ROMA TRE UNIVERSITY
DEPARTMENT OF CIVIL, COMPUTER AND AERONAUTICAL ENGINEERING
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MSc Course in Civil Engineering for natural risk protection
Laurea Magistrale in ingegneria Civile per la protezione dai rischi naturali

MSc Degree Thesis
Tesi di Laurea Magistrale

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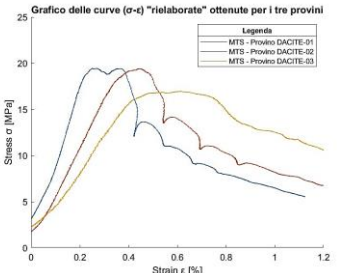
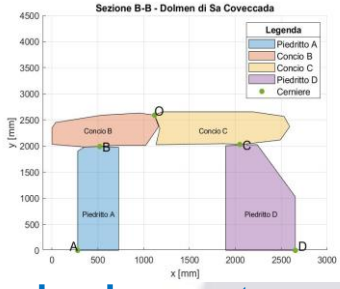
Structural assessment of Late Neolithic Sa Covaccada Dolmen in Mores (SS), Sardinia

Motivations and aims

The Dolmen of Sa Covaccada dates back to the first half of the 3rd millennium BC and is considered one of the most important megalithic structures in Sardinia. Due to the severe deterioration of trachyte surfaces, the collapse of some portions of the capstone, and the extensive crack pattern, the monument underwent a first restoration in 2011, but still requires important retrofitting. The stability of the top slabs is a main concern, but it has never been assessed to date . This work investigates the structural behaviour of of the monument with different engineering tools.

Methods and results





Following the inspection activities carried out in July 2023, compression tests were performed on three cubic specimens for the mechanical characterization of the stone. Tests were carried out in the Laboratory of Structures of Roma Tre University using DIC technology. Then, structural analyses were performed at two levels: an analytical model and a discrete element model (DEM, using UDEC software) were developed for the assessment of the collapse mechanisms of significant transversal cross-sections of the dolmen. A FEM model was built to investigate the stress field on the longitudinal orthostats and to identify local stress concentrations associated with cracks.

Conclusions and future developments

The failure mode and collapse multipliers provided by the analytical approach were validated by DEM simulations. The accurate representation of block geometry, contact points and crack pattern resulted crucial for a thorough structural assessment of the dolmen. A non-invasive, compatible and fully reversible restoration work was proposed to reduce the stress concentrations and detailed monitoring of the crack pattern was recommended. Further DEM analyses with 3D models are underway to develop a deeper understanding of the structural behavior of the monument.