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Neotectonic deformation and sea level variations, two main factors controlling the offshore and onshore occurrence of the large karstic springs in Central-eastern Peloponnese (Greece)

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Abstract

It is well known that, in present times, many outlets of the karstic aquifers are located below sea level. This problem is of great importance in semi-arid areas like Mediterranean as it causes the loss or salinization of critical freshwater resources in the surrounding areas. The occurrence and distribution of such submarine springs played a great role in the development of ancient civilizations. A typical example is the karstic springs occurring in the Central-eastern Peloponnese, which are closely related to Greek myths, ancient history and especially development of the area from the Mycenaean times and on.

In Central eastern Peloponnese near the seashore, there is a set of large karstic submarine springs arranged along a 16km length on a NNW-SSE direction, and whose elevation decreases from NNW to SSE (see table).

Name of spring	Elevation (m)	Water Discharge (m^3/h)
Kefalari	+24.00	12.000
Kroi	+3.00	180
Lerni	+0.60	7.200
Kiveri	- 6.00	60.000
Anavalos	-70 up -80.00	150.000

It has been proved that all these karstic springs are hydraulically connected to a number of sinkholes, located mainly on plateaus to the west, and aligned on a zone parallel to the springs, at elevations higher than 500m. The sinkholes are arranged along a 44km length on a NNW-SSE direction, but their elevation is decreasing towards NNW from 662m (Taka) to 528 (Skotini).

The kinematics of neotectonic deformation in the Hellenic Arc is very complex, creating blocks with antithetic rotational movement, since it is well known that it is one of the most tectonically and seismically active Arcs.

Geological data, karstification distribution and neotectonic deformation, as well as sea level changes indicate that an antithetic rotational movement has affected the group of sinkholes and the group of the karstic springs.