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Geomorphic and sedimentary Plio–Pleistocene evolution of the Nerja area (northern Alboran basin, Spain)

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Abstract

The Nerja area (S Spain), on the northern edge of the Alboran basin, underwent palaeogeographic, sedimentary and geomorphic changes during the Pliocene and Pleistocene, that were controlled by tectonics and by eustatic–climatic variations. The existence of NW–SE fault lines and the particular lithology of the area played a fundamental role in differentiating two sectors of divergent geomorphic evolution: the NE sector, which forms part of the Sierra Almijara, and the SW sector, in the area of Nerja.

The NE sector contains outcrops of Alpujarride marbles and is characterised as a continental domain that has been permanently emerged and subjected to uplifting at intervals, under which the relief becomes progressively steeper.

Today, the SW sector is constituted of Alpujarride schists and Plio–Quaternary sediments. This sector was partially affected by the marine transgression of the early Pliocene, during which time alluvial fans developed; distally, these are connected to littoral and shallow marine environments. During the early Zanclian, a tectonic event separated the Pliocene sediments into two lithostratigraphic units that rest unconformably but without any significant sedimentary interruption. As a consequence of this event, some fluvial courses changed direction. Towards the end of the early Zanclian, falling sea levels led to the emergence of the Nerja region. During the late Pliocene, marine sediments were restricted to the innermost areas of the Alboran Sea, but continental deposits did not develop, probably due to the warm, humid climate that did not favour clastic sediment supply. Another tectonic event in the Pliocene tilted the sediments of the Zanclean II unit in the western sector. During the cold period in the final Pliocene and in the basal Pleistocene, a pediment developed over the Pliocene units and the Alpujarride basement. Three phases of sedimentation of alluvial fans took place during the Pleistocene, becoming progressively more limited towards the SW. The deposition phases are separated by stages of erosion and trenching of the fluvial network, mainly occurring during periods of low sea levels. Another tectonic pulse has been identified, in the mid-Pleistocene, between the first and the second generation of fans, which caused further changes in the direction of some fluvial courses.

Keywords: Geomorphic evolution; Pliocene; Pleistocene; Alboran basin; Nerja; Malaga; Betic Cordillera

1. Introduction

The Betic Cordillera and the Rif constitute the westernmost extent of the Mediterranean Alpine mountain ranges. Its tectogenesis is related to a geodynamic framework of compression (approximately

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