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Quaternary geological mapping in Spain and contribution to the update of the International Quaternary Map of Europe

Ángel Salazar¹, Juan Antonio Rodríguez¹, Verónica Cañas², Ana Sevillano³, Inés Galindo⁴, Nieves Sánchez⁴

¹Instituto Geológico y Minero de España, Tres Cantos (Madrid), Spain. ²Freelance GIS technician, Gamiz-Fika, Spain. ³Instituto Geológico y Minero de España, Palma de Mallorca, Spain. ⁴Instituto Geológico y Minero de España, Las Palmas de Gran Canaria, Spain

Abstract

Accelerated erosion is an essential attribute of geological environments in the Mediterranean area, which distinguishes them from those of northern Europe. In addition, young mountain ranges (Alpine orogeny) are also common features in countries like Spain (average elevation 660 m). Therefore, Quaternary deposits are scarce, soils are thin (Leptosols, Regosols) and the bedrock frequently outcrops. Larger Spanish Quaternary formations are associated with local specific geological conditions, among which the following can be highlighted:

Alluvial deposits of the main rivers (terraces and floodplains) over soft-rocks of the Cenozoic basins (e.g. Duero river).

Estuarine and coastal sediments of the Gulf of Cádiz.

Neogene - Quaternary sedimentary basins linked to the fault-systems of the Betic mountains (figure 1)

Shore sediments, delta-fans and deltas in the Gulf of Valencia.

Aeolian sediments in the central plateau.

Volcanic rocks of Canary Islands.

Other Quaternary materials, such as mountain glacial deposits, continental volcanic rocks or materials related to karstic processes are usually very small in size, but of great scientific interest (e.g. Atapuerca).

Geological mapping in Spain start in 1849, with the creation of the "Commission for the Geological Map of Madrid and General of the Kingdom", later "Geological and Mining Institute of Spain (IGME)". The first maps were made with the same standards used at that time in Europe (mid nineteenth century), portraying the bedrock and the key Quaternary deposits in a single map. Due to the characteristics of the territory, the preparation of detailed thematic maps of Quaternary materials in a systematic way for the whole country, as is usual in Northern and Eastern Europe, would be as useless as expensive. Other thematic maps, such as geomorphological maps showing slope-slides and other erosion processes (in addition to key Quaternary deposits), are more helpful in Spain and are made regularly.

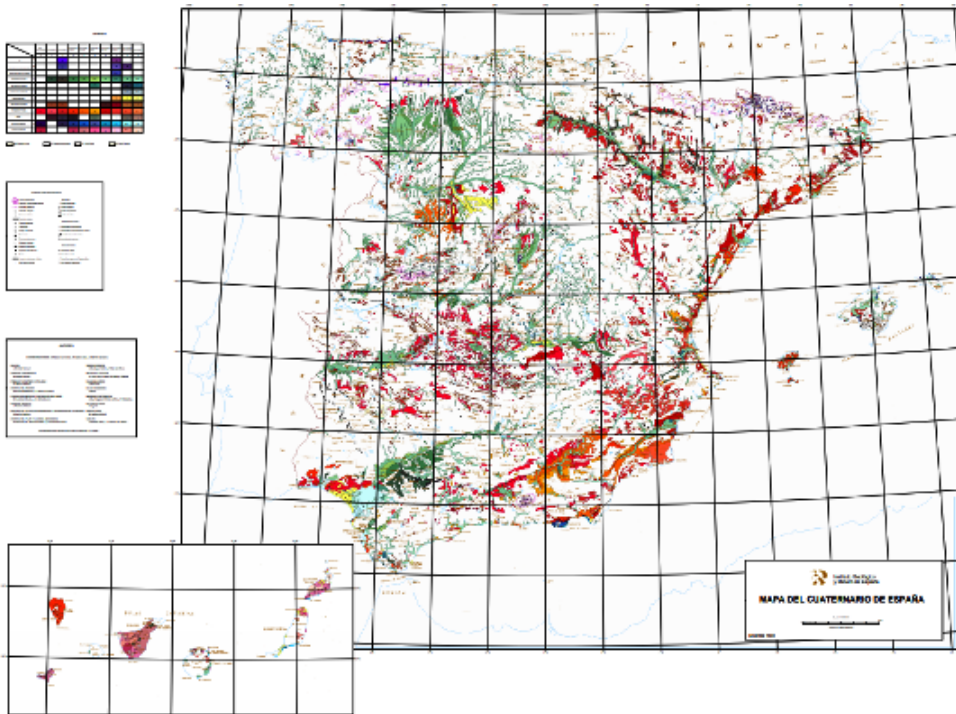
Geological maps of the Quaternary are only made in Spain to meet special needs, such as cooperation on European maps. The IGME published in 1989 a "Map of the Quaternary of Spain" at scale 1:1,000,000, with a vector version in 2010, but with no update (Figure 2). This map is outdated because at that time (1989), only half of the basic geological maps (scale 1:50,000, MAGNA project) of the country had been finished.

A new digital version of the Quaternary Map of Spain is being finalized (scale 1: 1,000,000, resolution 500 m), with reference systems ETRS89 (Iberian Peninsula and Balearic Islands) and REGCAN95 (Canary Islands). The data model for the new map is in accordance with the specifications and vocabularies of the INSPIRE directive and meets the requirements established for the IQAME-2500 project.





Figure 1. Pleistocene alluvial sediments of the tectonic basin of Guadix-Baza (Granada).



Spain scale 1:1,000,000 (1989 version)

Figure 2. Quaternary Map of