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Poliani polje (SW Greece) an indirect indicator of neotectonic evolution (active tectonics)

By
Dr. Ioannis Fountoulis[1]
Assistant Professor of Tectonics
National and Kapodistrian University of Athens
Faculty of Geosciences, Department of Dynamic Tectonic Applied Geology

ABSTRACT

Poliani's polje being the largest karstic form at the Kalamata's major area (SW Greece) is located at an altitude of 650m., between two neotectonic macrostructures, the Megalopolis graben to the north and the Kato Messinia graben to the southwest. The geological and geophysical survey gave us evidences to understand the morphology and that the karstic form developed in neritic cretaceous limestones of Tripolis unit.. The polje was formed by the unification of two pre-existed dolines, which formed its triangle shape. The dolines have formed along faults striking NE-SW and N-S and have been filled in with fluvial deposits that comprise silt, clay and polymictic conglomerates. The latter display high percentage of metamorphic pebbles that come from Arna Unit (phyllites and quartzites). The maximum thickness of these deposits is about 90 meters; their age is Middle to Upper Pleistocene and are partially covered by talus deposits, the composition of which markedly differs from that of the underlying sediments, as they consist mainly of fragments of clastic composition (from the eocene flysch of Tripolis Unit).

After examining the distribution and composition of the fluvial deposits in the polje, the following observations could be stated:

- Pebble size decreases downstream the Tzirorrema torrent, which flows through the polje, from 50 cm initially to 8 cm the southern end.
- The ratio of metamorphic to non-metamorphic pebbles decreases significantly downstream. At the northern end of the polje, the conglomerates consist almost exclusively of metamorphic clasts but heading southwards the participation of carbonatic and clastic pebbles increases.
- In three consecutive sampling locations downstream of the polje, the ratio of metamorphic/non metamorphic pebbles in the pleistocene deposits increases towards the lower members of the deposits.

The evolution stages of the polje are presented in Table 1.

[1] University of Athens, Faculty of Geosciences, Department of Dynamic Tectonic Applied Geology Panepistimioupoli Zographou, 15784, Athens, Greece, E-mail: fountoulis@geol.uoa.gr

Table 1: Evolution stages of Poliani polje.

Stage	Event	Age
VII	present-day condition	
VI	Fault reactivation upstream and downstream of the polje Local uplift Onset of incision and transformation to open system Completion of sediment accumulation	Quaternary
V	Continued influx of (mainly metamorphic) material Closed system, calm periods (red clays)	
IV	Fault reactivation Onset of sediment influx - composition unknown Closed stage - Polyani becomes a polje Closed geomorphological and hydrological system Open hydrogeological system, possibly temporally closed	U. Pleistocene
III	Fault reactivation First stages of polje formation Erosion dominates Open system, at least partially	L. Pleistocene
II	Faults Erosion - formation of tectonically controlled valleys Open hudrological, hydrogeological and geomorphological system	U. Miocene
I	End of tangential tectonics	M. Miocene