Relevance of salt on sedimentation and later deformation of the Northern Calcareous Alps fold-belt (NCA), Austria

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The NCA are a E-W striking 700km long salt-detached fold and thrust belt constituted by thick Neo-Tethyan Triassic platforms and mid to Upper Cretaceous syn-orogenic deposits.

Thick Triassic carbonate platforms constitute the structural framework of the NCA. The major formations are the Wetterstein Formation and the Hauptdolomit Formation which were originally deposited onto a widespread layered evaporitic sequence of uppermost Permian to lowermost Triassic age (Haselgebirge and Reichenhall Formation). Remnants of those evaporites (i.e. clay, Rauhwacke, Anhydrite, Gypsum, sandstones, etc.) are found today associated to major tectonic contacts along the complete length of the NCA. More complete sections of the Haselgebirge, sometimes carrying Halite, are found in the southernmost tectonic units (Juvavic nappe stack).

Structural and stratigraphic data collected in recent field campaigns in the NCA revealed the existence of salt withdrawal mini-basins bound by deformed salt welds which are remnants of former salt walls and diapirs that became squeezed upon shortening. Inflated salt bodies between those mini-basins have been the controlling factor during sedimentation causing rapid thickness changes due to salt migration and also for the deformation of the NCA during later shortening phases. The structures documented by our fieldwork are comparable in terms of geometry, dimensions and aspect ratios to published structures from the offshore South Atlantic margin and the Pyrenean rift.

Stratigraphic work from the past as well as from recent mapping campaigns and the construction of cross sections have demonstrated the strong heterogeneity of the Neo-Tethys passive margin architecture, in terms of sedimentary facies and thickness distribution. These extensive differences are a result of the highly dynamic sedimentary evolution due to the presence and the mobility of salt.

Permian to Lower Triassic evaporites are present over a large part of the NCA. We therefore propose that salt tectonics has been a primary architectural element in the NCA, from its beginning as a continental rifted margin until the subsequent deformation phases on the alpine fold-and-thrust belt.

The concept of salt tectonics will give a new perspective to the NCA which will produce models to explain many long-debated questions like rapid facies changes or massive differences in sedimentary thickness.