

A palynological Triassic–Jurassic boundary section in the salt-bearing Argo F-38 well, Orpheus Graben, offshore Nova Scotia, Canada

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The Late Triassic–Early Jurassic fill of the Scotian Basin represents the initial rift and drift tectonics of the Atlantic Ocean. Deposition included the evaporites that control salt tectonics across the margin, but their paleoenvironment and age are relatively poorly constrained due to few well penetrations and no biostratigraphy other than terrestrial palynology. This study examines Middle Jurassic and older palynology and geochemistry in the Argo F-38 well, which penetrates relatively undeformed salt-bearing strata into basement in the Orpheus Graben.

Passing down-well, a normal marine, dinoflagellatebearing Middle Jurassic (Bajocian–Bathonian) interval is abruptly replaced at 2232 m (KB MD) by Early Jurassic, terrestrial-palynomorph-dominated strata, the contact perhaps representing an unconformity. The assemblage is dominated (mostly >90%) by *Classopollis* species, but also present is *Echinitosporites* sp. A, *Callialasporites dampieri*, *Kraeuselisporites reissingeri*, *Ischyosporites variegatus*, *Cerebropollenites* sp., and other miospores. Rare acritarchs are present in the main salt-bearing interval (2305–3112 m/807 m). Not associated with other reworked palynomorphs, they may indicate that more hospitable conditions were intermittently present between episodes of salt deposition.

Above 2950 m, bromine concentration in salt ranges from 60 to almost 200 ppm, typical of Scotian and Grand Banks Argo Formation. Deeper than 2950 m, Br concentration incrementally drops below 60 ppm to as low as 5 ppm, typical of the transition to older Osprey Formation on the Grand Banks. Despite this hint of changing conditions, palynomorphs are largely the same. By 3136 m, slightly below the main salt interval, the presence of *Anapiculatisporites spiniger* and decline in *Classopollis torosus* abundance versus increasing *C. meyeriana* implies proximity to the Triassic–Jurassic boundary. Although uncertain due to possible caving, it is notable that slightly higher within the 3081–3112 m interval, certain Early Jurassic species make their last consistent down-hole occurrence, a base used as a marker just above the Triassic–Jurassic boundary in other parts of the world.

The bottommost sample at 3325 m still has *Classopollis*-dominated assemblages with a single occurrence of *Patinasporites densus*, a Rhaetian (Late Triassic) marker, consistent with entry into the Triassic before Paleozoic basement. Comparison to other wells in the region and across the Atlantic suggests that a consistent pattern of salt deposition may exist in the Central Atlantic region.