hydrothermal springs within the Dead Sea are understudied. This, coupled with rapidly lowering lake levels leaves a considerable knowledge gap in how this system is changing and responding with time. Previous studies have proposed the presence of underwater springs or seeps based on temperature anomalies and acoustic blanking observed on high-resolution seismic reflection profiles. Direct observations of nearshore springs were obtained by a team of scientific divers over 10 years ago who examined water chemistry and microbiology. Their study suggested that submarine springs must be connected to a high-pressure flow system, which is able to penetrate the fresh-saline interface in the Dead Sea, probably along tectonic faults and cracks. Fractures in the sediment would force variable rates of flow depending on width of the fractures, thus possibly leading to the different chemical compositions found in the underwater springs over a short distance. More recently, a follow up set of underwater and on land surveys were conducted in a similar, adjacent spring system, providing insight into the changes that have occurred over the past decade. This study will present a summary of past studies as well as insights gained from this most recent research.