Submarine allochthonous salt sheets: Gravity-driven deformation of North African Cretaceous passive margin in Tunisia – Bled Dogra case study and nearby salt structures

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Abstract

We used structural, stratigraphic and sedimentologic data, together with a comparison of nearby structures and a Bouguer gravity map, to evaluate the evolution of the Bled Dogra salt structure (northern Tunisia) during the Cretaceous. Triassic salt sheets are recognized in the northwestern region of the Tunisian Atlas. These salt sheets are the result of Cretaceous thick and/or thin-skinned extension along the south Tethyan margin. The Bled Dogra salt structure is one of these submarine allochthonous salt sheets, which was emplaced during the Early Cretaceous. The geologic framework, during this period, produces conditions for a predominantly gravity-driven deformation: extension has produced space for the salt to rise; vigorous differential sedimentation created differential loading that resulted in the emplacement and extrusion of a large volume of Triassic salt and formation of large submarine salt sheets. Geologic field data suggest an interlayered Triassic salt sheet within Albian sequences. Salt was extruded at the sea floor during the Early–Middle Albian and was initially buried by Middle–Late Albian strata. The Coniacian corresponds to a second transgressive cover onto the salt sheet after the gliding of the first salt cover (Late Albian–Turonian). In addition, this northwest Tunisian area exposes evidences for salt flow and abundant slump features at the base of a northward facing submarine slope, which was probably dominant from the Early Cretaceous to Santonian. Two gravity deformation processes are recognized: gravity gliding and gravity spreading. Acting concurrently, these two processes appear indistinguishable in this geologic context. Like the present-day salt-involved passive margins – such as the northern Gulf of Mexico, the Atlantic margin of Morocco, the Brazilian Santos basin, the Angola margin, Cadiz in western Iberia, and the Red Sea – the North African Cretaceous passive margin in Tunisia provides evidences that deformation in a passive-margin salt basin is predominantly gravity-driven deformation.