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Abstract

The studied field area is located in northern Spain in the Álava province south of the town of Vitoria-Gasteiz. In this region the Tertiary Ebro Basin is accompanied by a small mountain chain named the Sierra de Cantabria. In this mountain chain the southern part of the Peñacerrada salt diapir was mapped at 1 : 10 000 within a 6.1 km² sized area.

The oldest exposed of the salt diapir are evaporites and pelites of Upper Triassic age. From the beginning of the Norian several transgressive and regressive periods occurred with dolomite deposition within a characteristic sabkha environment.

In Upper Sinemurian the stenohaline littoral sea was deepened to a bathyal depositional centre due to extensional tectonics until the Toarcian / Aalenian boundary. The Mesozoic Basco-Cantabrian trough was closed as a result of the opening of the northern Atlantic and therefore marine sedimentation stopped at the latest in Upper Jurassic times.

During the Lower Cretaceous, sedimentation was dominated by input from a deltaic shelf. After a first delta phase (REITNER & WIEDMANN, 1982) a small scale marine ingression occurred. During the first diapiric uprise of the Upper Triassic evaporites, a small patch reef complex was formed until lower Aptian times. With the break trough of the diapir, coral growth stopped. The second delta phase (REITNER & WIEDMANN, 1982) started from Albian times with sand and conglomerate deposits.

This phase, with fluviatile sedimentation was stopped by the Upper Cretaceous transgression. The marine calcareous sedimentation in Cenomanian times lead to the formation of an extended carbonate platform. The extensional tectonic regime, halokinetic movements of the Upper Triassic salt, and the permanent near coastal position controlled the thickness and facies distribution of the sediments within the investigated field area. The water depths of the whole area of sedimentation continuously decreased since Santonian and therefore the terrigenous input of clastic material increased. Marine sedimentation completely stopped with the beginning of the Campanian.

During Quaternary times the uplifted Mesozoic limestones were karstified and the tufaceous limestones, alluvial as well as the talus deposits were sedimented.

Important structural elements of the Sierra de Cantabria are formed by halokinetic movements of the Peñacerrada salt diapir and the Pyrenees Orogeny. At the Eocene / Oligocene boundary the onset of the Pyrenees Orogeny took place. During this orogeny the former Mesozoic Ebro massif was inverted to a foreland basin (= Ebro Basin). The evaporites lead on one hand to the formation of this diapir and on the other hand they formed a favourable thrust horizon for far scale nappe transport. During the Miocene, the Mesozoic calcareous sediments of the former Basco-Cantabrian Basin were folded and thrusted in a southward direction on top of the Eocene / Oligocene sediments of the Ebro Basin. The Mesozoic units were folded and formed the Sierra de Cantabria. At the front of the Sierra de Cantabria thick fanglomerates were deposited. Pronounced halokinetic movements started at the same time.

A special feature of the Pyrenees Orogeny is the formation of a tectonic diamict with striated and polished limestone fragments comparable to those formed in the impact crater from Nördlinger Ries (southern Germany). Both occurrences of these striated pebbles are formed by plastic deformation within a clay-mineral matrix under high confining pressure. This leads to the important conclusion, that striated pebbles of this specific type are not necessarily restricted to impact craters.

Key Words:
Sierra de Cantabria; Alava; northern Spain; Carñiolas; Basco-Cantabrian Basin; Lower Cretaceous; Aptian; Urgonian; Wealden; patch reef; corals; rudists; amber; tectonic diamict; impact criteria; polished and striated pebbles; plastic deformation; Bunte Breccia; ejecta blanket; Nördlinger Ries