The existence of topological strings is a fundamental prediction of many physically motivated field theories. Numerical simulations provide a powerful technique with which to study their evolution, illuminating regimes which are inaccessible using traditional analytical methods. However, the vast difference in scale between a typical string width and the scale of the Universe poses a significant computational challenge, so approximations must be made for simulations to be feasible. Two methods are predominantly used; to assume the string has zero width using the Nambu-Goto method, or a fixed comoving width using adapted classical field equations. Though useful, both approximations introduce systematic effects that are likely to reduce the accuracy of predictions of radiative signatures. I will demonstrate our application of the Adaptive Mesh Refinement (AMR) code, GRChombo, to the evolution of so-called `global' strings formed by a U(1) symmetry breaking of a complex scalar field. AMR adapts the resolution of the numerical solution grid to the scale of the problem, eliminating the need to approximate the width by using finer resolution at the string cores. We use accurate diagnostics to measure emitted massive and massless Goldstone radiative modes, comparing the massless quadrupole mode to linearised radiation calculations. The direct analogy between gravitational radiation and massless Goldstone boson (or axion) radiation and means that AMR will also enable accurate prediction of gravitational wave signatures.