This manuscript documents the unusual occurrence of Andean-style volcanic assemblages at a time in Earth’s history when these types of rocks are very rare because of fundamental differences in early Earth tectonic processes to modern plate tectonic theory. These rocks near Thunder Bay, Ontario, are well preserved and provide an excellent opportunity to study their chemistry without hindrance from post-deposition modification by structural events or metamorphism. These 2.72 billion year old rocks record some of the earliest evidence of modern plate tectonic processes and have important implications for the geologic development of North America.