

Shaping and eroding the Iranian Plateau: the interplay between surface, tectonic and mantle processes.

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Abstract

The Iranian Plateau is the second largest orogenic plateau in the world, following the Tibetan Plateau. It lies within the upper plate of the Arabia-Eurasia collision zone and extends in a northwest-southeast direction. The plateau's southern edge includes the High Zagros Mountains, while the northern margin is defined by the Urumieh-Dokhtar Magmatic Zone and the western Alborz-Talesh Mountains. The interior of the plateau has a low-relief topography marked by sedimentary basins and mountain ranges. The morphology resembles a basin and range system, and many of the interior basins are now externally drained, routing sediments to the Caspian Sea.

The plateau uplift likely began after approximately 17 million years ago as indicated by the presence of Lower Miocene shallow-water marine sediments in the Qom Formation. However, the timing of the uplift and how the plateau laterally (along strike) expanded remains poorly understood, as does the history of incision and the shift from endorheic to exoreic drainage conditions.

To understand the Iranian Plateau's development, we use a multidisciplinary approach, combining sedimentary facies analysis, magnetostratigraphy, geochronology, isotopic analysis, and low-temperature thermochronology. This allows to explore how tectonics, climate, and mantle dynamics have interacted to shape the plateau's surface evolution. This balance between these forces is essential to understanding the plateau's ongoing changes.

Biosketch

Paolo Ballato graduated from the University of Pisa in 2002 under the supervision of Prof. Paolo Scandone and Prof. Etta Patacca, with a field mapping thesis on the Molise Nappe, Southern Apennines. In 2009, he obtained his PhD in Earth Science from the University of Potsdam, supervised by Prof. Manfred Strecker and Prof. Anke Friedrich, with a thesis titled 'Tectonic and Climatic Forcing in Orogenic Processes: The Foreland Basin Point of View, Alborz Mountains, N Iran'. He worked on several postdoctoral projects in Potsdam before moving to the University of Roma Tre with a Rita Levi Montalcini fellowship in 2016. Since 2019, he has been appointed as an Associate Professor. He was also an adjunct professor at Texas A&M University for two years (2018-2020) as part of a student exchange project and a Fulbright Scholar in 2019. In recent years, he has developed a growing interest in techniques that bridge different spatial and temporal scales, focusing on the interaction between tectonics, deep-seated processes, and surface dynamics.