We consider General Relativity (GR) on a space-time with boundaries. We argue that this theory has a non-trivial space of `vacua', consisting of spatial metrics obtained by an action on a reference flat metric by diffeomorpisms that are non-trivial at the boundary. In an adiabatic limit, the Einstein equations reduce to geodesic motion on this space of vacua with respect to a particular pseudo-Riemannian metric that we identify. We show how the momentum constraint implies that this metric is fully determined by data on the boundary only, while the Hamiltonian constraint forces the geodesics to be null. We comment on how the conserved momenta of the geodesic motion correspond to an infinite set of conserved boundary charges of GR in this setup.