Andean basin dynamics in northern Chile

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The Andean forearc of northern Chile comprises Triassic-Recent arc-related magmatic rocks and sedimentary basins. Origin, position and internal facies architecture of the sedimentary basins can be related to arc dynamics and stress regime.

The Andean margin has been in net extension/subsidence over much of the Mesozoic-Recent, related to poor coupling between the Nazca and South American plates. Regional contractional events, linked to plate rearrangements and changes in convergence angle/rate, include mid Cretaceous back-arc basin collapse (major source rock) and retro-arc thrust belt formation. This crustal reorganisation was succeeded by episodic eastward volcanic arc migration and associated foreland thrust front propagation through Tertiary times.

An intermontane basin developed to the east of the thrust belt during the Late Cretaceous. Subsequent eastward thrust front migration inverted part of this basin, sourcing an Oligocene basin to the east. This pattern of eastward-stepping depocentres being uplifted as piggy back basins, sourcing the next younger basin to the east, is still active in the Recent **Salar de Atacama** hydrocarbon play, where an intrabasinal foldbelt (Cordillera de la Sal) is uplifting on a thin-skinned rotating thrust sheet. Although lying to the foreland side of thrust belts, these basins were formed on actively thickening crust (now some 70 km); this questions the importance of thrust loading for basin formation in this crustal segment.

Basin-fills are characterised by alluvial fan, aeolian and lacustrine facies associations. Sediment dispersal patterns (and thus reservoir position/geometry) are complex but predictable, reflecting the interplay of thrust system dynamics and palaeoclimate.