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10Be and 36Cl surface exposure dating of man-made excavations in northern Lebanon: Phoenician structures or not?

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In principle, surface exposure dating can be applied to anthropogenic structures such as flattened bedrock platforms or ancient quarries, even though it still has an unrealized potential in archaeological settings (Akçar et al., 2009; Rixhon, 2018). Antique quarries may represent a favourable context for this method, provided that major issues related to (i) inheritance and (ii) erosion (i.e. pristine bedrock surfaces of quarry floor/walls) can be avoided. The first point must be critically assessed given that muon-induced reactions produce cosmogenic nuclides at greater depths (i.e. several meters below the surface). In the framework of this study, two archaeological sites in northern Lebanon were selected: Batroun and Anfeh. Although their excavation structures are well-studied, the so-called "great Phoenician trench", i.e. a moat structure excavated in the Anfeh promontory and the "Phoenician sea-wall" related to quarrying activity in Batroun, their age remains unknown. These structures were respectively excavated in Eocene limestone and Late Pleistocene aeolianite. Samples for 36Cl (#4) and 10Be (#5) analysis were collected accordingly. Both sites present favourable characteristics to cope with inheritance: the moat floor is located ∼10 m below the original surface whereas the top of the Phoenician sea-wall indicates quarrying depths reaching (at least) 4-5 m. Traces of former extracting activities on the quarry floor/walls are still conspicuous at several spots; the latter were preferentially targeted for sampling. Careful field measurements allowed a reliable assessment of topographic shielding, which plays a significant role in Anfeh. Sample preparation is currently under process. Surface exposure ages should be able to discriminate between a Phoenician origin or a latter excavation (e.g. during Middle Ages), without eluding a possible stepwise, polygenetic extraction process (especially in Batroun).

References

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