Efficient time-integration in HOMME-NH important for maximizing the performance of the E3SM atmosphere model. Nonhydrostatic models typically employ a horizontally explicit, vertically implicit (HEVI) partitioning where vertical acoustic waves are implicitly treated. This permits stable integration of acoustic waves by implicit-explicit type methods without a severe time-step restriction or communication intensive solves. Recently, we have developed a family of custom ETD Runge-Kutta methods for time-integration in HOMME-NH. These methods utilize matrix exponentials rather than implicit solves for stable and efficient integration in HOMME-NH. This poster explores the development of these methods and documents their accuracy and efficiency