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Hazard assessment of the stability of a cavern roof along the coastline

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This work concerns the hazard assessment about the stability of a large shallow depth cavern, located along the coastline rocky sector of Polignano town (Apulia, Southern Italy) under an intensely urbanised area. This cavern, which lies at the sea level, has been created by a prolonged process of sea erosion within a rock mass formed of a lower stratified limestone mass and an upper Gravina Calcarenite mass. The thickness of the cavern roof, which has a dome shape, is less than 10 metres in the centre. Important buildings, as hotels and private houses, are located just above the top of the roof. Erosion processes have been observed to be still active along the whole cavern due to climate factors and, in particular, to sea salt weathering and sea spray effects. In 2007 a large calcarenite block, 3 m large, fell down from the cavern roof and consequently a field investigation campaign was carried out for a rational stabilization plan in order to understand the current stability conditions of the roof and the potential failure mechanism. Therefore, a thorough geo-structural survey has firstly been carried out, together with laboratory and in-situ testing for measuring the physical and mechanical properties of the calcarenite rock and of the corresponding joints. A monitoring system has also been planned and installed in order to measure the erosional rate and the block displacements in the cavern.