That's how those got there! Microbasins and other unusual soft-sediment deformation structures in the Horton Group, Windsor-Kennetcook subbasin, Nova Scotia, Canada

MORGAN E. SNYDER AND JOHN W.F. WALDRON

Department of Earth & Atmospheric Sciences, University of Alberta, ESB 1-26, Edmonton, Alberta T6G 2E3, Canada

<mesnyder@ualberta.ca>

The Mississippian Horton Group, exposed in the Windsor-Kennetcook subbasin of the Maritimes Basin, shows spectacular soft-sediment deformation structures. Because of their accessibility, these structures are much visited by student and other field trips. Soft-sediment deformation structures provide information on the early deformation history of these sedimentary rocks, as they formed when primary stratification was in a weakened state due to liquidization of sediment. The exposed soft-sediment deformation structures include well-known features like load structures and intraformational breccia, and less common features like clastic dykes, sedimentary boudins, and bulb structures (which resemble load casts but protrude upwards from the top surfaces of sandstone and siltstone beds). A unique set of soft-sediment deformation structures, here termed microbasins, are well known to the geological community but previously not well understood. These are elliptical bodies of sand and silt that show a strong preferred orientation parallel to the clastic dykes. Internal lamination shows localized discordances around the margins of the structures, and therefore records differential subsidence and erosion during their development. Some of the structures show convex-up laminae, formed where the underlying mudstone layer is pinched out. Microbasins are geometrically and kinematically similar to minibasins associated with salt tectonics, but are approximately three orders of magnitude smaller. They are interpreted to result from soft-sediment deformation that took place during sedimentation.

Soft-sediment deformation structures in the Horton Group can be divided into two categories: those that clearly initiated close to the sediment-water interface, like microbasins and sedimentary dykes, and those that probably formed within the sediment pile, like soft-sediment boudins and bulb structures. The triggering mechanism for all the soft-sediment deformation structures was likely a combination of seismicity and overpressured conditions. A strong preferred orientation of these soft-sediment deformation structures oriented NWSE is attributed to dextral strike-slip on the E-W Minas Fault Zone to the north and associated faults. Seismicity associated with movement along these faults could have induced liquidization of sediment.

Atlantic Geology, 2016, Volume 52
Atlantic Geoscience Society Abstracts 42nd Annual Colloquium & General Meeting 2016
doi: 10.4138/atlgeol.2016.004