



# Evaluation of Granite Topography in the Ida Madra Geopark in the Context of Geoheritage

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## Abstract

This study evaluates the granite topography of the Ida Madra Geopark in northwestern Türkiye as a significant geoheritage resource. Seven representative geosites were systematically assessed using the Kubalíková (2013) methodology, integrating scientific, educational, economic, conservation, cultural, and aesthetic values. Field surveys revealed that tors, boulders, exfoliation domes, and spheroidal weathering features constitute the most distinctive landforms of the region. These granite landscapes provide valuable insights into long-term geomorphological evolution while simultaneously reflecting strong cultural associations, including pastoral traditions, and ancient quarrying activities. The results show that scientific and educational values are high, whereas economic utilization remains limited, underscoring the need for improved conservation strategies, legislative protection, and community-based geotourism initiatives. Overall, the Ida Madra Geopark emerges as a distinctive geoheritage territory where geological processes and cultural identity converge, offering important contributions to geoconservation and sustainable regional development.

**Keywords** Granite landforms · Geoheritage · Tors · Geosite assessment · Ida Madra Geopark

## Introduction

Granite landforms exhibit distinctive morphological characteristics that differentiate them from those developed on other lithologies. Features such as tors, boulders, granite sands, and a variety of other granitic forms are widely distributed across many parts of the world and occur more frequently than comparable landforms on other rocks (Palmer and Neilson 1962; Twidale 1982; Ballantyne 1994; Migoń 1996, 2006; Aguilera Emilia et al. 2014). Granite topography has therefore attracted considerable scientific attention, with numerous studies examining its general properties,

the diversity of associated landforms, and their geomorphological and scientific significance (Palmer and Neilson 1962; Eden and Green 1971; Ballantyne 1994; Migoń 1996; Gunnell et al. 2013; Aguilera Emilia et al. 2014; Migoń and Vieira 2014; Michniewicz 2019).

Although the scientific importance of granite landscapes has long been recognized, their evaluation within a geoheritage framework is relatively recent. This perspective highlights not only their scientific significance but also their educational, cultural, economic, and aesthetic values, thereby enhancing their relevance for promotion, geotourism, and conservation (Druguet et al. 2015; Michniewicz et al. 2015; Migoń and Pijet-Migoń 2017; Gordon 2018; Migoń et al. 2018, 2019; Nazaruiddin 2020; Migoń 2021). Geoheritage, broadly defined as elements of Earth's geological diversity with significance for science and society (Brocx and Semeniuk 2007; Brilha et al. 2018; Migoń 2021), increasingly forms the basis for geoconservation and geotourism initiatives, often within geoparks, though its scope extends beyond them (Gordon 2018).

Granite weathering occurs in multiple stages, influenced by both mineral composition and duration of exposure. These processes—granular disintegration, block-by-block separation, exfoliation, and spheroidal (onion-skin) weathering—typically

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