Modelling of the Cameros basin and relationships with the mountain front (La Rioja)

Author:
Miguel Ibáñez Belloso

Tutor:
Antonio Teixell Cácharo

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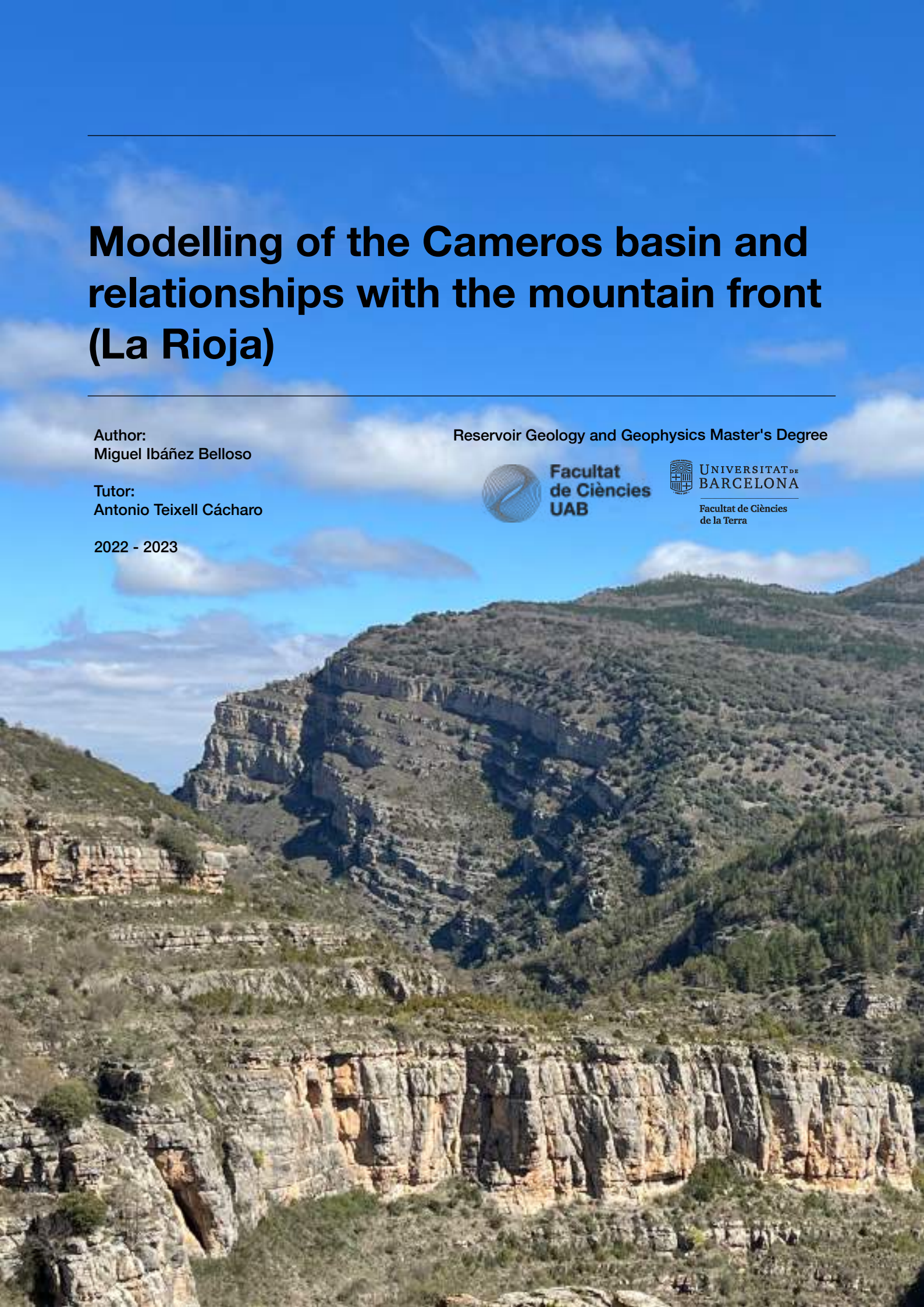
Facultat de Ciències UAB

Universitat de Barcelona
Facultat de Ciències de la Terra



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Abstract

The use of salt tectonics to explain the evolution of inverted sedimentary basins traditionally interpreted as fold-and-thrust belts is an increasingly common practice, although without precedents in the Cameros basin. The objective of this work is to propose and document a model of extension and inversion of a rifted margin that is applicable to the Northern Cameros margin, including salt tectonics concepts to overcome the limitations of previous models. To achieve the objective, a field and office work was designed based on the updating of the geological cartography of the area, the construction of two cross-sections that represent different structures along the basin and the restitution by stages prior to the basin inversion. Evidence for the application of salt tectonics has been identified: thinning-wedge halokinetic sequences in the Leza and Cidacos valleys, a megaflap in Antoñanzas and the truncation of stratigraphic units by a large Keuper exposure that I define as the northern Cameros salt-wall. The deposition of the lower Cretaceous Weald facies units is controlled by subsidence and salt migration towards the northern Cameros front and the formation of a syn-extensive drape-fold. The reservoir potential of the Cameros basin is small, but it could be strategic in modelling possible natural gas or hydrogen storage.

1. Introduction and objective

The application of salt tectonics to explain systems that were traditionally interpreted as inverted fold-and-trust belts is a common recent practice in basins floored by evaporites, as in the case of the Pyrenees. Most of the halokinetic footprint can be erased during the inversion of such extensional basins, which makes the interpretation difficult. However, evidence of diapir growth, such as halokinetic sequences, can be preserved in the sedimentary record. In the Pyrenees, several studies have performed structural reinterpretations applying salt tectonics, such as McClay *et al.* (2004), Saura *et al.* (2016) or Burrell-García (2020). In the case of the Cameros basin, located in the northeastern Iberian range, there are no studies centred in the structural reinterpretation applying salt tectonics concepts, in spite that the basin is underlain by a Triassic Keuper evaporite unit.

Traditionally, the main fields of study in the Cameros were in the Cretaceous dinosaur footprints and trackways of the Weald facies deposits (Pérez-Lorente, 2015) and the sedimentology of the Cretaceous syn-extensive basin infill (Mas *et al*., 2004). In the field of structural geology, the Cameros has been defined using a traditional fold-and-thrust belt model (Casas-Sáinz, 1990), where Keuper evaporites act as the detachment level during the inversion of the Cretaceous basin (Casas-Sáinz *et al*., 2009; Álvaro *et al*., 1979), but there is still a lack of consensus regarding the evolution of the basin.

A number of evidence of diapirism can be observed along the Northern Cameros thrust (NCT), related to the Keuper evaporites. The main diapiric evidence is a major 12 km wide allochthonous evaporite accumulation that forms a salt-wall in the NCT between the Leza and Jubera valleys. The Laturce mountain shows signs of halokinetic growth strata. The complex structures near the