While variability has long been recognized as a distinguishing feature of quasars, the extremes of this behavior have only recently been systematically probed by new generations of wide-area, multi-epoch surveys. This work has identified a new class of ``changing-look quasars'' in which the strong UV continuum and broad hydrogen emission lines associated with unobscured quasars either appear or disappear on timescales of years. The physical processes responsible for such changes are still debated, but physical changes in the quasar such as the black hole accretion rate or accretion disk structure appear more likely than changes in obscuration. Here we report on three epochs of spectroscopy of SDSS~J110057.70-005304.5, an extreme mid-infrared variable quasar at $z = 0.378$ whose UV continuum and broad hydrogen emission lines have dramatically faded over the past 20 years. An archival spectrum of this quasar from 2010 shows an intermediate phase of the transition during which the flux below rest-frame $\sim 3400$~\AA\ has collapsed. This is unique compared to previously published examples of changing-look quasars, and is suggestive of dramatic changes in the innermost regions of the accretion disk. The optical continuum has been rising again since mid-2016, leading to a prediction of a rise in hydrogen emission line flux in the next few months. If our prediction is confirmed, the physics of changing look quasars are being driven by effects within 10 light-hours of the central supermassive black hole.