



The Central High Atlas Jurassic diapiric province (Morocco): a field analogue for salt rift basins preceding continental break-up

Mar Moragas⁴, **Eduard Saura**^{1,2,4}, Juan Diego Martín-Martín³, Jaume Vergés⁴, Philippe Razin⁶, Carine Grélaud⁶, Gregoire Messenger⁵, and David Hunt⁷

¹Universitat Autònoma de Barcelona, Geologia, (eduard.saura@uab.cat)

²Lithica SCCL, Girona, Spain

³Departament de Mineralogia, Petrologia i Geologia Aplicada, Universitat de Barcelona, C/ Martí i Franquès s/n, 08028 Barcelona, Spain.

⁴Group of Dynamics of the Lithosphere, Geosciences Barcelona, Geo3Bcn-CSIC, Spain.

⁵Equinor, G&G Research, Martin Lingesvei 33, Fornebu, NO-1330 Fornebu, Norway

⁶ENSEGID - IPB, Bordeaux University, Pessac, France.

⁷Equinor, TDI, Sandsli, Norway N-5024.

Continental passive margins are often defined by early salt-related rift systems buried beneath thick sedimentary successions, with structural and sedimentary architectures only directly observable when inverted in orogenic systems where primary salt structures are overprinted by compression. The Central High Atlas diapiric province (Morocco) is an inverted salt-related rift basin with active salt tectonics since early Mesozoic times that provides an exceptional view of early syn-rift sediments and structure. For the first time, regional balanced and restored cross-sections of the Central High Atlas showing the diapiric nature of the basin and the role of salt tectonics during its evolution are presented. The constructed cross-sections across the Central High Atlas include seven salt walls and six intervening elongated minibasins with associated halokinetic depositional sequences, providing evidence of diachronous diapiric growth from Early Jurassic to Cenozoic times. Several of these diapirs bifurcate or amalgamate along strike, so the number of major structures varies laterally. The comparison of the restored and balanced cross-sections allows estimating a shortening of about 38 km, 21 km accumulated in the Atlassic fold and thrust belt frontal domains, and 17 within the Jurassic rift basin.

During the Early Jurassic rifting, shallow water carbonate platforms nucleated both along the margins of the High Atlas Basin and around most salt walls (i.e., highs) within the basin, while intervening minibasins underwent higher subsidence rates and were filled with deeper-water limestones and marls. Subsequently, a longitudinal mixed clastic carbonate deltaic system prograded eastwards filling the minibasins between the long rising salt walls. During this stage, shallow marine shoals and reef patches developed attached to the diapiric walls, evidencing continuous diapir rise.

Throughout the whole rift basin, where local diapir uplift rate is similar to regional subsidence rate, shallow deposition environments or even local subaerial conditions occurred. Thus, platform

development was enhanced and karstic processes could develop around salt structures in central parts of the basin. The lessons learnt in the Central High Atlas serve as a valuable analog and provide insights for understanding the early stages of rifting, salt tectonics, and the subsequent evolution of passive margins on a worldwide scale.